

UNIV. OF
TORONTO
LIBRARY



Digitized by the Internet Archive
in 2007 with funding from
Microsoft Corporation

THE NEW PHILOSOPHY



A QUARTERLY MAGAZINE
DEVOTED TO THE INTERESTS OF
THE SWEDENBORG SCIENTIFIC ASSOCIATION.

VOLS. VII—IX.

1904 to 1906.

126319
12/2/13.

THE SWEDENBORG SCIENTIFIC ASSOCIATION,

BRYN ATHYN, PA.



B
4468
S84N4
v. 7-9

INDEX

TO

The New Philosophy

VOLUMES VII-IX

INDEX.

- Active and Passive. (J. Whitehead), VII, 41.
- Animal Kingdom, Part 4. See Swedenborg.
- Beekman, Lillian.
 Glacial TheoryVIII, 263
 RadiumVII, 113
- Book Notices and Reviews.**
- Edison, E. R.
 Swedenborg's Vortex-rings, VIII, 214.
- Haeckel, Ernest.
 Riddle of the Universe, VII, 38.
- King, J. B. S.
 Chemistry of Food. ..IX, 128
- Kip, A. L.
 Animal and Plant Correspondences, VII, 37.
- Retzius, Gustaf.
 Emanuel Swedenborg as an Anatomist and Physiologist, VII, 40.
- Spencer, Herbert.
 AutobiographyVIII, 183
- Stroh, Alfred Henry.
 Relation of Modern Science to Swedenborg's Principles of Nature, Especially His Doctrine of Fire, VII, 40.
- Swedenborg, Emanuel.
 Swedish Furnaces and Their Draughts, VII, 64.
- Blood.**
- Brown, R. W.
 Swedenborg's Theory of the Blood, VII, 124.
- Brown, Reginald William.
 Principia TheoryVII, 123
- Swedenborg's Theory of the Blood, VII, 124.
- — — Editor.
 Swedenborg, Emanuel.
 Philosophia Corpuscularis in Compendio, VIII, 194.
- — — Translator.
 Swedenborg, Emanuel.
 Corpuscular Philosophy in Brief.
- Chemistry of Swedenborg. (E. A. Farrington), VIII, 170.
- Comparisons of the Systems of Christian Wolff and Swedenborg, (Swedenborg, Emanuel), IX, 1. 195.
- Corpuscular Philosophy in Brief, VIII, 195.
 (Swedenborg, Emanuel.)
- Degrees. (Frank Sewall), IX, 60.
- Development of Swedenborg's Science and Philosophy, (A. H. Stroh), IX, 26.
- Ductless Glands. (E. A. Farrington), VII, 54.
- Farrington, Ernest Albert.
 Chemistry of Swedenborg, VIII, 170.
 Ductless Glands, VII, 54.
- Farrington, Harvey.
 Emanuel SwedenborgVII, 31
 Prof. Reynolds's Theory of the Structure of the Universe, IX, 45.
 Progress of ScienceVII, 59
- Glacial Theory. (Lillian Beekman), VIII, 263.

- Goethe, Johann Wolfgang von.
Swedenborg's Influence Upon.
(Frank Sewall), IX, 12.
- In General Concerning the Motion
of the Elements. (Swedenborg,
Emanuel.) VIII, 269.
- International Congress of Arts and
Sciences, VIII, 176.
- King, J. B. S.
Scientific Terminology of Swe-
denborg's Time, IX, 5.
- Limbus. (Harvey Farrington.)
VII, 33.
- Limbus. (A. H. Stroh.) VIII, 26
- New Ways of Discovering Mines,
(Swedenborg, Emanuel), IX,
103.
- Observations on the Human Soul.
(Swedenborg, Emanuel.) VIII,
203.
- On the Nature of Fire and Colors.
(Swedenborg, Emanuel.) VIII,
203.
- On Various Kinds of Soil. (Swe-
denborg, Emanuel.) IX, 37.
- Parrish, Stephen D.
On Swedenborg VIII, 291
- Philosophia Corpuscularis in Com-
pendio. (Emanuel Sweden-
borg.) VIII, 194.
- Price, Rev. E. S., tr. See Swe-
denborg, Emanuel. On the
Senses.
- Principia Theory. (R. W. Brown.)
VII, 123.
- Principles of Chemistry. See Swe-
denborg, Emanuel.
- Progress of Science. (Harvey
Farrington.) VII, 59.
- Psychological References in Swe-
denborg's Manuscript, "Codex
88." (Stroh, A. H.) IX, 49.
- Radium. (Lillian Beekman.)
VIII, 154.
- Remarks on Mussels, Snails, etc.
(Emanuel Swedenborg.) VIII,
198.
- Retzius, Gustaf.
Emanuel Swedenborg as an An-
atomist and Physiologist, VII,
7.
Letter of Greeting to.... VII, 19
- Review of the Course of Sweden-
borg's Science in Sweden. (A.
H. Stroh.) VII, 20.
- Reynolds, Osborne.
Theory of the Structure of the
Universe. (Harvey Farring-
ton.) IX, 45.
- Schlieper, Hans.
Address on Swedenborg's Natur-
al Philosophy, IX, 39.
- Science.**
Brown, R. W.
Principia Theory VII, 123
- King, J. B. S.
Scientific Terminology of Swe-
denborg's Time, IX, 5.
- Retzius, Gustaf.
Emanuel Swedenborg as an An-
atomist and Physiologist,
VII, 7.
- Swedenborg's Contribution to
Science, VII, 76.
- Stroh, A. H.
Development of Swedenborg's
Science and Philosophy, IX,
26.
- Review of the Course of Swe-
denborg's Science in Swe-
den, VII, 20.
- Scientific Society of Upsala and
Swedenborg. (A. H. Stroh.)
VIII, 298.

- Senses, on the. See Swedenborg, Emanuel.
- Sewall, Frank.
 Modern Pragmatism and Swedenborg's Doctrine of Degrees, IX, 60.
 Notes on the International Congress of Arts and Sciences Held at St. Louis, VIII, 176.
 Swedenborg's Contribution to Science, VII, 76.
 Swedenborg's Influence Upon Goethe, IX, 12.
 — — — Translator.
- Schlieper, Hans.
 Address on Swedenborg's Natural Philosophy, IX, 39.
- Sex. (Harvey Farrington.) VII, 63.
- Stroh, Alfred Henry.
 Development of Swedenborg's Science and Philosophy, IX, 26.
 Historical Notice of Swedenborg's Work on Chemistry, VII, 46.
 New Reference to the "Limbus," VIII, 267.
 Psychological Reference in Swedenborg's Manuscript, "Codex 88," IX, 49.
 Review of the Course of Swedenborg's Science in Sweden, VII, 20.
 Swedenborg and the Scientific Society of Upsala, VIII, 298.
 Swedenborg on the Variation of Animals, VIII, 193.
 Three Plaster Casts of Swedenborg's Skull, IX, 36.
 — — — Translator.
 Swedenborg, Emanuel.
 Comparison of the Systems of Christian Wolff and Swedenborg, IX, 1.
 In General Concerning the Motions of the Elements, VIII, 269.
 New Ways of Discovering Mines, IX, 103.
 Observations on the Human Soul, VIII, 200.
 On the Nature of Fire and Colors, VIII, 208.
 On Various Kinds of Soil and Mud, IX, 37.
 Remarks on Mussels, Snails, etc., VIII, 198.
- Swedenborg, Emanuel.
 Comparisons of the Systems of Christian Wolff and Swedenborg, IX, 1.
 Corpuscular Philosophy in Brief, VIII, 195.
 In General Concerning the Motions of the Elements, VIII, 269.
 New Ways of Discovering Mines, etc., XI, 103.
 Observation on the Human Soul, VIII, 200.
 On the Nature of Fire and Colors, VIII, 208.
 On the senses. Chap. V.
 The Ear and the Sense of Hearing.
 Nos. 112-125VII, 1
 Nos. 126-135VII, 109
 Nos. 136-149VIII, 149
 Nos. 150-172VIII, 185
 Nos. 173-183IX, 97
 On Various Kinds of Soil and Mud, IX, 37.
 Philosophia Corpuscularis in Compendio, VIII, 194.

- Remarks on Mussels, Snails, etc.,
VIII, 198.
- Swedenborg, Emanuel.
Principia.
Principia Theory, Brown, R.
W., VII, 123.
- Principles of Chemistry*.
Historical Notice, Stroh, A.
H., VII, 44; VIII, 300.
- Swedenborg, Emanuel.**
Brown, R. W.
Swedenborg's Theory of the
Blood, VII, 124.
- Farrington, E. A.
Chemistry of Swedenborg,
VIII, 170.
- Farrington, Harvey.
Emanuel Swedenborg, VII, 31.
- Parrish, S. D.
Emanuel Swedenborg, VIII,
291.
- Schlieper, Hans.
Address on Swedenborg's
Natural Philosophy, IX, 39.
- Sewall, Frank.
Swedenborg's Influence on
Goethe, IX, 12.
- Stroh, A. H.
Development of Swedenborg's
Science and Philosophy, IX,
26.
- Psychological References in
Swedenborg's Manuscript,
"Codex 88," IX, 49.
- Swedenborg and the Scientific
Society of Upsala, VIII, 298.
- Swedenborg on the Variation
of Animals, VIII, 193.
- Three Plaster Casts of Swe-
denborg's Skull, IX, 36.
- Whitehead, John.
Swedenborg's Practical Life
and Search for the Soul, IX,
113.
- Swedenborg Philosophy Club of
Chicago.
ReportVII, 142
- Swedenborg Scientific Association.**
Letter of Greeting to Dr. Retzius,
VII, 19.
- List of MembersIX, 82
- Officers and Committees.
1904-5VII, 107
1905-6VIII, 259
1906-7IX, 95
- Reports of Officers and Com-
mittees.
Board of Directors, VII, 96;
VIII, 251; IX, 90.
- Editor of "The New Phil-
osophy," VII, 98; VIII, 253;
IX, 90.
- Executive Committee, VIII,
251.
- Secretary, VII, 90; VIII, 246;
IX, 82.
- Treasurer, VII, 94; VIII, 249;
IX, 88.
- Committee on Incorporation,
VII, 104; IX, 93.
- Committee on the New Edi-
tion of the Animal Kingdom,
VII, 100; VIII, 254; IX, 91.
- Committee on a New Edition
of the Principia, VII, 100;
VIII, 253; IX, 91.
- Committee on "Lesser Prin-
cipia," VII, 101; VIII, 254;
IX, 92.
- Committee on the Translation
of "The Senses," VII, 101;
VIII, 254; IX, 91.
- Committee on Translation of
Swedenborg's Early Swedish

- Scientific Treatises, VIII, 255; IX, 92.
- Committee on the Publication of Swedenborg's Scientific Manuscripts, VIII, 255.
- Report on the Printing of Swedenborg's Scientific Works in Sweden and America, VIII, 256; IX, 93.
- Reproduction of Swedenborg's Manuscripts by the Swedenborg Scientific Association and the Royal Academy of Sciences, VII, 102.
- Transactions.
 7th Meeting, 1904...VII, 69
 8th Meeting, 1905...VIII, 225
 9th Meeting, 1906 ...IX, 53
- Swedenborg Recognized as the First Scientist to Explain the Phenomena of Light, IX, 48.
- Upsala, Scientific Society. See Scientific Society of Upsala.
- Urbana University Scientific Club ReportVII, 106
- Whitehead, John.
 The Active and the Passive, VII, 41.
 Swedenborg's Practical Life and Search for the Soul, IX, 113.
- Wolff, Christian von.
 Swedenborg, Emanuel.
 Comparison of the Systems of Christian Wolff and Swedenborg, IX, 1.

THE NEW PHILOSOPHY.

VOL. VII.

JANUARY, 1904.

No. I.

THE SENSES.

PART FOUR OF THE ANIMAL KINGDOM, BY EMANUEL
SWEDENBORG.

CHAPTER V.

THE EAR AND THE SENSE OF HEARING.

112. *Every modification thus in origin received from motion is vibrated in a double manner, first by a certain local motion from the centre of motion, which finally goes off to a distance into a kind of conatus, not into motion openly local, or into vibration in its own place.* 1. This may appear from chords and strings which are vibrated visibly. 2. It may be seen from drums and membranes, which are vibratorily elevated and beat the air, 3, from the sound of the larynx and of trumpets, 4, from the sound of a switch. 5. This also appears from the whistling when the wind enters cracks. 6. When chords betake themselves to motion it is necessary that a volume of air yield place, and that it rebound into its own place. 7. Suppose a line consisting of pure elastic spheres, the parts of which are thus compressed, as has been said; an impulse upon the line, moves a great part of the line from place, 8, even until the impulse is absorbed by gravity. 9. Then there remains only the vibration and the throwing of one against the other, but it immediately comes to rest in its own place. 10. This can be compared with the conatus to local motion, for it does not yield more in place than that it may immediately return; thus it is reciprocal local motion, while at first motion may be of

many things and of the volume. 11. Then begins a motion of the particles, which is continued to a long distance, from the cessation of the local motion. 12. Indeed for the most part natural motion is reciprocal, and to be called vibratory, which continues sound generally to a long distance. 13. But that it is also diminished, this the phenomena also declare.

113. *Every modification tends to a straight line, for the posterior part presses upon the anterior with full force, but upon the side parts with a diminished force; although the forces are diminished they equate the whole, and thus act upon the anterior.* 1. Suppose spherules of air to lie thus as globules in quiet air, cubically arranged, in such a manner that six or eight shall encompass one. 2. One particle does not penetrate into another, unless it removes those that are at the sides, so that it may act immediately. 3. The force at the same time being expended upon the lateral globules they make a full force which is impressed upon the anterior. 4. In whatever position this is, the full force always returns upon the part which is anterior in the straight line, no matter how many intermediate parts there may be; for the intermediate parts give at the same time as much of the forces as they receive to those which are contiguous. 5. This may appear from sounds, in that they go off in a straight line. 6. Especially from this, that an echo from a wall returns directly into the ear, thus from a multiplied echo. 7. A similar thing happens in the ether, and its rays of light which similarly rebound, even so far that this nature is constant. 8. From the spherical form of particles the same thing results, but not from any other figure; for then the determinations would not be into a straight line, but according to the movements of the contact.

114. *The modification is therefore from the moved centre into every periphery, in every direction, as radii.* 1. This is the consequence. 2. It appears visibly in water. 3. It appears sensibly in sounds and in the air. 4. The centre being moved they return upon it from all sides. 5. It appears visibly from chords in the manner in which they tremble and throw themselves out from their linear axis. 6. It appears in similar other things.

115. *But indeed their local motion, as also the conatus itself, is propagated into a spiral line, or into perpetual circles from distance to distance.* 1. This agrees with the nature of the parts, in which is the effort of flowing off into a spiral, if nothing hinders. 2. But since in the full atmosphere there is no such thing as a solitary part, hence the local motion is coerced that it may not run off into that gyre; that is, into a natural gyre. 3. But it is evident from certain other phenomena, as from fire, concerning which we shall treat elsewhere. 4. Besides this, while local motion persists, one part thrusts those at the sides. 5. And each one of these those at its sides, which it moves to the sides. 6. Likewise in water, but in a circulatory manner; for the particles are hard, and do not endeavor to come into any other form than the circular by simple tension. 7. Sound does not travel by this way, but only the fluxion of its parts, among which one must make distinction, for there is no modification without local motion, then a vibratory motion, as it were conatus; otherwise one part could not impinge upon another, and communicate its force. 8. What local motion bombs set up when ships are blown up with powder, even to the extent that earthquakes are caused, appears from historical narratives.

116. *The pressure from the centre of motion by straight lines in the direction of radii invades every single part, which at the same time is moved into a spiral. On account of this the propagation of the modification by straight lines balances the propagation of the fluxion by the spire.* 1. Thus they proceed with equal pace. 2. On the other hand, if the one should run ahead of the other, there would be no distinct propagation. Thus one corresponds to the other. 3. If the local motion from the side be examined, we can deduce geometrically, that it is such as is a circle to its diameter; such also results from geometry.

117. *Especially also the interfluent ether gives wings to the air, as well by the straight line as by the circle of the out-flow.* 1. By the circle it does not give sound itself, but by the straight line. 2. Every particle drives the ether, which surrounds and holds the parts in their form, for no part subsists

out of itself. 3. The air driven in volume flows, and likewise tends into a straight line and at the same time into a vortical line. 4. Hence it appears that the air thence obtains wings. 5. This fact appears from this that air passes through glass, wood, water in a [diving] bell, through walls, metals, with diminished life; as in an [air] pump in which is a bell. 6. Wherefore the propagation is carried through by the ether. 7. But this is in a general way and in a volume, for one particle of air responds to a little volume of ether. 8. Thus also it is in the conatus. 9. Otherwise sound would not be propagated to so long a distance.

118. *From these things it may appear what an infinite number of things enter into one module of sound, and how composite sound is; or it may appear how gross, dull, and fallacious is the sense of hearing.* 1. It appears from one drum, which makes the whole tremble together with the body and membranes; yet one stroke gives but one sound, although it consists of so many vibrations. 2. It appears in harps, flutes and other instruments. 3. It appears that there are myriads of particles of air or so many little volumes, 4, more in rude sounds. 5. How many volumes are not the parts of the ether? They are incomprehensible. 6. This appears from the membrane of the ear drum consisting of so many layers. 7. It appears from the whole cranium and brain being stirred up. See former excerpts.

119. *In order that the particulars of sound may be heard, it is necessary that there be a general sound to which particulars may be referred, by which they are distinguished, and may be elevated, even to the sensation of hearing.* 1. Hence one sound increases until it is immense. 2. There is nothing that is not referred to what is general, and it can be distinguished by this. 3. The whole body of an instrument sounds together. 4. So the whole cranium. 5. The sound is according to the elasticity and contremulation of the body, as in mills. 6. Hither are to be applied all the rules concerning the cavities in the peritoneum. P. I., 7, see former excerpts. 8. Thus tones are parts of a general discrete quantity.

120. 7. *The differences of sounds are as to quantity and*

quality; quantity is force, loudness or strength; quality is the depth or height of pitch; there are also still many other, especially mixed differences, concerning which see *The Tongue* and *The Larynx*.

121. Quantities arise if the parts of volumes of air are more strongly contracted or dilated, while the same speed remains; for if they are more deeply or more gently compressed thence the quantity varies likewise. 1. This appears especially from strings and membranes. 2. The same string can produce the same sound, if only it be more strongly or more gently contracted; 3, or even if it is elongated. 4. Likewise membranes. 5. The same string contracted or shortened, the tension remaining the same, is changed as to quality. 6. That this is quantity, and that it thence arises, is because, a similar swiftness requires the same composition of the auditory nerve, 7, and the same composition and thickness of the membrane. 8. For if it be either more strongly or more weakly acted upon, until a similar sound breaks through it, but louder or softer. 9. A like thing obtains in other things, as in tendons, muscles, actions, and light.

122. *Quality however arises from a diverse swiftness of the changes of state or of compression and expansion.* 1. This also may appear from strings and membranes, and from musical instruments, and their plates, etc. 2. Likewise from the nerves and membranes in the animate and living body. 3. This is also from causes, for a thing sounds more intensely, the more swiftly or quickly it is vibrated. 4. Wherefore a sharp breaks through space more swiftly than a flat. 5. This the phenomena also dictate.

123. *Hence it may appear, what local motion, and what modification great volumes of air much compressed produce, and what smaller volumes produce.* 1. Thence a ratio can be given between the quantities of the volume and the quantities of the motion. 2. Then the same respectively to qualities. 3. The whole of Geometry can thence be produced.

124. Then it may appear what quality harmony is among various speeds, in order that it may be harmonious or discordant. 1. The harmonic art teaches this. 2. The ear itself

knows it. 3. There are harmonies between like altitudes, thence a chord exists by the lowering or raising of the sound. 4. The other things, which were adduced above about the air, also have their natural harmonies. 5. Thus there is nothing which may not fill a whole science, even to the extent that if the knowledge is to be perfect it will require a unique mind. 6. These things may be reviewed.

125. 8. *From these things it may appear, how sound is modified by acoustic tubes and speaking trumpets, conchs and horns.* 1. It is different from the modification produced by gut strings and chords. 2. It is otherwise when the voice is emitted through tubes, as through speaking trumpets. 3. It is otherwise when there is only a tremulation. 4. Thus the differences are of a triple kind, although in themselves they are only double. 5. It is the same whether the voice is emitted or a sound is made, only let it speed.

EMANUEL SWEDENBORG AS AN ANATOMIST AND
PHYSIOLOGIST.

The opening address* at the Congress of Anatomists, delivered at Heidelberg, May 29, 1903, by the President, PROF. DR. GUSTAF RETZIUS.

It has been customary in our association for the president to open the meetings with an address on a theme of general interest elucidated by means of new facts. It was my intention to bring before you a subject of such a nature from the field of Morphology, and I had gone so far in the preparation of it that most of the address was ready in manuscript. But at this point it became plain that it was impossible to treat the problem in question within the time suitable for such an address.

For this reason I concluded to treat of quite a different theme on this occasion, a theme which belongs, indeed, to a long past period of our science, but which nevertheless in a remarkable manner presents points of connection with modern investigations.

There are, indeed, instances showing that presidents of these meetings have taken up the history of times long past in order to lay before the assembled members the labors of famous predecessors. I especially call to mind the meeting of Basel, at which Privy Councillor Merkel dedicated his opening speech to the memory of the great Vesalius. This was praiseworthy in a double respect, since Vesalius had labored in Basel, where that beautiful monument to his memory, the Vesalianum, has been erected, in which his spirit still lives and labors.

On the present occasion I should have preferred to devote my address to one of those departed heroes of anatomical science

*Emanuel Swedenborg als Anatom und Physiolog auf dem Gebiete der Gehirnkunde. Eröffnungsrede des Vorsitzenden Prof. Dr. Gustaf Retzius an dem Anatomenkongresse in Heidelberg d. 29. Mai 1903.

Abdruck aus den Verhandlungen der Anatomischen Gesellschaft auf der siebzehnten Versammlung in Heidelberg von 29. Mai bis 1. Juni 1903. Verlag von Gustav Fischer in Jena. Translated into English by C. Th. Odhner, for *New Church Life*.

who have labored at this University, to a Friedrich Tiedemann or a Friedrich Arnold; but as I lacked the special studies in the archives necessary for such an object, I would not have been able to present a sufficiently accurate picture of these men.

I therefore hope that you will pardon me if I bring forward into light an overshadowed figure from my native land, a name which for a long time has remained in a darkness that to a certain extent still veils it, but which nevertheless is gradually being placed in a clearer light. Moreover, I shall perform a duty by bringing out of the ruins of the past the contents and significance of the scientific literary remains of that Swedish investigator of nature, Emanuel Swedenborg, inasmuch as I have been asked to do so by request from abroad, and, in fact, through the Ministry of Foreign Affairs.

A number of thorough students of Swedenborg, and most especially the Englishman, James John Garth Wilkinson, the German, J. F. Immanuel Tafel, and the German-American, Rudolf L. Tafel, have with great enthusiasm and energy called attention to and published a series of very remarkable statements and views, especially concerning the anatomy and physiology of the brain, contained in the extensive manuscripts of our author, which are preserved in the Library of the Royal Swedish Academy of Sciences, and Rudolf L. Tafel especially has emphasized the fact that many of Swedenborg's discoveries have been wonderfully confirmed by modern investigations. This subject was brought anew before the scientific world in 1901 by Dr. Max Neuburger, of Vienna, in a spirited address entitled "Swedenborg's Beziehungen zur Gehirnphysiologie," delivered at the assembly of German scientists and physicians held at Hamburg, in the year 1901.

As Rudolf L. Tafel, in 1882, had done in his great work, containing some of Swedenborg's manuscripts on the Brain, so Dr. Neuburger now calls attention to the fact that Swedenborg had made a series of important discoveries, particularly in respect to the motion of the Brain, the seat of the psychical phenomena and the localization of the motor centres. Dr. Neuburger further addressed himself in a communication to the Swedish-Norwegian legation in Vienna, in which he express-

ed his regret that an extensive manuscript by Swedenborg on the Brain, which is preserved at Stockholm, had not yet been published. Last spring I received from the Ministry of Foreign Affairs at Stockholm a communication referring to this subject. It is therefore in a certain measure my duty to report what I have done in this respect.

For a just appreciation of Swedenborg's work and service in the fields of Anatomy and Physiology, it is necessary to have a knowledge of his other works and of the history of his mental development. We must be allowed, therefore, to glance briefly at this subject.

Swedenborg, the son of the famous poet and philologist, Bishop Jesper Swedberg, was born at Stockholm, in the year 1688, and was carefully educated, especially in classical languages and literature. His own inclinations, however, led him to the study of Mathematics and Physics, and to these he devoted himself more and more. After extensive scientific journeys in various countries, he returned to Sweden, a learned young man, in the year 1714. King Charles XII., himself mathematically inclined, recognized the great talents of Swedenborg, and appointed him Assessor in the College of Mines. From now on Swedenborg devoted himself to Physics, Mineralogy and Metallurgy, made mechanical inventions, and, together with the famous Polhem, founded the *Dawdalus Hyperboreus*, the first Swedish journal devoted to natural sciences. Swedenborg declined the professorship of Mathematics in Upsala, which had been offered to him, and devoted himself exclusively to his practical and scientific works. And now he began to publish his great scientific writings. In the first volume of his *Opera Philosophica et Mineralia* he explained among other things his new theory of cosmogony, a nebular theory, in which—long before Kant and Laplace—he represented in word and illustration the formation of the planets in the solar system. Laplace himself informs us that he had received his first ideas on this subject from Buffon, and Buffon, as is known, had Swedenborg's work in his library.

Later on Swedenborg created a theory of light, which he based on the acceptance of the undulation and pressure of the

ether. At the same time he presents a kind of molecular theory of the universe, which is a wonderful forerunner of the stereochemical theory, which in our own times has been developed in so magnificent a manner.

Even before this he had made discoveries in the fields of Geology and Paleontology and had expressed opinions which were far ahead of his own times: he had, for instance, recognized petrified plants, and pointed out that the middle part of Sweden in a former period had been deep under water, and that certain whale-bones (the *Balaena Swedenborgii* of Lilljeborg), as well as numerous accumulations of marine remains, such as heaps of mussel-shells high up on land, dated from this period.

It would take us too far to enumerate here further examples of his services in this line. What has been adduced will suffice to enable us to recognize his unusual penetration and his profound insight into the workshop of Nature.

Having occupied himself during many years with the earnest study of the *inorganic* world, he now gradually passed over to the organic. He was evidently possessed of a deep, unconquerable desire for a knowledge of the whole of Creation, and this desire led him even higher. After eager studies in Anatomy during his journeys in Italy, he now devoted himself more and more, and finally exclusively, to the study of this subject.

It was in his great anatomical-physiological work, the *Œconomia Regni Animalis*, (published in the year 1840-'41), that he first presented his experiences and views, and in the years 1744-'45 he published another great work, the *Regnum Animale*. Beside this he wrote a series of minor treatises on diverse anatomical questions, as well as some large volumes on the Brain and other parts of the nervous system, but these have as yet been made known only in parts by Wilkinson and by Immanuel and Rudolph L. Tafel.

These writings bear witness of great learning, and, on the whole, of logical deductions, although the lack of accessible facts may sometimes have misled him. But Swedenborg was evidently an acute and close observer and at the same time a penetrating thinker. In respect to his observations one can only

lament that he did not place sufficient value upon his own investigations and discoveries, and that he did not thoroughly describe them, especially by the way of illustrations and charts, which would have made it easier to understand his writings.

It is quite evident that in all his endeavors he sought for *the Truth*, and for it alone, and not for honor or fame. He wished to solve the riddle of the universe, and above all to find the fountain of life, the seat and nature of the soul. It was for this purpose that he devoted so many years of earnest work to the study of the Brain.

He attempted to apply his theory of the motion of the molecule to the structure and the functions of the Brain. He believed that he had traced the mystery, and during the course of these his investigations he succeeded, in fact, in penetrating deeper in several fundamental fields than the rest of his contemporaries.

With the year 1745 Swedenborg began to enter still further upon the study of the mystery of the soul. From now on began his *theosophical* period, and with this he ended his activity in the field of natural science.

After this brief review of his life and work, I return to the particular object of the present address, that is, the facts which justify me in making a communication to you on the subject of this wonderful investigator.

I will therefore put before you the most important of the facts which are contained in the anatomical works of Swedenborg, particularly in respect to the general Anatomy and Physiology of the Brain, and I will do this in connection with the presentations of Rudolph Tafel and Max Neuburger, as well as on the basis of the studies which I myself have made, with the assistance of Mr. Alfred Stroh.

Depending upon the works of the most prominent anatomists of his own and of the preceding period, Swedenborg gives thorough descriptions of the structure of the Brain, its meninges and vessels, and adds here and there his own theorizing thoughts and views, many of which may, indeed, seem strange and peculiar to us in the present age. But in order to be able to judge of the process of Swedenborg's reasoning, one must

remember that he was at the beginning a mathematician, chemist and physicist in a wide sense, and that he developed his method of reasoning according to the manner of such a discipline. Again and again he indicates, as the supreme end of investigation, the creation of a mathematical philosophy, which was to arrange and embrace all sciences according to one uniform plan and to explain all the various phenomena. He sought to connect the Infinite with the finite; he believed that he had found a connecting point for this purpose, and that he was on the track of such an explanation. This connecting point is, in fact, his "*Point*," and the explanation is to be found in the motion, the *Tremulation*, a vibrating and undulating motion of the finest particles. Even in one of his earliest writings, printed in 1718, he reduces the *nature of life* to such tremulations.

When he now passed on to extensive studies of the psychical phenomena, he endeavored to find a confirmation of his theory in the *structure of the Brain*. It is evident from his writings that he himself had been eagerly occupied in examinations and experiments with the Brain, as also that he had very thoroughly studied the literature on the subject. As early as the year 1734 he had come to the decided conviction that the phenomena of the soul, the Psyche, have their seat in the *gray substance*, and most especially in the cortical substance of the cerebrum. This thought may be traced like a scarlet thread throughout all his writings on the Nervous System.

This thing is to be most especially emphasized, because the anatomists of the highest order, not only before him, but also for a long time after him, had placed the seat of the Psyche elsewhere, sometimes in the medullary substance and the walls of the ventricle, sometimes even in the fluids of the latter.

In harmony with Malpighi and the best anatomists of his time, and following the direction of Hippocrates, he accepted the idea that the cortical substance is to be regarded as a kind of glandular substance, and consequently that the Brain itself is a kind of gland of the highest degree, which prepares the animal spirit and at the same time performs all the psychic functions.

According to Swedenborg's view the gray or cortical sub-

stance consists of a mass of innumerable and most minute particles of an oval form, which he sometimes designates as *glandules*, sometimes as *spherules*, *organules* or *cerebellulâ*. These little particles, which he conceives to be a kind of most minute laboratories or organs, are separated from one another by another substance, which covers them and also holds them together in ever larger groups, thus constructing the greater organs of the Brain. Each *spherule* is furnished with a minute arterial branch, and terminates in a *fine fibre*, which passes on to the medullary substance beneath it, and here becomes somewhat grosser and medullary, in order afterwards to pass on through the *crura cerebri* to the *medulla oblongata* and *spinalis*, and through these onward with the peripheric nerves to the various organs of the body, the glands, the muscles, and the skin, there to find their peripheric ends. All these nerve-fibres are on the way furnished with coverings, which combine them into ever larger bundles; and the nerve-stems themselves receive on their departure from the Brain and the medullas their own special sheaths, which are a continuation of the three coverings of the Brain and the spinal marrow. The nerve-fibres in this way conduct into all parts of the body the finest or spirituous fluid, which had originated in the spherules of the gray substance, and which is actuated and moved through a kind of "animation" of the Brain.

The cortical substance, which contains an incalculable mass of the above-mentioned finest arterial branches, produces an abundant lymph, which also finds its way through the medullary fibres, and which through the nerves is carried about into the whole body. This circulation of the lymph is effected through the motions of the Brain. While the anatomist of Swedenborg's time either denied the motion of the Brain or else regarded it as synchronous and connected with the pulsation of the arteries, or arising from the contractions of the dura mater, Swedenborg on the other hand brought forth sure proofs to show that the motion of the Brain not only exists and constantly presents itself in living conditions, but is also synchronous and closely connected with the motion of the lungs, the respiratory motion. Moreover, Swedenborg is to my knowl-

edge the very first who pointed out the real nature of the *cerebro-spinal fluid*; the former anatomists present concerning it only very vague and hesitating accounts: they speak of vapors and moistures, etc. But Swedenborg, in fact, recognized not only its existence, but also its distribution and its great importance, and this long before Cotugno [d. 1822], who is generally referred to as the discoverer of this fluid. He has also followed its motion in the great ventricles of the Brain, and out of these through the fourth ventricle in the subarachnoidal space, and he speaks in connection with it of *the central channel* of the spinal marrow, which commences at the *calamus scriptorius*, and which to my knowledge was until then unknown.

Finally, he has also described at length the *discharge* of the cerebro-spinal fluid forward by means of the *fila olfactoria* into the mucous membrane of the nose; he is, therefore, to be designated as the forerunner of G. Schwalbe, as well as of Key and of myself.

On the whole, Swedenborg has devoted great attention to the lymphatic apparatus of the Brain and of the whole nervous system, and I cannot but deplore that Key and I were not acquainted with these works and accounts of our great countryman, when, in the years 1875-'76, we gave an historical presentation of these questions in our monographic work.

While these discoveries and views of Swedenborg are very remarkable when compared with those of his contemporaries, there remains to be mentioned another fact, which is to be described as nothing less than *wonderful*.

For he arrived at the firm conviction that there is a *localization* in the cortical substance, and, indeed, of *motor* centres. The cortex, says Swedenborg, is the seat of the voluntary activity of the muscles.

"Ut cerebrum ex suo cortice, ut a motus principio, possit quas velit, fibras, nervos, et musculos excitare."

The Brain has the power and liberty to influence all the nerve-fibres or bundles of nerves, and consequently all the nerves and muscles of the body, and to excite them to activity. *Different regions of the cortical substance rule over different motor regions of the body.*

Swedenborg divided the Brain differently from the way it is done in our days, and differently also from the way of his own contemporaries. He did, indeed, accept three Lobes, but he described these as an *upper* lobe, stretching along the marginal convolution, a *middle* lobe, beneath this, and a *lowest* lobe. And now he came to the astonishing conclusion that the muscles of the *lower* part of the body, *i. e.*, the lower extremities, have their centres in the *upper* lobe, while the muscles of the abdomen and thorax, (respectively the upper extremities), have their centres in the *middle* lobe, and the muscles of the head and the face theirs in the *lowest* or third lobe, for, he adds, the groups of muscles and the lobes of the Brain show that they "correspond to one another in an inverse ratio." I here take the liberty, on account of the importance of the subject, to quote his own words:

Ita etiam dispositus videtur ordo, quod id efficiant corpora striata, quæ cerebrum determinat, et mens rationalis jubet, imo ita ut a supremis immediatius dependeant muscoli et actiones, quæ in ultimis corporis sunt, seu in plantis; a lobo medio muscoli quæ sunt abdominis et thoracis, et a lobo tertio, qui sunt faciei et capitis: nam videntur ordine inverso sibi correspondere. (From the manuscript of Codex 58, p. 217, written in the year 1744; Comp. Rud. L. Tafel's *The Brain*, Vol. I., pp. 58-59, 68.)

Swedenborg, therefore, has not only predicted the localization of the motor centres of the cortical substance, in harmony with the views gained from pathological and physiological experiences during the latter half of the past century, but he has even on the whole correctly pointed out the seat of these centres!

Whether he arrived at this conception through his own physiological or pathological discoveries, cannot be definitely determined from the accounts in such of his voluminous printed or unprinted works as have hitherto been examined. In any case it is significant that he refers to experiments with animals, in order to determine with certitude which gyres correspond to the various groups of muscles.

"Experientiæ est et temporis," says he in his *Œconomia Regni Animalis* of the year 1741, "ut evestigetur qui gyrus et qui serpens tumulus

in cerebro hunc aut illum musculum ut correspondentem suum in corpore respiciat."

Dr. Neuburger, who in general strongly emphasizes Swedenborg's predictions in regard to the localization of the motor centres, although he does not refer to Swedenborg's accounts of their special and inverse arrangement, refers both to the expression cited above and also to another which is equally remarkable, and which reads as follows :

Ergo inquirendum venit, qui tori corticei his aut illis musculis in corpore correspondent; quod fieri non potest nisi per experientiam in vivis animalibus, per punctiones, sectiones et compressiones plurium, perque inde in corporis musculis redundantes effectus.

It is with justice that these expressions have been described as "wonderful."

In respect to the *Sensorium*, also, there is a series of statements which command a decided interest. He follows the nerves of the various organs of sense, the smell, the sight, the hearing and the touch, to the base of the Brain, the medulla oblongata; and the Brain itself, and, indeed, through the crura cerebri, into the medullary substance of the Brain; after the nerve-fibres have entered here, they go forth each one to its special spherule in the cortical substance. Their terminal stations, therefore, are also in the cortex. But here he describes no special centres of the sensories, but emphasizes the internal connection of the various impressions of the senses. There is, he says, one only and common sensory,—a *sensorium commune*—in the cortex :

Ergo nulla cerebri pars individua organo cuidam sensorio corporis correspondet, sed est substantia corticis in communi, quæ nullius non gradus modificationes secundum seriem, in quam disposita est, recipit, et ad judicem animam convenienter refert; quæ percipit, intelligit, sapit quamcunque mutationem ex cujuscunque generis, speciei, gradus tactu suo systemati ejusque nexibus. . . . Haec confirmantur, in apoplecticis, epilepticis, catalepticis, maniacis . . . catulis, etc.

Swedenborg, therefore, assumes as the sources, *i. e.*, the terminations of the nerve-fibres of the organs of sense certain definite places in the cortical substance; but he emphasizes the

fact that there exists so internal a conjunction between the innumerable higher perceptive sensory elements of the cortex, that they act conjointly in the highest psychic activities: hence the unity of the cerebral functions.

The difference between Swedenborg's views and those of modern science is, in fact, not great. If I open a modern textbook on the Physiology of Man, I find, for instance, the following sentence as introduction to the concluding recapitulation in the chapter on the physiology of the cerebrum: "In the complicated spiritual functions all the centres of association and sense work together, since they are connected with one another by innumerable nerve-fibres, whence results the unity of the cerebral functions." (*Lehrbuch der Physiologie des Menschen*, by Robert Tigerstedt.)

Swedenborg, of course, was not aware of the fact that the central terminal organs of the nerves of the various organs of sense lie more or less collected each in their own regions of the cortex; he was not acquainted with the localization of the various sense-centres, which has become known only through the intense investigations of the past few decennai. We need not wonder at this. On the contrary, it is wonderful, that he, from the point of view of the science of his age, was able to penetrate so far into the mysteries of the construction of the Brain, as has been indicated above.

His views on these subjects were no passing fancies, no evanescent ideas. They return again and again in his works, in various places, and seem to have been gained by long years of study and thought. Divested of notions and views which in many respects are somewhat fantastic or naive, but which are in harmony with the ideas of his age, there nevertheless remains a series of conceptions which have been recognized and found correct only in our own age,—the age of natural sciences mightily extended and becoming ever more profound.

Emanuel Swedenborg, therefore, according to the standpoint of his time, not only had a thorough knowledge of the construction of the brain, but had also gone far ahead of his contemporaries in fundamental questions.

The question arises: how was all this possible? The answer

can hardly be other than this: Swedenborg was not only a learned anatomist and a sharp-sighted observer, but also in many respects an unprejudiced, acute and deep anatomical thinker.

He towers in the history of the study of the Brain as a unique, wonderful, phenomenal spirit, as an ideal seeker for truth, who advances step by step to ever higher problems. One may more easily understand his life and labors, as was pointed out above, when one places his achievements in Anatomy and Physiology in juxtaposition with those in Geology, Mechanics, Cosmogony and Physics. With this as a background, his whole endeavor becomes somewhat more intelligible. He sought to find the one principle of the universe and of life in the whole. He thought that he had found this original principle in the motion, the tremulation of the finest particles. This fundamental view of things led him always further to an almost all-sided investigation and to a view of the fabric of Creation, wonderfully deep for his time. With this view as a guide he gained knowledge and created theories which could be acknowledged and appreciated only in our own age.

LETTER OF GREETING TO DR. RETZIUS FROM THE
SWEDENBORG SCIENTIFIC ASSOCIATION.

Washington, D. C., January 8, 1904.

Mr. Gustaf Retzius, Professor, Doctor of Medicine, President of the Swedenborg Committee of the Swedish Academy of Sciences :

Dear Sir—The Swedenborg Scientific Association heard with great satisfaction your letter addressed to the President of the Association under date of May 7, 1903, in which you informed him of the safe arrival of the MS. transcription of the works *De Cerebro* and *De Morbis Cerebri*, and of the inception, by your committee, of the work of printing some of the earlier MSS. of Swedenborg, of Physical and Cosmogonical content, with the intention of going on later with the Geological and then with the Anatomical works. Our Association feels assured that the Academy of Sciences, in thus bringing to light the long hidden treasures contributed by its illustrious member, Emanuel Swedenborg, is rendering to the scientific world at large a distinct benefit, the importance of which will be increasingly appreciated as science itself progresses, and in so doing, is also adding lustre to its own honorable name.

Our Association is glad in every practicable way to co-operate with your honorable Committee in furthering the work so auspiciously begun, and with best wishes for the success of its enterprise and with high personal regard for yourself, we beg to remain, on behalf of the Swedenborg Scientific Association,

Very sincerely yours,

FRANK SEWALL, M. A., D. D., President,
Washington, D. C.;

LEWIS F. HITE M. A., Prof. Phil.,
Cambridge, Mass.;

HARVEY FARRINGTON, A. B., M. D.,
Chicago, Ills.

Committee appointed by the Swedenborg Scientific Association to send greeting to the Swedish Academy of Sciences in Stockholm. [Minute 368: 1903.]

A REVIEW OF THE COURSE OF SWEDENBORG'S SCIENCE IN SWEDEN.

IN these days, when the scientific works of Swedenborg are not only being read with reawakened interest by Newchurchmen, but are even beginning to receive their just recognition outside of the New Church by scientists of the first rank, one cannot but admire the farsightedness of those valiant soldiers in the noble cause of Swedenborg's Science, Wilkinson, Clissold, Strutt, Immanuel Tafel, and in later times, Rudolph Tafel, whose work was of fundamental importance, and has become the basis of the results of recent years. These pioneers had the courage to cast their bread upon the waters, and after many days it is returning.

The work of the Swedenborg Scientific Association is now well known, and the translations of a number of the scientific works of Swedenborg which have lately been published in America and England give evidence of the active interest of the New Church printing societies. In Germany a number of scientists have in recent years dealt with various sides of Swedenborg's scientific system, and in France a voice or two has also been heard. Of these notices Dr. Max Neuburger's *Swedenborg's Beziehungen zur Gehirnphysiologie* is most widely known. But the limits of a paper to be read at a meeting of the Swedenborg Scientific Association forbid my dwelling at length upon the general trend of interest in Swedenborg's scientific works, for my main purpose is to present a short review of the course of Swedenborg's Science in its author's native land.

Researches at Upsala have brought to light an interesting body of material regarding Swedenborg's life as a student at the University of Upsala and his connection with the body, which, after undergoing several reorganizations, became permanently established as the "Royal Society of the Sciences of Upsala" (*Societas Regia Scientiarum Upsaliensis*). Eric Benzeliuſ, Swedenborg's brother-in-law, was one of the leading spirits in the early history of this society, which is still in existence, and

which was founded a number of years before the Royal Swedish Academy of Sciences.¹

Swedenborg's name often appears in the records of this early scientific organization at Upsala. There is a letter by him to the Secretary in which he refers to his researches in the mineral kingdom and in which the *Lesser Principia* is referred to. The minutes also give evidence that a number of Swedenborg's scientific papers were read and discussed at the meetings of the Society. Thus in his own lifetime, by his connection with the Scientific Society of Upsala and later with the Royal Swedish Academy of Sciences, by his association with Polheim in engineering work, and in the publication of the earliest of Swedish scientific magazines, the *Dædalus Hyperboreus*, and later, by the publication of his scientific works in Sweden and in foreign countries, the name of the scientist Swedenborg became well known in his own country, although his work was so far in advance of that of his own day that it has remained for modern investigation to recognize its real value. The gigantic proportions of Swedenborg's scientific genius are gradually becoming visible on the modern horizon, and are awakening feelings of surprise and admiration in the minds of many beholders.

In 1845 the great anatomist and founder of modern anthropology, Anders Retzius, in a recently printed address² on *The Rise and Development of Anatomy in the Scandinavian North*, delivered on the occasion of his leaving the Presidency of the Royal Swedish Academy of Sciences, speaks as follows of Swedenborg's anatomical and physiological works:

During this period Emanuel Swedenborg also appeared as an author on anatomical and physiological subjects. He had previously dis-

¹For a good general account of the early history of the Scientific Society of Upsala and its relation to the Royal Swedish Academy of Sciences of Stockholm, see the *Essai sur la Société Royale des Sciences d'Upsal et ses rapports avec l'Université d'Upsal* par O. Glas. Upsal. Ed. Berling, Imprimeur de l'Université, 1877; pp. 99. In this Essay the names of Eric Benzelius and Emanuel Swedenborg are often met with.

²*Skrifter i skilda amnen jämte nagra bref af Anders Retzius. Samlade och utgifna af Gustaf Retzius. Stockholm. A. B. Nordiska Bokhandeln. 1902. pp. 288. The quotation is from pages 96-97.*

tinguished himself as a mathematician, physicist, chemist, mineralogist and physical geologist. Besides possessing an immense learning in all the sciences he wished by means of this learning to come to a knowledge of the human soul and to penetrate still further into the highest intellectual regions. With this end in view he elaborated his *Regnum Animale* and his *Œconomia Regni Animalis*, London, 1740, quarto, which latter has now been republished in London, translated into English by Wilkinson. Haller, indeed, makes favorable mention in the *Bibliotheca Anatomica* of the *Œconomia Regni Animalis*, but further than this Swedenborg's physiological writings have remained unread and not understood until very recent times. His *Regnum Animale* has now reappeared as a wonder book (*underverk*). One finds there ideas belonging to the most recent times, a scope, induction and tendency, which can only be compared with that of Aristotle. It is to be supposed that some decades will still be required in order to rightly estimate the merits of this work. Having finished his physiological works Swedenborg passed over to his investigations regarding the soul and from these to those regarding the spirit-world and religion, which have gained so many adherents in several continents.

The expressions of "the father of modern chemistry," the great Berzelius, respecting Swedenborg's contributions to geology, metallurgy, anatomy and physiology, contained in a paper read before the Scandinavian Scientific Association in 1842, and in his letters to Wilkinson, have been placed on record for the English reader by Dr. R. L. Tafel.³

In the paper read before the Scandinavian Scientific Association Berzelius says that Swedenborg in his geological treatise *Respecting the great depth of water and the strong tides in the primeval world; proofs from Sweden*,⁴ was the first scientist to call attention in a printed work to the rise of the Swedish coast. He also points out that Swedenborg correctly observed the general direction from north to south of the Swedish mountains and the presence of rounded and worn stones; the report of the skeleton of a whale which was sent by Swedenborg to the

³See the *Documents concerning Swedenborg*, Vol. 2, Part 2, pp. 896-897, and note 271, p. 1252.

⁴*Om Wattenens hogd och Forra Werldens Starcka Ebb och Flod. Bewjs utur Swergie. Stockholm, ahr 1719.* Two editions, pp. 16 and 40 respectively. Cf. *Documents concerning Swedenborg*, Vol. 2, Part 2, p. 895.

museum of Upsala University; the remnants of a wrecked ship far inland; and "some gigantic pots which he examined and found to have been hollowed out by other loose stones which were agitated to and fro by water in a state of great commotion." Berzelius sums up his statement with the declaration that none of the writers of the time previous to the publication of Swedenborg's little work, "with the exception of Swedenborg, had made genuine geological examinations, and that they all treated their subjects from a historico-geographical point of view."

Swedenborg's report concerning the skeleton of a whale, of which mention was made just above, was a contribution to geology of considerable importance. Under the scientific name of "*Balaena Svedenborgii* Lilljeborg" it is now well known, and has been described and reviewed in the Proceedings of the Royal Swedish Academy of Sciences for 1888.⁵ The writer recently examined the bones of this skeleton; they are stored in a box labelled "The Swedenborgian Whale" (*Svedenborgska Hvalen*) in the cupola of the Gustavian Hall (*Gustavianum*) at Upsala. It was in this hall that Swedenborg delivered his graduating thesis in 1709. The building is now mainly used as a zoological museum. In passing it may be noted that the petrified trunk of a tree, labelled as being from the collections of Swedenborg, is preserved in the museum of the Geological Department of the Academy of Sciences. In 1888, A. E. Nordenskiöld, in an address⁶ delivered on the occasion of the annual public meeting of the Royal Swedish Academy of

⁵Kongl. Svenska Vetenskaps-Akademiens Handlingar. Bandet 23 N:o 1. DER WAL SVEDENBORG'S (*Balaena Svedenborgii* Lilljeborg) nach einem Funde im Diluvium Schwedens beurtheilt von Carl W. S. Aurivillius, Mit drei Tafeln. Der K. Schwedischen Akademie der Wissenschaften vorgelegt den 1 April 1888. Stockholm, 1888. Kongl. Boktryckeriet. P. A. Norstedt & Soner. Pp. 58. This is a most valuable contribution.

⁶Föredrag vid Vetenskapsakademiens Årshogtid den 26 Mars 1888 af A. E. Nordenskiöld. Stockholm 1888. Stockholms Dagblads Boktryckeri. 16mo. Pp. 30. The quotation is from pages 4-6. Swedenborg is mentioned a number of times in other places in this valuable contribution.

Sciences, reviewed Swedenborg's contributions of geology as follows :

The merit of having first earnestly broached the question of the fluctuation of the level of the ocean and of having made the same the subject of an earnest scientific investigation therefore belongs to Emanuel Swedenborg, since he published at Stockholm in 1719 a work entitled: "*Om vattnens hogd och forra Werldens starka ebb och flod, bewis utur Sverige.*" From the constitution of the mountains in Westro-Gothia, from the petrifications in the horizontal beds of lime and marl, from banks of shells situated far above the present level of the ocean, from the wreckage of ships and the skeleton of a whale found far from the sea, from the forms of the sand-banks and the rounded form of the stones found in them, from the wandering blocks, or, as Swedenborg expresses it, from "the stones which are spread around the whole world," from the gigantic pots, from the coast-lines of Halleberg and Hunneberg, from fishes in inland seas situated far above the level of the ocean, and finally from the annual descent of the Baltic, confirmed by many proofs, Swedenborg draws the conclusion that the level of the ocean in Sweden in former times stood some hundred ells above its present altitude. The cause of the changes pointed out he attributes partly to a change in the velocity of the earth's rotation and in the time of the moon's revolution around the earth, by which the water is driven from the poles towards the equator, partly to the condition of water in the Baltic, which is higher than in the North Sea, the height of which is gradually diminishing.

Swedenborg's article, which contained the keynote of so much in the doctrine of the earth's history which is being discussed even today, was at first unnoticed and not understood by the learned world. But it became the first guiding hint for the investigations made by Anders Celsius, begun in the year 1724, during travels along our coasts, regarding the altitude of the water in the Baltic, and the results of which he gathered together in an article published in 1743 in the fourth part of the Proceedings of the Academy of Sciences, entitled: "Anmarkningar om vattnets forminskande sa i Ostersjon som Vesterhafvet."

In 1892 the present Superintendent of the Geological Department of the Royal Swedish Academy of Sciences, Professor Alfred G. Nathorst, in his work on the *Geology of Sweden*,⁷ expresses himself as follows in regard to Swedenborg geological contributions :

⁷SVERIGES GEOLOGI allmanfattligt framstald med en inledande historik om den Geologiska Forskningen i Sverige jemte en kort ofversigt af de Geologiska Systemen af A. G. Nathorst. Med flere hundra illustrationer.

After Hjarne we meet the celebrated theosophist, Emanuel Swedenborg (born 1688, died 1772). In 1719 he published "Om vatnets hogd och forra verldens starka ebb och flod," in which, from various phenomena in the country, he draws the conclusion that water formerly covered the greater part of it, which was supposed by Swedenborg to have been the case during "the deluge." Part of the proofs presented are indeed only loose suppositions, while others again bear witness of good powers of observation and are entirely correct. He mentions among other things the presence of petrifications in the mountains of Westro-Gothia, banks of shells at Bohuslan, the skeleton of a whale found in the parish of Wanga twelve miles from the sea; he describes gigantic pots, calls attention to the rounded form of stones in our mounds of rolling stones, which he attributes to the movement of the waves, etc. Furthermore, it should be noted that already in this work he maintains that, owing to the layer of trap above the layers in which petrifications occur in the mountains of Westro-Gothia, the same must have been deposited in the ocean. In 1722 he published another work, "Miscellanea observata circa res naturales," and the views he there expresses are founded upon observations made not only in Sweden but also in a great number of various places in Europe. He characterizes quite distinctly the various kinds of mountain formations which are found in Sweden, and regards all of them as having been formed in the ocean ("the deluge"). He describes vegetable fossils from Chartareux, and interprets them in a manner which is quite satisfactory for that time. Furthermore, he accounts for the presence of fossil molluscs in Lousberg at Aix-la-Chapelle, and endeavored to demonstrate by experiment that the trap in the mountains of Westro-Gothia, although a granite ("grasten") was originally deposited in the water as an especially fine sediment. As a whole, it may be regarded as distinctive of Swedenborg's method of demonstration that where possible he seeks to confirm the correctness of his position by means of experiment. He may, therefore, be regarded as one of the first [investigators] in the field of experimental geology. Space does not permit the giving in this place of a complete account of the work mentioned; but this may be noticed, that Swedenborg in the same work also occupies himself with the causes of the strata of mountains, their varying composition, layers, etc. Furthermore, the question of the decrease of water in the ocean is also here taken up, and in addition, he pays especial attention to the warm springs. He denies that the whole interior of the earth is in a glowing state, and thinks that the volcanoes receive their nourishment from melted masses in the earth's crust, which in a way may be said to agree with certain modern views of the same question. In others of his

Forra Delen. Stockholm. F. & G. Beyers Forlag. Pp. 160. The quotation is from pp. 2 and 4.

works various geological and paleontological statements are to be found, but the two here mentioned are the most important ones in respect to pure geology.

In 1879 appeared a review of Swedenborg's cosmogony in the *Vierteljahrschrift der Astronomischen Gesellschaft* by the Swedish astronomer, Magnus Nyren. The reviewer's conclusions in regard to the *Principia* have been presented in a free translation in *The Life and Mission of Emanuel Swedenborg*.⁸

⁸See *Vierteljahrschrift der Astronomischen Gesellschaft*, 14 Jahrgang, Erstes Heft, Leipzig, In Commission bei Wilhelm Engelmann. 1879, pages 80-91, UEBER DIE VON EMANUEL SWEDENBORG AUFGESTELLTE KOSMOGONIE, als Beitrag zur Geschichte der s. g. Kant-Laplace'schen Nebular-Hypothese; nebst einem Resume von Thomas Wright's 'New Hypothesis of the Universe.' Von Magnus Nyren. The portions rendered into English are to be found on pp. 85-87 of the original; cf. *The Life and Mission of Emanuel Swedenborg* by Benjamin Worcester. Boston: Roberts Brothers. 1883. Pp. 473. See especially pages 432-433. For the sake of convenience the original will here be quoted:

"So lautet, in engen Umrissen, die von Swedenborg aufgestellte Kosmogonie. Wie man sieht, weicht diese in Einzelheiten bedeutend von der später als die wahrscheinlichste anerkannten Hypothese über denselben Gegenstand ab, und überhaupt wird seiner Durchführung mit dem Falle der Wirbeltheorie die wissenschaftliche Basis entzogen. Trotz dieser Mangel und sogar manches offenbares Verstosses gegen das nach der Gravitations theorie Mögliche lässt es sich jedoch nicht leugnen, dass der eigentliche Kern der Nebular-hypothese, dass nämlich das ganze Sonnensystem sich aus einer einzigen chaotischen Masse gebildet hat, die sich zuerst zu einer kolossalen Kugel zusammen geballt und nachher durch Rotation einen Ring abgetrennt, der dann während der fortgesetzten Rotation in einzelne Theile zerfallen ist, die sich schliesslich zu Kugeln-Planeten zusammengezogen haben—dass diese Idee zuerst von Swedenborg ausgesprochen ist. Das hierauf bezügliche Werk von Kant: "Allgemeine Naturgeschichte und Theorie des Himmels," ist nämlich erst 1755, also 21 Jahre später ausgegeben; Laplace hat seine Hypothese erst 62 Jahre später veröffentlicht. Hierbei ist noch zu bemerken, dass Sw. seiner Hypothese die, aller Wahrscheinlichkeit nach, richtigere Form gegeben hat, dass nämlich, so wie auch Laplace später annahm, die Planeten aus zerfallenen Ringen (auf dem Standpunkte der Wirbeltheorie hatte Sw. nur einen solchen nothig), nicht wie Kant meinte, durch unmittelbar aus der ursprünglichen Dunstmasse gebildete Conglomerationen entstanden sind. Was die Sonne selbst betrifft, so ist über ihre Genesis in Swedenborg's Kosmogonie nichts gesagt, und man konnte aus den abwechselnd vor-

Swedenborg's cosmogony has also been referred to by the Meteorologist, Dr. Nils Ekholm, in a contribution to the Proceedings of the Royal Swedish Academy of Sciences for 1900; Swedenborg's comparison of the forces obtaining in the primeval "chaos" to those of the magnet is spoken of in terms of high admiration.⁹ In this same connection the recognition of Swedenborg's position in the history of cosmogony to be found in a

kommenden Ausdrucken dafür: "Sol," "oceanus solaris," "spatium activum solare," schliessen wollen, das er sie als einer nach seinen Grundgestandtheilen von den Planeten verschiedenen Körper darstellen wollte. Dass aber eine solche Schlussfolgerung nicht berechtigt wäre, geht deutlich daraus hervor, dass Activa primi et secundi, aus welchen die Sonne ja besteht, nicht anders sind als "Finita prima et secunda in motum localem excurrentia," und der Unterschied zwischen Sonne und Planeten also nur graduell sein kann.

Ueber die Richtigkeit der oben gegebenen Deutung des Satzes, dass die Milchstrasse die gemeinschaftliche Axe des Sternhimmels sei, wage ich hier nicht mit Bestimmtheit zu entscheiden, und wäre es also auch nicht berechtigt, darauf gebaute Schlussfolgerungen in Betreff Swedenborg's Ansichten über die berührte Frage zu machen. Wenn aber, wie es mir scheint, kein anderer Sinn darin gefunden worden kann, als dass die Milchstrasse der Aequatordurchschnitt (Zodiacus) unserer ganzen sichtbaren Himmelssphäre sei, so kommt auch in Bezug auf die ersten Ideen über die Aufstellung des galaktischen Sternsystemes Swedenborg die Priorität zu.

Dass, man, indem man Swedenborg Gerechtigkeit widerfahren lässt, die Verdienste von Kant und Laplace um die berührten Fragen nicht im geringsten vermindert, versteht sich von selbst. Denn erstens hat wahrscheinlich keiner von diesen etwas von Swedenborg's Ansichten über denselben Gegenstand gewusst. Obgleich nämlich ein Referat darüber in den Leipziger "Acta Eruditorum" für 1737 erschienen ist, und Kant in der angezogenen Abhandlung erwähnt, dass diese Schriften ihm zugänglich waren, so kann dennoch kein Zweifel darüber sein, dass er es erwähnt haben würde wenn er für seine Ideen etwas von Sw. geliehen hatte. Zweitens haben sowohl Kant wie Laplace das unbestrittene Verdienst, die fragliche Hypothese vom Standpunkte der Gravitations theorie beleuchtet und entwickelt zu haben, da Sw. dagegen jede Schlussfolgerung nach den Forderungen der Wirbeltheorie ausführte.

⁹See note 1 on page 4 of *Bihang till K. Svenska Vet.-Akad. Handlingar. Band 26. Afd. I. N:o 1. UEBER DEN ENERGIE-VORRATH, DIE TEMPERATUR UND STRALUNG DER WELTKÖRPER von Nils Ekholm. Mitgetheilt den 10 Januar 1900. Geprüft von R. Rubenson und B.*

recently published text-book by Professor Svante Arrhenius of the University of Stockholm, should be noticed.¹⁰ A long and critical review of Swedenborg's mathematical labors by Gustaf Enestrom appeared in the Proceedings of the Academy of Sciences for 1889.¹¹ In still another place it is stated that Professor Christian Loven described Volume I. of Dr. R. L. Tafel's *The Brain, etc.*, at a meeting of the Academy of Sciences.¹² Further material respecting the views of eminent Swedes regarding Swedenborg's scientific works may be found

Hasselberg. Stockholm. Kongl. Boktryckeriet, P. A. Norstedt & Soner. 1900. Pp. 73. The note reads as follows:

Diese Theorie wurde in der That ziemlich vollständig schon von EMANUEL SWEDENBORG aufgestellt, jedoch ohne eine durch die Gravitations theorie gegebene wissenschaftliche Begründung. Indessen hat Swedenborg die zwischen den Theilchen des "Chaos" wirkenden Krafte mit den magnetischen Krafte verglichen, die er experimentell zu bestimmen suchte. Dadurch erwies er sich als ein wirklicher Naturforscher. Siehe: Emanuelis Swedenborgii etc. *Principia rerum naturalium* etc. *Dresdæ et Lipsiæ, 1743, p. 387 ff.*

¹⁰See page 222 of *LEHRBUCH DER KOSMISCHEN PHYSIK von Dr. Svante August Arrhenius, Professor der Physik an der Hochschule Stockholm. Erster Teil. Mit 166 Abbildungen im Text und 2 Tafeln, Leipzig. Verlag von S. Hirzel. 1903. Pp. 472. The lines in question will now be quoted:*

Schon viel fruher, als es Zeit war, um ähnliche Betrachtungen uber die Wärmeverluste des Sonnensystems anzustellen, ist man zu ähnlichen Schlüssen gelangt. Swedenborg dachte sich den Urzustand des Sonnensystems als ein chaos von nebeliger Materie, welches allmahlich durch Krafte, die den elektrischen und magnetischen analog waren geordnet wurde, bis es zuletzt die jetzige Anordnung annahm.

¹¹*Bihang till K. Svenska Vet.-Akad. Handlingar. Band 15. Afd. I. N:o 12. EMANUEL SWEDENBORG SASOM MATEMATIKER. Af Gustaf Enestrom. Meddeladt den 9 Oktober 1889 Genom D. G. Lindhagen. Stockholm 1895. Kongl. Boktryckeriet, P. A. Norstedt & Soner. Pp. 29.*

¹²*Ofversigt af Kongl. Vetenskaps Akademiens Forhandlingar, 1883, N:r 1 o. 2. See the fourth minute for the meeting of Wednesday, the 14th of February, which reads as follows in English:*

"Hr. Chr. Loven gave a description of E. Swedenborg's investigations and views regarding the brain, in connection with the lately published work "The brain, considered anatomically, physically and philosophically by E. Swedenborg. Edited, translated and annotated by R. L. Tafel. Vol. I. [1882.]

in the well known biographies by Fryxell and Beskow, and no doubt more information will gradually come to light. And now it may be said that the day of study and preparation has been succeeded by one of action. As may be seen recorded in the last issue of *The New Philosophy*, the Academy of Sciences first appointed a special committee to investigate Swedenborg's scientific works, and subsequently accepted the recommendation of the committee to print a selected collection of manuscripts and works out of print, the beginning to be made with the *Lesser Principia*. The printing of this work is being carried on at present, and it may be added that it was decided to proceed at once with the printing of another volume planned to contain the geological contributions of Swedenborg, together with the *Miscellaneous Observations* and *Principles of Chemistry*; the printing of this volume has also been begun.

It will be a memorable day when the student of Swedenborg's Science will have before him for a comparative and complete examination all the material now practically buried out of sight in inaccessible manuscripts. The work which the Academy of Sciences has begun is a great step in this direction, and the Swedenborg Scientific Association is devoting some of its energies to the same end. Experience has shown that translations need revision from time to time, and likewise that the interpretation of some special theory contained in Swedenborg's scientific works without taking into consideration its whole historical development may easily lead to results which are either incomplete or misleading. The fundamental and most important work, therefore, is the printing of the text of hitherto unpublished manuscripts and the reprinting of the text of the works out of print. When this object has been fully attained the complete development of Swedenborg's Science will be possible—there is work here for many universities! Examination has shown that the universal principles of Science and Philosophy are set forth in Swedenborg's scientific works and applied to the explanation of the natural universe as a whole, and the human body in particular, in a manner so marvellous that when it is once fully comprehended these works are seen to contain a force which is capable of unifying all the

sciences and philosophically directing their course. We may indeed marvel at the unique quality of Swedenborg's genius, but, as in his own case, when we contemplate the interior workings of nature, sight is lost of personalities and we stand in awe of wonders whose First Cause is felt to be the Infinite. "The greater worshippers of nature we are, the greater worshippers of Deity we may become." How important, therefore, the publication of the works of Swedenborg, which are so capable of unlocking the secrets of nature! It is most fitting that the leading position in this work should be taken by the Academy of which Swedenborg was once a member, and in his native country, in, as Dr. Wilkinson said, "a land whose stones are iron, and out of whose hills thou mayest dig brass."

ALFRED H. STROH.

Stockholm, Sweden, May 31, 1903.

1688—EMANUEL SWEDENBORG—1772.

At every recurrence of the anniversary of Swedenborg's birthday we commemorate the event with festivity, and speak with eulogy of his virtues as a man, as a citizen and as a philosopher, and the custom seems justified not only as a tribute to true greatness, but also as a valuable means of stimulating us to study more earnestly the teachings set forth in his writings. In this way a celebration performs a great use.

Swedenborg's life was indeed an exemplary one, and one which we might profitably emulate, for he was a devoted and self-sacrificing citizen, an industrious and indefatigable scientist and philosopher, and withal a pious Christian. His true character is revealed in his writings, which ever impress the reader with the bearing of the man, his zeal, sincerity and profound humility in the presence of the Truth, which he earnestly sought and esteemed above all personal merit and glory. And thus while following his simple, clear and powerful expositions of rational principles we unconsciously receive a most important lesson, the lesson of humility in our own attitude toward the Sun of Wisdom, the God of the Universe.

As evidence of this fundamental characteristic in Swedenborg, we cannot do better than quote from the *Principia*: "In writing the present work I have not aimed at the applause of the learned world, nor at the acquisition of a name, or popularity. To me it is a matter of indifference whether I win the favorable of every one, or of no one; whether I gain much or no commendation. Such things are not objects of regard to one whose mind is bent on truth and true philosophy. Should I, therefore, gain the assent or approbation of others, I shall receive it only as a confirmation of my having pursued the truth. If the principles I have advanced have more of truth in them than those which are advocated by others; if they are truly philosophical, and accordant with the phenomena of nature, the assent of the public will follow in due time, of its own accord; and in this case should I fail to gain the assent of

those whose minds, being prepossessed of other principles, can no longer exercise an impartial judgment, still I have those with me who are able to distinguish the true from the untrue, if not in the present at least in some future age. Truth is unique, and will speak for itself. If what I have said be true, why should I be eager to defend it? Surely truth can defend itself. If what I have said be false, it would be a degrading and silly task to defend it." And in the *Economy* he remarks, "I do not undertake this work for the sake of honor or emolument, both of which I shun rather than seek, because they disquiet the mind, and because I am content with my lot; but for the sake of truth, which alone is immortal." Sentiments such as these are rarely met with in philosophies, ancient or modern, and they are but the expression of that sphere of truth and sincerity which pervades everything Swedenborg wrote.

In view of the great discoveries of modern science, we are often led to imagine what glory Swedenborg might have obtained among men, had he not chosen to forsake his own experimental research and devote himself to the higher paths of philosophical truth deduced from the facts discovered by others. Thus he opened the doorway to the interior principles which underlie all science, and which are finding their confirmation in modern discovery. But Swedenborg's books, and the truths they contain, are still comparatively unknown, and will not be generally recognized and received until "some future age."

As further testimony to the humility and sincerity of the man, note what he says in regard to his decision to forsake experiment and seek for truth. In the *Economy* (No. 18) we read, "Here and there I have taken the liberty to throw in the results of my own experience; but this only sparingly, for on deeply considering the matter, I deemed it best to make use of the facts supplied by others. . . . Besides, I found, when intently occupied in exploring the secrets of the human body, that as soon as I discovered anything that had not been observed before, I began (seduced probably by self-love) to grow blind to the most acute researches of others, and to originate the whole series of inductive arguments from my particular

discovery alone. . . . I therefore laid aside my instruments, and restraining my desire for making observations, determined rather to rely on the researches of others than to trust to my own."

There seems to be a decided use, therefore, in resounding once a year the praises of our author, whose high personal character enters into his teaching of truth, and makes us feel a certain safety in accepting his guidance. While liable to human error, and not infallible, he sought the truth earnestly, sincerely, rationally and in a thoroughly disinterested manner, and urges his readers to do likewise, and not to accept as true what does not appeal to the enlightened rational mind.

NOTE AND COMMENT.

Swedenborg's avowed end and aim in his scientific and philosophical research was the discovery of the real nature of the human soul.

In the *Principia* theory he finds the nexus between the finite and the Infinite in the "natural point," and the supreme force of nature in the pure and total motion of this point, which first becomes an element of the natural universe by successive composition and in the first aura. Later, in his treatises upon the *Animal Kingdom* he finds the nexus between spirit and matter in his spirituous fluid or bodily soul, the "form of the parts of which results from the essential determination of the first aura." In this supreme and wonderful spirit, and its operation in the human body, he reaches the goal of his ambition as far as natural science and philosophy could carry him. Beyond it lay the "great unknown," of which his labors could yield him but the natural effects. Revelation alone could open to him the world of spirit, the human soul itself, and the science of the spiritual world and of Theology. Beyond the finite is the Infinite, and beyond the inmost of the human body is the soul itself, which he calls immaterial, but Swedenborg had glimpses of this "great beyond" even in his scientific and philosophical period. For he had devout faith in the revelations of Holy Scripture, and frequently speaks of the Sun of Wisdom, of the

Deity of the universe, and of the heaven of the blessed. In his *Rational Psychology* he endeavors to associate the structure and phenomena of the human body with the qualities and operations of the mind, and this work, together with the *Worship and Love of God*, may be called intermediate between his philosophical and theological writings, for in them he reached beyond natural science and philosophy into the realm of the mind, or psychology. To those who are interested only in Swedenborg's scientific discoveries the philosophy of these later works does not appeal as it does to those who also accept the Doctrines taught in his subsequent theological works, and it is clear that the intermediate period will be viewed from two standpoints, the scientific and the theological.

The subject of intermediates, or of the nexus between the natural and spiritual worlds, and the corresponding one between the bodily soul and its spirit, called by Swedenborg in the theological works, the *Limbus*, or Border, has lately been treated in two articles appearing in the columns of magazines of the New Church, which we would commend to the attention of our readers.

A series of three papers by the Rev. C. Th. Odhner on the subject of the Limbus is published in New Church Life for April, May and June, 1903. In No. I. the writer states, "I believe that the differences of opinion as to what is meant by the 'Limbus' have arisen from the fact that this inmost natural substance, being intermediate between the natural and the spiritual, partakes of the qualities of both, and consequently can be regarded from two very distinct points of view: the scientific and the theological. Regarded from the point of view of natural science, the 'Limbus' appears as the inmost part or substance of the human anatomy, and the attempt has been made to identify it with the 'animal spirit' or 'spirituous fluid,' which is described at length in Swedenborg's scientific works. Regarded from the point of view of the spiritual doctrine of the New Church, the 'Limbus' has been identified with the mental substances which compose the exterior or natural memory of man. It is my purpose to show that both of these propositions are correct; that the substances of the lower memory are identi-

cal with the spirituous fluid, and that both are identical with the 'Limbus.' " In No. III. it is demonstrated, "That the Limbus is identical with that inmost fluid substance of the body which is called the 'spirituous fluid' or 'animal spirit,' " and a most interesting array of passages is brought from the scientific works in proof of the premise. The writer avows, however, that "it is not within the scope of our purpose, or, indeed, of our ability, to treat systematically and exhaustively of the vast subject of the animal spirit. This must be left to some specialist who is thoroughly acquainted, not only with Swedenborg's whole physiological system, but also with his cosmology. In the meantime, and in the absence of any thorough-going treatise on this subject, we can give only a few general outlines of Swedenborg's doctrine concerning the animal spirit, as bearing especially on the subject of the Limbus." And in conclusion, he states, "We cannot, at present, pursue this fascinating subject any further, but hope that some competent scholar will, before long, take up the whole subject of the first aura, and explain it in a popular manner."

We heartily coincide with the desire here expressed and hope that Mr. Odhner, or others of our readers, will prepare papers for publication upon the subjects of the first aura and of the animal spirit. It is especially desirable that the relative use of the terms "animal spirit" and "spirituous fluid" in the scientific works be explained clearly.

The second article referred to appeared in the *New Church Review* for October, 1903, and is entitled "The First Aura and the Plane of the Limbus," by Rev. L. P. Mercer. Acknowledging the results of the studies by Mr. Odhner, and "assuming as conclusive that the first aura of the *Principia* and of the *Animal Kingdom* is identical with that realm of the 'purer substances of nature' in which the Limbus is formed and subsists, and by which the spiritual world is enveloped and conserved," the writer undertakes to throw light upon several problems of spiritual philosophy, and in so doing gives an excellent outline of the theory of the first aura. In concluding, he states, "When we consider the continual reference of all beginnings and dominant movements of life, by Swedenborg in his *Animal King-*

dom, to the universal aura as the dominant and moulding force and substance, we may expect to find in a comparative study of his theological writings and his philosophical physiology true and rational conceptions of the simultaneous movements of the two worlds under the Divine Father in the origin of living forms and differentiations of successive generations in existing species. Without the first aura and its movements present in all succeeding formations, with the Infinite in it by the universal natural point or first ens, the doctrines and solutions of the work on the *Animal Kingdom* fall to the ground. It is by this that he explains the problem of problems, how dead substance becomes living substance, by manipulations and modifications of motions, rendering them subservient and reactive to spiritual influx."

Both of these treatises are valuable contributions to the elucidation of the subject of intermediates. The theories presented were brought to our notice some years ago by Miss Beekman, and we are glad to see them now set forth and published.

As the treatment in both cases is chiefly from the theological standpoint, we content ourselves with this mention.

EDITORIAL.

THE New Philosophy is the official organ of the Swedenborg Scientific Association and as such must aim to be expressive of its thought and activity as a body. The Association was organized not only for the purpose of preserving, translating and publishing the Scientific and Philosophical works of Emanuel Swedenborg, but also for the purpose of promoting the principles taught in those works. It is here that the New Philosophy has a wide field of usefulness before it. The papers read at our annual meetings, and the discussions of the various subjects treated of, are invaluable in promoting the life of the organization, but the time of the meetings is limited, and a comparatively small number of the members is able to attend and take part in the deliberations. In view of this fact, the New Philosophy should be a means whereby the members may come together in thought throughout the year. Without abandoning the high standard of the past in publishing translations of Swedenborg's works and exhaustive treatises upon allied subjects, the paper can be made more generally useful to the members, and hence more thoroughly representative of the common thought of the body. Heretofore the contributors have been limited to

a few of our more prominent students and writers, but we are quite certain that there are others who could furnish interesting and valuable material. The editor wishes to remind readers of the *New Philosophy* that its pages are open at all times to the discussion of live topics in the domain of science and philosophy, considered in the light of Swedenborg's teachings.

Swedenborg's Science is in its infancy. Many of his works are not accessible even to the student thoroughly conversant with the original tongue. But what we do know of his wonderful system reveals capabilities of development and application that exceed the bounds of the imagination. The fact that there is much we do not as yet understand should act as an incentive to further study and consideration. The explanations or interpretations we attempt need not be considered authoritative or final, but subject, as all matters purely scientific should be, to revision when clearer light is brought to bear upon them.

In this age of extended scientific research and discovery, confirmations of Swedenborg's theories are brought to light continually, if one only looks for them, and many interesting problems are also presented. Our faith in his principles is at times assailed by the modern discoveries and teachings. When this is the case the subject should be canvassed as publicly and thoroughly as possible. Such matters, bearing as they do upon the application of principles in which we believe, should be ventilated in our magazine that all may know the result, and the use of the journal will be greatly enhanced by it. Articles, notes and comments, questions for answer, news items and other communications in the line of the above suggestions will be most acceptable, and we hope that the members of the Association will unite to make the *New Philosophy* more generally popular as a means of mutual enlightenment, and thus more efficient in disseminating the principles of Swedenborg's Science.

REVIEWS.

Animal and Plant Correspondences: By A. L. Kip, the *Knickerbocker Press*, N. Y., 1902. "These studies are based on the doctrine that there is an exact parallelism or correspondence between every object in nature and some activity of the mind" (p. 237). Accepting this, the author's introductory statement, as a universal truth, and one which has found utterance in all those masters of philosophy, ancient and modern, who have seen in man's mind the microcosm which is reflected in the macrocosm of the outer universe, we would still have to raise the question as to the authority, or the scientific basis, for the particular correspondences here given. Swedenborg, who taught such a doctrine of correspondences, gives a vast number of instances from the literal sense of Holy Scripture, and the author occasionally refers to these, but not as a rule. John Worcester is sometimes cited, and his

works are referred to as giving a store of further correspondences; but for the most part the author gives his own interpretation of the spiritual or mental trait corresponding to the object he names, whether animal or plant, appealing to no other authority than his own and the reader's lively sense of poetic imagery and allegory, and using some excellent and always interesting sketches of the natural objects as given in accredited and popular writers, as a justification of his thus reading their spiritual significance. While the book can hardly be said, therefore, to have value either as science or doctrine, it may be regarded as an interesting but purely arbitrary effort to apply from one's individual standpoint, a universal doctrine to the elucidation of particulars. The very absence of reference to higher authority than the author's own imagination relieves the book of dogmatic assumption, and the reader will have pleasure in seeing how far the analogies here drawn seem to have a real basis in the objects described. While more dignified, because involving a deeper study of nature, and a wider range of observation, this kind of correspondence is hardly more scientific than that familiar to some readers in the old-fashioned "language of flowers." Unlike some of the author's previous books, the natural object of the correspondence is here described with fulness and accuracy, and so the reader is furnished material for judging of the reasonableness of the likeness traced. The case is quite different with the correspondences of Swedenborg, which in many instances are based on interior and hidden qualities of the natural object or event quite beyond the reach of the ordinary thought, and therefore to be accepted on authority as part of a truly revealed and not scientifically acquired system of truth. But the freedom to apply the general truth to the particulars of one's own knowledge and experience must be accorded. This is what is done more or less in preaching sermons from the Word; and so long as the line is distinctly drawn between the Divinely given truth and man's rational inferences from that truth, all such efforts are legitimate and their real value must be left to the verdicts of the rational and enlightened judgments of those addressed.

F. S.

The Riddle of the Universe. Ernst Haeckel. This work is an attempt to solve the problems of existence by the doctrine of Monism, of one degree of existence, namely, the material. This material existence is declared to be eternal, and identical with God. The author is both a pantheist and a materialist. After a scathing arraignment of all forms of supernaturalism, in which the idea of a distinction between God and nature, the soul and the body, and spirit and matter is rejected, he undertakes to solve the problem by asserting that there is but one kind of substance, namely, matter, the various activities of which account for all phenomena, even for mind itself. According to this theory

"there is no personal God," "no immortal soul," "no free will," p. 349. Although dogmatically asserting throughout the book that this Monistic philosophy solves "The Riddle of the Universe," in the last chapter he admits that the problem of substance is as much a mystery as ever. He says:

"We grant at once that the innermost character of nature is just as little understood by us as it was by Anaximander and Empedocles twenty-four hundred years ago, by Spinoza and Newton two hundred years ago, and by Kant and Goethe one hundred years ago. We must even grant that this essence of substance becomes more mysterious and enigmatic the deeper we penetrate into the knowledge of its attributes, matter and energy, and the more thoroughly we study its countless phenomenal forms and their evolution. We do not know the 'thing in itself,' that lies behind these knowable phenomena," p. 380.

Here, in the conclusion of the book, he acknowledges his absolute ignorance of the essence of the whole problem. Contrast this with his arrogant assumption in Chapter I., where he says:

"In my opinion, the three transcendental problems, the nature of matter and force, the origin of motion, and the origin of simple sensation and consciousness, are settled by our conception of substance," p. 16.

The author, however, has a very easy way of avoiding the difficulty, he says:

"But why trouble about this enigmatic 'thing in itself' when we have no means of investigating it, when we do not even clearly know whether it exists or not? Let us, then, leave the fruitless brooding over this ideal phantom to the 'pure metaphysician,' and let us instead, as 'real physicists,' rejoice in the immense progress which has been made by our monistic philosophy of nature," p. 380-381.

In other words, the monistic, materialistic, pantheism of Haeckel solves all the problems of existence, but is forced to confess its ignorance of the deeper things of nature.

The doctrine of discrete degrees is fundamental to a real solution of these universal problems of existence. The supernatural and the divine cannot be proved by materialistic methods. Even the purer things of nature, its higher degrees, are not capable of proof by the ordinary chemical and physical methods, yet all the grosser forms of nature are derived from the higher. To deny the divine and supernatural because not demonstrable by chemical and physical modes of investigation is both unphilosophic and unscientific. Every purely materialistic conception of the universe with its one degree, monism in the ultimate plane of existence, in its last analysis is compelled to cry mystery, plead ignorance, and confess its inability to solve the problem.

Supernaturalism has often raised the plea of mystery, and required a blind faith; but these are by no means essential factors of this belief.

Swedenborg shows a rational solution of the problem. He draws aside the veil separating the two worlds. He shows both the spiritual and the divine to be visible and tangible, manifest to the senses of man, not the senses of the body but of the spirit. They are demonstrable entities manifested to sight, hearing and touch; but to see the rational philosophy thereof, it is necessary to know that there are three discrete degrees of substantial existences, and to understand the relation of these to each other. The philosophy which solves the riddle of the universe is not a materialistic, pantheistic monism; but a philosophy recognizing a trinalism of Divine, spiritual and material substances, bearing the relationship of soul, spirit and body; the lower actuated and animated by the higher; the higher invisible and intangible to the lower; but capable of manifesting itself in various ways. They are manifested to many by the opening of his spiritual senses. The proof is as absolute as any demonstration of material fact.

J. W.

The Relation of Modern Science to Swedenborg's Principles of Nature, Especially His Doctrine of Fire, by Alfred H. Stroh. A paper read before the Principia Club of Bryn Athyn, Pa., at a regular meeting, May 20th, 1901, and a special meeting on June 12th following. 8mo., pp. 38.

This is a very interesting presentation of Swedenborg's theory of Fire, and contains numerous quotations from ancient and modern authors. It was published in abridged form in *New Philosophy* for October, 1902. Copies of the pamphlet may now be had on application to the Publication Office of the Swedenborg Scientific Association, Bryn Athyn, Pa. Price, 50 cents.

*Emanuel Swedenborg as an Anatomist and Physiologist, by Professor Dr. Gustaf Retzius. Published under the auspices of the Swedenborg Scientific Association, Bryn Athyn, Pa., 1903. The President's address at the Congress of Anatomists, Heidelberg, May 29th, 1903, which appears elsewhere in this issue of *New Philosophy*. May be obtained in pamphlet form at the Publication Office. Price, 10 cents.*

THE NEW PHILOSOPHY.

VOL. VII.

APRIL, 1904.

No. 2.

THE ACTIVE AND PASSIVE.

ONE of the philosophical doctrines to be found throughout all the works of Swedenborg is that concerning the existence of an active and passive in all productions. As illustrations of this, we may instance the atmospheres and the matters of the earth, the soul and the body; the spiritual and the natural, the Divine Being and the universe.

Of the active and passive we read:

"Throughout nature passive is associated with active; and this in order that the passive may break and limit the forces of the active body; otherwise the powers would not be bounded, they would have no sphere, and hence no form of which quality is predicable." *A. K.*, II., 491, note.

"Nature, in her greatest and least parts, has constantly associated together active and passive, the one to be the companion of the other; the agent or active, without the patient or corresponding passive, is a principle without a limit by which alone no effect is produced; the passive must be present, as a mediate, determinant and coefficient cause of the effect. Thus the ear, which is a passive organ, not only receives the sounds and words of the agent or active organ, the larynx, but also determines them distinctly toward the cerebrum or general sensorium; hence an effect is produced, as it were an offspring, which offspring is an idea." *A. K.*, II., 358, note a.

"The larynx and the ear are two associate organs, and mutually stand to each other in the relation of married partners; something almost similar to connubial rites takes place between them; for the one conforms itself, exactly and absolutely, to the modes, measures and actions of the other; when the one is active the other is passive, or what amounts to the same thing, when the larynx is sounding and speaking, the ear is imbibing and hearing the sounds and the speech." *A. K.*, II., 358.

The active force is the internal, the passive or receptive substance is the form by which the force is brought into external

manifestation. The active is as it were the soul, the passive is the body by which the inner force is brought forth to view. The active is relatively invisible and intangible, the passive relatively visible and manifest. The active is, as it were, the "power behind the throne," often unseen and unacknowledged; the passive is the manifest seat of power beyond which the sensual man does not rise in his judgment of causes. The rational man looks within to the active force as the cause, the sensual man, looking from the outside, blends cause and effect in the passive subject, ascribing all the phenomena to the passive instrument. Two different judgments of the same phenomena arise, one looking to real causes, the other immersed in fallacies and appearances. Swedenborg, by his doctrine of the active and the passive, places in our hands an instrument by which we can clearly distinguish these two modes of judgment, and see that the judgment from interior causes is rational and true; the other from outward appearances is fallacious and erroneous.

Some applications of this principle of the active and the passive will elucidate the subject, and render it more comprehensible and clear.

In the first place we must guard against the idea that the active is not substantial. There can be no activity except in a substance. Hence Swedenborg teaches of God that He is Substance Itself and Form Itself. He possesses a Divine Activity, which animates and actuates all things of the created universe. Created things relatively to Him are passive, being actuated from His infinite force and power. This force or power is transmitted through discrete degrees of substances down to the lowest, each succeeding degree being actuated by the next higher, and inmost by God Himself. The created universe is thus a chain of causes and effects from firsts to lasts, all animated or actuated inmost by God, but discreted from Him, as effects are from their producing Cause.

Let us, however, take some illustrations from nature itself. The sun is the active source of all the forces, powers, and effects in the solar system. These active forces are communicated to the earth through discrete degrees from highest to lowest: The activity of the substances of the sun, to be

transmitted, must have suitable media, the aura, ether and air. These are passive relatively to the sun, because they clothe and transmit its activity. Each degree, however, though passive to the higher, becomes an active force to the lower, because it actuates the lower as though it possessed this activity in itself. We can trace back all terrestrial activity through these degrees to the sun itself, which is the primary active force in its world.

The human body is full of illustrations of the two principles of an active and a passive. The brain and nervous system are the media by which the active force enters into the kingdom of the body. All life and activity descend thence into muscle, blood vessel, heart, lungs and bone. The muscles on receiving activity transfer and transmit the force to the lower forms, becoming an active relatively to them.

The same principles are illustrated in the first formation of the body. There is an active, living, formative force in the seed. This clothes itself with a passive in the ovum. By the union of the two a new individual is produced. The male gives the active, the female the passive. The active is the formative power or substance, weaving, as it were, the tissues out of the substances of the ovum and those furnished by the mother. When viewed by the microscope, we see only the visible substances that are formed. We see them successively moulded and built up into the form of the body; but the moulding active substance and force is in a higher degree, invisible to the gross senses, and visible only to the rational intellect looking beyond the sense impression to the cause working within. The observer who is governed by sense alone sees nothing of the inner cause; the rational philosopher rises from the effect to the cause, and divines the wonderful operations at work within. As an illustration of this ascent to the inner active force we will quote a portion of Swedenborg's rational analysis of the formation of the chick in the egg:

"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. With respect to this formative substance or force, such is the defect of terms, that we can predicate scarcely anything adequate of it, except that it is the first, the most perfect, the most universal, and the most simple of all the substances and forces of its Kingdom;

and that it has assigned to it, within its own little corporeal world, a certain species of omnipresence, power, knowledge and providence. The first ends, as well as the middle and ultimate ends . . . appear to be present to it and inherent within it simultaneously and instantly.

"According to the nature and state of this formative substance . . . causes flow into their effects. . . . The formative force or substance is the cause, whose nature . . . determines the form of all things in the body.

"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.

"Since, then, all things are most nicely subordinated and co-ordinated, it follows that the spirituous fluid is the first cause; the purer blood, the second cause; and the red blood, the third cause, or the effect of the former causes; also that the purest fibrils are first produced; then the vessels of the purer blood; and lastly the vessels of the red blood.

"Consequently, as the living creature grows successively in the egg or womb, it passes through four remarkable changes and diversities of state. The first, when by the mediation of the spirituous fluid, the initiations of the two brains and medullæ are drawn and delineated. The second, when by the medium of the purer blood the simple texture of the heart is provided. The third, when by the medium of the red blood the lungs are brought into existence. The fourth, when the lungs themselves begin to breathe the air." *E. A. K.*, I., 247.

Here we see a rational analysis by which the mind is lifted up from the visible effects to the invisible cause, which cause is the soul that forms and afterward governs the body. It is the part of wisdom to perceive these interior causes, and not to dwell entirely in the plane of the effects visible to the senses. This dwelling in the lower planes almost exclusively is one of the defects of modern science. In embryology little attention is given to the active force operative in the formation. The mind is drawn down to the sight of the eye, which is busy observing the changes that take place. A judgment is then made from sense appearances alone, while sight is lost of the real cause operating within.

Embryologists do indeed describe the process of fecundation by the male, and recognize that this is essential to any production; but they do not perceive that each sex gives a dis-

crete degree to the new individual—the male giving the active, the soul, the formative substance; and the female clothing this, and bringing it into the world. Neither do they recognize the truth that this formative soul, once communicated, is ever afterwards within the organism, performing all the operations both in the formation of the embryo and governing the completed individual.

The active clothes itself with a substance in a lower plane, thereby bringing its activity into lower forms, descending, as it were, by the steps of a ladder, and manifesting its own nature and quality in a lower degree. This lower is the passive instrument which brings forth to manifest view what is deeply hidden in the higher. It corresponds in all particulars to its animating soul and cause. The universe is constructed in all its particulars according to this order, for we find proofs and illustrations of the law of the active and passive in each and everything. In conclusion, we will quote from the work on *Influx*, (No. II), as follows:

“It is well-known that in every operation there is an active and a passive, and that nothing exists from an active alone, neither from a passive alone. It is similar with the spiritual and the natural. The spiritual, because it is a living force, is active; and the natural, because it is a dead force, is passive. Hence it follows, that whatever has existed in the solar world from the beginning, and afterwards exists every moment, is from the spiritual by means of the natural, and this not only in the subjects of the animal kingdom, but also in the subjects of the vegetable kingdom. . . . That in the production of effects these two forces appear as one, is because the spiritual is within the natural as the fibre is within the muscle, and as the blood is within the arteries; or as thought is within the speech, and affection within the sounds of the voice, and make themselves felt through the natural from these. . . . It is a truth testified by every created thing, that a posterior does not act from itself, but from the prior from which it is, thus that neither does this act from itself, but from something still prior, and that nothing acts except from the First, which acts from Itself, thus from God.”

JOHN WHITEHEAD.

HISTORICAL NOTICE OF SWEDENBORG'S WORK ON CHEMISTRY.

SWEDENBORG'S work on Chemistry was published at Amsterdam in 1721. (*Prodromus || Principiorum || Rerum Naturalium || Sive || Novorum Tentaminum || Chymiam & Physicam Experimentalem || geometricè explicandi. || Amstelodami, || Apud Joannem Osterwyk, 1721. || Sumtibus Autoris. ||* [pp. 199, 16mo]). As the title says, the work is "A fore-runner of the first principles of natural things, or of new attempts to explain chemistry and experimental physics geometrically." The work is a "fore-runner" of a larger work which it appears that Swedenborg planned to publish. However, he never did publish it. It has sometimes been supposed that the manuscript commonly known as the *Lesser Principia*, the publication of which has been undertaken by the Royal Swedish Academy of Sciences, is the complete work of which the "fore-runner" was published. But this is not the case. The *Lesser Principia* is clearly a work written sometime *after* the "fore-runner," and shows the process of development of those important principles of natural philosophy which were finally published in 1734 in the *Principia*. From the numerous references in the "fore-runner" of 1721, it may be inferred that Swedenborg wrote a work, or planned a work and perhaps partly finished the writing of it, at least in the form of a draft, the manuscript of which is not known to be in existence. There is much to be said regarding the question of the proper date of the *Lesser Principia* and its relation to the "fore-runner" of 1721, and to the *Principia* of 1734, but a full discussion of the evidence would occupy much space.

In the *Documents* Dr. R. L. Tafel says on page 901 of Vol. II:

A favorable notice of this work [*i. e.*, the 'fore-runner' of 1721] appeared in the *Acta Eruditorum* of Leipzig, in the number for February, 1722, pp. 83 to 87. At the close of his review the critic says, 'It is to be observed that the illustrious author endeavored to give an account *a priori* of all those facts which are established experimentally;

and indeed that he endeavours to deduce the ultimate causes from the shape, the size, the weight, and the interstices of the particles. In doing so he displayed much penetration, and no less industry; but how much of truth he attained in his theories, we leave to others to determine.¹

Dr. Tafel continues :

A second edition of this work was published in Amsterdam by John and Abraham Strander in 1727, and a third in Hildburghausen in 1754 by J. G. Hanisch.

It is certain that a second edition was published in 1727 as stated above, but it would be interesting to know whether a third edition was published in 1754, or whether Dr. Tafel based his statement on the data given on a new title-page of the work contained in a copy preserved in the Royal Library at Stockholm. The copy in question is a very interesting one, and the writer had many opportunities of examining it and preparing some notes on it while in Sweden. The copy has wide margins, is bound in a dark leather and yellow paper, and contains two fly-leaves before the title-page. On the outside of the first fly-leaf, near the middle of the page, there is written by Swedenborg :

"Hæc Lucubrationes, quæ sunt primitiæ, dono dantur Viro nobili, Equiti, consiliario Cancellariæ A. Stiernmanno, amico,
ab autore

Holmiæ 1760, d. 12 Maii

EM : SWEDENBORG."*

At the bottom of the page Swedenborg wrote :

"Eques in sensu spirituali, qui vocatur sensus mysticus, significat Scientem et intelligentem; similiter Stiernmann, nam stellæ in eo sensu significant cognitiones veri et boni, ita stellarum vir scientem et intelligentem."**

*"These treatises, which are my first fruits, are given as a present to the nobleman, knight, councillor of the Kansli, A. Stiernmann, to a friend,

by the author

Stockholm, 1760, the 12th of May.

EM : SWEDENBORG."

***"A knight in the spiritual sense, which is called the mystical sense, signifies one who is knowing and intelligent; likewise Stiernmann, for stars in that sense signify the cognitions of truth and of good, thus a man of stars, one who is knowing and intelligent."

Between the last two words the word "in" was written by Swedenborg and then crossed out.

The name "Stiernmann" literally translated from the Swedish is, "Starman."

It may be remarked in passing that at the library of the University of Upsala, *Carolina Rediviva*, there is preserved a volume bound in parchment, with wide margins, containing the "fore-runner" of 1721, together with the three other treatises published by Swedenborg in 1721. On each of the three title-pages is written, at the top, "Emanuelis Svedenborgii," and at the bottom,

"Bibliothecæ Upsaliensis
anno 1722
dono Nobiliss. Auctoris."

From this and from several other cases which have come to the writer's attention it appears that Swedenborg not infrequently presented his works, not only the scientific but also the theological ones, to friends, learned men, and universities.

In the volume preserved at the Royal Library, on the *second* fly-leaf, on the inside, facing the title-page, former Librarian Klemming wrote in lead pencil:

"En ny bokhandlar titel
är tillagd här och är rar."*

Librarian Klemming, by the way, often wrote short notes in lead pencil or ink in volumes in the Royal Library and also on manuscripts. There are many such annotations on the Swedenborgiana, both printed matter and manuscripts, which are preserved in the Royal Library, and sometimes they are of much value. Librarian Klemming was an enthusiastic collector of all material relating to Swedenborg, and succeeded in making a unique collection, which is of the very greatest value and interest, and which has never been fully described. But to return to the new title.

On the page after the title-page, on rather rough paper, is the new title-page, which reads as follows:

"Prodomus || Principiorum || Rerum Naturalium || sive ||
Novorum || Tentaminum || Chymiam & Physicam Experi-

*"A new book-dealer's title is added here and it is rare."

mentalem || Geometrice explicandi. || Amstelodami, 1727. || Prostans || apud || Ioh. Godofredum Hanischium || Bibliopolam Hildburghusenum. || Hildburghusæ 1754."

Dr. R. L. Tafel in his *Emanuel Swedenborg as a Philosopher, and Man of Science*, (1867), quotes on p. 244 from *The New Jerusalem Magazine* for November, 1830, where the then "recent" science of Crystallography and M. Dumas's statement of Swedenborg's anticipation of the fundamental ideas of the new science were noticed. The latter part of Dr. Tafel's quotation is herewith cited :

This subject is mentioned in a work on 'Chemical Philosophy' recently published in Paris, consisting of a course of lectures delivered in the college of France by M. Dumas, a gentleman of much and deserved celebrity. There is a notice of this work in the forty-fifth number of the *Foreign Quarterly Review*, published in London. M. Dumas distinctly ascribes to Swedenborg the origin of the modern science of crystallography. He says, 'It is then to him we are indebted for the first idea of making cubes, tetrahedrons, pyramids, and the different crystalline forms, by grouping the spheres; and it is an idea which has since been renewed by several distinguished men, Wollaston in particular.'

In the same work by Dr. Tafel, on pp. 244-245, there is the following quotation from No. 160 of the *Intellectual Repository* for 1853, regarding Professor F. C. Calvert's opinion of Swedenborg's work on Chemistry :

In a lecture on 'Atoms, and the Molecular Arrangement and Properties of Bodies,' recently delivered at the Royal Institution in Manchester, by the eminently scientific lecturer on chemistry, PROF. F. C. CALVERT, it was asserted by the lecturer that 'Swedenborg was the first to discover that atoms were spheres, and that with them cubes, octohedrons, etc., could be formed.'

The only translation of the "fore-runner" of 1721 which has ever been published was issued by the Swedenborg Association in London. 1847, under the title, *Some Specimens of a Work on the Principles of Chemistry, with other Treatises. By Emanuel Swedenborg*. 8vo, pp. 253. The volume, besides the "fore-runner," includes the three other treatises published by Swedenborg in 1721.

When the writer first began to study this remarkable work

by Swedenborg on geometrical chemistry he was convinced that the theory given by Swedenborg must be fundamentally true. Not long after, while turning over Van 't Hoff's *Arrangement of Atoms in Space*, what was his surprise to find Swedenborg's work recognized in the introduction as the first contribution to stereo-chemistry. This has been noticed before in an article published in *The New Philosophy* for October, 1901, p. 131, but the complete quotation from the introduction in question will be presented in this place:

Every time I write on stereo-chemistry a new name has to be added to complete the history of its development. In my "Dix Annees dans l'Histoire d'une Theorie" I mentioned Gaudin and his "Architecture du Monde," 1873; then Meyerhoffer in his "Stereochemie" added Paterno,¹ who in 1869 proposed to explain isomeric bromoethylenes by a tetrahedral grouping round carbon; and Rosenstiehl,² who in the same year, represented benzene by six tetrahedra; and now Eiloart, in his "Guide to Stereochemistry," goes back to Swedenborg's "Prodromus Principiorum Rerum Naturalium sive Novorum Tentaminum Chymiam et Physicam Experimentalem geometricè explicandi."³ See *The Arrangement of Atoms in Space*, by J. H. Van 't Hoff. Translated by Eiloart. Longmans, Green & Co., 1898. Pp. 211. The quotation is from page 1 of the *Introduction* by Van 't Hoff.)

In *Science* for October 23d, 1903, pages 513-529, is contained a very interesting review of "*The Atomic Theory*," by Professor F. W. Clarke, of Washington, D. C., delivered on May 19, 1903, before the Manchester Philosophical Society, as the Wilde Lecture. On pages 515-516 Swedenborg's chemical theory is referred to as follows:

To Boyle and Newton the atomic hypothesis was a question of natural philosophy alone; for, in their day, chemistry, as a quantitative science, had hardly begun to exist. Attempts were soon made, however, to give it chemical application, and the first of these which I have been able to find was due to Emanuel Swedenborg. This philosopher, whose reputation as a man of science has been overshadowed by his fame as a seer and theologian, published in 1721 a pamphlet upon chemistry, which is now more easily accessible in an English

¹Gior. di Scienze Naturali ed Econ. vol. V., Palermo; Gazz. Chim. 1893. 35.

²Bull. Soc. Chim. 11, 393.

³Jañ Osterwyk, Amsterdam, 1721.

translation of relatively recent date.* It consists of chapters from a larger unpublished work, and really amounts to nothing more than a sort of atomic geometry. From geometric groupings of small, concrete atoms, the properties of different substances are deduced, but in a way which is more curious than instructive. Between the theory and the facts there is no obvious relation. The book was absolutely without influence upon chemical thought or discovery, and, therefore, it has escaped general notice. It is the prototype of a class of speculative treatises, considerable in number, some of them recent, and all of them futile. They represent efforts which were premature, and for which the fundamental support of experimental knowledge was lacking.

In 1775, Dr. Bryan Higgins, of London, published the prospectus of a course of lectures upon chemistry, in which the atomic hypothesis was strongly emphasized. It was still, however, only an hypothesis, quite as ineffectual as Swedenborg's attempt, and it led to nothing.

The early workers of the first half of the nineteenth century, Dumas and Calvert, who referred to Swedenborg's chemical theory, saw in it the first discovery of the underlying principles which determine crystalline structure, and, indeed, this is involved in Swedenborg's theory. When Swedenborg's work was noticed by Eiloart in his *Guide to Stereo-chemistry*, the great authority on stereo-chemistry, Professor Van 't Hoff, of the University of Berlin, acknowledged it as the first work which anticipated the now triumphant science of stereo-chemistry. Dr. Clarke, however, treats the whole question in a very critical manner. He acknowledges that he has found no one prior to Swedenborg who attempted to apply the atomic hypothesis to chemistry, but asserts, nevertheless, that Swedenborg's attempt "is the prototype of a class of speculative treatises, considerable in number, some of them recent, and all of them futile." He also sees no obvious relation between the theory advanced and the facts adduced. It is, indeed, true that Swedenborg's work was futile in the sense that it was not followed by a grand development in the world of chemistry, and so far as is known today "the book was absolutely without influence upon chemical thought or discovery." But Sweden-

*"Some specimens of a work on the Principles of Chemistry with other treatises." London, 1847. Originally published at Amsterdam, in Latin. [1721.]

borg's work was by no means futile when considered as a necessary link in that chain of physical, chemical and cosmological investigations which produced the first work in the world presenting a nebular hypothesis of the origin of the planets from the sun. It may even be that Kant, Buffon and LaPlace were indebted to Swedenborg to some extent. LaPlace mentions his indebtedness to Buffon, and the writer recently saw Buffon's set of Swedenborg's *Opera Philosophica et Mineralia* in the Forbes collection of Swedenborgiana preserved in the book-rooms of the American Swedenborg Printing and Publishing Society, at 3 West 29th street, New York City. In each of the three volumes, on the title-pages, is the autograph "Buffon," and below it the date "1736." This shows that Buffon had the *Principia* two years after it was published, thus long before he published his own work. Another consideration is, that by means of the "bullular hypothesis," which Swedenborg formulated in the "fore-runner," he really laid the foundation of his most remarkable discoveries in physiology and psychology, for on the sure path of *mechanical* conceptions of matters and substances, that they consist of corpuscles of varying degrees of composition, elasticity and other attributes, he was enabled to formulate his *rational psychology* and to explain many things theoretically which have been most amply substantiated by the whole course of subsequent discovery.

Experience shows that the only way in which the value of Swedenborg's philosophical and scientific works can be justly gauged is by viewing them as a whole. When this is done it is found that Swedenborg began as an observer and experimenter, made various discoveries; but always reaching out for the solution of the more subtle and elusive secrets of nature, finally devoted most of his time to reasonings on the basis of the observations and experiments made by others. It was not because he under-valued observation and experiment that he did this. No scientist or philosopher has commended them in more favorable terms. But he loved the direct *meditation* upon the causes of things so much better than the *observation* of the effects of those causes that he finally devoted himself exclusively to what he loved best. And his choice was a wise one, for

otherwise he would have stopped half way and never reached his goal; consequently the world would not have received from his pen the most wonderful philosophy of the universe around us and the human body which has ever been written.

Swedenborg's position in the history of science and philosophy is unique. He stands midway between the older workers in the field on the one hand, who were bound to trust more to theory and such few experiments as had been made, and the great army of men on the other hand, who observe and experiment in all directions with the help of the finest appliances and instruments which modern industry can perfect. This view places Swedenborg's Chemistry in its proper position. With such experiments as he had, (and from the preface to the "Fore-runner" it may be seen that he thought he had a great many), he applied the atomic hypothesis, which had been revived by Gassendi and Boyle, to the chemistry of his time. In his preface he says, "The reader will be equally astonished with myself, that the knowledge of invisibles has remained hidden from the learned world up to the present time, when so many experiments respecting them are on record." He then marvels at the perfection of the experiments and discoveries in the fields of physics and chemistry and the height to which geometry had been developed, and continues, "If, therefore, a thousand signs indicate one thing, we must suppose, as the subject is purely geometrical, that it may eventually be discovered and demonstrated. For what are Physics and Chemistry? What is their nature, if not a *peculiar mechanism*? What is there new in nature, *which is not geometrical*? What is the variety of experiments, but a variety of *position, figure, weight, and motion* in particles?" It is in this conception of *peculiar mechanism* and *geometrical* arrangement, which Swedenborg saw must be the secret to the many phenomena of physical chemistry, that the value of his work consists. What indeed "is the variety of experiments, but a variety of *position, figure, weight, and motion* in particles?" The very same question may be asked today quite pertinently for the reason that this view is fundamental to any thorough consideration of the constitution of matter. As he usually does, Swedenborg went right to the heart of the question; he saw

the fundamental law clearly, applied it fearlessly, was not discouraged because his contemporaries did not accept his views, but went ever forward with the hope of unlocking still more interior secrets in nature. He succeeded so fully that we do not hesitate to assert that he will some day be everywhere recognized as the greatest natural philosopher who has ever lived.

ALFRED H. STROH.

THE DUCTLESS GLANDS.

A VALUABLE work on the physiology of the ductless glands has recently come from the pen of Dr. Charles E. de M. Sajous, of Philadelphia.¹

The theory advanced by Dr. Sajous regarding the functions of the pituitary body, the thyroid gland and the adrenals, if supported by future investigation, seems likely to revolutionize modern ideas respecting cellular metabolism. The theory is based largely upon modern research in histology, physiological chemistry and allied branches, and it is worthy of note that, starting from this basis, the author has reached conclusions which in several respects resemble the views advanced by Swedenborg. A brief presentation of these points of resemblance will be of interest.

According to Sajous, the anterior pituitary body, the thyroid gland and the adrenals together compose a system which controls oxidation throughout the body. The anterior pituitary body is the adrenal nerve-centre; the thyroid, by its iodine secretion, acts as a stimulative adjunct to this centre; and together they regulate the functional activity of the adrenals.

In regard to this activity the author says:

"The physiological function of the internal secretion of the adrenals is to combine loosely with the atmospheric oxygen in the lungs and to endow the blood plasma with its oxidizing properties."²

¹*The Internal Secretions and the Principles of Medicine*, by C. E. de M. Sajous, M. D.; F. A. Davis Co., Philadelphia, 1903.

²*Monthly Cyclopedia of Practical Medicine*, Vol. VI., p. 83.

This is equivalent to saying that it converts mere serum or lymph into genuine blood.

Comparing this statement with Swedenborg, we read :

"That the juice of the cavity of these [adrenal] glands . . . is a kind of extremely pure extract of the blood, and has a power of imparting a certain sanguineous tincture and nature to the serum, is here stated as a conclusion from what has gone before. . . This much at least is certain, that immense numbers of lymphatics permeate these capsules after birth, and in adult subjects, and that no more serum is admixed than is wanted for the blood. Hence it follows that this juice is an extract most rich in blood, one drop of which will ensanguinate a little volume of serum."³

It is apparent that Swedenborg recognized in the adrenal secretion a fluid important in the process of blood formation. He emphasized the fact that the glands possess an attractive power, by which they are enabled to draw the purer volume of the blood away from the kidneys and lower region generally, and to return it to the venous stream by a "short cut." He also pointed out that the adrenals are the centre of a lymph circulation, drawing this fluid from the peritoneal folds and—after vivifying it—injecting it into the blood current. This latter view gives added color to Sajous's theory of the vitalizing effect of the adrenal secretion.

Swedenborg did not, of course, connect this secretion with oxygen, as that element was not discovered until a year after his death. He did, however, call attention to the fact that the adrenals are much larger during embryonic life, when the lungs are inactive, than they are after birth.⁴

This fact has a direct bearing upon Sajous's theory, for during the prenatal period, instead of imbibing oxygen directly from the atmosphere, the embryo must derive it indirectly, from the maternal blood in the placenta. Hence it follows that—a larger quantity of adrenal secretion being needed for this purpose—the glands would be more highly developed in the fœtus.

³*Animal Kingdom*, Vol. I., No. 275.

⁴*Animal Kingdom*, Vol. I., No. 275.

Sajous's conclusion regarding the function of the adrenal secretion aided in the solution of many hitherto obscure physiological problems. He says:

"The ease with which oxygen carried by the plasma could penetrate the minute vascular networks of all cellular elements not only furnished a clue to the physiological chemistry of the latter, but it also led to the discovery that various structures, the functions of which were unknown, were in reality blood-channels, or rather plasma-channels. Thus the axis-cylinders of all nerves and the dendrites of neurons were found to contain a fluid identical to blood-plasma in its reactions to staining fluids. Even the neuroglia-fibrils asserted their identity as plasma-capillaries, the neuroglia felt-work of the substance of the brain and cord representing the intrinsic circulation of these organs. The muscular contractile structures, the various glandular organs, including the liver, pancreas and spleen, the gastric and intestinal glandular elements, etc., were all found to be so disposed as to allow free circulation of this oxidizing plasma, the red corpuscles passing on in the larger channels"⁵

These statements confirm in a general way Swedenborg's teaching regarding the circulation of a higher order of blood through the nerves and fibres.⁶ We would hardly be justified in claiming that this oxidizing plasma is in reality the animal spirit, but the connection which Sajous traces between the adrenal secretion and the anterior pituitary body seems more than a coincidence. With reference to this subject he observes:

"Our investigation showed that the adrenals were directly connected with the anterior pituitary body through the solar plexus, the splanchnic nerves and the cervico-thoracic ganglia of the sympathetic. Indeed, this diminutive organ, hardly as large as a pea, and now thought to be practically functionless, proved to be the governing centre of the adrenals, and, therefore, of all oxidation processes."⁷

In regard to this organ Swedenborg says:

"The cerebrum pours the spirit of its fibres, in union with

⁵*Monthly Cyclopedia of Practical Medicine*, Vol. VI., p. 4.

⁶*Economy of the Animal Kingdom*, Part I., No. 128 et seq. See also *The Brain*, Part II., No. 493 et seq.

⁷*Monthly Cyclopedia of Practical Medicine*, Vol. VI., p. 5.

the arterial juice of the glandular choroid plexus, through a particular efferent vessel, the infundibulum, into a certain conglobate gland, for the pituitary gland exactly resembles the conglobates."⁸

This would suggest that there might be a physiological relation between the secretion of the adrenals, which permeates the nerve fibres, and the "spirit of the fibres," poured out by the cerebrum into the pituitary body and thence into the system, for it is stated by Swedenborg that a portion of the animal spirit is sent out through the nerves, while the remainder traverses the infundibulum to the pituitary body, proceeding thence into the venous sinuses and thus to the descending blood-stream.⁹

Sajous assigns to the thyroid gland a prominent part in body metabolism. According to him it acts as an adjunct to the pituitary body, sustaining the functional efficiency of the latter by means of its secretion—iodine in organic combination. Whether this be true or not, it is certain that the thyroid is of vital importance to the system, for it is well known that disease of the gland is followed by serious disorders of nutrition, like myxœdema, cretinism and exophthalmic goitre.¹⁰

Swedenborg does not seem to have formulated any very definite theory regarding the functions of the thyroid gland. He conjectures that the stomach, through the œsophagus, draws from it "the spirits and nobler essences which are of use in digestion."¹¹ We do not here find any close analogy between Swedenborg's ideas and those of Sajous, further than that both of them recognize the formation by the gland of a "spirit or nobler essence," an "internal secretion."

⁸*Animal Kingdom*, Vol. I., No. 190.

⁹*The Brain*, Part I., Nos. 330, 331. See also Miss Lillian Beekman's article, entitled *Mechanism in the Brain, etc.*, *New Philosophy*, January, 1901.

¹⁰Total extirpation of the thyroid gland results in a condition known as cachexia strumipriva, which closely resembles myxœdema. Complete removal of the pituitary body causes speedy death, preceded by convulsions, dyspnœa and rapid emaciation. Death also ensues from total destruction of both adrenals.

¹¹*Animal Kingdom*, Vol. I., No: 8r.

According to the theory of Sajous the leucocytes, or white blood corpuscles, play an important role in bodily nutrition. They assist in the formation of certain nutrient substances, (peptone, myosinogen, fibrinogen, hemoglobin and myelin), which either build up new tissues or liberate heat and energy. This process is carried on largely by means of phagocytosis, which thus becomes a very important function in the metabolic cycle.¹²

In connection with this peculiar ability of the leucocytes to ingest and digest substances with which they come in contact, and with their ability to exhibit amœboid movements, note the following quotation from Swedenborg:

"Nothing is more common than for forms in a state of quick motion to appear in all those parts where the afflux of the spirits is abundant. . . . So that it seems as if the substance called animal spirit were in the constant desire and endeavor, wherever opportunity is offered, to clothe itself with a body, which, however, quickly relapses into its constituent principles or spirits."¹³

This statement is quite applicable to the wandering cells of the blood and lymph.

Referring to the presence of the adrenal secretion in muscle-fibre, Sajous says:

"We found that contraction of the heart-walls was in great part due to this secretion, and that the latter penetrated the heart substance by way of the Thebesian foramina. The coronary arteries did not lose their functional importance, however; they also were found to supply the cardiac muscle-fibres with oxidizing substance."¹⁴

That the nutrient fluid of the heart penetrates its substance through the Thebesian foramina is an interesting "re-discovery" of a fact well known to Swedenborg, for he says:

"There are little columns and lacunæ in the ventricles and auricles; there are fleshy ducts; and there are motive fibres. The blood flows from the heart into the lacunæ, especially under the columns; from the lacunæ it is expressed into the fleshy ducts; from the fleshy ducts

¹²*Monthly Cyclopedia of Practical Medicine*, Vol. VI., p. 88.

¹³*Animal Kingdom*, Vol. I., No. 81.

¹⁴*Monthly Cyclopedia of Practical Medicine*, Vol. VI., p. 4.

into the fibres; from the fibres into the coronary vessels, both arteries and veins; from the coronary vessels . . . into the aorta or . . . the right auricle."¹⁵

Swedenborg thus makes the so-called coronary arteries act as veins. Although Sajous does not admit this to be the case, he seems to have established beyond dispute that the heart is not entirely dependent upon its tributary, the aorta, for nourishment.

It may be seen from the foregoing comparisons that the germs of many of the most recent discoveries in science—especially in physiological science—are contained in the works of Swedenborg, and we cannot but marvel at the genius of a man who, from such a narrow and imperfect basis in fact, was enabled to formulate principles and discover laws so accurate, so varied, and so far-reaching.

E. A. FARRINGTON, M. D.

THE PROGRESS OF SCIENCE.

THE history of science from ancient to modern times, is one series of kaleidoscopic changes. The alchemist, in his search for the magic touchstone, laid the foundations of chemistry, by bequeathing to posterity a mass of chemical facts, but his theories died with him. The astronomer of the Middle Ages, though adding his quota of facts to the knowledge gained from the East, was utterly at sea in his attempts to explain them. The physician of early times gathered together a few facts regarding the use of remedies in the treatment of the sick, but his notions as to the workings of disease and even some of the simplest problems in physiology were little short of ridiculous. Even after the rule of superstition and dogmatic assumption was broken, old theories continued to give place to new, as the light of new discoveries was brought to bear upon them, and although it cannot be denied that substantial progress has been made in the clearing up of many questions hitherto obscure or entirely misunderstood, the forward movement has consisted, for the most part, in the recording of innumerable

¹⁵*Economy of the Animal Kingdom*, Part I., No. 398.

facts and phenomena, which as yet have received no rational explanation. This is especially true of the remarkable additions to scientific knowledge during the past decade. Never before have investigators penetrated so deeply into the mysteries of Nature. New forms of matter have been isolated, new forces discovered. In the laboratory, results have been attained, which, a few years ago, were considered absolutely impossible. The advent of the X-ray opened the way for a series of notable discoveries along the line of radio-activity, from the rays described by Becquerel down to the "n" rays of Blondlot and the actinic emanations from the living body, recently demonstrated by Charpentier. As a result many old and apparently well established theories have been exploded. The list of so-called elements has gradually expanded, and now even the theory of atomic indivisibility is proved a fallacy by the discovery of countless smaller bodies or "ions" in the atom itself. Investigations in the field of biology have collected unmistakable evidence that the theory of natural selection, universally accepted as the prime factor in evolution, is by no means an adequate explanation of the origin of species. Evidently science is passing through a transition period. The solid substratum of facts is more solid than ever, and has attained to the more interior planes of Nature, but the superstructure of theory is fast becoming unstable.

In this connection it will be interesting to note the effect of the awakening of interest in Swedenborg's science and philosophy among men of the learned world. In certain respects they have been approaching the views of the great Swedish scientist, as shown, for instance, in the electromagnetic theory of light, which, though it dates back to the year 1861, is now being more fully developed, and has led to the first positive proof of the existence of the ether. Roentgen opened the gates of a realm in which Swedenborg was quite at home. Those who have read the address of Prof. Gustaf Retzius before the Congress of Anatomists at Heidelberg, and the tribute to Swedenborg's genius by Max Neuburger, may readily conclude that he is to receive more than a passing notice. Moreover, the great number of discoveries made by Swedenborg, but attributed to later investigators, cannot fail to excite wonder

and admiration for the man who could so outstrip his contemporaries. The test of true genius is not the collating of a large number of facts, but the ability to reason correctly from the facts in hand. Swedenborg, with comparatively few facts at his disposal, arrived at conclusions which have been reached by others only after the lapse of more than a century. This was because he was guided by certain rational principles which he himself had formulated, and of such universal bearing were they that, into whatever field he entered, they were constantly at his service. Few authors have written so voluminously and yet with such remarkable unity throughout. His gigantic system is rational and consistent in every detail. This in itself should appeal to the mind of every affirmative student. That which is rational never grows obsolete. The lapse of ages in no wise detracts from its validity. The Science of Swedenborg is just as true and just as capable of application in the twentieth century as it was when fresh from the author's pen, and is bound to have at least some effect on the prevailing theories of the day. The extent of this effect is a matter for conjecture. One thing, however, is obvious, and that is that the widespread agnosticism among scientists will effectually bar any very general acceptance of Swedenborg's teaching. Swedenborg had a profound belief in an all-wise Creator and a life hereafter. It is well known that, from early childhood, his thought turned toward the contemplation of spiritual things. This native bent is strongly evidenced in his writings. In fact, it was his avowed object, through all his scientific career, to investigate the soul. The objection might easily be raised that his science is tinctured too strongly with religious hue to be strictly scientific. For this reason, we believe that some of his treatises may not meet with favor.

But Swedenborg has done a wonderful thing; he has demonstrated that a true science and a true religion are not incompatible, and, indeed, that the one may serve as a basis in the mind for a more intimate conception of the other. What more consistent when contemplating the works of the Creator, than to turn the thoughts to the Creator Himself?

HARVEY FARRINGTON, M. D.

NOTE AND COMMENT.

ON another page we publish an interesting historical review of Swedenborg's *Specimens of a Work on the Principles of Chemistry*, by Mr. A. H. Stroh. This early work of Swedenborg's contains not only the outlines of his later theory of cosmogony, but also the germs of several physico-chemical theories which are usually attributed to more recent investigators.

Thus the founder of stereo-chemistry is commonly supposed to be Louis Pasteur, who, in 1860, proposed "certain crystalline properties in molecules" as an explanation of the remarkable properties of the tartaric acids. Wislicenus, in 1873, asserted that tri-dimensional formulæ were necessary to account for the behavior of the lactic acids, and in the following year Van 't Hoff and le Bel developed these ideas into a consistent theory, in which the carbon atom was represented as a regular tetrahedron. As a matter of fact, Swedenborg, in his *Specimens*, had ascribed a definite geometrical figure to atoms and molecules and had shown that their properties depended upon this figure, over a hundred years before Pasteur was born.

Again, the establishment of crystallography upon a mathematical basis is generally attributed to Rene Just Haüy. Nicolaus Steno had noted as early as 1669 that the corresponding angles of different specimens of rock-crystal were equal. Later, Guglielmini had established the constancy of crystal-angles as a general law, but no systematic theory had been developed by these observers, and it is commonly supposed that none appeared until 1784, when Haüy published his *Essai d'une Theorie sur la Structure des Cristeaux*. Now Swedenborg, in 1721, not only described the structure and cleavage of certain crystals as accurately as did later writers, but in addition he explained these phenomena upon a remarkably simple geometrical basis. Thus he antedated Haüy, de l'Isle and other early crystallographers by about sixty years, and, indeed, it is not unlikely that the Swedish chemist Bergmann, who is credited with the discovery of cleavage, derived his ideas from the *Specimens*.

Swedenborg's observations regarding water of crystallization were far in advance of his day. In fact, this occluded water was not understood until comparatively recent years, and even now no theory accounting for it is as simple and reasonable as his. In several places Swedenborg treats of water particles which behave very much like what is now known as water of constitution, the recognition of which is ascribed to Thomas Graham. Moreover, here and there in the *Specimens* there are glimpses of the modern theory of solution as elaborated by Pfeffer, Van 't Hoff, Raoult and Arrhenius.

We might enumerate other discoveries which are foreshadowed in

this little work on chemistry, but space forbids. These few instances, however, are sufficient to indicate the value of Swedenborg's method of reasoning and the soundness of the chemical principles which he developed by means of it. It is evident that the *Specimens* are much more than a mere scientific curiosity, interesting only because of their position as a link in the chain of chemical history. In reality they contain a large amount of material which will be of no small service in the future development of chemical science.

BIOLOGISTS have long supposed that sex was determined by purely physical conditions. Hofaker, as early as 1828, claimed that the sex of a child depended upon the relative age of the parents; Thury maintained that the time which elapsed between the liberation of the ovum and its fertilization was the determining factor; while Schenk asserted that sex depended on nutrition, more girls being born to poorly fed parents than to those who were well nourished.

This materialistic view of the question led to the belief that sex could be controlled by artificial means, but the falsity of this assumption has been very effectually proved by the recent studies of Cuenot, Strasburger, Born and others. These investigators have demonstrated that sex is determined in the ovum, and is unaffected by external factors, a conclusion which necessitates the reconstruction of prevailing notions.

Castle has accordingly come forward with a new hypothesis in which he assumes that there are two kinds of spermatozoa, "male" and "female." Moreover, because the ovum shows a selective power toward certain spermatozoa, he concludes that there are also two kinds of ova, one receptive of the "female" spermatozoa, and the other receptive of the "male." These he terms the "male" and "female" ova, and supposes that the "male" spermatozoon is capable of uniting with the "female" ovum only, and vice versa. Later, when the polar bodies are extruded, sexual differentiation takes place.

Most physiologists consider the spermatozoa as sexless, simply because they cannot prove them to be otherwise. Swedenborg, on the contrary, recognized in them the sole determining element of sex, for he understood the origin of the soul from the father, and knew that as the soul is, so will the body be. Although Castle's theory leaves much to be desired, it is nevertheless a step in the right direction, because it attributes to the spermatozoa an important part in sex determination, and excludes mere accidents as causative factors.

DURING the past six months the Swedenborg Philosophy Club of Chicago, has been actively engaged in the study of Swedenborg's *Economy of the Animal Kingdom*. At the meeting of December 7th, Mr. R. W. Brown gave a very instructive explanation of Swedenborg's theory of the "three bloods," illustrating his subject by means of several interesting charts. On January 4th he made some further re-

marks in amplification of his previous talk on the subject of the blood. At this meeting also a letter from Miss Lillian Beekman, on Radium, was read, and was much enjoyed by all present. At the following meeting Dr. E. A. Farrington read a paper supplementing Miss Beekman's letter, and reviewing the present state of knowledge regarding radio-active substances. On March 7th, Mr. R. W. Brown presented a sketch of Swedenborg's "Principia theory" and his theory of salt. The subject was illustrated by diagrams and by several models of the particles of water, salt and acid, which rendered the theory regarding these substances remarkably clear and lucid.

E. A. F.

THE FIRST EDITION OF SWEDENBORG'S MANUSCRIPT ON SWEDISH FURNACES AND THEIR DRAUGHTS.

In the tenth part of *Noraskog's Archives*, Stockholm, 1903, number 48, pages 201-232, is printed the first edition of Swedenborg's manuscript on *Swedish Furnaces* (*Beskrifning ofver Swenska Masungnar och theras Blasningar*). The work was submitted to the College of Mines on the 2d of November, 1719, and consists of 42 short chapters describing various kinds of furnaces, to which are added two additional chapters in which Swedenborg presents his own views as to improving the furnaces.

The manuscript has been well printed on good paper, Swedenborg's marginal notes being included. *Noraskog's Arkiv*, published in large octavo by J. Johansson, fr. Noraskog, can only be obtained from Hr. Johansson himself, the price being 5 kronor, or about \$1.35. The text of Swedenborg's work on *Swedish Furnaces* is preceded by a few introductory remarks and by an illustration showing Swedenborg in his old age. At Knutsberg a fragment of a copy of Swedenborg's manuscript was found which led to an examination of the original which is preserved in the College of Commerce, in the archives of the Mining Department.

Below the illustration is a reproduction of an autograph by "Em: Swedenborg," and after Swedenborg's introduction his signature is again reproduced. An English translation of the introduction constitutes a portion of Document 145 in Dr. R. L. Tafel's *Documents concerning Swedenborg*, Vol. I., pages 404-405. Dr. Tafel also lists the manuscript in his "Chronological Account," *Documents*, Vol. II., p. 897, and mentions his having a copy of it. Two copies are also preserved among the manuscripts of Swedenborg in the Library of the Royal Swedish Academy of Sciences, one of which is numbered as Codex 99. The writer also examined a very fine copy preserved in the "Ralamb collection" at the Royal Library, Stockholm. Another copy was made last year under the writer's supervision for the Swedenborg Scientific Association.

In his introduction Swedenborg says that his principal object was to investigate the nature of fire as it acts on a large scale in furnaces, that he might be enabled to draw conclusions with regard to its mode of operation and its qualities on a small scale. That Swedenborg's investigations of furnaces and smelting had much to do with the formation of his theory of fire is evident from an examination of his *Miscellaneous Observations*.
A. H. S.

"A DIALOGUE BETWEEN MECHANICA AND CHYMIA ON
THE CONSTITUTION OF NATURE."

In an article in *New Church Life*, February, 1904, entitled *Three New Manuscripts by Swedenborg*, there was described a manuscript which promises to throw some new light on the development of Swedenborg's chemical and physical theories. The manuscript is in the handwriting of Swedenborg, but the latter portion exists as a first draft in the handwriting of Polhem. The question of the real authorship of this manuscript is a complicated one. Several of the positions taken in the manuscript, which is a dialogue between "Mechanica" and "Chymia" about the constitution of nature, are identical with those of Swedenborg as presented in his manuscripts and printed works. The manuscript is contained on 25 pages (quarto), and probably dates from about 1718. Many of the expressions are similar to those of the little paper by Swedenborg *On the Causes of things*, a translation of which appeared in *The New Philosophy* for January, 1903.

The following particulars concerning the contents of this manuscript were not given in the article in *New Church Life*. On page 3 of the manuscript, fire, water, glass and round particles are mentioned; also least parts and the first origin of the earth from fire. Page 4 mentions glass in connection with cosmology; also the origin of the mountains, and the flood. Page 5 mentions the central fire, the bottom of the ocean, strata, sand and clay. Page 7 mentions that a hollow bullet can be made to float on water; also the centre of rotation. Pages 9 and 10 speak of the salt particles smaller than the water particles, which are formed at the bottom of the sea by pressure. Pages 13 to 17 mention sulphur or the smallest oil particles, fire, ether, air, and that our gross hearth-fire is not as subtle as the fire in the sun. Hiaerne, the Swedish chemist, is also mentioned and reference is made to "Boiles experiment." Whoever may be the author of this manuscript it is certainly a most valuable piece of evidence regarding the development of Swedenborg's theories of the constitution of nature, and further study of it, together with a comparison of Hiaerne's and Boyle's contributions to chemistry, with which Swedenborg was well acquainted, will no doubt clear up many questions which are now wrapped in obscurity. The numerous manuscripts of Polhem, preserved in the Royal Library, should also be consulted.

A. H. S.

COMMUNICATED.

SWEDENBORG'S TEACHINGS CONCERNING VITAL
FLUIDS AND THE "LIMBUS."

Editor *New Philosophy*:

In the last issue of *New Philosophy*, under Note and Comment, recent articles by Rev. C. T. Odhner and Rev. L. P. Mercer regarding the "limbus" and the "first aura" of the *Principia* are reviewed. In general I am in hearty agreement with the articles, but wish to call attention to what I consider to be an error in Mr. Mercer's position, namely, the contention that the natural sun was created *after* the first natural aura. According to both the *Principia* and the Theological Writings the order is the reverse, and this can be proved by many passages, and also by general principles.

As to the relation of the "animal spirit" to the "spirituous fluid" I would say that an examination of the passages employing these terms in the scientific works and the Writings shows that Swedenborg uses the term "animal spirit" differently in different places. Sometimes the "animal spirit" is identical with the purer or middle blood, sometimes it is a term with the very same meaning as "spirituous fluid." Here, as in many other cases, Swedenborg varies his terminology as he proceeds with his work from year to year, and it is no more difficult of explanation in this case than in many others.

Swedenborg's theory of three bloods or vital fluids is one of the most wonderful doctrines in his physiology and psychology, and it is most interesting to observe how the theory grew in his mind. Of course, many of his ideas were derived from the writings of his contemporaries and predecessors, who wrote at considerable length on the animal spirit and the blood.

Some years ago Dr. Ernest A. Farrington and I made an investigation in regard to Swedenborg's ideas concerning the figure of the red-blood globule, and we were convinced that in that particular he followed Leeuwenhoek too far. That great scientist taught that the red-blood globule is a sphere composed of six smaller globules, whereas it is well known today that the red-blood globule is a biconcave disk. Of course this error does not involve Swedenborg's whole theory of the three bloods and their composition.

Since fluids are more perfect in form and motion than solids it follows that in the human body there must be a supreme fluid of some kind to serve as a bond of connection and communication with the spiritual mind of man. That there is such a fluid is clearly taught in the Writings, and so the conclusion naturally follows that the "limbus"

of the Writings must be on the same plane as the "spirituous fluid" or "animal spirit" of the scientific works, *i. e.*, when "animal spirit" is used in the sense of the highest vital fluid of the body. No doubt this parallel has been suggested to many readers of the *Economy of the Animal Kingdom*.

This, however, merely opens the question. There is very important material in the *Worship and Love of God*, and the most extended treatment of the subject by Swedenborg has never to my knowledge been brought forward. I refer to an unprinted manuscript on the *Mechanism of the Soul and the Body*, from which new light may be obtained, especially in regard to the interiors, and really the most important part, of the "limbus," namely, the *active space inside* the first elementary particle; for if the "limbus" *per se* includes the whole elementary particle, it is divisible into degrees.

A. H. STROH.

[Space forbids an extended treatment of the point raised by Mr. Stroh in regard to the question of the priority of the sun or first aura in the creation, and we will await a full statement and elucidation of his position, which is in course of preparation. We also hope to be able to place before our readers shortly an exhaustive treatment of the relation of the "animal spirit" to the "spirituous fluid." For an excellent outline of the "Circulation of the Intermediate or Purer Blood throughout Body and Brain" see an article by Miss Beekman in *New Philosophy* for January, 1901.

It is likely that an English translation of the work entitled the "*Mechanism of the Soul and the Body*" will be published before long, as Mr. Stroh is now engaged upon it.—EDITOR.]

HEIGHT OF THE AIR.

EDITOR *New Philosophy*:

I would like to know whether Swedenborg makes any statement in his scientific works regarding the height to which the aerial atmosphere extends above the earth. The subject is referred to in *Apocalypse Revealed*, No. 907, where the Holy City is treated of, the height of which was "twelve thousand furlongs." After explaining that this is to be understood according to its internal sense, the number continues, "If the height of the city were twelve thousand furlongs, it would rise immensely above the clouds, yea, above the aerial atmosphere, the height of which does not exceed thirty furlongs (*triginta stadia*); yea, it would rise immensely in the ether toward the zenith." In at least one edition this is translated "three hundred furlongs," which would be $37\frac{1}{2}$ English miles, and it would seem, in the light of several well-known facts, that "thirty furlongs," or $3\frac{3}{4}$ miles, was an error. So far as I am advised, scientists have not yet ascertained the

exact height of the air, and there are many theories based on different methods of calculation.

Will you kindly state whether the scientific works throw any light upon the problem, and oblige,

Yours truly,

PAUL CARPENTER.

Chicago, 26th March, 1904.

[It is not unlikely that Swedenborg made a slip of the pen, and wrote *triginta* instead of *trecenti*, but we do not know any statement in the scientific works showing what was his theory in regard to the exact height of the aerial atmosphere, and would be glad to hear from our readers about this interesting question, and to have the results of any study that has been made looking to a solution, either in the light of the scientific works or modern investigation.—EDITOR.]

ANNOUNCEMENT.

THE SWEDENBORG SCIENTIFIC ASSOCIATION.

ANNUAL MEETING.

THE Seventh Annual Meeting of the Swedenborg Scientific Association will be held in the National New Church, corner of Sixteenth and Corcoran streets, Washington, D. C., on Wednesday and Thursday, May 25 and 26, 1904. The opening session will begin at 3 P. M. on Wednesday, and the President's Address will be delivered at 4:30 P. M. of the same day. Suburban dinner at 7 o'clock in the evening, at a charge to be determined later.

The second session will be held on Thursday 26th, at 10 A. M., when papers will be read and discussed.

All who propose to attend the meeting or to contribute papers will kindly notify Rev. Frank Sewall, 1618 Riggs Place, Washington, D. C.

By order of the President.

E. J. E. SCHRECK,

Secretary.

6949 Eggleston Ave., Chicago, Ill., March 31st, 1904.

THE NEW PHILOSOPHY.

VOL. VII.

JULY, 1904.

No. 3.

SWEDENBORG SCIENTIFIC ASSOCIATION.

SEVENTH ANNUAL MEETING.

THE Seventh Annual Meeting of the Swedenborg Scientific Association, held in the National Church of the New Jerusalem, corner of Sixteenth and Corcoran streets, Washington, D. C., on Wednesday, May 25th, and Thursday, May 26th, 1904.

FIRST SESSION.

WEDNESDAY, May 25, 3:15 P. M.

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

395. The minutes of the second session of the last annual meeting not having yet been approved, but having been printed in the July, 1903 issue of *The New Philosophy*, it was unanimously *voted* that the reading of these minutes be dispensed with, and that they be approved.

396. The chair appointed Messrs. J. R. Stephenson and Russell Eaton 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. Thomas French, Jr.; *Arncliffe, Australia*, Mr. Richard Morse; *Boston, Mass.*, Mr. Horace P. Chandler, Rev. James Reed; *Bryn Athyn, Pa.*, Rev. Charles E. Doering, Rev. J. F. Potts, Mr. Alfred H. Stroh; *Cambridge, Mass.*, Prof. L. F. Hite; *Chicago, Ill.*, Rev. John S.

Saul, Rev. E. J. E. Schreck, Rev. John R. Stockwell, Jr.; *Chillicothe, O.*, Miss Carrie Sproat; *Cincinnati, O.*, Rev. Lewis P. Mercer; *Newtonville, Mass.*, Rev. John Goddard; *Oakdale, Md.*, Mr. George E. Cooke; *Pittsburg, Pa.*, Rev. John R. Stephenson; *Richmond, Va.*, Rev. Junius B. Spiers; *Stockholm, Sweden*, Rev. C. J. N. Manby; *Urbana, O.*, Rev. Russell Eaton; *Washington, D. C.*, Rev. Frank Sewall, Mr. Paul Sperry, Mr. Walter I. Swanton.

VISITORS.

Arncliffe, Australia, Mrs. Richard Morse; *Bluemont, Va.*, Miss Bessie Lloyd Smith; *Buffalo, N. Y.*, Rev. Clyde W. Broomell; *Bryn Athyn, Pa.*, Miss Alice Potts; *Cambridge, Mass.*, Rev. Jacob E. Werren, Miss Werren; *Chicago, Ill.*, Miss Clara E. Bartels, Mr. C. H. Cutler; *Chillicothe, O.*; Miss Emma Sproat; *Columbus, O.*, Mr. and Mrs. Abbott; *Peoria, Ill.*, Mrs. E. K. Turbitt; *Philadelphia, Pa.*, Mr. and Mrs. Wm. McGeorge, Jr., Miss McGeorge; *Springfield, O.*; Miss Ruth Spaulding; *St. Louis, Mo.*, Miss Ross; *Toledo, O.*, Rev. John Ramsey Hunter; *Waltham, Mass.*, Prof. Moses, Mr. F. Lux; *Washington, D. C.*; Miss Edythe Abell, Mr. John S. Barrington, Miss Katherine K. Patton, Miss Maud G. Sewall, Miss E. F. Sewall, Miss Florence L. Smith, Mr. J. Henry Smith, Mr. S. B. Wright; *Yarmouthport, Mass.*, Miss Emma Mayhew; and others.

397. *Voted* that the President's annual address be made the order of the day this afternoon at 4:30 o'clock.

398. The Secretary's Report, including a bibliographical list of the Scientific and Philosophical Works of Swedenborg that have been copied, translated or published since the organization of the Swedenborg Scientific Association, was read.

399. *Voted* that the Report be accepted, and the Secretary be requested to continue annually to report such a list.

400. The Treasurer's Report was read.

401. The chair appointed Messrs. Horace P. Chandler and L. P. Mercer a committee to audit the Treasurer's accounts.

402. The report of the Board of Directors was read.

403. The report of the editor of *The New Philosophy* was read.

404. The report of the Committee on a new edition of the *Principia* was read.

405. The report of the Committee on a new edition of the *Animal Kingdom* was read.

406. The report of the Committee on the translation of *The Senses* was read.

407. A report from the Rev. Alfred Acton to the President of the Association on the translation of the *Lesser Principia* and on the publication of *De Sale*, one of Swedenborg's scientific manuscripts, was read.

408. The report of the Committee, appointed to send greeting to the Royal Swedish Academy of Sciences was read.

409. A communication by Mr. Alfred H. Stroh on the reproduction of Swedenborg's manuscripts by the Swedenborg Scientific Association and the Royal Swedish Academy of Sciences was read by him.

410. *Voted* that Mr. Stroh's communication be received, that the Association expresses its appreciation of it, and orders it printed in the Transactions.

411. A communication from the Urbana University Scientific Club was read by the Rev. Russell Eaton.

412. A communication from the Swedenborg Philosophy Club of Chicago was read.

413. *Voted* that the communication be received with thanks and be embodied in the Transactions.

414. *Voted* that the hour of 10:30 o'clock tomorrow be appointed for the election of officers.

415. The hour of 4:30 o'clock having arrived, the annual address was delivered by the President.

416. Moved that the hearing of the paper by Mr. A. H. Stroh and Dr. E. A. Farrington, on "Swedenborg's Theory of Vital Fluids," be made the order of the day for 11:00 o'clock tomorrow morning.

417. *Voted* to take a recess until tomorrow morning at 10:00 o'clock.

SECOND SESSION.

THURSDAY, May 26, 10:30 A. M.

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

419. The Committee appointed to audit the Treasurer's accounts reported that they had examined them and found them correct.

420. On motion of the Rev. L. P. Mercer, the following resolutions were adopted.

Resolved, That the acts of Mr. Alfred H. Stroh, as representing the interests of the Swedenborg Scientific Association, in his intercourse with the Swedish Royal Academy of Sciences, and as communicated by him to this Association, are hereby formally approved.

Resolved, That he be empowered to continue to act abroad as the official representative of this Association.

Resolved, That his communication be received and entered among the official reports to the Association.

421. The hour of 10:00 o'clock having arrived, the meeting proceeded to the election of officers.

422. The Rev. Frank Sewall, A. M., D. D., was nominated for the office of President.

423. *Voted* unanimously that the Secretary be instructed to cast the ballot for the nominee.

424. Dr. Sewall was declared elected President.

425. The Rev. Eugene J. E. Schreck was nominated for the office of Secretary.

426. Mr. Schreck nominated Mr. Edmond Congar Brown for the office.

427. The chair appointed Mr. Paul Sperry teller.

428. Pending the election, on motion of Rev. Junius S. Spiers, the following preamble and resolution were unanimously adopted:

WHEREAS, The Board of Directors recommends that the Constitution be amended by adding to Article III, on "Membership," the words "Honorary members may be elected on recommendation by the Board of Directors."

Resolved, That the Constitution be and it hereby is amended in agreement with such recommendation.

429. The Rev. L. P. Mercer moved the adoption of the following resolution :

Resolved, That it is the sense of this Association that the new edition of the *Principia* should be published without an interpretative introduction.

430. Discussed by Messrs. Mercer and Sewall.

431. The teller reported that the total number of votes cast for Secretary was 11, of which Mr. Schreck received 9, and Mr. Brown 2.

432. Mr. Schreck was declared elected Secretary.

433. The Rev. Charles E. Doering was nominated for the office of Treasurer.

434. *Voted* unanimously that the Secretary be instructed to cast the ballot for the nominee.

435. Mr. Doering was declared elected Treasurer.

436. The following gentlemen were nominated for the Board of Directors: The Rev. L. P. Mercer, Prof. Harvey Farrington, M. D., the Rev. Willis L. Gladish, Mr. Robert B. Caldwell, Jr., the Rev. Alfred Acton, the Rev. John Whitehead, Mr. Alfred H. Stroh, Prof. Thomas French, Jr., Prof. L. F. Hite, Mr. Horace P. Chandler, Dr. George M. Cooper.

437. The chair appointed Messrs. Paul Sperry and Russell Eaton tellers.

438. Pending the election, the discussion of Mr. Mercer's resolution (minute 429) was resumed by Messrs. Stroh and Spiers.

439. The resolution was adopted unanimously.

440. Mr. Doering *moved* that the next annual meeting be held in the rooms of the American Swedenborg Printing and Publishing Society, New York City, at a time to be determined by the Executive Committee.

441. The motion was discussed by Messrs. Chandler, Stephenson, Potts and Mercer, and was carried unanimously.

442. The tellers announced the election of the following gen-

tlemen to the Board of Directors: The Rev. L. P. Mercer, Prof. H. Farrington, M. D., Mr. Alfred H. Stroh, Prof. Thomas French, Jr., Prof. L. F. Hite, Mr. Horace P. Chandler, Dr. Geo. M. Cooper, Mr. Robert B. Caldwell, Jr., the Rev. Alfred Acton.

443. On motion of the Rev. John R. Stephenson the following preamble and resolution were adopted:

WHEREAS, Mr. Alfred H. Stroh has offered to this Association his transcript of Swedenborg's paper, *De Causis Rerum*, which was made directly from the original manuscript preserved in the Diocesan Library at Linkoping.

Resolved, That the Association accepts the same with thanks.

444. Mr. Alfred H. Stroh read the paper entitled "Swedenborg's Theory of Vital Fluids," prepared by himself in conjunction with Dr. E. A. Farrington, and illustrated by models made by Dr. Farrington.

445. *Voted* on motion of Mr. Stroh that the Executive Committee be authorized to effect an exchange of publications with the Royal Swedish Academy of Sciences.

446. On motion of Mr. Hunter, seconded by Mr. Doering, *voted* that the thanks of the Association be tendered to the Washington Society of the New Church and friends of the Association for the use of the National church and for their entertainment.

447. Mr. Schreck moved the adoption of the following resolution:

Resolved, That the Executive Committee be given full power to proceed with the incorporation of the Association.*

448. Discussed by Messrs. Mercer, Chandler, Doering and Schreck.

449. Letters on the subject were read from Mr. Thomas S. Crane, of New York, and Mr. J. Q. Wetherbee, of London, England.

*The Report of the Committee on Incorporation, although mailed in time, was not received by the Secretary until after the annual meeting. It is included in the reports printed in this issue.—SECRETARY.

450. The motion was adopted unanimously.

451. On motion of Mr. Stroh the motion (minute 316) that the Board of Directors be authorized to change the name of the body to the "Swedenborg Scientific and Philosophical Association" when the time comes to incorporate the body, was taken from the table.

452. Discussed by Messrs. Stroh, Mercer, Stephenson, Schreck, Sewall, Chandler, and Morse.

453. *Voted* to refer the motion to the Executive Committee.

454. Letters were read from the Rev. Willis L. Gladish and the Rev. S. M. Warren.

455. The chair reported having received a letter from the Rev. Isaiah Tansley on the subject of the new edition of the *Principia*.

456. The minutes of the second day's session were read and approved.

457. On motion the meeting adjourned.

EUGENE J. E. SCHRECK,

Secretary.

MEMORANDUM.

THE members and friends of the Association in Washington had made preparations for a banquet on the evening of Wednesday, May 25th, when, at Cabin John Bridge Hotel, near Washington, thirty gentlemen sat down to dinner. In the course of the evening the following toasts were proposed, the Rev. E. J. E. Schreck acting as toastmaster.

1. The Swedenborg Scientific Association, responded to by Dr. Sewall.

2. The Revival of Swedenborg's Philosophy, R. Kenna Campbell, Esq.

3. The Royal Swedish Academy of Sciences and Its Swedenborg Committee, Mr. Alfred H. Stroh.

4. The History of the Reproduction of Swedenborg's Manuscripts, Mr. Horace P. Chandler.

5. "The Worship and Love of God," Rev. L. P. Mercer.

6. Our Philosophy Clubs—Especially the New Urbana University Scientific Club, Rev. Russell Eaton.

7. Sweden, the Native Land of Swedenborg, Rev. C. J. N. Manby.

8. The Future Philosophy Clubs of Australia, Mr. Richard Morse.

9. The Washington Members and Friends of the Swedenborg Scientific Association.

THE ANNUAL ADDRESS OF THE PRESIDENT, 1904.

SWEDENBORG'S CONTRIBUTION TO SCIENCE.

To the Swedenborg Scientific Association:

A review of the progress made during the past year in the work to which our Association is devoted, namely, the Preservation, Translation, Publication and Distribution of the Scientific and Philosophical works of Emanuel Swedenborg, and the Promotion of the Principles taught in these works, will embrace in its survey a field which is almost entirely new, or which at least has not been so included since the days when these works were being first produced and put forth before the scientific world in their purely scientific character; when, as yet, their illustrious author was known only as a scientist and as a philosopher and not as a seer and theologian. I refer to the field of special scientific research outside of ecclesiastical bias or affiliation, and without any distinctly religious profession, and thus entirely apart from any theological propaganda.

We see today, after a lapse of a century and a half since the production of these works, during which time, to quote the language of a distinguished physicist in this country, Swedenborg's "reputation as a man of science has been overshadowed by his fame as a seer and a theologian,"* the author's important treatises on the Brain and on the Constitution of Matter receiving the attention of a class of minds to which his theology has made no appeal, or at least not the prior appeal. It is likely that this field will grow constantly larger, and it is interesting to reflect on what may be the possible results, on the one side, to the future of science, and on the other to that of the Church. The fact, in itself, that the interest aroused in Swedenborg's scientific theories, both at the first in the recognition accorded him in the *Acta Eruditorum*, and in the Royal Academies of Science in Paris, Stockholm and St. Petersburg, and

*Professor F. W. Clarke, address on the Atomic Theory before the Manchester Philosophical Society, 1903.

that which is being revived today among the learned specialists in Europe, is quite apart from all theological or religious motive, would seem to indicate that there is somewhere a very sure ground of meeting and greeting, in the interests of pure science, of Swedenborg and modern specialists. With this meeting once brought about, and a start made together from this common ground of fact, what and whither the progress will be, is the interesting question, to which we shall later give a broader glance.

To rehearse the items of this year's progress referred to, we may mention in the way of the advertising or propaganda of Swedenborg's scientific theories:

I. The article on *Swedenborg Reviewed* in the *Neue Freie Presse* of Vienna, Austria, by Dr. Max Neuburger, Docent of the University of Vienna, an article extensively copied and noticed in other capitals of Europe (Berlin, Copenhagen).

II. Dr. Neuburger's article in the medical periodical *Janus*, for September 15, 1903, on Swedenborg's Doctrine of the *Corpora Quadregemina*.

III. Dr. Neuburger's article in *Janus*, August 15, 1903, on Swedenborg's Doctrine of the *Vita Propria*.

IV. A review by C. G. Santesson, published in Stockholm by Isaac Marens, 1903, of Dr. Neuburger's article on Swedenborg and the *Vita Propria*.

V. The address of Dr. Gustav Retzius, of the Royal Swedish Academy of Sciences, before the Congress of Anatomists, held in Heidelberg, May 1903, on Swedenborg as an Anatomist and Physiologist.

To glance at the field nearer home, and to mention those whose interest in Swedenborg is more than a merely scientific one, we note:

VI. An article in the *American Medical Monthly*, September, 1903, by C. S. Mack, M. D., of La Porte, Indiana, on "Swedenborg upon the Brain, Heart and Lungs."

VII. A treatise on "Fire," by Alfred H. Stroh, published under the auspices of the Swedenborg Scientific Association, 1903, Bryn Athyn.

VIII. An article on "The Ductless Glands," by Dr. Ernest A. Farrington, being a brief review of a work on *Internal Secretions* by Dr. Sajous, of Philadelphia, contributed to the *New Philosophy* of April, 1904.

IX. The interesting articles contributed to the Church periodicals, the

New Church Life and the *New Church Review*, respectively. by Professor C. Th. Odhner, on *The Limbus*, and by Rev. L. P. Mercer, on *The First Aura*, in which the meeting ground between the spiritual and natural realms of the universe are discussed.

X. The article on *Radium*, by Rev. H. Clinton Hay in *New Church Review* for April, 1904.

XI. An article on "The Economy of the Animal Kingdom" and a review of the same work by Professor Thomas F. Moses, in the *New Church Review* for April, 1904.

XII. An article on Radium in the *New Church Magazine* for November, 1903, by Rev. J. P. Rendell, B. A.

XIII. In the transcription of the MSS. of Swedenborg in the Royal Academy Library we have to record:

(a) *By the Commission of the Royal Academy*: (1) "*The Height of Water*," published by Swedenborg in two editions in 1719, Doc. Chronol., No. 19; (2) Remarks on Mussels, Snails, etc., Doc. 311; (3) "*On the Rise and Fall of Lake Wenner*," Doc. Chron. 25; (4) Three extracts from the *Acta Literaria Sueciæ* for the years 1720-1721, Doc., Chron. 27; (5) "Miscellaneous Observations," Doc., Chron. 33. In all, 144 pages of Vol. I., to contain the Geological Treatises; 80 pages of Vol. II., being one-third of the *Lesser Principia*.

(b) *Under the auspices of our Association*: Besides the Codices reported as copied at our last annual meeting, a number of MSS. and Documents have been copied for and by Mr. Stroh, who generously offers to produce them in translation in the *The New Philosophy*, and to contribute the original copies to the archives of our Association.

XIV. In translation and publication we have to mention: (a) A continuation of the serial publication of the treatise, *De Sensibus*, in *The New Philosophy*, through the "Ear and the Sense of Hearing," Nos. 122-125; (b) the work on Salt, *De Sale*; (c) *The Summary of the Principia*, now first translated from the Latin by Alfred H. Stroh, and published by the Swedenborg Scientific Association, Bryn Athyn, 1904.

XV. The reports of the several committees on the new editions of the *Principia*, of the *Animal Kingdom*, of the *Lesser Principia*, and *The Worship and Love of God*, will show the progress reached in these lines.

To return now, for the few moments left us, to the consideration of the question touched upon at the beginning of this paper, namely, the restored connection or touch between the science of Swedenborg and the scientific research of today and the results likely to flow from this connection, let us briefly consider the question: What distinctly new element does Swe-

denborg contribute to science, and what is its practical value to the science of today?

It is important in discussing this question to place ourselves as absolutely as possible on the purely scientific plane of thought, to approach the subject so far as we can, as we would if Swedenborg had never advanced beyond the plane of the scientist and philosopher, and consequently had never had his name associated with theology, or the Church, or been "shadowed" by the prejudices which such association rouses in some minds.

It was in the year 1852 that the Royal Academy of Sweden, of which body Linnæus and Berzelius were, like Swedenborg, alumni, paid the tribute to Swedenborg thus recorded in its minutes:

"The Academy has this year caused the annual medal to be struck to the memory of the celebrated Swedenborg. It represents Swedenborg's image on the obverse, over it his name, under it *Nat. 1688, Dem. 1772*. On the reverse a man in a dress reaching to the feet, with eyes unbandaged, standing before the temple of Isis, at whose base the goddess is seen. Above it: *Tantoque exultat alumno*; beneath: *Miro natura investigatori socio quond. aestimatiss. Acad. Reg. Scient. Suec. MDCCCLII.*"

This medal of the Swedish Academy, issued some 100 years after the publication of Swedenborg's scientific works, may be regarded as reflecting the scientific estimate, an estimate entirely without a theological bias on the part of the distinguished body of scientists who awarded it, and, therefore, such as rested on the achievements of Swedenborg in science and philosophy pure and simple. Emerson, it will be remembered, treats of Swedenborg as the "mystic," but calls him this not because he dwells in the occult and obscure, but because he saw as one whose eyes were opened into the inner mysteries hidden from other men and brought these forth into the clear light of day.

Such would seem to be the significance of the image on the medal—a man with eyes unbandaged standing before the temple of Isis.

It is an interesting question whether and how far Swedenborg's fame and actual influence as a scientist and philosopher have been obscured and restricted by the association of his

name with theology and seership, and especially with an ecclesiastical movement and organization. It must be admitted that this combination of vast scientific and intellectual achievements with the more spiritual and abstract vocation of the theologian and prophet is not without other illustrations and examples even in contemporary history. Leibnitz gave to mathematics his Differential Calculus and to Philosophy his theory of morals and the pre-established parallelism, or harmony of action between soul and body, and yet his life was largely engaged in vast moral and religious schemes like that of reuniting Catholicism and Protestantism, and in writing his theological system, the *Theodicee*.* Newton's fame as the discoverer of the law of gravitation is not dimmed by the fact that in his later years he was much devoted to scriptural and theological studies, and left behind him *Discussions as to the Nature of the Divine Trinity* and *Observations on the Prophecies of Daniel and the Apocalypse of St. John*; also a *Church History* complete, and a *History of the Creation* and many tracts on Divinity.

Even in the far-distant past a seership like Swedenborg's in degree of marvelousness is recorded of Pythagoras, who is said to have had his spiritual senses opened that he might enter into that higher world above physical sense, in which it was permitted him to hear the real harmony of the spheres; and Plato in the last book of the *Republic* narrates a tradition of the man Er who was permitted to enter the spiritual world and see the realms of heaven and hell and the concourse of spirits in a general judgment, and the several ways leading to the permanent abodes of immortal souls. May we not conclude that not even an *odium theologicum* will finally prevail in keeping Swedenborg from receiving his merited recognition from the scientific world?

Another, and perhaps more plausible, explanation of the apathy of modern science in relation to Swedenborg's monumental contributions, may be the very fact of the universality

**Essaies de Theodicee sur la bonte de Dieu, la liberte de l'homme, et l'origine du mal.*

of his scientific observation and of his philosophical system. If we find in him an idealism as beautiful, as substantial, as vital and creative, as that of Plato, a practical doctrine of entelechy, and an investigation of the actual world of effects as full of common sense and of human interest as that of Aristotle; if we see in him an interpretation of the internal sense of the Old Testament far outreaching in sublimity of meaning and form those of Philo Judaeus and the Church Fathers; if we see a doctrine of degrees among things material, spiritual and Divine which includes the finest insights of Plotinus and strips his doctrine of its burden of superfluities; if he has a logical substratum for a rational Christianity more thorough and logically unassailable than that of Aquinas, a doctrine of the animation of all the universe as complete as that of Bruno and Leibnitz, of the Divine in-dwelling in man as lofty and spiritual as that of Eckhardt and without the latter's liability to Pantheism; if he has, finally, in his splendid system of Cosmogony and of Physiology, the germs of all the most brilliant discoveries of the present time, whether in the Science of the Brain, in the composition of the Blood, the structure of the Nervous System, or the development of nature out of the infinite through the medium of the first entity symbolized in science by the word "atom"—if Swedenborg is thus so universally comprehensive, how shall we attach any special significance to his system, or set apart him who will not be apart from that living world of knowledge in which his mighty spirit moves?

It is not to be denied that credit has been awarded to Swedenborg by high scientific authority for special contributions to knowledge which are of signal and ever-increasing importance. The Russian astronomer, Nyren, has asserted Swedenborg's claim to priority in the promulgation of the nebular theory of the universe.* Eiloart and van 't Hoff agree in tracing the modern stereo-chemistry back to Swedenborg's work on Chem-

*Swedenborg's theory is directly traceable by documentary evidence down through Buffon to La Place. (See *New Philosophy* for April, 1904, article on History of Chemistry, by A. H. Stroh.) Kant's access to Swedenborg's works is also well known.

istry; similar acknowledgment has been made by Professor F. C. Calvert before the Royal Institute in Manchester in 1853, as regards the originality of Swedenborg's theory of the molecular arrangement of bodies, and by M. Dumas, a French savant, in regard to Swedenborg's grouping of crystalline forms.†

In the realm of metaphysics and psychology Professor Heinze, of Leipzig, in his *Observations on Kant's Lectures on Metaphysics*, in *Abhandlungen der Sächsischen Gesellschaft der Wissenschaften* (Leipzig, 1894), and Du Prel in his essay on Kant's Mystical View of the World, and in his edition of Kant's Lectures on Psychology, have pointed out unmistakable instances of Swedenborg's influence upon Kant.‡

To pass over many recognitions of lesser significance among modern specialists, we have at last to mention the great tributes only recently made to Swedenborg's scientific productivity by Doctor Gustav Retzius, of the Royal Swedish Academy of Sciences, in his Heidelberg Address before the Congress of Anatomists in May last, and in the summary of Swedenborg's anticipations of modern discoveries presented by Dr. Max Neuburger, of the University of Vienna, in his widely published article on *Swedenborg Redivivus*.

Here we have one of the foremost anatomists of Europe asserting that "Swedenborg is the first to his knowledge who pointed out the real nature of the cerebro-spinal fluid;" he "is the forerunner of G. Schwalbe and of Key and of himself (Retzius) in describing the discharge of the cerebro-spinal fluid." "He has not only predicted the localization of the motor centers of the cortical substance in harmony with views gained from pathological and physiological experiments during the latter half of the past century, but he has even on the whole, correctly pointed out the seat of these centers." "Emanuel Swedenborg, therefore, according to the standpoint of his time, not only had a thorough knowledge of the con-

†See article in *New Philosophy* for April, 1904, on History of Chemistry.

‡See Kant's *Dreams of a Spirit Seer*, Introduction. London, Swan, Sonnenschein & Co., 1900.

struction of the brain, but also had gone far ahead of his contemporaries in fundamental questions. . . . He towers in the history of the study of the brain as a unique, wonderful, phenomenal spirit, as an ideal seeker after truth, who advances step by step to ever higher problems.”*

Dr. Neuburger in his articles in the August and September number of *Janus*, VIIIth year, declares that Swedenborg “before Schlichting, discovered the respiratory motion of the brain and first assigned exclusively to the cortex cerebri: the psychical functions, and indeed located the centres of muscular activity in the cortex. . . .” Further, Dr. Neuburger says: “Pre-eminent as Swedenborg stands, whether setting forth the hypotheses of the central sun, whether deriving the process of crystallization 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 Lavoisier, 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.” And again: “The great physiological system set forth by Swedenborg in his two great works, *Æconomia Regni Animalis* and *Regnum Animale*, 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.”

It is here, then, that we find a competent expression from authorities entirely ultra-theological and free from religious bias, of the actual practical value of Swedenborg's science and philosophy to the sciences of today. I call attention to these utterances, and especially to the whole tenor of Dr. Retzius's address, for the reasons, first, that they are valuable as coming from scientific experts and specialists, and secondly, because of

*Dr. Gustav Retzius, Heidelberg address in *New Philosophy* for January, 1904.

the singular and important witness they bear to the importance of what is central and vital in Swedenborg's system, and that which sets him truly in a place by himself among all the investigators of natural science.

It is well to know of these particular discoveries by Swedenborg made so long before their verification by modern science, but the facts themselves are not what constitute the chief and real importance of these discoveries—but the *method* and the great underlying and unifying *principle*, which made these discoveries possible and which could give to Swedenborg's whole scientific and philosophic—yea, even including his theological system—a unity, a consistency, a compactness, such as comes as near to a realization of his own dreams of a *Universal Mathesis* or science of sciences—or to Aristotle's conception of the First Philosophy—as will be possible for the human mind to reach. For, as for the particular facts, interesting, nay, sublime as they are, whether of the bullular physics, of the limbus of nature, the vital fluids, the formation of the sun in the outgoings from the Infinite, the kingdom of the soul, or of animated life, and the construction of mind—all these, it may be said, are now being discovered by science itself, and by purely scientific processes, and, therefore, without the aid of Swedenborg's discoveries, and it is only by the verifications of this modern experimental science that the discoveries themselves acquire any real scientific value. How, then, can it be said that the Scientific and Philosophical Works of Swedenborg, granting their historic interest, have any practical value for the science of the present, or of the future?

It is because our answer to this question is found in the purely *ex parte* testimony of the two authorities I have quoted that I have called attention to them and offer their verdict as one more convincing to the scientific world than any that would come from the judgment of a layman or from a mind predisposed by theological considerations.

For here I find the admission that it is not the facts themselves that are of the utmost importance in the progress of science, but the method of handling the facts, and then I find a definition of the method itself. The method of handling is

that of induction, but the method is subordinate to a single purpose, which Dr. Neuburger calls the *Search for God*, but which Swedenborg more generally designates by the philosophical term, the *Search for the End*. In a word, it is the teleological process of discovery that here finds its vindication as nowhere else in the history of science. Aristotle was not without his doctrine of the end; he distinctly declares that nature everywhere follows an end, and that this end is the Good. But in all his various works we do not see this single principle working out into one great system, but rather a disjointed and fragmentary mass of mingled observation and speculation, such as to defy the attempts of students to reduce them to a single philosophic plan. Not so with Swedenborg, whose doctrine of the end, operating through its two subordinate degrees in their order—cause and effect—permeates every contemplation from that of God down to the first atom or point of nature, and from the first emotion of Love and an all-governing Will, out through all the subtle laws of providence and permission to the utmost self-assertion and even reactive defiance of the individual. It is this that makes Swedenborg's entire production a *system*. It is by this unity of method which the scientist himself terms "the Search for God," that it is claimed these profound discoveries were reached "in both physiology and anatomy, which had escaped the learned profession,—even the very laws of life."* This search for the one supreme principle, the end, was, says Dr. Neuburger, "the common fundamental principle which bound the early scientific with the later theological writing." It is of no small significance that from the field of pure science there should come this witness to the productive force of a system which embraces both the natural and the supernatural realms of knowledge.

The same testimony is borne by Dr. Retzius in the Heidelberg address,† but with even a stronger insistence on the supreme value of Swedenborg's contribution as lying in the

*Neuburger's Swedenborg Redivivus, *New Philosophy*, October, 1903, p. 152

†See *New Philosophy*, January, 1904.

method and in the first principle, which is, of course, an *a priori* one, whether assumed or revealed.

As to the unity of Swedenborg's system, Dr. Retzius says: "One may more easily understand his life and labors when one places his achievements in Anatomy and Physiology in juxtaposition with those in Geology, Mechanics, Cosmogony and Physics. With these as a background, his whole endeavor becomes somewhat more intelligible. He sought to find the one principle of the universe and of life in the whole. The thought that he had found this original principle in the motion, the tremulation, of the finest particles—this fundamental view of things led him always further to an almost all-sided investigation and to a view of the fabric of creation wonderfully deep for his time. With this view as a guide he gained knowledge and created theories which could only be acknowledged and appreciated in our own age." The significance of this tribute to Swedenborg's method of proceeding from the centre to circumference, from the first principle to the ultimate effects, need not be dwelt upon. It takes all the research and accumulative knowledge of the present age, a century and a half later, to be able to give an appreciative glance to what Swedenborg saw and declared as true without any of the means of demonstration from experiment now at hand, surely a powerful witness to the value of a method.

More especially this method and its first principle is described thus (p. 12 loc. cit.): "He sought to connect the Infinite with the finite; he believed that he had found the connecting point for the purpose, and that he was on the track of such an explanation. This connecting point is, in fact, his Point, and the explanation is to be found in the motion, the tremulation, a vibrating and undulating motion of the finest particles. Even in one of the earliest writings, printed in 1718, he reduces the nature of life to such tremulation."

In connection with this it is interesting to quote from Dr. John J. Garth Wilkinson, of the Royal College of Surgeons, London, a similar recognition of Swedenborg as affording as no one else has done, a link between our knowledge of the finite and the Infinite. It is true that Dr. Wilkinson is attending to

the manner in which Swedenborg traces the origin of life in man through the vital fluids and the generative processes. In his advertisement to the English edition of the Sixth Part of the *Regnum Animale: Sectio Secunda: de Generatione*: London: William Newberry: 1852: Dr. Wilkinson says:

"We suppose that there is no writer before nor since Swedenborg's time, who has treated as he has done of the continuity of the body on the one hand, and of the permeation of vibrations and living influences through it, on the other. . . . Our Swedenborg, Licentiate of no College, has wonderfully indicated to us many of the great bridges and highways of vibrations and influences, and in so doing has thronged with living states and forms parts which were previously dispersed, lying in sand heaps of cell-germs. To the new pathology which chronicles the passage of states through Man, he is as yet the most important contributor from the physiological side."

It is thus we find modern science following with assent Swedenborg's tracing of the descent of life from motion in the Infinite, the Self-active and the Source of all motion, out into the universe of vibrations or of radio-activity. The law of action and reaction involved in this simple theory of motion and vibration is as fundamental in Psychology, in Ethics, and in pure Theology, as in Physics. The principle is one, acting and exhibited in the several discrete planes of being, Divine, spiritual and natural. It is End on the highest plane seeking realization in effect in the lowest and outermost. In its highest conceivable idea it is Love seeking its object in its Other; and the reciprocal seeking of this Other for its Source. It is God and His World.

Let me point out in conclusion a few passages in Swedenborg himself, where this doctrine of the end seeking its effect in use is distinctly asserted and illustrated. Thus in No. 7 of the work *De Generatione* we read: "The wonderful manner in which all things in the animal body are disposed and arranged is evident on slight reflection from the situation of the parts as corresponding to their uses." Here is the assertion that function or use is the clue to the explanation of all the particular arrangements and so to the classification or naming of particulars. It is only where we understand their uses that we can

learn any real truth about the parts of any system and the use is the end or purpose seeking its actualization in effect.

Again, in No. 17: "Nature has an end in all the least steps of all things, and hence it is that the reason of everything may be found out." This truth of philosophy, imbedded as it is in the very nature and conditions of human knowledge itself, namely, that particulars can only be truly known through reference to their universals, and that the universal in everything or system is the end, is forcibly stated by Swedenborg in the following passage from the same work, No. 84: "It will now be well to consider particulars; without a general idea, however, the ideas of singulars would not be easily perceived; for *they must attach their idea to some general*. Such is the lot and condition of human intelligence." In No. 85: "Nature, in proceeding from the universal to the outermost in substances, does this in modes and other accidents, but *matters* are so arranged that there is always some peculiar cause of the inferior order to call it into existence and play. The innermost cause (in the human body) excites the simplest fibres. This cause is put into the very nature of the soul and issues therefrom . . ." In No. 105:

"The soul residing in the principles of natural things looks upon the whole of nature as lying beneath it like one who looks upon the fields from a mirror in a tower. Universal nature is but the *instrumental* cause which ministers to life and necessarily concurs to all its decisions; the whole physical world being completely subject to the moral and spiritual worlds, and so nothing can be in the way to prevent the soul from passing most freely to ends which are the only things that it regards. The soul which resides in the principles of natural things, and keeps all nature underneath it to serve life as an instrumental cause, of its own nature so disposes all things that effects correspond to ends, to which effects the soul passes through the innermost penetralia of the sciences and arts. Thus she (the soul) puts together the texture of the body, which to our mind's eye is full of miracles, while the soul of our own nature produces similar and still other things to infinity without any of the previous knowledges to aid her."

Was it on the ground of some such psychic intuition that we may understand Swedenborg's own *anticipation* of those facts which it took a century of experiment to find out? Whatever

the means, there can be no doubt that Swedenborg attaches the prior importance to what we may call the *a priori* knowledge, whether derived from revelation or from pure reason. At the same time, no one is more rigidly opposed than he to the holding of hypotheses as facts before they are actually demonstrated to be true. The several points under discussion in the work alluded to will, he says (No. 105):

"require to be further proved. In that case, should anything, when duly considered, not fall in with facts, it will be the surest proof of hallucination. Otherwise it may be assumed, if not as demonstrated, still as confirmed by all those proofs and phenomena that are at present extant. If so, then this theorem is in the last term of the probable and the first term of the true. We cannot by any means get into the veriest truths unless we be instructed, not *a posteriori*, but *a priori*. *That alone which flows from the Divine mouth is truth.* We shall, therefore, deduce in the sequel how anatomical, and at the same time physical proofs, and lastly how philosophical conjectures coincide here, and joining their forces, fight under the flag of our induction. In that place we shall again take up the present argument to confirm *a posteriori* those matters that conduce to our principles."

And finally, in his argument on the Mechanism of the Inter-course of the Mind and the Body, being the Second Part of the work on the *Infinite*, Swedenborg gives us this clear statement of his method and the principle on which it rests, namely, the method of induction from effects to causes, which induction is based on the prior assumption of an inmost end governing both cause and effect. Thus he says in the discussion of the Immortality of the Soul, p. 114:

"We know from the effect what is involved in the cause, from the last end what lies in the first, from the body what lies in the soul, namely, that in the body by the instinct of the soul a similar estate is desired to that which is in the soul. . . . Thus we may argue from effects to causes by the analytical method with good certainty, and by what we know arrive at a knowledge of the unknown, of which we are in search."

But all certainty of inductive knowledge depends upon the great *a priori* law which he now immediately lays down, and with which we conclude our discussion of Swedenborg's con-

tributions to modern knowledge (p. 115): "Nothing happens in the grosser world, but its principles lie in the subtler, together with the causes which determine it to occur in its distinctive manner, nor is there a single end in the grosser world but respects an end in the subtler, although the *latter* end is only a means to the essential End in the most pure Being."

FRANK SEWALL.

Reports.

REPORT OF THE SECRETARY.

To the Swedenborg Scientific Association:

The minutes and reports of the last annual 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, 1903. The list of members was revised up to date of publication.

During the year nineteen new members have been received, seven have been stricken from the roll in accordance with minute 160, twelve have resigned, and three have died, namely, Mrs. M. H. Bull, of Quincy, Ills.; Rev. P. B. Cabell, of Wilmington, Del.; Mr. M. V. Thompson, of Prairie City, Oregon. The present membership is 185.

As Keeper of the Archives, I have received from Dr. J. R. Swanton, editor of *The New Philosophy*, the typescript of Dr. C. L. Olds's translation of *Swedenborg's Characteristic and Mathematical Philosophy of Universals*.

The present whereabouts of the manuscripts may be ascertained from the appended list.

EUGENE J. E. SCHRECK,
Secretary.

May 23, 1904.

SCIENTIFIC AND PHILOSOPHICAL WORKS OF SWEDENBORG.

COPIED, TRANSLATED OR PUBLISHED SINCE THE ORGANIZATION OF THE SWEDENBORG SCIENTIFIC ASSOCIATION, MAY 28, 1898.

WORKS REPRINTED.

The Soul; or, Rational Psychology. Translated and Edited by the Rev. Frank Sewall. 388 pp. New York, 1900.

Original Manuscript contained in Codex 54.

Published in Latin by Dr. Immanuel Tafel, Tübingen, 1849. 274 pp.

The Infinite. London, 1902. Pp. 235.

Originally published by Swedenborg in 1734, Dresden and Leipsic.
Economy of the Animal Kingdom. Translated by Rev. Augustus Clissold.

Originally published by Swedenborg in 1740-1741, London and Amsterdam.

Second American edition, New York, 1903.

Ontology; or, the Signification of Philosophical Terms. New Edition, translated and edited by the Rev. Alfred Acton, Boston, 1901. 59 pp.

Original Manuscript contained in Codex 54.

WORKS PUBLISHED IN ENGLISH FOR THE FIRST TIME.

Tremulation. Translated from the Swedish by the Rev. C. Th. Odhner. Boston, 1899. Pp. 79. Photolithographs, I., pp. 132-180.

Original Manuscript, Diocesan Library of Linköping.

Contains also a translation of a paper on *Tremulation* from No. 6 of the *Daedalus Hyperboreus*.

Motion and Position of the Earth and the Planets. Translated from the Swedish at the expense of Mr. L. P. Ford, London, 1900. 45 pp.

Published by Swedenborg at Skara, 1718.

Corpuscular Philosophy in Brief. Transcribed from the photolithographed MS., and translated by Rev. E. F. Goerwitz, Prof. Vinet, Prof. Riborg Mann, and Rev. R. W. Brown. Published in Latin and English in "The New Philosophy," Vol., 22, 23. Photolith., Vol. VI., p. 318.

Characteristic and Mathematical Philosophy of Universals. Translated by Dr. C. L. Olds, and published in "The New Philosophy," Vol. VI., pp. 44-48. Photolithograph, Vol. VI., pp. 255-269.

Causes of Things. Translated by Mr. A. H. Stroh, and published in "The New Philosophy," Vol. VI., 20-22.

Original Manuscript in Swedish, in the Diocesan Library at Linköping. Transcript of original Swedish MS. made by Mr. A. H. Stroh and offered to the Sw. Sc. Assn. Photolithographs, I., pp. 24-27.

Summary of the Principia. Translated by Mr. A. H. Stroh, and published in "The New Philosophy," Vol. VI., pp. 8-20, 33-43, 115-151. Photolithographs, Vol. III., pp. 146-167.

Original MS. contained in Codex 88, Stockholm Academy of Sciences.

Published in separate form by the Sw. S. A., Bryn Athyn, 1904, pp. 66.

Notes to the Principia. Translated by Rev. R. W. Brown, and published in "The New Philosophy," Vol. III., pp. 134-147.

Original Manuscript, Codex 88. Photolithographs, III., pp. 83-90.

Transcription in the Library of the Academy of the New Church.

The Senses. Translated by the Rev. Enoch S. Price, and published in "The New Philosophy," II., pp. 129-133; IV., 1-8, 33-40, 105-113; V., 1-10, 145-151; VI., 1-7, 109-114; VII., 1-6.

Published in Latin by Dr. Immanuel Tafel, Tubingen, 1848.

Diseases of the Fibres. Translated by Dr. C. L. Olds, and published, 1897-1899, in "New Church Life." 1897, *Vol. XVII.*, pp. 7-9, 28-30, 42, 58-60, 75-77, 89-90, 110-111, 121-122, 137-138, 151-152, 167-169, 183-184. 1898, *Vol. XVIII.*, pp. 20-22, 38-39, 52-53, 72-73, 88, 119-120, 152-153, 168-170, 181-183. 1899, *Vol. XIX.*, pp. 7-8. Translation of *Economia Regni Animalis*, Part III., Section III., as edited by Wilkinson in 1847, London.

Original MS. in Codex 77. Edited by Wilkinson, London, 1847.

WORKS TRANSCRIBED.

A. Under the Auspices of the Swedenborg Scientific Association.

Principia Rerum Naturalium (The Lesser Principia). Transcribed by Rev. E. F. Goerwitz, 111 pp.; Prof. Vinet, 115 pp.; Rev. R. W. Brown, 116 pp. Manuscript at present in hands of the Rev. Alfred Acton, Bryn Athyn, Pa.

Original MS., Codex 87.

Photolithograph, II., pp., 103-144.

English translation in progress by Rev. Alfred Acton, assisted by Rev. C. E. Doering and Mr. A. H. Stroh.

The transcript was edited by Mr. A. H. Stroh in Stockholm, and is being printed by the Swedish Academy of Sciences.

Excerpts From Aristotle (Codex 36).

Index Variorum Philosophicorum (Codex 37).

De Magnete (Codex 81).

De Sulphure et Pyrite (Codex 82).

De Sale Communi (Codex 83).

De Secretione Argenti et Cupri (Codex 84).

De Vitriolo deque Modis vitriolum Elixandi (Codex 85).

Geometrica et Algebraica (Codex 86).

Varia Philosophica Anatomica et Itineraria (Codex 88).

Description of Swedish Iron Furnaces (Codex 99).

Other transcriptions in report of Mr. A. H. Stroh, *New Philosophy*, July, 1902.

B. Under the Auspices of the Royal Swedish Academy of Sciences. (The MSS. copied and printed; the other material printed.)

Remarks on Petrified Mussels, Snails, etc. (Swedish). Printed.

Original Manuscript, Diocesan Library of Linköping.

Photolithographs, Vol. I., p. 19.

The Rise and Fall of Lake Wenner (Swedish).

Original Manuscript, Diocesan Library of Linköping.

Photolithographs, Vol. I., pp. 120-126.

Height of Water, etc. (Swedish).

Published by Swedenborg in two editions, 1719. Second edition is republished.

Letter to Jacob a Melle. Published in *Acta Literaria Sveciæ*, 1721, pp. 192-196.

Miscellanea Observata, Parts I.-III. Published by Swedenborg in 1722 at Leipsic.

For further material copied by Royal Swedish Academy of Sciences see report of Mr. A. H. Stroh, *New Philosophy*, July, 1903.

On Swedish Furnaces. Printed in original Swedish by J. Johansson in Noraskogs Arkiv, Part 10, Stockholm, 1903.

See "The New Philosophy," 1904.

WORKS PUBLISHED IN ENGLISH NOW UNDERGOING REVISION.

Principia, 763 pp., 8vo. Originally translated by Rev. A. Clissold. Revised by Messrs. Sewall, Mann, Price, and Notes and Corrections sent to Messrs. Tansley and Rendell, of England, in whose hands they now are.

Animal Kingdom, 1119 pp., 8vo. Under revision by Rev. C. E. Doering, Dr. H. Farrington and Mr. A. H. Stroh. Originally translated by Dr. Wilkinson.

Worship and Love of God. Parts I. and II. revised, and Part III. translated by Mr. A. H. Stroh.

Second Swedish edition in *Nya Kyrkans Harold*, 1902-1903. 1902, pp. 19-26, 53-57; 1903, pp. 33-35, 69-71, 92-93, concluding with No. 15, i. e., Part I., Section I. Translated by Rev. J. E. Boyesen and Mr. Alfred H. Stroh.

TRANSLATIONS IN MANUSCRIPT.

Mechanism of Soul and Body, partly translated by Mr. A. H. Stroh. Manuscript, contained in Codex 88. Photolithograph, Vol. III., pp. 91-102.

On Copper and Copper Ore. Translated by Mr. A. H. Searle at ex-

pense of L. P. Ford. Originally published by Swedenborg in folio at Dresden and Leipzig, in 1734. 534 pp. Estimate of English, 900 pp, 8vo.

TRANSCRIPT MADE BEFORE THE ORGANIZATION OF THE
SWEDENBORG SCIENTIFIC ASSOCIATION.

De Cerebro et de Morbis Cerebri. Transcribed by Rev. P. B. Cabell.
At Present in the Royal Swedish Academy of Sciences.

REPORT OF THE TREASURER.

BRYN ATHYN, May 25, 1904.

To the Members of the Swedenborg Scientific Association:—

The report of the Treasurer of the Swedenborg Scientific Association is herewith submitted to you.

The membership dues have been \$17.01, and the subscriptions to *The New Philosophy*, \$10.94, more than during the previous year; whereas the special contributions have been \$36.90 less, making the total receipts, not counting special funds, \$8.95 less than during the previous year.

Among the expenses this year is the publication of the *Summary of the Principia*, the first publication of the Association.

It was the purpose of the Swedenborg Scientific Association to use the plates of the *Diseases of the Fibres* to issue an edition of that work. But on investigation, no trace of any plates could be found, and the evidence seems conclusive that no plates were ever made of the work.

Arrangements can, however, be made to republish the work on *The Senses*, which is appearing serially in *The New Philosophy*, if the Association deems it desirable to do so.

In regard to the reproduction of the Scientific Manuscripts, it will be seen from the balance on hand that the Association has not yet enough money to fulfill its obligation to furnish \$200.00 toward this fund, part of which will be needed to see the first work, viz., *De Sale*, through the press.

Attention is called to the contribution of \$50.00 from a member of the Association on condition that the balance for publishing the *Principia*, estimated at about \$2,000, be raised by July, 1904, and that if it is not raised by that time, the money is to be held awaiting instructions from the contributor.

Respectfully submitted,

C. E. DOERING,
Treasurer.

FINANCIAL STATEMENT.

SWEDENBORG SCIENTIFIC ASSOCIATION, MAY 25, 1904.

RECEIPTS.

Balance on hand as per last report, ..		\$83 85	
Membership dues,	\$199 01		
Subscriptions, <i>New Philosophy</i> ,	167 24		
Special Contributions,	1 81	368 06	\$451 91
		<hr/>	

EXPENDITURES.

The New Philosophy:—

Printing four Issues,	\$205 88		
Paper 3½ Reams,	16 50		
Cover Paper,	9 00		
Envelopes,	5 46		
Editor's Stationery and Postage,	14 80		
Addressing Envelopes,	4 00		
Express and Hauling N. P.,	2 47		
Postage,	1 47	\$259 58	

General:—

Stationery,	\$4 71		
Stationery for President,	50		
Postage and Stationery for Secretary, ..	3 81		
Postage,	10 02		
Mail Box,	20		
Express on MSS. to Sweden,	3 05	22 29	
Printing "Summary of Principia,"	33 73		
Paper and Cover for Principia,	10 00	43 73	325 60
		<hr/>	<hr/>

Balance,			\$126 31
----------------	--	--	----------

SCIENTIFIC MSS. ACCOUNT.

RECEIPTS.

Balance as per Last Report,	\$82 78	
Contribution by Rotch Trustees,	100 00	
Paper Sold to A. H. Stroh,	54	\$183 32

EXPENDITURES.

"De Sale:—"

A. Acton, Sundry Items,	\$2 62
-------------------------------	--------

Printing 16 pages,	24 10	
Printing 16 pages,	25 00	
Postage on MSS.,	38	52 10
	<hr/>	<hr/>
Balance,		131 22
<i>"Worship and Love of God" Account:—</i>		
Balance as per last report,....		13 10
Special Contribution for Publishing		
<i>The Principia</i> ,		50 00
		<hr/>
Total Balance,		320 63

RECAPITULATION.

Total Balance as per Last Report,	\$179 73	
Total Receipts,	518 60	\$698 33

EXPENDITURES.

<i>New Philosophy</i> ,	\$259 58	
General,	22 29	
<i>Summary Principia</i> ,	43 73	
Scientific MSS. Acct.,	52 10	377 70
	<hr/>	<hr/>
Balance,		\$320 63
Audited and found correct.		
Washington, D. C., May 26, 1904.		

HORACE P. CHANDLER,
L. P. MERCER.

REPORT OF THE BOARD OF DIRECTORS.

1. SINCE the last annual report of the Board of Directors, two meetings have been held, one on July 2, 1903, at 12:30 P. M., in Chicago, Ills., the other on May 24, 1904, at 8:00 P. M., in Washington, D. C.

2. At the meeting in Chicago, the Rev. Wm. B. Caldwell's offer to write accounts of the meeting of the Association for the *New Church Messenger*, *New Church Life*, and *Morning Light*, was accepted.

3. At the same meeting the appointment of an editor for *The New Philosophy* was considered, and Prof. Harvey Farrington, M. D., of Chicago, and Alfred H. Stroh, of Bryn Athyn, Pa., were nominated.

4. Subsequent correspondence among the members of the Board resulted in the election of Prof. Farrington as editor, who entered upon his duties with the new year, Dr. John R. Swanton having completed Volume VI., including, under his efficient editorial supervision, the

preparation by Mr. Emil E. Stroh, of Bryn Athyn, Pa., of an Index for the first six volumes of the journal.

5. At the meeting of the Board held in Washington, the Executive Committee reported that a thorough search in the establishment of the Franklin Printing Company, of Philadelphia, where Dr. Old's translation of the *Diseases of the Fibres* was set up in type when it was originally published in *New Church Life*, during the years 1897, 1898, 1899, had failed to discover the plates of the treatise, and that the manager was quite certain that the plates had never been manufactured, as they have no record of them whatever. The proposed publication of the treatise, in book form, is, therefore, postponed.

6. The Executive Committee reports that *The Worship and Love of God* has not been published, as the manuscript is not yet ready for the press, and the response to the appeal for funds is insufficient, only \$315.00 having been subscribed, which is about one-third of the estimated cost.

7. The Executive Committee reports that *The Summary of the Principia* published serially in *The New Philosophy*, has been issued separately, making a volume of sixty-six pages (at fifty cents). This is the first volume transcribed, and translated direct from Swedenborg's MS., that has been published by our Association.

8. Beginning with the present volume of *The New Philosophy*, the instalments of the treatise on *The Senses* will be printed as rapidly as sufficient material for 16 or 32 page-forms is in hand. This type is held by *The Examiner*, No. 9 North Queen street, Lancaster, Pa.

9. The Executive Committee, when considering the question of the time and place of the next meeting, referred to them by the Association (minute 388), received suggestions pointing to New York, Baltimore, and Washington. On consulting by correspondence with the members of the Board of Directors, and finding a majority of the replies to be in favor of Washington, the committee decided to hold the annual meeting in that city on Wednesday and Thursday, May 24th and 25th, the National Church of the New Jerusalem being offered to them for the purpose.

10. The Executive Committee reports that at the instance of the Committee on the Publication of Swedenborg's Scientific MSS., it has entered into an agreement with the Rotch Trustees by which, in consideration of \$400.00 in all, contributed by them toward the publishing of the works on *Salt*, *Vitriol* and *Sulphur*, 25 copies of each of these works shall be transferred to them.

11. On the recommendation of the Executive Committee that the Board of Directors should present a resolution to the Association regarding the time and place of holding the annual meetings, the Board considered the question. A letter from an absent member of the Board was read, in which the holding of the annual meetings of the Association in

the sphere of a church meeting was deprecated, and it was earnestly advocated that the meetings should be entirely independent of church meetings, and proposed that they be permanently held in the rooms of the American Swedenborg Printing and Publishing Society in New York, under the supposition that they have been offered for our use. These rooms were considered peculiarly suitable, as they were the home of a literary and publication society, and gave access to such of Swedenborg's works as may be needed during our sessions. The Board recommends that the question of the next annual meeting be decided by the Association itself.

12. The Board of Directors recommends that the Constitution be amended by adding to Article III. on "Membership," the words, "Honorary members may be elected on recommendation by the Board of Directors."

13. Reports have been received from the Committees on the Revision of the *Animal Kingdom*, the Revision of the *Principia*, the Translation of the *Senses*, the Committee on the Publication of Swedenborg's Scientific Manuscripts, all of which are submitted herewith.

14. On the question of interpretative introductions referred to in the report on the *Principia*, the Board recommends that the *Principia* be published without such an introduction.

15. Prof. Enoch S. Price having tendered his resignation from the Committee on the New Edition of the *Principia* and recommended Mr. Alfred H. Stroh in his place, the Board accepted the resignation and appointed Mr. Stroh on the Committee.

16. Acting on the advice of the Committee of Incorporation, the Secretary of the Association issued a formal notice of the intention to incorporate the Swedenborg Scientific Association, and that the question of such incorporation would be considered and voted upon at the regular annual meeting of the said Association, which will be held on Wednesday and Thursday, May 25th and 26th, 1904, beginning at 3 o'clock P. M., Wednesday, in the National church, corner of 16th and Corcoran streets, N. W., Washington, D. C. This notice was sent to all the members of the Association more than a month previous to the proposed meeting.

17. The Board recommends to the Association an exchange of publications with the Royal Academy of Sciences in Stockholm.

EUGENE J. E. SCHRECK,
Secretary.

REPORT OF THE EDITOR OF "THE NEW PHILOSOPHY."

Since the transference of *The New Philosophy* to the present editor, on December 2, 1903, two numbers have been issued, namely, the January and April numbers of this year.

Although there has never been any definite decision as to the size of our magazine, the usual number of pages has been thirty-two. I have endeavored to keep within the same limits, but felt justified in augmenting the January number to forty-two pages in order to include important matter, which would have lost in interest by being held over till July, notably Mr. Alfred H. Stroh's "Review of the Course of Swedenborg's Science in Sweden." I regret that the German and Swedish in this article could not be marked with the proper accents, but these are not included in the usual linotype font. The April number was reduced to thirty-two pages, thus maintaining the average.

In editing *The New Philosophy* the following points have been kept in view:

1. The publication of a translation from Swedenborg. The work on the *Senses* was continued in the January issue, but the translator was unable to furnish copy for April. The type of this and all future translations will be held, or extra sheets will be struck off, so that they may be issued in book form at comparatively little expense to the Association.

2. Keeping in touch with scientists in the world at large. Copies of *The New Philosophy* were sent to all the leading scientific and philosophical periodicals with the request that they exchange. As yet no replies have been received. This heading includes notices of new facts bearing upon Swedenborg's science and reviews of books or articles that would be of interest to our members, especially if Swedenborg is quoted or referred to.

3. The study of Swedenborg's science and philosophy, especially by articles which are scholarly and well written, but not so technical as to be unintelligible to those of our readers who are not scientists.

4. The fostering of interest in the life and work of the Association by announcements of the work accomplished, and brief reports of what is going on in the lesser organizations devoted to the same interests as our Association.

5. The promulgation of the teachings of Swedenborg's scientific and philosophical works, especially by sending the magazine to public libraries and reading rooms in connection with institutions of learning.

6. The recording of all new discoveries and items of interest in connection with the *Swedenborgiana*.

Subjects of purely theological nature have not been admitted, but it must be conceded, that, since Swedenborg, in his philosophy, bordered so closely upon the world that lies beyond, it would be well-nigh impossible to exclude all references to his Theology.

In concluding, I wish to acknowledge my indebtedness to the Rev. Wm. B. Caldwell and to Dr. Ernest A. Farrington, of the Swedenborg

Philosophy Club of Chicago, for their very efficient assistance in my editorial work.

Respectfully submitted,

HARVEY FARRINGTON, M. D.,
Editor.

Chicago, May 15, 1904.

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

Your Committee has learned that the revision of the text of the *Principia* by Messrs. Tansley and Rendell is nearing its completion. The hope is entertained that the work may be submitted to the printers within a few months.

As the understanding between the Swedenborg Scientific Association and the London Swedenborg Society looked to co-operation both in the editing and in the publishing of the *Principia* (*New Philosophy*, Vol. III., p. 44, 101), and as the London Society accepted the "some three hundred subscriptions" to the new edition of the *Principia* as collateral for our share of the expense of publishing the work, the edition to consist of one thousand copies, our Association agreeing to take one-half, that is, five hundred copies, and pay for them as money comes in from sales, your Committee would recommend that as soon as the work of editing is finished in a way satisfactory to the joint editing committee, the treasurer be instructed to turn over the subscriptions that are still valid, to the London Society, and to obtain others requisite to make up the amount necessary to meet the expense of half the edition.

In view of the doubt expressed by the London Society as to the policy of our Association (*New Philosophy*, III., p. 84) in regard to the insertion of interpretative introductions, a policy not adopted in their new edition of the work on *The Infinite*, the Committee would like further instructions from the Association, as to the character of the introductory matter desirable to be inserted, if any, in the proposed new edition of the *Principia*.

FRANK SEWALL,
Chairman.

REPORT OF THE COMMITTEE ON THE TRANSLATION OF THE "ANIMAL KINGDOM."

Dear Dr. Sewall:—

The Committee on revision of the *Animal Kingdom* begs to report . that all but the last chapter of the first volume has been revised.

C. E. DOERING.
Chairman.

REPORT OF THE COMMITTEE ON THE TRANSLATION OF
"THE SENSES."

I wish to report that the work of translating the fourth part of the *Animal Kingdom*, "The Senses," goes slowly on. I hope each summer to get time to go ahead more rapidly; perhaps I may be able to do so the coming summer. I hope so.

Yours sincerely,

ENOCH S. PRICE.

MR. ACTON'S REPORT ON THE TRANSLATION OF THE
"LESSER PRINCIPIA" AND THE PUBLICATION
OF "DE SALE."

My long illness greatly interfered with the work on *De Sale* and *The Lesser Principia*, for when I was able to resume duties I found but little leisure for any work outside my profession.

In regard to *De Sale*, we have finished printing the third sheet (pp. 33-48), and I have done most of the work required for preparing copy for two more sheets, which I hope will be printed during the summer or fall. I suppose you understand that the handwriting of the copy we received from Sweden was so poor that the MS. has to be re-copied to render it fit for the printer, and this takes a good deal of time.

Little more work has been done on the translation of *The Lesser Principia* than on *De Sale*. Mr. Doering, Mr. Stroh, and I have met every week for the past two or three months to discuss what I have translated. Still the work goes slowly, and this, principally, on account of the number of passages where the meaning is very obscure and difficult to get at.

In both works, *De Sale* and *The Lesser Principia*, as much progress has been made as was possible under the circumstances. I think it will be sufficient to report progress in both committees, and to incorporate such report of progress in your presidential report.

ALFRED ACTON.

REPORT OF THE COMMITTEE TO SEND GREETINGS TO
THE ROYAL SWEDISH ACADEMY OF SCIENCES.

Your Committee addressed a Letter of Greeting under date of January 8, 1904, to Mr. Gustav Retzius, Professor Doctor of Medicine, President of the Swedenborg Committee of the Royal Swedish Academy of Sciences, expressing the satisfaction felt in the beginning of the work of the Academy in publishing the scientific works of Swedenborg. The letter appears on page 19, of Vol. VII., of *The New Philosophy*.

FRANK SEWALL,

Chairman.

REPORT ON THE REPRODUCTION OF SWEDENBORG'S
MANUSCRIPTS BY THE SWEDENBORG SCIENTIFIC
ASSOCIATION AND THE ROYAL SWEDISH
ACADEMY OF SCIENCES.

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

The present report is in continuation of the one sent last year. (See *The New Philosophy*, July, 1903, pp. 97-99.) A reply to the last report was received from the committee appointed by the Association, and as a result, the manuscripts mentioned in the early portion of the report have been retained for use by the Swedenborg Committee of the Royal Swedish Academy of Sciences.

Progress has been made in the editing of the new edition of the *Worship and Love of God*. Part I. has been still further revised, a number of valuable suggestions by Dr. Frank Sewall being incorporated.

The copying of Swedenborg's manuscripts by the Association has not been completed. Up to the present time the following Codices or parts of Codices have been copied, 36, 37, 81, 82, 83, 84, 85, 86, 88, 99. Only a portion of the unreproduced material in Codex 88 has been copied. Codices 81, 82, 83 and 84 were finally collated by the writer, and the copies forwarded to America before leaving Sweden last August. Numerous critical and explanatory notes were made in red ink in the copies to facilitate the editing in America. The copies not sent to America were, with the consent of the Librarian of the Royal Swedish Academy of Sciences, carefully stored in the Library of the Academy. They have been partially collated, and the writer hopes to continue the work this summer.

In addition to the above-mentioned copies of the manuscripts a number of manuscripts and documents were copied by or for the writer; translations of some of these copies will be offered for publication to *The New Philosophy*, and the original copies will be placed in the Archives of the Association.

As reported last year, a great deal of copying of Swedenborg's manuscripts was undertaken by the Swedenborg Committee of the Royal Swedish Academy of Sciences. This work has been continued, and progress has also been made with the printing of the two volumes on which work was begun.

In volume I there have been printed: 1. *Om Watnens Hogd*, etc., the work on the *Height of Water*, etc., published by Swedenborg in two editions in 1719. The second edition, which differs somewhat from the first, has been reprinted. See the *Documents*, Chronological Account, No. 19.

2. *Anmarckninger om Musslor, Sneckor*, etc. (*Remarks on Mus-*

sels, Snails, etc.). See *Document* 311, No. 5. These *Remarks* have hitherto been accessible in the photolithograph only.

3. *Om Wennerns Fallande och Stigande*, etc. (*Concerning the Rise and Fall of Lake Wenner.*). See *Documents*, Chronological Account, No. 25. This treatise has hitherto been accessible in the photolithograph only.

4. *Excerpta Tria ex Actis Literariis Sveciæ ex Annis 1720-1721.* (*Three Extracts from the Acta Literaria Sveciæ of the years 1720-1721.*) The first two extracts are reviews of Nos. 1 and 3, the third extract is Swedenborg's Letter to Jacobus a Melle of Lubeck. See *Documents*, Chronological Account, No. 27.

5. *Miscellanea Observata*, etc.; the *Miscellaneous Observations*, etc., the work published by Swedenborg at Leipsic in 1722. Of this work Parts I. to III. are in print, and the printing of Part IV., which is extremely rare, will follow. See *Documents*, Chronological Account, No. 33.

Altogether over 144 pages of Vol. I. have been printed. The volume is designed to contain Swedenborg's contributions to Geology.

Of volume II., 80 pages are in type, containing more than one-third of the work commonly known as the *Lesser Principia*. See *Documents*, Chronological Account, No. 26. The original basis of the printer's copy of this important work is the copy made from the photolithographed reproduction by Messrs. Goerwitz, Vinet and Brown. (See *The New Philosophy*, July, 1902, pp. 128-129.) This copy was reproduced in the early half of 1902, three type-written copies being made. One of these type-written copies was presented to the writer by Mr. C. Hj. Asplundh with the understanding that after it had been corrected in Stockholm by comparison with the original manuscript, a revised copy of one of the other type-written reproductions should be made. In Stockholm, when the Swedenborg Committee of the Royal Swedish Academy of Sciences was organized, the writer, acting as the representative of the Swedenborg Scientific Association, agreed to turn over the type-written copy in his possession to the Swedenborg Committee, provided the work would be printed. A decision was soon made and the printing begun. The typewritten copy had been partially edited in America, but was finally edited in Stockholm after the decision to print had been made. This copy is being carefully preserved and will be placed in the Archives of the Association when the printing has been completed.

The corrected proof-sheets of the two volumes have been regularly forwarded to America by the writer's assistant in Stockholm, Fil. Kand. Hr. Otto Holm, and, after final revision and the preparation of critical notes by the writer, have been returned to Stockholm for printing. The Rev. Alfred Acton has given valuable aid in the final revision of the proof-sheets of the *Lesser Principia*.

The "Memoir respecting Emanuel Swedenborg as a Scientist and Natural Philosopher," mentioned in last year's report, is in the hands of the printer.

The writer takes this opportunity to make acknowledgment of the valuable help given to him as the representative of the Swedenborg Scientific Association by the officials and members of the Royal Swedish Academy of Sciences, and also by the librarians in Stockholm, Upsala, Linköping and Lund.

Respectfully submitted,

ALFRED H. STROH.

Bryn Athyn, Pa., May 11, 1904.

REPORT OF THE COMMITTEE ON INCORPORATION.*

NEW YORK, May 21, 1904.

To the Swedenborg Scientific Association:—

The undersigned, the surviving member of the Committee on Incorporation, begs to report as follows:

This Committee was appointed at the meeting of the Society in 1902, and consisted of Mr. Carl Hj. Asplundh as Chairman, and myself, but through some misunderstanding I was not notified of my appointment until a few days before the 1903 meeting, when, as Mr. Asplundh had in the meantime died, I was asked for a report. Upon my stating that I had not been notified, and, therefore, had done nothing, the Association continued the matter in my hands as a Committee of one. As the preliminary legal formalities can only be carried out at a regular meeting of the Association, it was not possible for me to do anything further than to prepare a plan and present the same to the Association at the next meeting.

I would now report that, having very carefully considered the whole matter, I had drafted a proposed Certificate of Incorporation under the New York law regulating corporations of the nature of our Association, and also certain preliminary resolutions, and it was my intention to present same to the coming Annual Meeting at Washington, and recommend that the legal formalities be gone through with there. At almost the last moment, however, a doubt has suggested itself as to the possibility of technical objections being made, some time in the future, to the legality of our incorporating under the New York corporation law at a meeting held at Washington, outside of the jurisdiction in which we incorporate.

I do not think an objection of this kind would be upheld in the courts, but still it might be, and should we ever be so fortunate as to

*See note to minute 447.

have a large legacy left to us, we might find the same contested on the ground that we were not legally incorporated. I therefore recommend, in order to avoid all risk, that, while the Association at the meeting at Washington, should approve the proposition to incorporate and instruct the Directors to consummate the same, it should not attempt to actually complete the legal formalities at that time.

If this recommendation is agreed to, I would suggest that the Association pass a vote substantially as follows:

"Voted, that it is desirable that this Association be incorporated, and that the Directors of the Association are hereby authorized to incorporate the same, under the laws of the State of New York, with the corporate name of 'Swedenborg Scientific Association' for the purposes stated in the Constitution."

Such a resolution must be passed by the unanimous vote of the members present and voting. Should any great opposition manifest itself, the project would fail, but should only a few vote in the negative they should be appealed to change their votes and make the action unanimous, or at least to refrain from voting. The passage of such a resolution will place it in the power of the Directors to call a meeting at New York City or elsewhere within New York State, at which the legal formalities can be gone through with. This meeting will be in form a regularly called meeting of the Association for the purpose of incorporating, but it will not be necessary for any large number to attend, as it will be understood that the meeting will be held under the auspices of the Board of Directors, and be attended by such members as may find it convenient to attend, simply for the purpose of complying with form, the substance having been voted at the Washington meeting.

As a preliminary to this meeting I would also suggest that Article V. of the Constitution be amended by striking out the word "annually," changing "time" to *times* and "place" to *places*, and by adding the following sentence at the end: "At any meeting of this Association nine members shall constitute a quorum." The object of this is to remove all doubt as to the power of the proposed New York meeting to legally incorporate. The reason the number nine is chosen is because this is the smallest number which would constitute a legal quorum under the New York law. These amendments must, of course, be recommended by the Board of Directors, as required by Article VI. of the Constitution.

The reasons I have chosen the New York law to incorporate under, are, first, that our Association was organized in New York City, and its second meeting was held here, so that as an unincorporated Association, having no other definite home, we may be said, in a sense, to be already under the New York law; and secondly, as I am much more familiar with the membership or non-stock corporation laws of New

York than with those of other States, and as this branch of the law is very technical and full of pitfalls, for the better avoidance of these I selected New York.

Should the proposed plan not be approved, I would still suggest that the matter be referred to the Board of Directors, with power, and either with or without special instructions, so that it will not be necessary to wait until the next meeting of the Association before taking some action.

In closing, I wish to be allowed to state my indebtedness to Mr. Marston Niles, of this city, one of our recently received members, who, as a lawyer, has made a special study of the New York law of membership corporations, for valuable suggestions as to this matter. If it is allowable for me to do so, I would respectfully suggest that he be added to the Committee on Incorporation (in case such committee be continued), as I think his advice will assist in solving the problem of what is best to be done.

Respectfully submitted,

EDMOND CONGAR BROWN,

Committee on Incorporation.

Communications.

THE URBANA UNIVERSITY SCIENTIFIC CLUB.

TO THE SWEDENBORG SCIENTIFIC ASSOCIATION.

Gentlemen:—The Urbana University Scientific Club would submit the following report of their organization and work:

The visit of the Rev. Dr. Sewall to Urbana in March resulted in the forming of our Scientific Club. The spirit of interest in the Church and in the writings of Swedenborg that he found there took shape, at his suggestion, in the formation of some of our older young men into the club, whose purpose is the study of Swedenborg's Science.

Mr. Ernest G. Dodge, A. M., of Kentucky, was elected president, and Mr. Daniel Edson, of New Hampshire, secretary and treasurer.

The New Philosophy was subscribed for and is to be kept on file in the study of the Rev. Russell Eaton, which is used as a study and club room for members and friends of the Association.

The Club meets once in two weeks on Friday nights, and the first work the Club has undertaken is the study of the life of Emanuel Swedenborg. This work is still occupying the Club, and two papers have already been presented, the first on the early part of Swedenborg's life, presented by Daniel Edson, discussion led by E. G. Dodge; the second prepared by Gilbert Smith on the life of Swedenborg between

his graduation and his illumination. The plan is to follow these with papers and discussions on the period of his illumination.

Our numbers are small and our work is, of necessity, elementary, but the spirit of our Club is determined, and our love for the Church is deep and ardent. We propose to learn, that our love may find means to express itself.

Respectfully submitted,
DANIEL EDSON, *Sec.*

OFFICERS AND COMMITTEES FOR 1904-1905.

PRESIDENT.—REV. FRANK SEWALL, A. M., D. D., 1618 *Riggs Place, Washington, D. C.*

SECRETARY.—REV. EUGENE J. E. SCHRECK, A. M., 6949 *Eggles-ton Avenue, Chicago, Ill.*
(Minutes 248, 290, 399.)

TREASURER.—REV. CHARLES E. DOERING, *Bryn Athyn, Mont-gomery Co., Penna.*
(By-Law 3, minute 160.)

BOARD OF DIRECTORS.

The President, the Secretary and the Treasurer, *ex-officio*.

Rev. L. P. Mercer, cor. 4th and John Sts., Cincinnati, O.; Prof. Harvey Farrington, M. D., 815 Marshall Field Building, Chicago, Ill.; Mr. Alfred H. Stroh, Bryn Athyn, Montgomery Co., Pa.; Prof. Thomas French, Jr., Ph. D., Amherst, Mass.; Prof. Lewis F. Hite, 1 Avon Place, Cambridge, Mass.; Mr. Horace P. Chandler, 53 Devonshire St., Boston, Mass.; Dr. George M. Cooper, Bryn Athyn, Montgomery Co., Pa.; Mr. Robert B. Caldwell, Jr., 1924 Frick Building, Pittsburg, Pa.; Rev. Alfred Acton, Bryn Athyn, Montgomery Co., Pa.

EXECUTIVE COMMITTEE.

The President, the Secretary and the Treasurer, *ex-officio*.

(Reference, minutes 440, 445, 447, 453; report of Board of Directors, 1903, sections 6, 11.)

EDITOR OF "THE NEW PHILOSOPHY."

Prof. Harvey Farrington, M. D.

COMMITTEE ON A NEW EDITION OF THE "PRINCIPIA."

Rev. Frank Sewall, Prof. C. Riborg Mann, Mr. Alfred H. Stroh,
Rev. C. Th. Odhner.

(Reference, minutes 429, 439.)

COMMITTEE ON A NEW EDITION OF THE "ANIMAL KINGDOM."

Rev. C. E. Doering, Dr. Harvey Farrington, Mr. Alfred H. Stroh.

COMMITTEE ON THE TRANSCRIPTION AND TRANSLATION OF THE "LESSER
PRINCIPIA."

Rev. Alfred Acton, Rev. Charles E. Doering.
(Report Board of Directors, 1903, section 3.)

COMMITTEE ON THE TRANSLATION OF "THE SENSES."

Rev. Enoch S. Price.

COMMITTEE ON THE TRANSLATION OF SWEDENBORG'S EARLY SWEDISH
SCIENTIFIC TREATISES.

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

COMMITTEE ON THE PUBLICATION OF SWEDENBORG'S SCIENTIFIC MANU-
SCRIPTS.

The President, the Treasurer, the Rev. Alfred Acton, Mr. Arthur
W. Burnham, Mr. Horace P. Chandler, Mr. Alfred H. Stroh, Mr.
Robert B. Caldwell, Jr.

(Minutes 288, 345-347; B. D., 156, 159; New Phil., July, 1901, p. 85.)

KEEPER OF THE ARCHIVES.

The Secretary.
(Minutes 291, 292, 443.)

COMMITTEE ON INCORPORATION.

Edmond Congar Brown, Esq.

THE NEW PHILOSOPHY.

VOL. VII.

OCTOBER, 1904.

No. 4.

THE SENSES.

PART FOUR OF THE ANIMAL KINGDOM, BY EMANUEL SWEDENBORG.

CHAPTER V. (*Continued*).

126. *Sound is increased by trumpets according to the width of the orifice, just as in compression of the air.* 1. Of what quality a sound or modification is can be elucidated and known, if it be compared with the compression; 2, for it is alternate compression of the air, and its rebounding into its own dimension, which produces sound. 3. The phenomena of the pressure of the atmospheres are known, that is, they press according to altitude and the aperture of the ear. 4. Sound is urged on the more and collected in tubes if they are made according to the spiral fluxion of the air, as in horns and other instruments, and in the cochlea of the ear and in cylinders. 5. It creeps along the walls, 6, and there, having collected force, it flies forth through the opening, according to the ratio of pressure, driven by both causes of modifications, by the fluxion into a spire as well as by the propagation along a straight line. 7. The opening is the centre of modification, where the sound breaks forth. 8. Furthermore, a trifling chink can stretch a large bladder, as is found by experience. Thus a very small and thin sound can fill the great belly of a trumpet.

127. *The vibration which runs along the walls of a trumpet does not discriminate the sound, except as to its general quality respectively to its parts.* 1. The vibration struck out by the vibrating walls produces nothing different from what is done by an instrument to which strings are attached. 2. For the wall does not give forth a distinct sound, 3, but a general under which are particulars. 4. This is evident from speaking trumpets without the voice, or with the voice, or from

trumpets through which air is forced to produce sound. 5. These things are according to rules. 6. Wherefore the whole of geometry is applicable here, and the science of these things is inexhaustible.

128. *All these things exist most distinctly in the ear, where all the internal and most secret geometry and harmony of the modulations of the air are; for the ear is an organ altogether for receiving the modification of the air, as the larynx is an organ for presenting those modifications. Thus we cannot better learn about modification than from the ear and larynx themselves, upon which nature has inscribed the very nature of the air; for modification is the active force of its form; for the driven air fits itself to the form, yields modification, and, if interiorly examined, fully indicates what lies hidden in the air.*

129. *While the air thus modified impinges upon the elastic membranes, it communicates an impression conformable to them; thus it passes from a fluid state into what is consistent and from what is consistent into a fluid.* 1. That it passes from a fluid or air into the membranes appears in the ear. 2. That it passes from what is consistent into a fluid, appears from strings, from musical instruments, and from the larynx. 3. That sound passes a second time into what is fluid, appears from the harmony in the string of an instrument, when a string of another is touched. 4. For the general vibration passes by means of what is consistent into the body of the other instrument; 5, there it excites the very string of the same tone. 6. This is a sign that the relation and harmony of generals is like that of particulars. 7. For when a string is moved together with its fastening, another general sound results, under which sounds a like particular. 8. The same appears if something be attached to the fastening of a string, namely, that the particulars of the sound undergo thence a general variation. 9. *And such as is the body of the instrument, such will be the particulars of the sound in common or in general.*

130. *Wherefore hearing is also touch, for its varieties and affections result from membranes and nerves being moved.* 1. This appears from the modification of the air, 2, from the air itself in all things. 3. The air exerts a double force of modi-

fication into the ear, namely, of fluxion and of modification. 4. One tone, however, is highly compounded.

131. *A like modification traverses the nerves which correspond and is carried to the brain; in the nerves, and especially in the brain, modification means sensation, for life is in modification.* It has been shown above, 1, that sensation is modification, life being added. 2. The modification runs through the membranes according to its composition, degrees and velocity. 3. So also it traverses the animal spirit, whence nerves are hard and soft.

132. *As is the modification, such is the change in the brain, in general and in particular, namely, in the cortex,* 1, where the ends of the nerves are, 2, where the partitions are, according to all their compositions, 3, where the cortex is made for receiving all its changes of state. 4. This is announced in its own manner to the soul. 5. Many modifications joined at the same time create a harmony, which is natural, whence arises affection. 6. Many harmonies joined at one time create another harmony, which appears under visible and imaginative sensation. 7. Many of the latter still further conjoined create a harmony under an intellectual idea, and so forth.

133. *In order that the ear may perceive anything, it is necessary that a general modification be present.* 1. This takes place through the cranium, which is everywhere perforated. 2. It takes place through the bones of the temples. 3. It happens more regularly through the Eustachian tube. 4. It passes into the whole osseous system, 5, and into the membranous system through the *dura mater*. 6. Wherefore the bones are everywhere conjoined in the ear, and these communicate with the bones of the cranium through the sutures next to the *membrana tympani* on the one side, and through the Eustachian tube; on the other. 8. And the modulation traverses all the nerves; wherefore nerves run through the *aqueductus Fallopii*. 9. This sense traverses the whole cerebrum and cerebellum. 10. Indeed, it runs through the whole body, and there is nothing which does not vibrate.

134. *The modification of the air and the vibration of what is consistent, and of the harder parts of the body, are of the*

same kind. 1. Thus from one we may learn concerning the other. 2. All parts are, in themselves, solid, or cohere well together. 3. Between all the parts are openings or interstices for the ether. 4. The ether being agitated, the parts vibrate. 5. Thence arise effluvia. 6. Therefore, the life of these effluvia is as it were from a perpetual vibration.

135. *How wonderful is the nature of the oscillation, vibration and trembling, and how it penetrates, and how strong it is, appears abundantly from the phenomena.* 1. A very small origin produces a very great result. 2. The vibration of one fibre transfers itself into the entire body. 3. That of a single string bound to its fastening transfers itself into the whole beam. 4. A single carriage vibrating affects a whole house, a temple, a city, a mountain. 5. Thus in order that its nature may be most efficacious there; for nature has inscribed its own power upon it, 6, and has endowed it with life.

RADIUM

IN CONNECTION WITH SWEDENBORG'S DOCTRINE OF
ARCHITECTONIC UNITS AND THEIR SPHERES.

Radium is a metal. It is the last of a series of substances of allied but lesser powers which recently have been isolated from pitch-blende.

Pitch-blende itself is a uranium compound found either in connection with the primitive granite—the one rock in which minute pockets of pure hydrogen or nitrogen gas are sometimes met with¹—or associated with certain metals in the form of phosphate of copper and uranium. The entire class of uranium salts is noted for its exhibition of brilliant phosphorescent and fluorescent phenomena.

Radium itself is procurable from pitch-blende only by a tedious and delicate process, several tons of the blende being required to furnish a few grains of the metal. In fact, not more than an ounce or so of radium is as yet in the hands of mankind, and that is not in the form of the pure metal, but of radium chloride or bromide. Small, however, as the known amount of radium is, its discovery and investigation have involved results of wide consequence, with some points of especial interest to lovers and students of Swedenborg's works.

It has presented the first unmistakable and unescapable experimental evidence along the line of Swedenborg's great doctrine of emanant spheres.

It has led to an enlarged idea of the molecule or least integral unit of an inorganic substance, as itself a peculiar equilibrated integer of form, which possesses not only a complex internal structure with an internal economy of its own, but a possible functional activity or faculty of its own, hitherto escaping perception—the faculty, namely, of producing and breath-

¹It is noteworthy that these are the gases found occluded in radium bromide. See article on the subject by Professors Curie and Dewar, *Chem. News*, Feb. 19, 1904.

ing out an actively radiant sphere. This approximates Swedenborg's doctrine of the existence of concrete architectonic units of structural form, physical property and function, in the mineral as in the vegetable and animal kingdoms; and in some distant manner surmises the possible powers and uses which Swedenborg predicates of such concrete units.

It has broadened and subtilized our ideas of force to include the imaginative image of spheres of imponderable yet real particles radiant from all concrete matter, with a consideration of the necessary action of such radiant spheres upon the surrounding ether, upon each other, and upon adjacent matter. It has given a final guess as to a possible relation of such spheres to ether vortices and currents in the collaboration of magnetic and electric phenomena. This all looks in the direction of Swedenborg's doctrine of the two specific factors concerned in the production of nature's greater and more intimate forces; notably, the magnetic and electric.²

Finally, it has introduced a new problem into thought, the problem of the maintenance of the integral and functional energy of molecules; a problem as fundamental as that of the maintenance of the energy of suns; and, probably, like that, in its last answer to be referred to no half-way source, or anything short of the living and continuous Infinite.

Thus, insignificant in bulk as the known amount of radium appears to be, notable things have been learned of it; things not only in themselves startling to the common modes of thinking of matter, but directly countervailing all the habits and maxims of modern scientific thought; so that the man, who, five years ago, had ventured clearly to predicate the like as true of any substance whatever, would have been met by a simple, "That is not possible," and his statement regarded as a pipe dream. Yet these very things in the case of the newly discovered sub-

²The hypothesis of molecular magnets looks in this direction; and so also does Kelvin's guess as to the probable necessary association of activities of the ether and intangible particles of "matter" in electromagnetic phenomena, as given in his presidential address of November, 1893.

stance, radium, came suddenly attested by such pronounced and luminous witness of experience and experiment, that they could not but be accepted as established facts, thus giving to thought new ideas with which to deal.

Moreover, the uncontrovertible establishment of the simple facts in the case of radium gave immediate standing to sundry old observations pointing to the same general conclusions, which, under the idea of *a priori* impossibility, had been rejected as mistakes someway, and relegated to the waste heaps of human thought. In addition, as indicated, the roused affirmative experimentation which followed the establishment of the radium findings, brought into view a mass of data not confirmatory merely, but such as developed the whole line of thought and enlarged its scope to include both the organic and inorganic kingdoms.

The first thing definitely learned concerning radium, a thing testified by many effects, and sustained by the cross-examination of repeated and various experiments, was that from every least portion of the metal their issues incessantly a streaming emanation of finest particles, particles imponderably small, yet travelling at so high a velocity that they are able to penetrate surrounding substances deeply, and even to pass unhindered through a plate of metal. It was made sure also that this emanation from radium is not, *per se*, any undulation of the surrounding ether, but a cloud or sphere of actual substantial particles, a sphere composed of the primitive particles, as it were, of which its own molecular substance is built. The individual particles of this sphere are certainly smaller than the hypothetical entities called atoms. For if we compare the bulk of one such particle with that of the least combining-weight of the substance itself (to which we have given the name atom), it is almost as if we compared a single stone with a building reared of a thousand such.

Thus, all about the parent radium there exists a certain radiant outrush and efflux of finest bombarding particles, perpetually issuing from its mass. Moreover, this radiant efflux of particles produces no ascertainable diminution, either of the weight of the parent mass or of its proper potency of efflux.

Spontaneously, easily, the radiation is continued, week after week, month after month, year after year, aeon after aeon probably. Still the individual body of radium from which all this endless emanation of finest particles or "corpuscles" is taking place seems to be no more affected or diminished thereby than in the organic world any body is diminished by the rapid emanation of its sphere,—if so be assimilation and red integration go on *pari passu*. It certainly seems assured that the molecules (the units or concrete integral forms), the mass of which constitutes the mass of the metal, are not integrally injured or emanated out of existence by the rapid throwing off of this sphere. It appears to be their orderly function or office. They continue to be radium still, and apparently are as whole, as replenished, as active, as ever.

The spontaneity and permanence of the radium emanation has been confirmed rather than shaken as time goes on. Heydweiller's announcements as to his own discoveries of loss of weight, when subjected to repeated control tests in more authoritative hands, gave as repeated negative results. Thus, as Madame Curie notes, they "cannot yet be looked upon as established facts,"³ a Scotch verdict which leaves the burden of proof heavily upon him. Rutherford's early 1903 views allowed to the thorium molecule a million years' life lease, to radium but a few thousand, the basis of his conclusion being, Hartley says, "a loss of weight, calculated rather than observed."⁴ In his 1904 lectures, however, he seems increasingly disposed to extend the period into millions of years for radium itself; while Soddy intimates that the primeval formation of our present supply of pitch-blende, from which radium is isolated, dates back to anywhere between a hundred million and a thousand million years.⁵ Yet it is obvious that the molecular integrity of the pitch-blende now in the world presents itself still in very real and solid existence.

³*Chemical News*, Dec. 4, 1903.

⁴*Chemical News*, Sept. 25, 1903.

⁵*Radio-activity*, Frederick Soddy, 1904. The Van Nostrand Co.

Several noteworthy things have been ascertained of the emanating particles themselves.

The course of their outgoing stream can be deflected by a magnet. In this case the action of the magnetic current reveals a new fact, the fact that the emanant sphere is not homogeneous. It consists of three grades of particles differing in density, amount, penetrative power, electric relation, and responsiveness to the urgency of the magnetic current. For under the influence of the magnetic field the stream of emanant particles is separated into three streams, one of which is bent somewhat toward the left of its spontaneous course; one curves to the right, far to the side of its original course, describing a circular path in the plane of the figure, and the third continues on uninfluenced.⁶ In the first class the particles are the largest and the most abundant. They carry a positive electric charge, they move with the lowest velocity, and from their relatively large mass and low velocity they are readily absorbable by surrounding matter, being detained and entangled among its molecules. To these particles the name "Alpha rays" has been given. In the second class the particles are much smaller, and move far more rapidly; their speed being of an order comparable with that of light waves. They carry a negative charge, possess greater penetrative power, and in a number of ways present characteristics like, or, at least, allied to those of cathode rays. Particles of this second or intermediate class are called "Beta rays." In the third class the particles are the least abundant; undeflectable by the influence of the magnet, and carry no electric charge. These particles are the smallest of all and possess a velocity so high that it has hitherto escaped definite determination; the puzzling indications being that it probably is of a higher order than the speed at which light is transmitted through the denser and more complex ether field of our system. These rays are termed "Gamma rays." They cannot be absorbed, entangled or detained in surrounding

⁶*Chemical News*, Oct. 2, 1903. Radio-active Substance, Curie.

matter, and their penetrative power appears to be absolute.⁷ The magnetic field thus acts as a sort of sieve to sift the general sphere emanating from radium into particles of three grades.

This fact of the existence of three grades of particles in the general sphere emanating from radium is perhaps interesting in view of Swedenborg's two great laws of concrete form. *First*, that in the world of the inanimate creation, as in the animate, and in the smallest as in the largest integral forms thereof, every such concrete integer of form presents three degrees of substantial structure;⁸ *Second*, every such created form, least as greatest, is environed by a sphere of finest imponderable particles "the like of what is inside it; and that this is continually breathed out by it."⁹ The line of conclusion would lead us to anticipate the presence of a triple emanation from all kinds of molecular units under competent test, although the possibility that in other substances, as in radium, the three grades of radiant particles co-existent in the common sphere, would differ greatly as to abundance, and in nature, might make the competency of test difficult to determine. This experimental assurance, however, that the common "spherical" radiation of the radium molecule is composed of particles of three grades, differing certainly in mass, velocity and nature, in its bearings on Swedenborg's two great laws, coincides, so far as it goes, with findings in the department of arc-spectra, Kayser and Runge having found the spectra of certain groups of chemical elements to be calculable by certain formulæ, and to be constituted of three series of lines, a principle series, and two subordinate series, one sharp and one diffuse. In addition, substances which possess allied chemical structure exhibit allied series of absorption spectra.¹⁰

The penetrative power of the radium emanation or sphere

⁷*Chemical News*, Aug. 28, 1903. *Penetrating Rays of Radium*, R. J. Strutt. Note Strutt's criticism on the analogy between the Gamma rays and Roentgen rays.

⁸*Divine Love and Wisdom*, Nos. 184, 190, 192, 207, 208, 225.

⁹*Divine Love and Wisdom*, No. 293.

¹⁰Hartley's Presidential Address, Chem. Sec., Brit. Association, 1903.

need scarcely be dwelt upon. It is a commonplace of popular interest that this radiant bombardment of particles from the metal comes with such force that the sphere of a pinch of radium folded in paper, inside a box, and placed in an outside coat pocket, penetrates through all the intervening objects and causes a deep-seated destructive inflammation of the skin, slow to appear and extremely obstinate to heal. Its continued action upon the spinal marrow and brain produces paralysis and death.

If, when the eyes are closed, a little radium bromide or chloride be brought near the temples, the radiation penetrating the organism causes the interior of the eye to phosphoresce, and gives rise to a sensation of light.

Perhaps the most charming fact about radium is its luminosity. The bombarding outrush of its sphere of radiant particles always comes with sufficient drive and force to set up ripples or undulations of light in the surrounding ether; their action here being very like the action of a shower of stones, or the beat of an oar in setting up water ripples on a lake.¹¹ Thus, radium is, as it were, self-luminous, and that continually and spontaneously, without previous exposure to sunlight, or any other means of extraneous stimulus or renewal. A mass of radium molecules of so inconsiderable a bulk as the merest pinch, could by no means remain concealed in a room, for the force with which its combined sphere would strike the surrounding ether could not but set up the undulations of light. Thus its whereabouts would be revealed by the ether activity which its own sphere excited. Moreover, the light is strong enough to cast a shadow eighteen inches away.

The action of these various radiations upon a sensitive plate and the fine radiographs produced in various ways are too well known to need particular mention.¹²

¹¹*Lesser Principia*, Nos. 117 to 130, inclusive.
Principia, Part III., Chap. V., Nos. 20, 21.

Swedenborg's theory of light as an undulatory pressure of the ether, and the *modus operandi* of the various agencies by which such undulatory pressure can be excited are discussed in the writer's pamphlet on *Spectrum Analysis*, published a few years ago.

¹²*Chemical News*, Nov. 6, 1903, Curie.

Even the denser "corpuscles" of the emanent sphere, those which are absorbed or detained by environing matters, are of sufficient motor energy to set up the fine ripples of light in the ether, and that for a long while. Thus they render luminous the very stream of the grosser matters in which they may be entangled, revealing the eddies of its current and their own place by the soft moving radiance.¹³ This particular grade of particles absorbable by surrounding substances is, it will be recalled, the most abundant, the general emanant sphere, composed of corpuscles of the largest size, carrying a positive electric charge, moving with the least velocity, and very slightly deflectable by the magnetic field. It would seem that under favorable circumstances three emanant particles spontaneously tend to synthetize into known substances, the product of such synthetization being variously interpreted as helium, nitrogen and lanthanum. Ramsay, isolating this emanation as far as possible, in a tube, and sealing it, after a time found it spontaneously beginning to show spectrum lines not previously present; these lines apparently being identical with those of helium.¹⁴ In addition to this his latest work maps one line in the consolidating emanation spectrum coinciding with line 5595, hitherto determined only in the spectrum of lightning.¹⁵ Runge and Precht, experimenting under somewhat different conditions, have read the lines produced as those of lanthanum.¹⁶ In spite of the divergence of result under varying circumstances, which, perhaps, might be expected, one thing at least seems to be indicated by all the results. The corpuscles of the emanation thus spontaneously synthetizing, must be far smaller and more primitive than *atoms*. For, as judged by least combining weights, two homogeneous atoms synthetizing combine into a molecule of the original substance. But these emanating particles of the radium, when they recombine, do not

¹³See article by Ramsay and Soddy, *Chem. News*, Aug. 28, 1903.

¹⁴See articles in *Chemical News* for Aug. 28, 1903, and May 27, 1904.

¹⁵Ramsay and Collie, *Chem. News*, June 24, 1904.

¹⁶*On the Emanation Substance*, Giesel, *Chem. News*, June 3, 1904.

produce radium, nor do they produce any other of the substances with which they have been accidentally associated. This gives the greater interest to Ostwald's prediction in his Faraday lecture of 1904, on *Elements and Compounds*, that the atomic theory will some day receive honorable interment; an interest enhanced by the fact that Swedenborg's own theory of molecular structure cannot well be expressed in terms of the present atomic theory, though it is practical enough to meet such problems as the cause of the inverse ratio of specific heat and atomic weight.

One other point is of interest in connection with the spectrum tests. Radium sparked in the air gives the lines belonging to nitrogen;¹⁷ and the nitrogen lines are, in general, those belonging to the spectrum of lightning.¹⁸

Beautiful as are the luminescent phenomena of radium, however, and much as the apparent synthesis of helium from the grosser particles of the emanation challenges interest, another feature of the new findings is more astonishing still. The sphere of particles emanating from the radium rushes out with such force that it is able to set up not only the rippling undulations of the ether which the eye senses as light, but also those fuller oscillations, and central or nuclear rotary movements of the larger ether bullæ, in which the very motion of heat consists, according to Swedenborg's theory of the bullular or foam constitution of the ether, and his centrifugal theory of heat based thereon. Moreover, the amount of ethereal heat motion thus perpetually excited by the radiant force of the bombarding sphere given off from radium is measurable in definite terms of work done. If the heat thus produced by a given weight of radium be communicated at once to a volume of water of equal weight, it will raise the temperature of the water one degree in from thirty-six seconds to fifteen minutes, the

¹⁷See Boys' Presidential Address before the Math. and Physical Section, Brit. Ass'n, 1903.

¹⁸*Spectrum Analysis*, Laundauer, Wiley & Sons, 1898, page 211.

time varying in the hands of different experimenters and under slightly different conditions.¹⁹

Thus the salts of radium are the source of a spontaneous and continual evolution of heat.²⁰ This is the marvel of marvels to modern experimental observation. Yet, as a fact, it stands crucial tests.

¹⁹*Radio-activity*, F. Soddy. Van Nostrand Co.

²⁰*Chemical News*, Nov. 6, 1903, Curie.

(To be Continued.)

REPORT OF THE SWEDENBORG PHILOSOPHY CLUB OF CHICAGO.*

To the Swedenborg Scientific Association:—

The following report of the work done by the Swedenborg Philosophy Club of Chicago during the past year is submitted for the purpose of placing on record studies which were considered of sufficient value by the Club to deserve wider circulation. The studies are by no means complete, but it was thought that even fragmentary work, if made available, might be of use to the members of the Association. If others who are engaged in the study of Swedenborg's scientific and philosophic writings would place in the hands of the Secretary of the Association notes and references regarding their work, a mass of valuable material would soon accumulate. Reports of this kind might not be of sufficient importance to merit publication, but if the fact that the Secretary had them on file was advertised, they might prove very useful to those who wished to pursue studies along similar lines.

The Club has devoted most of its time during the last seven months to the study of the first chapter of Swedenborg's *Economy of the Animal Kingdom*, treating of the "Composition and Genuine Essence of the Blood." Several paragraphs were read and discussed at each meeting, and from time to time topics of unusual interest were assigned to various members of the Club for special study, the results of which were presented in the form of reports.

The work of the Club may be conveniently classified under three general heads:

- I. *Swedenborg's Principia theory.*
- II. *Swedenborg's theory of the blood.*
- III. *Radio-activity.*

*Printed by order of the Swedenborg Scientific Association.

I.

THE PRINCIPIA THEORY.

REPORT OF REV. R. W. BROWN, PRESENTED MARCH 7, 1904.

This report was illustrated by blackboard diagrams and by charts and models prepared for the Club by Messrs. R. W. Brown, J. A. Burt and Dr. E. A. Farrington. Models of the particles of water, salt and acid were exhibited, and served to elucidate Swedenborg's theory of the formation of these substances in a remarkable manner.

1. *The first natural point.* Principia, Pt. I., Chap. II.
 - a. Its origin.
 - b. General nature and motion.
 - c. Relation to succeeding entities.
2. *The series of finites.* Principia I., Chaps. III., IV., V., VII., VIII.; III., Chaps. III., VI., VIII., IX.
 - a. Their origin by composition from each other and originally from the first natural points.
 - b. Their three motions.
 - Progressive.
 - Axillary.
 - Translatory.
 - c. Source and derivation of these motions and their essential significance in Swedenborg's theory of creation.
 - d. The finites are naturally active, but may become relatively passive.
3. *The series of atmospheres.* Principia I., Chaps. VI., IX.; III., Chaps. V., VII., X.
 - a. General nature of an atmospheric unit or "elementary particle."
 - Its active interior.
 - Its passive surface.
 - Its motions.
 - Its elasticity, etc.
 - As a unit of space.
 - b. The four atmospheres.
 - Their successive origin.
 - Their similarities.
 - Their differences.
 - Their functions.
4. *The first or universal atmosphere.* Principia I., Chap. VI.
5. *The evolution of our solar vortex.* Principia I., Chaps. IX., X.
 - a. The sun. Ibid, Chap. X.
 - b. Origin of the second atmosphere. Ibid, Chap. IX.

- c. Primary origin of planets and satellites around the sun. Principia III., Chap. IV.
- d. Origin of the planetary atmospheres, ether and air. Principia III., Chaps. V., VII., XI.
- 6. *The further history of our earth.*
 - a. The formation of water. Principia, Pt. III., Chaps. IX., X.
 - b. The positions of round particles. Chem., Pt. VIII.
 - c. The interstices between round particles. Chem., Pts. VIII.-X.
 - d. The formation of salt by means of water. D. L. W., 420; Principia, Pt. 3, Chap. IX.; E. A. K., I., 36, 45, 69-79, 83-92, 95-96, 99, 109, 115, 149; A. C., 10300; Misc. Obs., Pt. I., No. 10; II., 22, 23; III., 28-38; Chem., Pt. XI.
 - e. The formation of acid. E. A. K., I., 71-72; Chem., Pt. XII.
 - f. The formation of other inorganic elements. Chem., Pts. XIII.-XV., XXV.; E. A. K., I., 69-83.

II.

SWEDENBORG'S THEORY OF THE BLOOD.

A. GENERAL STATEMENT OF THE THEORY. REPORT OF REV. R. W. BROWN, PRESENTED DECEMBER 7, 1903.

- 1. *The Bloods.* E. A. K., I., S.-115, 314.
 - a. The spirituous fluid, I., 89-91, 100; E. A. K., 271, II., 122, 130, 165-166, 205, 222, 312.
 - b. The middle blood or animal spirit. E. A. K., I., 40, 100, 272; II., 122, 130, 305; Animal Spirit, Chaps. I.-XVII.
 - c. The intermediate lymph. A. K., 167, 168.
 - d. The red blood. E. A. K., I., 95-96, 272, 325; II., 122, 130, 222; Red Blood, Chaps. I.-XXIII.
- 2. *The origin of the bloods.* Origin and Propag. Soul, Chap. III.; Brain, I., 330+
 - a. Simple cortical glandules. E. A. K., I., 644; II., 165, 304.
 - b. Cortical glands. E. A. K., II., 110+ A. K., 509, note rr
 - c. Choroid plexuses, etc.
 - d. Heart. A. K., 162, note b.
- 3. *Vessels of the bloods.* E. A. K., I., 128+ II., 130.
 - a. The simple fibres. E. A. K., I., 157; II., 122, 130, 204+
 - b. The nerve fibres and corporeal fibres. E. A. K., I., 157; II., 124+
 - c. The nerve fibres and fascicles and lymphatics. E. A. K., I., 157.
 - d. The arteries and veins. E. A. K., I., 128-240.
- 4. *Circulation of the bloods.* E. A. K., I., 148, 279, 286, 325, 329; A. K., 162, 383, note s; 529, note h; Brain, I., 338
 - a. Spirituous fluid. The most universal. Through its own simple fibres as well as throughout the courses of all the other

bloods. E. A. K., I., 154, 370; II., 117-127, 167-175, 221; A. K., 410, note u; Brain, I., 331.

- b. Middle blood. Less universal. Through its own fibres and also through all the vessels of lower degree. E. A. K., I., 170, 359, 365; A. K., 162+
- e. Lymph. Still less universal. Through the fascicles of the nerves and through the lymphatics as well as through the blood vessels proper. (The position of this lymph is problematical.)
- d. Red blood. Least universal of all. Through the arteries and veins. E. A. K., I., 128-240, 326, 335.

B. GENERAL CORRESPONDENCE OF THE BLOODS AND THEIR VESSELS WITH THE ATMOSPHERES.. REPORT OF REV. R. W. BROWN, PRESENTED MAY 2, 1904.

1. *General correspondence.* E. A. K., II., 223, 227; S. D., 1830+
2. *Each is in a similar series, the members of each series being similarly related.* D. L. W., 304, 316.
 - a. As to successive composition. E. A. K., I., 271-278.
 - b. As to discreteness.
 - c. As to the first of the series. D. L. W., 197.
 - d. As to each member of the series.
 - e. As to the number of members in the series.
 - f. As to respective activity. E. A. K., I., 166-177; Trem., p. 3; Soul, 16; Mech. of Intercourse, VIII-XI.
3. *As each atmosphere is made up of least units which are similar, so is each blood similarly made up.*
4. *Active and passive.* As each atmospheric unit is made up of an active interior and a passive surface, so each blood is related to its proper vessel as active to passive. Trem., p. 59; Mech. of Interc., X., XI.
5. *General Forces.* As the general forces of the world reside in the atmospheres, so the general forces of the body reside in the bloods. E. A. K., I., 166-177; II., 223; A. K., 392, 512.

The general forces are dependent upon the following things in each series:

- a. Upon the intrinsic motion of the units, whence there is *progressive*, *axillary* and *local* motion in elementary particles, and *undulatory* or *modificatory*, *axillary* or *central* and *local* or *translatory* motion in the particles of the bloods. E. A. K., I., 169.
- b. Upon contiguity, elasticity, etc. (See below, No. 7.)
- c. Upon general centres of motion, from which arise general undulations. The respective centres of motion for the bloods are the brain, the lungs and the heart. E. A. K., I., 166-177, 279, 286; also in general, 280-287, 505.

6. *Particular modifications.* Each blood, like each atmosphere, is capable of an innumerable variety of particular modifications dependent upon the general forces. E. A. K., I., 170-174, 234; A. K., 513.
 - a. The particular modifications of the atmospheres produce the varieties of sounds, colors, etc. Those of the bloods produce the variations of touch, taste, smell, hearing, sight and still higher faculties. (Orientation or the "homing" instinct.) E. A. K., II., 272, 339.
7. *Contiguity, Elasticity, Fluidity, Expansion and Contraction* of the parts of the bloods correspond to those of the atmospheres. Mech. of Interc., VIII-XI.; cf. muscular action, E. A. K., I., 40, 503-4.
8. *The degrees of motion* of the atmospheres are comparable with the fluxions of the corresponding fibres and vessels. Soul, 16; Mech. of Interc., VIII-XI.
9. *Correspondence of circulations.* Soul, 16; Mech. of Interc., VIII-XI.
 - a. As to universality.
 - b. As to vorticality. Soul, 16.
 - c. Comparison of watery medium or serum as to flow, solution, chemical changes, precipitation, evaporation, etc.
10. *Effluvia.*
11. *Fixed substances.*
12. *Gravity.* S. D., 3727; E. A. K., I., 179; A. K., 69.
13. *Blood is as it were an imitation of an atmosphere.* E. A. K., I., 234; A. K., 406, note f.
14. *Atmospheres created for the sake of the body and its bloods.* Ready response to spiritual forms and influx. Soul, 523.
15. *Particular correspondence.*
 - a. Universal atmosphere = spirituous fluid.
 - b. Sun's atmosphere = } middle blood including its serum
 - c. Ether = } or lymph.
 - d. Air = Red blood.

C. INTERRELATIONS BETWEEN ATMOSPHERES AND BLOODS, BASED ON
THEIR CORRESPONDENCE. CONTINUATION OF MR. BROWN'S REPORT.

1. *General Relation.* A. K., 485. *Difference between bloods and atmospheres.* I. Bloods animate; atmospheres inanimate. E. A. K., II., 314; D. L. W., 315.
2. *Bloods and organs of the body formed by means of corresponding atmospheres.* Corp. Phil.
 - a. By substances in them, especially the so-called effluvia. Soul, 48.
 - b. By means of their motions.

- c. Atmospheres constantly nourish, recruit, and renovate the blood. A. K., 406, 485; also *ibid*, note g; 492; E. A. K., I., 50-57; D. L. W., 370, 420-421; D. Wis., X., 3².
 - d. Atmospheres act only as means.
 - 3. *Atmospheres communicate their changes of state to the blood.*
As: heat, cold, dryness, moisture, in all their varieties; their partial motions, perturbations, and a multitude of other states. A. K., 485; E. A. K., II., 241.
 - 4. *By interflowing, the atmospheres give fluidity to the bloods.* E. A. K., I., 65.
 - 5. *The atmospheres hold the parts of the body in connection.*
 - a. Particles of bloods. E. A. K., I., 65.
 - b. Parts of body. A. K., 394; *ibid*, note d; 485; A. C., 3627, 3628², 9499; D. L. W., 152, 176, 185, 302, 310; S. D., 4063.
 - 6. *The gravity of the higher atmospheres relates man to the earth.* A. K., 485; *ibid*, note e.
 - 7. *Modulations of the atmospheres cause corresponding undulations in the bloods and thence sensations; i. e., the undulations are continued by the bloods.* Soul, 16; E. A. K., I., 609; II., 289, 293, 296; D. L. W., 291; S. D., 222.
 - 8. *Effluvia in the atmospheres cause sensations.* Soul, 43+; E. A. K., I., 609; A. K., 345.
 - a. Man does not sense those above the air but animals do. Soul, 48.
 - 9. *The atmospheres receive and carry away disorganized elements from the blood and body.* A. K., 485.
 - 10. *Functions of specific atmospheres.*
 - a. Universal aura. Its relations to the spirituous fluid. Soul, p. 5; E. A. K., I., 613-617, 623-624, 633-638; II., 166-167, 226-227, 231, 241, 270, 290, 293, 297, 312-315, 348-352; Corp. Phil.; Mech. of Interc., V., pp. 127-128.
 - b. Sun's atmosphere. E. A. K., I., 635; II., 341.
 - c. Ether. E. A. K., I., 635; A. C., 3702, 4523-57.
 - d. Air. E. A. K., I., 43-45, 50-52, 91, 92, 635; A. K., 406; A. C., 4407, 4523, 6057; D. L. W., 420; D. Wis., X., 3²; T. C. R., 371.
- D. ATMOSPHERIC EFFLUVIA. CONTINUATION OF MR. BROWN'S REPORT.
- 1. *Origin, nature and degrees.* Soul, 43-48; E. A. K., I., 50-57, 68; Principia, I., pp. 222-3; II., p. 224; A. K., 345, 406, 485, 492; Adv., I., 1457; Senses, 78; Documents, Vol. II., p. 768-769; A. C., 7454, 10130; S. D., 3339; A. E., 1108; D. Wis., X., 3²; D. L. W., 293, 370; T. C. R., 499, 585.
 - 2. *Where and how the absorption takes place.*
 - a. In the lungs. Senses, 88; S. D., 1035.
By veins. A. K., 406; *ibid*, note n, 506; D. Wis., X., 3²; D. L. W., 420.

By lymphatics and corporeal fibres.

b. *In the nasal crypts.*

By corporeal fibres. Senses, 88.

c. *In the cuticles.* A. K., 406, note m, 492, 504, 506; Soul, 48; S. D., 1022, 1035.

By corporeal fibres. A. K., 406, note m, 492; S. D., 1738.

By veins and lymphatics.

d. *Superior ways analogous to the simple fibres* for the subtlest elements (?).

3. *What the particular vessels receive.*

a. Veins. The elements from the air. A. K., 406; *ibid*, note n; 506, 508-509; D. L. W., 420.

b. Lymphatics. Carry what is analogous to the chyle, for the middle blood. A. K., 510.

c. corporeal fibres. The elements from the ether and superior auras. A. K., 508, 509.

4. *Where the vessels carry their atmospheric elements.*

a. Veins.

b. Lymphatics.

c. Corporeal fibres. A. K., 509.

To the left chamber of the heart.

To the pulmonic cells.

To the cortical glands. S. D., 1035.

5. *Manner and effect of consociation of atmospheric elements with the bloods.* A. K., 406, note o.

a. Some consociate blood and chyle.

b. Some enter red blood itself and copulate the constituent particles of pellucid blood.

c. Some enter the composition of the middle blood.

d. Blood changed from venous to arterial in lungs, partly by virtue of the accession of matters from the atmospheres.

D. Wis., X., 3²; D. L. W., 420.

E. ORIGIN AND NATURE OF THE CORPOREAL FIBRE.. CONTINUATION OF MR. BROWN'S REPORT.

1. *In general.* A. K., 105, note a, 315, 503-504, 507, 509, 520, note n; Senses, 78⁹, 88; Brain, I., 75, 79, 93-95, 104; Soul, p. 3; S. D., 1035; D. L. W., 316; D. P., 296⁴.

2. *That it forms the inner coat of the arteries and the outer coat of the veins.* E. A. K., I., 116, 222; A. K., 506.

F. QUOTATIONS FROM THE OLD ANATOMISTS RESPECTING THE ANIMAL SPIRIT. REPORT OF DR. E. A. FARRINGTON, PRESENTED DECEMBER 7, 1903.

1. "A NERVE is a round, white, long, smooth Body . . . deriving its origin from the Brain or Spinal Marrow, and serving (as is supposed)

for the conveyance of Animal Spirits." (*Anthropologia Nova*, or a New System of Anatomy, etc., by Jas. Drake, M. D., F. C. P., F. R. S. Lond. Smith and Walford, 1707. 2 Vols., 8vo, 748 pp., and indices.

— p. 7.)

2. "SPIRITS have been anciently distinguished into three sorts, *Animal*, *Vital*, and *Vegetative*; but the moderns have reduced them to one sort, viz., the *Animal*; about the nature of which, and the matter whence they are formed, great Disputes have arisen among *Anatomists*: tho' the existence of them have not yet been demonstratively prov'd. It is hard to define what could never yet be brought under the judgment of our *Senses*, so that every man is at liberty to entertain what notions he pleases concerning them, of which some have been extravagant enough. All that we shall offer concerning them (if they have a real existence) is that they must needs be extreme subtle Bodies, which escape all manner of Examination by the *Senses*, tho' never so well assisted, and pervade the Tracts of the *Nerves*, which yet have no discoverable *Cavity* or *Perforation*, nor could every by any experiment be collected, yet are *constantly moving* in vast quantities, as they must of necessity be, to perform all those mighty Operations which are ascribed to them. However, the Antiquity of the Opinion claims some Reverence. By their help we are supplied with a vast number of *precarious solutions* of great *Phenomena*; and without them we must leave a great *chasm* in the *Philosophical History* of *Animal Bodies*. They are suppos'd to be separated in the *Brain* from the subtlest parts of the *Blood*, and from thence to be carry'd by the *Nerves* to all the Parts of the Body, for the performance of all *Animal* and *Vital Functions*. But of what peculiar nature they are, we leave those to wrangle about who are better satisfied of their existence." (*Ibid.* pp. 11 and 12.)

3. "From undeniable evident experiments all anatomists are now convinced that to the nerves we owe our sensation and motion . . . yet a hot dispute has arose about the manner how it is produced, viz., whether sensation or motion are occasioned by a vibration communicated to the nerves, which these gentlemen suppose entirely solid and tense, or by a liquid contained and moved in them. The last of these opinions I rather incline to for these reasons, because the nerves proceeding from the brain bear a great analogy to the excretory ducts of other glands. Then they are far from being stretched and tense in order to vibrate: and what brings the existence of a liquid in their cavities next to a demonstration is the experiment first made by Bellini, and related by Bohn and Pitcairn, which I have often done with exact good success; it is this: After opening the thorax of a living dog catch hold and compress the Phrenick nerve, immediately the diaphragm ceases to act; remove the compressing force, that muscle again contracts; gripe the nerve with one hand some way above the diaphragm, that septum is inactive; then with the other hand strip down the nerve from the first

hand to the diaphragm, this muscle again contracts, after once or twice having stripped the nerve thus down, or exhausted the liquid contained in it, the muscle no more acts, squeeze as you will, till the first hand is taken away or removed higher, and the nerve stripped, i. e., the liquids in the superior part of the nerve have free access to the diaphragm or are forced down into it, when it again will move." (*The Anatomy of the Human Body*, with XXXIV. copper-plates. W. Cheselden, F. R. S., 3d Edition. London. W. Bowyer. 1726. 8vo. 376 pp. — pp. 248-249.)

G. QUOTATIONS FROM THE WRITINGS OF THE NEW CHURCH RESPECTING THE ANIMAL SPIRITS. REPORT OF DR. H. FARRINGTON, PRESENTED APRIL 4, 1904.

Arcana Cælestia. 4050, 4227, 5180, 8530, 9154.

Spiritual Diary. 831, 914, 962, 1130, 1730, 1808, 1812, 1968, 3419, 3459, 5575.

Apocalypse Explained. 1084, 1153.

Divine Love and Wisdom. 423.

Doctrine of Sacred Scripture. 66.

Adversaria. IV., 197; V., 156.

III. RADIO-ACTIVITY.

This subject, although somewhat foreign to the work laid out by the Club, was considered of sufficient interest to deserve study, and two evenings were devoted to it.

A. RADIUM. A letter from Miss Lillian Beekman, of Bryn Athyn, Pa., read by Rev. W. B. Caldwell, January 4, 1904.

The phenomena of Radium were explained according to the universal law of emanation and reintegration, which law was shown to operate in all created things, and not in Radium alone. The statements were based chiefly on numbers from Swedenborg's works, namely, *Divine Love and Wisdom*, 293, and *True Christian Religion*, 499. The writer also contrasted the phenomena of ordinary combustion with those of Radium. The apparent constancy in the weight of Radium salts was explained by the law that influx is equal to efflux, or reintegration to emanation.

B. MODERN VIEWS OF RADIO-ACTIVITY AND THE SUBSTANCES WHICH PRODUCE IT. REPORT OF DR. E. A. FARRINGTON, PRESENTED FEBRUARY 1, 1904.

1. History of the discovery of "rays."

a. The X-rays.

b. The cathode rays.

c. The Becquerel rays.

2. *History of the discovery of radio-active substances.*
 - a. Uranium.
 - b. Polonium.
 - c. Radium.
 - d. Actinium.
 - e. Thorium.
 - f. Other substances.
3. *Properties of radio-elements.*
 - a. Physical.
 - b. Chemical.
 - c. Radiant.
4. *Phenomena of Radio-activity.*
 - a. The various rays.
 - Alpha rays.
 - Beta rays.
 - Gamma rays.
 - b. The emanation.
 - Properties.
 - Disintegration.
 - Helium.
 - c. Excited or "induced" radio-activity.
5. *Theories of radio-activity.*
 - a. Ether theory.
 - Mendeleeff, Kelvin.
 - b. Disintegration theory.
 - Rutherford and Soddy, Ramsay, etc.
 - c. Minor theories.
6. *Modification of present scientific hypotheses.*
 - a. Atomic theory.
 - b. Inorganic evolution.
 - c. Helmholtz "contraction" theory.
 - d. The sun's corona.
 - e. The aurora borealis.
 - f. Theories of molecular energy.
7. *Radio-activity and Swedenborg's Science.*
 - a. Swedenborg's theory of inorganic evolution.
 - b. His theory of the structure of atoms.
 - c. His theories of activity and molecular motion.
 - d. Teaching of the Writings respecting influx, afflux and efflux.
8. CLASSIFIED BIBLIOGRAPHY OF RADIO-ACTIVITY AND RELATED SUBJECTS.

The following index is by no means complete, but it contains enough references so that by its use a very thorough study of the subject of radio-activity is possible. The aim has been to index only those periodicals which are available to the average reader. For this reason

reference to French and German literature has been omitted except in a few instances where the subject was important or was not discussed in the English papers.

The material is classified according to subject-matter, but so many articles treat of more than one subject that adequate cross-references would be impracticable. The articles are, therefore, indexed under the principle topic as given in the title.

Articles of a popular nature are marked with a P; those without this mark are purely scientific. Articles checked with an X are of especial interest or value.

In the magazine references the numbers following the abbreviated name of each periodical refer (1) to the month, (2) to the day of the month (given in weeklies only), (3) to the year, and (4) to the page. (The latter is omitted in some of the weeklies.)

The abbreviation *Ra.* means *Radium*. *R-act.* means either *radio-active* or *radio-activity*, according to the way in which it is used. Whenever it was considered of advantage to the student the name of the author has been inserted.

Key to Titles of Periodicals.

- Am. Cath. Quart. = American Catholic Quarterly.
- Am. Jnl. Sc. = American Journal of Science.
- Ann. Chim. Phys. = Annales de Chimie et de Physique.
- Atl. Mo. = Atlantic Monthly.
- Berichte = Berichte der Deutschen Chemischen Gesellschaft.
- Cass. Mag. = Cassier's Magazine.
- Cent. Mag. = Century Magazine.
- C. N. = Chemical News.
- C. R. = Comptes Rendus Hebdomadaires des Seances de l'Academie des Sciences.
- Cont. Rev. = Contemporary Review.
- Cosmop. = Cosmopolitan.
- Cur. Lit. = Current Literature.
- Eng. Mag. = Engineering Magazine.
- Harp. Mo. = Harper's Monthly.
- Harp. W. = Harper's Weekly.
- Indep. = Independent.
- Jnl. Chem. Soc. = Journal of the Chemical Society (Lond.).
- Lit. Dig. = Literary Digest.
- Liv. Age = Living Age.
- McClure = McClure's Magazine.
- Nat. = Nature.
- N. C. Rev. = New Church Review.
- 19th Cent. = Nineteenth Century.
- Ontl. = Outlook.

Phil. Mag. = London, Edinburgh and Dublin Philosophical Magazine and Journal of Science.

Phys. Zeit. = Physikalische Zeitschrift.

Pop. Sc. Mo. = Popular Science Monthly.

Proc. Roy. Inst. = Proceedings of the Royal Institution of Great Britain.

Proc. Roy. Soc. = Proceedings of the Royal Society of London.

Rev. of Rev. = Review of Reviews.

Rev. gen. chim. = Revue generale de chimie pure et appliquee.

Sci. = Science.

Sc. Am. = Scientific American.

Sc. Am. S. = Scientific American Supplement.

A. ON THE STRUCTURE OF RADIANT MATTER IN GENERAL.

x Modern views of matter; the realization of a dream. Crookes. CN., 6-12-03-277

x Structure of the atom. J. J. Thomson. Phil. Mag. 3-04-237.

Radiation from an electron in a circular orbit. Heaviside. Nat. 1-28-04-293.

Radiation from an electron in an elliptic or any other orbit. Heaviside. Nat., 2-11-04-342..

x Chemical conception of the ether. Mendeleef. (Abstract.) Am. Jnl. Sc., 3-04-243.

Ionization of atmospheric air. Nat. 12-17-03-154.

Ionization of air. Campbell. Nat. 3-31-04-511.

B. ON RADIO-ACTIVITY IN GENERAL.

x Cause and nature of R-act. I. Rutherford and Soddy. Phil. Mag. 9-02-370.

x Cause and nature of R-act. II., *ibid.* 11-02-569.

R-act. J. J. Thomson. Sc. Am. S. 11-15-02.

R-act. Rutherford. Phil. Mag. 4-03-481.

x Recent research in R-act. P. Curie. Am. Chem. Jnl. 4-04-410.

[contains Bibliography of R-act.].

x R-act. processes. Rutherford. C. N. 6-19-03-297.

R-act. New International Encyclopedia. N. Y., Dodd, Mead & Co., 1903, Vol. XIV., p. 758.

P Radiant energy. Eng. Mag. 2-02-764.

Studies in R-act. Eng. Mag. 4-02-114.

Recent developments in R-act. Eng. Mag. 6-03-419.

Singular phenomenon of R-act. Sc. Am. 6-13-03-444.

Mystery of R-act. Sc. Am. S. 6-13-03.

R-act. Sc. Am. S. 10-3-03.

Recent studies in Ra. and R-act. Sc. Am. S. 3-12-04.

x P Ra. and R-act. Mme. Curie. Cent. Mag. 1-04-461.

x Recent discoveries in R-act. and their significance. Millikan. Pop. Sc. Mo. 4-04-481.

P R-act. Duncan. Harp. Mo. 8-02-356.

P Radiation. Cass. Mag. 9-02-628.

P Revolution in nature. Harp. W. 8-15-03-1348.

I. *Induced Radio-activity.*

Induced R-act. Curie and Debiegne. Sc. Am. S. 5-10-02.

x Excited R-act. and method of its transmission. Rutherford. Phil. Mag. 1-03-95.

x Induced R-act. P. Curie and Danne. C. R. 3-14-04-683.

x Induced R-act. P. Curie and Danne. C. R. 3-21-04-748.

Secondary radiation produced by Ra. rays. Nat. 12-31-03-198.

Secondary radiation of Ra. Nat. 3-24-04-489.

Excited R-act. and Ionization of atmosphere. Rutherford and Allen. Phil. Mag. 12-02-704.

Induced R-act. in air. J. J. Thompson. Phil. Mag. 9-02-352.

Induced R-act. excited in air at foot of water falls. McLennan. Phil. Mag. 4-03-419.

II. *Relation of Radio-activity to other phenomena.*

R-act. and the conservation of mass. Nat. 4-28-04-606.

R-act. and the electron theory. Crookes. C. N. 3-7-02-109.

R-act. and the electron theory. Crookes. Sc. Am. S. 11-15-02.

Correlation of luminosity with R-act. Armstrong. Proc. Roy. Soc. 10-19-03-258.

Correlation of luminosity with R-act. Armstrong. C. N. 8-21-03-89.

Effect of heat on R-act. Sc. Am. S. 11-21-03.

Does R-act. depend on concentration? Rutherford. Nat. 1-7-04-222.

Analogy between R-act. and the behavior of Ozone. Jnl. Chem. Soc. 3-04-11-154.

Comparison of capacities in electrical work. Application to R-act. McClelland. Phil. Mag. 4-04-362.

Deviating rays of R-act. substances. Rutherford and Grier. Phil. Mag. 9-02-315.

III. *Roentgen or X-rays.*

Polarization of X-rays. Barkla. Nat. 3-17-04-463.

Ionization and X-rays. McClung. Nat. 3-17-04-462.

Effect of temperature on gas ionization by X-rays. McClung. Phil. Mag. 2-04-81.

P World beyond our senses. Harp. Mo. 6-03-117.

Secondary radiation of X-rays. Sc. Am. 6-6-03-425.

IV. *Becquerel, cathode and canal rays.*

- x Canal and cathode rays. Leininger. Phil. Mag. 2-04-180.
- x P Becquerel rays. Ramsay. Cont. Rev. 5-02-730.
- x P Becquerel rays. J. J. Thomson. Harp. Mo. 1-03-289.
- P Becquerel rays. Rev. of Rev. 1-03-100.
- A kind of R-act. imparted to certain salts by cathode rays. McLennan. Phil. Mag. 2-02-195.

V. *Blondlot or N-rays.*

- x N-rays. Blondlot. C. R. 11-19-03-729; 11-23-03-831; 12-7-03-962, 1-18-04-125; 3-14-04-665; 2-29-04-565.
- N-rays. Generalization of observed phenomena. Blondlot. C. R. 11-2-03-684.
- Emission of N-rays by soluble ferments. C. R. 1-25-04-196.
- Blondlot's N-ray experiments. Swinton. Nat. 1-21-04-272.
- N-rays. Burke. Nat. 2-18-04-365.
- N-rays. Swinton. Nat. 3-04-412.
- N-rays. Rudge. Nat. 3-10-04-437.
- N-rays. Schenck. Nat. 3-24-04-486.
- N-rays. McKendrick. Nat. 4-7-04-534.
- N-rays. Blondlot. Am. Jnl. Sc. 2-04-174.
- New form of radiation. Sc. Am. S. 6-6-03.
- N-rays. Sc. Am. 8-22-03-131.
- P N-rays. Harp. W. 11-14-03.
- P New discoveries in radiation. Lit. Dig. 3-19-04-404.
- P N-rays. Lit. Dig. 3-26-04-443.

VI. *Fluorescence and Phosphorescence.*

- Fluorescence and Phosphorescence. Andrews. Sci. 3-11-04-435.
- Fluorescent and Phosphorescent diamonds. C. N. 10-10-02-176.
- Fluorescent and Phosphorescent diamonds and their influence on the photographic plate. C. N. 11-21-02-247.

C. ON RADIO-ACTIVE SUBSTANCES IN GENERAL.

- On Ra. and R-act. substances. Giesel. C. N. 11-21-02-250.
- x Thesis de doctorat. June, 1903. Mme. S. Curie. Ann. Chim. Phys. 1903, series VII., Vol. 30, 145.
- x Thesis de doctorat. English translation. C. N. 8-21-03-85 to 12-4-03-271, under title: "Radio-active Substances."
- Ra. and other R-act. substances, etc. Wm. J. Hammer, N. Y. D. Van Nostrand Co., 1903. 8vo., pp. VIII+72.
- Reviewed by Remsen. Am. Chem. Jnl. 1-04-83.
- Reviewed. C. N. 1-16-03-25.
- x Elements verified and unverified. Baskerville. C. N. 3-4-04 to 4-29-04. See esp. pp. 194-195, 210.

- x R-act. bodies. Becquerel (in French). Proc. Roy. Inst. 11-03-85.
- Ra. and Ract. substances. Rev. Gen. Chim 1-24-04-41.
- Ra-act. substances. Eng. Mag. 7-03-590.
- x Comparison of radiations of R-act. substances. Rutherford and Brooks. Phil. Mag. 7-02-1.
- x Comparative study of Ra. and Thorium. Rutherford and Soddy. Phil. Mag. 4-03-445.
- Ra., Actinium, Polonium. Sc. Am. S. 1-25-02.

I. Radium, the substance in general.

- x Ra. P. and S. Curie and Bemont. C. R. 12-26-1898-1215.
- Mystery of Ra. Crookes. C. N. 4-3-03-158.
- Mystery of Ra. Crookes. C. N. 4-17-03-184.
- Ra and its mysteries. Ramsay. Sc. Am. 1-2-04-9.
- Ra. New International Encyclopedia, N. Y., Dodd, Mead & Co., 1903. Vol. XIV., p. 763.
- P Ra. Walker. Cosmop. 9-02-524.
- P Wizard metal. Harp. W. 4-25-03-677.
- P Ra. the wonderful. Cur. Lit. 4-03-420.
- P Mystery of Ra. Indep. 6-44-03-1357.
- x P Ra. and its lessons. Lodge. 19th Cent. 7-03-78.
- P Mystery of Ra. Cur. Lit. 7-03-41.
- Ra. in England. Pop. Sc. Mo. 8-03-381.
- P Edison on Ra. Harp. W. 8-29-03-1421.
- P Wonders of Ra. Moffett. McClure. 11-03-2.
- x P Ra. and its wonders. Kunz. Rev. of Rev. 11-03-585.
- P Wonders of Ra. Rev. of Rev. 11-03-593.
- P New revelation in science. Atl. Mo. 12-03-787.
- P Revelations of Ra. Liv. Age. 12-5-03-577.
- P New element Ra. Merritt. Cent. Mag. 1-04-451.

1. Discovery of Radium.

- P Discovery of Ra. Liv. Age. 7-18-03-129.
- P Discovery of Ra. Outl. 10-24-03-433.
- P Hunting for Ra. Lit. Dig. 2-20-04-257.

2. How obtained.

- How Ra. is obtained. Sc. Am. 1-30-04-98.
- Production of Ra. Eng. Mag. 3-04-981.
- P Ra. How obtained. Harp. W. 11-28-03-1916.
- x Separation of Ra. and Barium. Marckwald. Am. Jnl. Sc. 3-04-244.

3. Properties.

- Extraordinary properties of Ra. Sc. Am. 2-28-03-149.
- P Peculiarities of Ra. Indep. 4-2-03-811.

P Remarkable properties of Ra. Cass. Mag. 5-03-75.
Properties of Ra. Sc. Am. 1-2-04-4.

4. Experiments.

Contributions to knowledge of Ra. Marckwald. C. N. 2-26-04-97.
x Experiments by Mme. Curie. Sc. Am. 5-10-02-328.
x Further experiments by Mme. Curie. Sc. Am. 4-4-03-243.
P Ra. experiments. Cur. Lit. 2-04-170.
Action of Ra. on mercurous salts. Jnl. Chem. Soc. 3-04-11-173.
Action of Ra. X-rays and ultra violet light on minerals. Kunz and Baskerville. C. N. 1-104-1.
Experiments and observations with Ra. compounds. Ackroyd. C. N. 10-23-03-205.

5. Recent developments.

Recent developments of Ra. Sc. Am. S. 7-25-03.
New developments of Ra. mystery. Sc. Am. 8-15-03-118.
Still another Ra. puzzle. Sc. Am. 12-5-03-402.
Progress of the study of Ra. Sc. Am. 1-13-04-131.
Progress of the study of Ra. Sc. Am. S. 1-20-04.
Progress of the study of Ra. Pop. Sc. Mo. 3-04-476.

II. Atomic weight of Radium.

x Atomic weight of Ra. Mme. Curie. C. R. 11-13-1899-760.
Atomic weight of Ra. Mme. Curie. C. R. 8-6-1900-382.
Atomic weight of Ra. Mme. Curie. C. N. 8-18-02-61.
Atomic weight of Ra. Mme. Curie. Sc. Am. S. 10-11-02
Atomic weight of Ra. Watts. Phil. Mag. 7-03-64.

III. Spectrum of Radium.

x Spectrum of Ra. Demarcay. C. R. 12-26-1898-1218.
Spectrum of Ra. Demarcay. C. R. 11-6-1899-716.
Spectrum of Ra. Demarcay. C. R. 7-23-1900-258.
Spectrum of Ra. C. N. 10-23-03.
Spectrum of Ra.—luminous radiation. Huggins. Proc. Roy. Soc. 8-15-03-196.
Spectrum of Ra.—further observations. Huggins. Proc. Roy. Soc. 11-21-03-409.
Ultra violet spectrum of Ra. Crookes. Proc. Roy. Soc. 10-19-03-295.
Ultra violet spectrum of Ra. (correction). Proc. Roy. Soc. 11-21-03-413.
Ultra violet spectrum of Ra. Crookes. C. N. 10-23-03-202.

IV. Heat effect of Radium.

x Heat evolved by Ra. salts. Curie and Laborde. C. N. 4-3-03-159.
Heating effect of Ra. emanation. Shuster. Nat. 11-5-03-5.
Heating effect of Ra. emanation. Shuster. Nat. 11-19-03-55.

- Heating effect of Ra. Rutherford and Barnes. Nat. 12-10-03-126.
 Heating effect of Ra. Rutherford and Barnes. Phil. Mag. 2-04-202.
 Heating effect of Ra. Rutherford and Barnes. Am. Jnl. Sc. 4-04-327.
 Heat of Ra. Mills. Nat. 1-7-04-224.
 Heat given out by Ra. Runge and Precht. Jnl. Chem. Soc. 1-04-II.-7.
 Heat given out by Ra. Sc. Am. S. 3-5-04.
 P New source of Heat. Rev. of Rev. 6-03-74I.
 Ra. a new source of heat. Bolton. Pop. Sc. Mo. 5-03-61.

V. Relation of Radium to Electricity.

- x Magnetic and electric deviation of the easily absorbed Ra. rays. Rutherford. Phil. Mag. 2-03-177.

- Motion of Ra. in electric field. Joly. Phil. Mag. 3-04-303.
 Self-electrification of Ra. Sc. Am. S. 10-31-03.
 Specific ionization produced by corpuscles of Ra. Phil. Mag. 5-03-550.
 Specific ionization produced by corpuscles of Ra. Phil. Mag. 6-03-698.
 Loss of negative electricity by Ra. Strutt. Phil. Mag. 11-03-588.
 Ra. radiation and contact electricity. Blythswood and Allen. Phil. Mag. 12-03-701.

VI. The Rays of Radium.

- Experiments with Ra. rays. Bleekrode. Nat. 12-3-03-103.
 Scintillations of Ra. Wood. Sci. 1-29-04-192.
 Experiments with Ra. scintillations. Perman. C. N. 1-15-04-33.
 x Spinthariscopes. Nat. 1-21-04-270.
 Alpha rays of Ra. Mance and Soddy. Nat. 2-11-04-343.
 Gamma rays of Ra. Ashworth. Nat. 1-28-04-295.
 x Nature of the Gamma rays of Ra. Rutherford. Nat. 3-10-04-436.
 Ra. Gamma rays. Sc. Am. S. 11-7-03.
 X-rays and Gamma rays of Ra. Eve. Nat. 3-10-04-436.
 Photographic action of Ra. rays. Skinner. Phil. Mag. 3-04-228.
 Photographic effect of Ra. rays. Stroud. Nat. 4-14-04-560.
 x Phosphorescence produced by Ra. rays. Becquerel. C. R. 10-27-03-629.
 Fluorescent bodies excited by Ra. Soddy. Nat. 3-31-04-523.
 Scintillation of Sidot's Blende produced by Ra. Elster and Geitel. C. N. 7-24-03-37.
 Ra. scintillations. C. N. 8-14-03-83.
 Oxidizing properties of the Ra. rays. Hardy and Willcock. Proc. Roy. Soc. 8-15-03-200.

On the intensely penetrating rays of Ra. Strutt. Proc. Roy. Soc. 8-15-03-208.

On the intensely penetrating rays of Ra. Strutt. C. N. 8-28-03-101.

VII. *The Emanation from Radium.*

x The new gas from Ra. Rutherford and Brooks. C. N. 4-24-02-196.

x Emanations from Ra. Crookes. C. N. 4-3-03-157.

Properties of emanations of Ra. Crookes. C. N. 5-22-03-241.

x Gases given off by Ra. Ramsay and Soddy. Phys. Zeit. 9-15-03.

x Condensation of Ra. emanation. Rutherford and Soddy. Phil. Mag. 5-03-561.

On the emanation substance from pitchblende. Giesel. C. N. 2-27-03-97.

x Gases occluded from Ra. bromide. Curie and Dewar. C. N. 2-19-04-85.

Gases occluded from Ra. bromide. Curie and Dewar. Am. Jnl. Sc. 4-04-324.

x Nature of the Ra. emanation. Kelvin. Am. Jnl. Sc. 4-04-327.

Emanations of Ra. Crookes. Proc. Roy. Soc. 4-30-04-405.

Emanations of Ra. McClelland. Phil. Mag. 4-04-355.

Ra. debris. Coppock. 2-18-04-365.

Ra. emanation at low temperature. Sc. Am. 8-8-03-98.

Examination of emanation given off by Ra. Sc. Am. 3-12-04-981.

P Emanation from Ra. Am. Cath. Quart. 10-03-815.

x Note on effect of extreme cold on Ra. emanation. Crookes and Dewar. Proc. Roy. Soc. 7-31-03-69.

Note on effect of extreme cold on Ra. emanation. Crookes and Dewar. C. N. 7-17-03-25.

VIII. *The Disintegration of Radium.*

x Disintegration of Ra. Ramsay. C. N. 7-24-03.

x Disintegration of Ra. with production of helium. Ramsay and Soddy. C. N. 8-28-03.

Disintegration of Ra. Woolhouse and Ramsay. Nat. 3-31-04-512.

Experiments in R-act. with production of Helium from Ra. Ramsay and Soddy. Sc. Am. S. 9-5-03.

x Experiments in R-act. with production of Helium from Ra. Ramsay and Soddy. Proc. Roy. Soc. 8-15-03-204; also C. N. 8-28-03-100.

Production of Helium from Ra. Sc. Am. S. 9-5-03, and 10-17-03.

Ra. and Helium. Sc. Am. 8-15-03-118.

Ra. and Helium. C. N. 7-24-03-38.

Decrease in weight of Ra. Heydweiller. Phys. Zeit. 10-15-02-81.

x R-act. elements as examples of elements decomposing at ordinary temperatures. Martin. C. N. 5-2-02-205.

- Evolution of matter as revealed by R-act. elements. Nat. 3-3-04-418.
 x R-act. change. Rutherford and Soddy. Phil. Mag. 5-03-576.
 P Transmutation of elements. Indep. 8-13-03-1927.
 x P Disintegration of R-act. substances. Rutherford. Harp. Mo. 1-04-279.
 Resolution of elementary substances into their ultimates, etc. Wilde. C. N. 10-16-03-190.

IX. *Radium and other phenomena.*

- x Result of study of Ra. on modern theories. Lake. C. N. 1-22-04-47.
 Ra. phenomena as ether effects. Smith. Sc. Am. 5-30-03-413.
 Source of energy of Ra. compounds. Ackroyd. Nat. 1-28-04-295.
 Valency and R-act. Martin. C. N. 6-27-02-310.
 x Position of Ra. in Periodic system according to its spectrum. Runge and Precht. Phil. Mag. 4-03-476.
 x Position of Ra. in Periodic system according to its spectrum. Runge and Precht. C. N. 3-27-03-45.
 Spectrum and R-act. Nagaoka. Nat. 2-25-04-392.
 Spectrum and R-act. Schott. Nat. 3-10-04-437.
 P Ra. its position in nature. Ackroyd. 19th Cent. 5-03-456.
 P Ra. and astronomy. Cur. Lit. 12-03-716.

X. *Radium and physiology.*

- x Physiological action of Ra. rays. Becquerel and Curie. Sc. Am. S. 12-14-01.
 Ra. and animals. Willcock. Nat. 11-19-03-55.
 Action of Ra. on colloids, hemoglobin, ferments, and red globules. Henri and Mayer. C. R. 2-22-04-521.
 Ra. and plants. Dixon. Nat. 11-5-03-5.
 Action of Ra. on Bacteria. Dixon and Wigham. Nat. 11-26-03-81.
 Destructive action of Ra. Nat. 2-4-04-317.
 P Radiation from plants. Lit. Dig. 3-12-04-369.
 P Human Radiation. Lit. Dig. 2-6-04-178.
 x On physiological action of N and canal rays. Charpentier. C. R. 2-1-04-270.
 Secondary X-rays produced through human body. Sc. Am. S. 12-14-01.
 Sensation of light produced by Ra. rays, its relation to the visual purple. Hardy and Anderson. Proc. Roy. Soc. 11-21-03-393.
 Action of Ra. salts on globulins. Hardy. C. N. 8-14-03-73.

XI. *Radium in Pathology.*

- Radiation in treatment of Disease. Nat. 4-7-04-535.
 Ra. in therapeutics. Sc. Am. S. 9-12-03.

Ra. in medicine. Sc. Am. S. 11-21-03.

P Therapeutic value of Ra. Cur. Lit. 10-03-406.

Morton on therapeutic value of Ra. Sc. Am. 1-30-04-90.

P Cure for cancer. Cur. Lit. 9-03-348.

P Ra. in phthisis. Cur. Lit. 1-04-218.

P Attempt to cure blindness with Ra. Lit. Dig. 5-14-04-702.

D. OTHER RADIO-ACTIVE SUBSTANCES.

I. Uranium.

x R-act. of Uranium. Becquerel. C. R. 3-23-1896-689; 3-30-1896-762; 5-118-1896-1086; 11-23-1896-855.

R-act. of Uranium. Curie. C. R. 4-12-1898-1101.

R-act. of Uranium. Rutherford. Phil. Mag. 1-1899-109.

R-act. of Uranium. Soddy. C. N. 10-24-02-199.

R-act. of Uranium. Rutherford and Soddy. Phil. Mag. 4-03-441.

R-act. of Uranium. Soddy. Sc. Am. S. 3-14-03.

x Atomic weight of Uranium. Richards and Merigold. C. N. 4-18-02-186 to 6-23-02-249.

II. Thorium.

x R-act. of Thorium compounds I. Rutherford and Soddy. C. N. 6-6-02-271 to 6-27-02-304.

x R-act. of Thorium compounds II. Rutherford and Soddy. C. N. 8-29-02-97 to 10-3-02-169.

R-act. of Thorium compounds. Sc. Am. S. 8-2-02.

R-act. Thorium. Hofman and Zerban. C. N. 2-28-02-100.

R-act. Thorium. Hofman and Zerban. C. N. 11-6-03-226.

x Induced R-act. and emanation of Thorium. Rutherford. 1-1900-1.

Activity induced by Thorium. Lerch. Jnl. Chem. Soc. 1-04-11-8.

R-act. Thorium. Zerban. Jnl. Chem. Soc. 1-04-11-41.

Complex nature of Thorium. Brauner. Nat. 4-28-04-606.

Thorium in Ceylon. Dunstan. Nat. 3-31-04-510.

III. Polonium.

R-act. constituent of Bismuth. Marckwald. C. N. 11-16-03-224.

x Polonium. P. and S. Curie. C. R. 7-18-1898-175.

x R-act. Bismuth (Polonium). Marckwald. C. N. 8-10-02-52.

Polonium. Giesel. C. N. 3-20-03-133.

Polonium. Giesel. C. N. 8-7-03-61.

Polonium. Giesel. Sc. Am. S. 8-29-03.

P Polonium. Cur. Lit. 8-03-148.

P Polonium. Indep. 6-18-03.

IV. Actinium and other Active Substances.

x Actinium. C. R. 10-16-1899-593.

x Actinium. Giesel. Berichte. 1-6-02-102.

- x Emanation of Actinium. Debierne. C. R. 2-15-04-411.
- x Radio-tellurium. Soddy. Nat. 2-11-04-347.
- Radio-tellurium. Marckwald. Nat. 3-17-04-461.
- Intensely R-act. gas prepared from metallic mercury. Strutt. Phil. Mag. 9-03-113.
- P Berzelium. Lit. Dig. 4-30-04-625.
- R-act. lead. Giesel. C. N. 2-21-02-89.
- x R-act. lead as a primarily active substance. C. N. 5-22-03-241.

V. Radioactivity of Common Substances.

- x Penetrating radiation from earth's surface. Cooke. Phil. Mag. 10-03-403.
- x R-act. of minerals and mineral spring waters. Strutt. Proc. Roy. Soc. 3-23-04-191.
- R-act. of minerals and mineral spring waters. Strutt. C. N. 3-18-04.
- R-act. of minerals and mineral spring waters. Strutt. Nat. 3-17-04-473.
- R-act. of minerals and mineral spring waters. Strutt. Am. Jnl. Sc. 5-04-398.
- R-act. gas in mineral springs. Nat. 1-14-04-247.
- R-act. gas in soil and water near New Haven. Am. Jnl. Sc. 2-04-97.
- Water, R-act. Adams. Phil. Mag. 11-03-563.
- x R-act. in the atmosphere. Allan. Phil. Mag. 2-04-140.
- Atmospheric R-act. at high latitudes. Simpson. Proc. Roy. Soc. 3-23-04-209.
- Atmospheric R-act. at high latitudes. Simpson. Am. Jnl. Sc. 5-04-398.
- x R-act. emanations in air. Elster and Geitel. C. N. 7-17-03-29 and 7-31-03-52.
- P Is R-act. universal? Cur. Lit. 1-04-21.
- x R-act. of ordinary materials. Strutt. Phil. Mag. 6-03-680.
- R-act. of ordinary materials. Strutt. Sc. Am. S. 4-4-03.
- x R-act. of matter. Becquerel. C. N. 4-11-02-169.
- P R-act. matter. Indep. 1-8-03-110.
- R-act. of metals generally. McLennan and Burton. Phil. Mag. 9-03-343.
- Cosmical R-act. Shuster. C. N. 10-2-03-166.

VI. Radio-activity and Swedenborg's Science.

- x Radium. Hay. N. C. Rev. 4-04-226.

Respectfully submitted,

E. A. FARRINGTON,

Secretary.

May 20, 1904.

CONSTITUTION AND BY-LAWS OF THE SWEDENBORG SCIENTIFIC ASSOCIATION.

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.

Honorary members may be elected on recommendation by the Board of Directors.

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.

LIST OF MEMBERS OF THE SWEDENBORG SCIENTIFIC
ASSOCIATION, CORRECTED TO MAY 31, 1704.

- Acton, Rev. Alfred, Bryn Athyn, Pa.
 Akerman, Wm., Widerange, Kan.
 Alger, Rev. W. R., 6 Brimmer St., Boston, Mass.
 Bailey, E. F., 39 High St., Fitchburg, Mass.
 Barger, Gerrit, Voorburg, The Hague, Holland.
 Barnes, Mrs. Emily S., Nashua, N. H. (Life member.)
 Barron, C. W., Cohasset, Mass.
 Barton, Miss Mary L., 947 T St., Wash., D. C.
 Barwell, J. W., Waukegan, Ill.
 Bauman, Stacy, Faunce, Pa.
 Becker, Dr. Henry, 1339 King St., W., Toronto, Can.
 Bellinger, Peter 226 Dunn Ave., Toronto, Can.
 Bennett, J. H., Terang, Victoria, Australia.
 Bigelow, John, 21 Gramercy Park, New York City.
 Biggs, M. G., Oreana, Okla. T.
 Boericke, Dr. F. A., 1011 Arch St., Phila., Pa. (Life member.)
 Boericke, Dr. Wm., 1812 Washington St., San Francisco, Cal.
 Boggess, Dr. W. B., 4953 Centre Ave., Pittsburg, Pa.
 Bostock, Edw. C., Bryn Athyn, Pa.
 Bowers, Rev. John E., 37 Lowther Ave., Toronto, Can.

- Brickman, Rev. W. E., Bryn Athyn, Pa.
Brown, Edmond Congar, 166 Cleveland St., Orange, N. J.
Browne, Chas. F., 1021 Fine Arts Bldg., Chicago, Ill.
Brown, Rev. R. W., 118 Maroon Heights, Univ. Chicago, Chicago.
Burnham, Arthur W., 6943 Eggleston Ave., Chicago, Ill.
- Caldwell, Robt. B., Sr., 46 Leopold St., Toronto, Can.
Caldwell, Robt. B., Jr., 804 Aiken Ave., Pittsburg, Pa.
Caldwell, Mrs. R. B., Jr., 804 Aiken Ave., Pittsburg, Pa.
Caldwell, Rev. Wm. B., 750 Warren Ave., Chicago, Ill.
Campbell, Richard Kenna, Dept. Commerce and Labor, Washington, D. C.
- Carman, Dr. L. D., 1351 Q St., N. W., Wash., D. C.
Carnes, Mrs. E. F., 1902 Walker Ave., Houston, Tex.
Carpenter, Paul, 1010 Park Ave., Chicago, Ill.
Carriere, Rev. C. L., 2128 St. Louis Ave., St. Louis, Mo.
Carswell, Robt., 1534 King St., W., Toronto, Can.
Champion, Chas. T., 5625 Madison Ave., Chicago, Ill.
Chandler, H. P., 53 Devonshire St., Boston, Mass.
Child, Rev. Thos., 4 Old Oak Rd., Uxbridge Rd., London, Eng.
Childs, Walter C., 18 Overlook Terr., Yonkers, N. Y.
Cline, Saml., Crossville, Tenn.
- Cockrell, Mrs. D'Arcy, Chelmsford Rd., Berea, Durban, Natal, S. Af.
Cole, L. S., 681 N. Ridgeway Ave., Chicago, Ill.
Collom, Rev. J. E., 500 E. 9th St., Los Angeles, Cal.
Cook, Geo. E., Oakdale, Md.
Cooper, Dr. Geo. M., Bryn Athyn, Pa.
- Cornell, Mrs. A. F., 1347 4th St., San Diego, Cal.
Cowley, Dr. Wm., 6015 Centre Ave., Pittsburg, Pa.
Cox, M. H. P., Kirkham, Md.
Craig, Chas. E., 2042 Albatross St., San Diego, Cal.
Cranch, Dr. Edw., 109 W. 9th St., Erie, Pa.
Cranch, W. A., Bryn Athyn, Pa.
Crane, Thos. S., 70 Nassau St., New York City.
Cronlund, Rev. Emil R., 47 Elm Grove Ave., Toronto, Can.
Cunningham, W. M., 174 N. 4th St., Newark, O.
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., Primos, Pa.
Dibert, W. S., Box 232, Garrett, Ind.
Dickson, W. K. L., Hotel Cecil, London, Eng.
Doering, Rev. Chas. E., Bryn Athyn, Pa.
Duncan, Chas., 1631 S. Broad St., Phila., Pa.

- Ebert, Chas. H., 518 Frick Bldg., Pittsburg, Pa.
 Farrington, Dr. Harvey, Glenview, Ill.
 Ferrett, Mrs. Jane L., 82 Booraem Ave., Jersey City, N. J.
 Flitcroft, Wm., Paterson, N. J.
 Ford, L. P., Burton Tower, Cresford, N. Wales.
 French, Prof. Thos., Amherst, Mass.
 Fuller, Miss Louisa M., 852 E. State St., Jacksonville, Ill.
 German, E. S., 1013 N. 13th St., Harrisburg, Pa.
 Gidiere, Capt. J. J., 427 Carondelet St., New Orleans, La.
 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, Rev. John, Newtonville, Mass.
 Gould, Dr. P. A., Gibsonburg, Ohio.
 Grant, Chas., Gerber, N. Dak.
 Gray, W. N., Stoneham, Mass.
 Gross, Philip, 126 Grand Ave., Milwaukee, Wis.
 Gunther, Emil P., 1316 Patapsco St., Balto., Md.
 Hanlin, Dr. S. B., Pomeroy, Ohio.
 Hanlin, Dr. W. A., Middleport, Ohio.
 Hanson, Peter, Long Beach, Wash.
 Harris, A. E., Mercer, Maine.
 Harris, John, Box 31, Canal Dover, Ohio.
 Hay, Rev. H. C., 15A Beacon St., Boston, Mass.
 Hicks, S. H., Bryn Athyn, Pa.
 Hite, Rev. L. F., 22 Mt. Pleasant St., Cambridge B., Mass.
 Hobart, Miss Carrie A., Bryn Athyn, Pa.
 Houghton, Dr. H. L., 56 Bay State Road, Boston, Mass.
 Iles, Henry W., Lyndhurst, York Rd., Southend On Sea, Eng.
 Janicke, Wm., Leona, Kan.
 Keefer, Dr. Chas. B., 1110 F St., Washington, D. C.
 Keep, Rev. R. H., 146 Gordon St., Atlanta, Ga.
 Keith, Dr. F. S., Newton Highlands, Mass.
 Kendig, Jos. R., Renovo, Pa.
 Kent, Dr. J. T., 1334 Hinman Ave., Evanston, Ill.
 Klein, Rev. D. H., Glenview, Ill.
 Knudsen, K., 2202 Ridge Ave., Phila., Pa.
 Kurka, R., Amboy, Wash.
 Landenberger, Rev. L. G., 3741 Windsor Pl., St. Louis, Mo.
 Layton, F. S., 6922 Stewart Ave., Chicago, Ill.
 Lechner, Miss Elsa C., 235 Dithridge St., Pittsburg, Pa.
 Lechner, Herman, 235 Dithridge St., Pittsburg, Pa.
 Liljeqvist, Hj., Eskilstuna, Sweden.

- McKallip, Mrs. M. J., 5316 Ellsworth Ave., Pittsburg, Pa.
McLaughlin, S., 450 E. 10th St., Los Angeles, Cal.
Macbeth, Geo. A., 717 Amberson Ave., Pittsburg, Pa.
Mackenzie, John, Box 584, Spokane, Wash.
Manby, Rev. J. C. N., 10 Engelbrektsgatan, Stockholm, Sweden.
Mann, Rev. Chas. H., Orange, N. J.
Mayhew, Rev. W. H., Yarmouthport, Mass.
Maynard, A. T., Glenview, Ill.
Meday, C. H., Pasadena, Cal.
Mercer, Rev. L. P., Oak and Winslow Sts., Cincinnati, Ohio.
Metcalf, John T., 276 Clinton St., Brooklyn, N. Y.
Metcalf, Dr. W. H., 119 College St., New Haven, Conn.
Morse, Rich, Cliff St., Arncliffe, Sydney, Australia.
Nash, G. V., Brönzwood Pk., Williamsbridge, N. Y.
Neuberger, Dr. Max, VI. Kollergerngasse 3, Vienna, Austria.
Nicholson, Ezra, 2415 Detroit St., Cleveland, Ohio.
Niles, Marston, 140 Nassau St., New York.
Niles, Wm., La Porte, Ind.
Norris, Mrs. E., 4717 Ben Venue Ave., Pittsburg, Pa.
Norris, Mark, 1003 Mich. Trust Co. Bldg., Grand Rapids, Mich.
Nussbaum, Rev. Chas. A., 1911 N. 12th St., St. Louis, Mo.
Nye, Chas. M., De Witt, Iowa.
- Owens, Geo. H., 2406 7th Ave., Moline, Ill.
Parker, Edgar, 502 S. 44th St., Phila., Pa.
Patch, Dr. F. W., Framingham, Mass.
Peck, Mrs. S. E., 108 Summer St., Newark, N. J.
Pendleton, Miss Venita, Bryn Athyn, Pa.
Pendleton, Rev. W. F., Bryn Athyn, Pa.
Peters, Mrs. B., 83 Lee Ave., Brooklyn, N. Y.
Pitcairn, Miss Agnes, 5227 Ellsworth Ave., Pittsburg, Pa.
Pitcairn, Mrs. Alex., 5227 Ellsworth Ave., Pittsburg, Pa.
Pitcairn, John, Bryn Athyn, Pa.
Potts, Rev. J. F., Bryn Athyn, Pa.
Potts, Miss Alice K., Bryn Athyn, Pa.
Prince, John T., West Newton, Mass.
- Raymond, Geo., Fitchburg, Mass.
Reed, Rev. James, 12 Louisburg Sq., Boston, Mass.
Roehner, W. F., 2439 N. College Ave., Phila., Pa.
Roschman, Richard, Waterloo, Ont., Can.
Roschman, Rudolph, Waterloo, Ont., Can.
Rosenqvist, Rev. J. E., 2006 Sedgeley Ave., Phila., Pa.
- Saul, Rev. J. S., 674 N. California Ave., Chicago, Ill.
Sawyer, Mrs. C. A., 2212 Union St., Berkeley, Cal.
Scalbon, Oscar, Glenview, Ill.

- Schoenberger, Jacob, 249 Craig St., Pittsburg, Pa.
Schott, Colon, 104 E. Court St., Cincinnati, Ohio.
Schreck, Rev. E. J. E., 6949 Eggleston Ave., Chicago, Ill.
Schwenk, Mrs. Therese, Box 91, Yalesville, Conn.
Sewall, Rev. Frank, 1618 Riggs Pl., Wash., D. C.
Smith, C. G., Jr., 3218 K St., Washington, D. C.
Smyth, L. S., 3 West 29th St., New York City.
Spamer, C. A. E., 215 N. Charles St., Balto., Md.
Spiers, Rev. J. B., 301 South Pine St., Richmond, Va.
Sproat, Miss Carrie, Chillicothe, Ohio.
Starkey, Rev. Geo. G., 543 S. 13th St., Denver, Colo.
Stephenson, Rev. John R., 628 Rebecca St., Pittsburg, Pa.
Stroh, Alfred H., Bryn Athyn, Pa.
Stockwell, Rev. John R., 46th St. and Woodlawn Ave., Chicago, Ill.
Swanton, J. R., 1641 13th St., N. W., Wash., D. C.
Synnestvedt, Rev. Homer, Bryn Athyn, Pa.
Synnestvedt, Paul, 5747 Holden St., E. E., Pittsburg, Pa.
- Tafel, A. L., 913 S. 49th St., Phila., Pa.
Tafel, Rev. L. H., 411 Jefferson St., Homestead, Balto., Md.
Taylor, Rev. James, Berlin, Ont., Can.
Thompson, D. L., 394 Yonge St., Toronto, Can.
Thompson, Dr. Wm. H., 361 Cedar Ave., Cleveland, Ohio.
Thurston, Dr. Rufus L., 260 Clarendon St., Boston, Mass.
Tomhagen, Dr. J. A., 2433 Hermitage Ave., Chicago, Ill.
- Van Buskirk, Mrs. V. H., Penn Ave., Peoria, Ill.
Vance, Dr. B., Springfield, Ill.
Vrooman, Rev. H., The Warren, Roxbury, Boston, Mass.
- Wagar, Miss Anna M., Lakewood, Ohio.
Wagner, Adolph, 3856 Flora Bldg., St. Louis, Mo.
Walker, Mrs. Mary K., 275 Clermont Ave., Brooklyn, N. Y.
Warren, Rev. Saml. M., 4 Milton Rd., Brooklyn, Mass.
Welch, Chas. E., 204 N. St. Louis St., Los Angeles, Cal.
Werner, Percy, St. Louis, Mo.
Westberg, Nils, Skepparegatan 5, Stockholm, Sweden.
Wetherbee, J. Q., White Cottage, Readington Rd., Hampstead, London, Eng.
Whiston, Dr. E. A., 16 Arlington St., Boston, Mass.
Whitehead, Rev. John, 581 Cass Ave., Detroit, Mich.
Williams, John, Urbana, Ohio.
Winslow, Benj. E., 1817 Wrightwood Ave., Chicago, Ill.
Woodward, Dr. H. Wells, 1110 L St., Wash., D. C.
Worcester, Rev. Jos., 1030 Vallejo St., San Francisco, Cal.
Wunsch, Henry, 555 Congress St., Detroit, Mich.

THE NEW PHILOSOPHY.

VOL. VIII.

JANUARY, 1905.

No. 1.

THE SENSES.

PART FOUR OF THE ANIMAL KINGDOM, BY EMANUEL SWEDENBORG.

CHAPTER V. (*Continued*).

THE EXTERNAL EAR.

136. *Experience.* The cartilage of the tube of the ear, or the duct of the external auditorium does not make a complete circuit; it is interrupted at one side; it makes this tube; it terminates obliquely; it binds itself to the margin of the osseous duct by inequalities: the border is bent about like a beak. In the circuit there are incisions, obliquely transversal; the front cleft is quadrangular. There are two ligaments, one attached to the front part of the osseous duct, the other to the convex shell from the side opposite to the former. Between the two ligaments there is, as it were, a wavy part of the muscles of the forehead; there are muscles and coverings. The bony part of the duct is longer; both together make a canal of ten lines. It is unequally roomy; it is tortuous; it is lined within with skin and cellular membrane, which supplies a part of the cartilage, and forms the cutaneous tube. The cellular membrane commingles itself with the periosteum and the perichondrium. There are glandules everywhere. There are hairs between which open the orifices of the glands. There are arteries sent off from the temporal and occipital arteries.

137. *Analysis.* 10. *The external ear is a kind of plane raised up for receiving the modifications of the air, that is to say, sounds; into this plane the modifications inflow everywhere, 1, for it is not to be believed that it flows into it from one point to another, but into the whole hollowed out area, 2, in-*

deed, directly into the ear itself. 3. For it approaches from the centre by the radii. 4. Thus it inflows directly, and more or less obliquely, according to the efflux of the sound, and those standing near the ear, or those receiving.

138. *All this modificatory collection, according to windings, is concentrated toward the concha and external auditory duct.*

1. To this end the external ear is made, and that form and fluxion of winding. 2. This also appears from artificial organs. 3. Sound can be dilated according to direction, and can be contracted; its quantity becomes greater in a smaller space. 4. Wherefore the external ear is formed exactly for that concentration with consummate art, from which not a single thing can be wanting. 5. That form is spiral according as is the fluxion of modified air, agreeing with what was said before; 6, and indeed everywhere according to the custom of nature, in that the number of the bendings is three times to and fro, and thus it returns to its beginnings, and the form is not a regular spiral, as is also the case in the intestines, in the brain, and elsewhere, especially in insects and their blind appendixes, etc. 7. That form will be treated of elsewhere more at length.

139. *The concha of the ear is so formed, and at the same time the auditory tube, that not air, but a modification of the air, appears to flow both in and out.* 1. For the small anterior portion, which is called the tragus, is as it were, a fence. 2. The modification flowing through the windings of the concha, does not all pass into the tube, but a part slips out under the tragus. 3. In the tube there is a bending upward and downward, mobile cartilages and other things, which cause the modification to return above the tragus, where there is a hollow. 4. Thus the abundance is distributed, 5, especially in its very high and elevated tension.

140. *Especially also in high and elevated sound, the tube itself can be widened, and thus yield to the impelling force, in order that no damage may be inflicted upon the organ.* 1. For there are mobile cartilages. 2. There is a widening in the middle. 3. There is a bending thus a beating back. 4. There are hairs which impede. 5. There is wax, which protects the tube that the air thus modified may not be impelled immediately against

the membrane of the tympanum. 6. All these things are to the end that they may avert injury.

141. *The external ear is so made that the modified air strikes it everywhere; it either flows following the walls into a spire, or is reflected, where the outwardly inclined lamellae, although covered, receive it; these lamellae receive and repel.* 1. This appears from the helix and antehelix. 2. Especially where the turning is, there it is covered, as it were, by a ceiling, lest the [sound] slip out. 3. It is the same everywhere else. 4. It would be too prolix to describe all this organism. 5. There is nothing in the acoustic art which does not exist here worked out.

142. *The tremor itself striking in upon the external ear, is concentrated towards the cutaneous tube, and about the periphery of the osseous tube, where it passes into an evident tremor.* 1. This is the cause of the organism. 2. Therefore the external ear is cuticular and membranous. 3. It absorbs the rays of modification; it repels them and again collects them. 4. The influent modification acts similarly. 5. Therefore that skin or epidermis, which is cellular, finally commingles with the perichondrium and periosteum. 6. This is in order that the collected tremor may finally terminate in the perichondrium and periosteum, so that it may cause them to vibrate. 7. To this end also is the cutaneous tube which made to vibrate more than the other parts. 8. To this end the soft membrane goes off into the harder which is, according to Winslow, attached to the cartilage and the bone of the duct.

143. *All that above described, is in order that the tremor may go forth through the whole continuous [organism], both the membranous, the cartilaginous, and the osseous; and thus from thence into the whole cranium.* 2. For the connection with the brain is by the membranes, 2, by the cartilages and bones, 3, by the Eustachian tube, 4, by the nerves; 5, thus in order that the sound cannot escape penetrating also by this way into the whole continuous [organism]. 6. Hence is the first common origin of that tremor or modification, which is required in sound, concerning which above.

144. *The vibration thus dashing in, where it strikes the*

organ which is constructed for the propagation of sound to the beginnings in the brain, there operates according to the organism of that part. 1. This is the general rule that the influent modification acts according to the organism of that part. 2. Thus it acts in one way in the auditory tube, 3, in another way in the Eustachian tube, 4, another in the vestibule of the ear, 5, another in the labyrinth, 6, in another way everywhere in the cranium. 7. This appears from a plate held between the teeth (*a stapede clavícula protensa*); there the teeth receive the sound, and yet it is distinctly heard although the ears are closed; 8, for whatever applies to itself a modification according to its own form, propagates it both according to its connection and according to its tone. 9. This is the cause of the senses of the whole organism and of the whole body.

145. *Wherefore no modification flows to the membrane of the ear drum, except the vibration propagated through the membrane of the auditory tube, through the cartilages and bones.* 1. It is carefully provided that the air shall not touch it. 2. The wax obstructs the way and the space is closed, so that there is nowhere open a chink for the air. 3. The air, would push the tympanum against the interiors, if it should strike the tympanum. 4. Wherefore the whole flux of the modification is wiped away, and altogether absorbed in the auditory tube. 5. There remains only the in dashing vibration. 6. These things are the cause of the organism of the external ear and of the auditory tube. 7. They are the cause of its windings; 8, the cause of the cutaneous tube. 9. Thus the naked membrane of the drum is nowhere exposed; wherefore if all the wax is removed it perishes. 10. This is the cause for the glands. 11. This tremor, thus propagated by concentration, is transferred by the contiguous air, thus also into its own organism. 12. This is the cause of the connection of the membranes with the perichondria and periosteæ, 13, and of the connection of these with the os pterium of the temples, 14, and with the Eustachian tube.

146. *Wherefore the tremor flows to the membrane of the tympanum only around its margins or periphery, and goes to the centres.* 1. There is no other way. 2. But of these things below.

147. *The human external ear is always erected for sonorous modification, lest anything perish from things said, and that all may be distinctly received.* 1. For by the ear man learns. 2. It must be of interest to human society, 3, to understand by means of the ear what the world means. 4. It will hear articulate sounds distinctly. 5. Therefore none or very slender muscles are furnished it. 6. There are ligaments which connect with the temples and thus hold the ear continually erect for the smallest more distinct sounds.

148. *It is otherwise in brutes, the ears of which are otherwise formed; for they do not seize upon articulate sounds, but only sounds which signify affections.* 1. The speech of brutes is only for the signifying of their affections to the ear in a general way, 2, as in love, in anger, in hunger, etc; 3, thus nothing articulately. 4. This general sound can be received by the ears of asses. 5. Although they reach them forth in order that they may catch the more distinct sounds. 6. Otherwise such ears are without use. 7. Thus ears are given to each according to his nature, 8, according to use, especially with his associates—O wonderful things!

149. *Therefore the uses of the external auditory duct are:* 1, To collect and concentrate every sonorous modification, that it may be strong; 2, to impress that modification upon the membranes, cartilages and bones; 3, to transfer it to the membrane of the drum, where it is more distinctly received and circumfused; 4, thus to receive a general modification without distinction into parts; these the cavity of the drum makes, and, 5, the labyrinth perfects, 6, indeed, also diffuses it throughout the whole head, whence it drives it into the nerves of the seventh pair which run throughout the whole face; and into the second vertebral nerve, which runs throughout the whole occiput, and thus from the vertebræ. 7. From the connection it appears how far sound is propagated.

RADIUM.

II. THE EFFECTS OF ITS EMANATION UPON THE ATMOSPHERES.

The facts outlined in our First Part will serve to illustrate certain particulars that Swedenborg gives regarding the interaction of radio-emanation and the ether. These particulars relate to the existence of radio-emanant particles of different sizes or grades, and the specific inter-action of each of these sizes or grades with the different sizes of bullæ developed in the basic foam structure of the ether, and which actually co-exist in the immediate environment of the planets. A brief outline of his doctrine of the atmospheres will make this clear.

It is perhaps new to readers of the *New Philosophy* that Swedenborg predicates a foam structure of the ether, the separate bullæ of this elemental foam being formed of vortex rings, or "finites," characterized interiorly by a peculiar spiral circulation.

The purely continuous substance antecedent to vortex rings or points he does not call an *ether* at all, but he calls it the Infinite,—the Father. It is the continuous Substance, the Infinite, which necessarily surrounds, directs, and acts upon all vortex rings in the universe; and thus upon and in and through the bullular or foam structure of the ethers; and in and upon all the concrete ultimate structure of matter also.

Swedenborg also predicates that from primary vortex points, *of the given type of circulation and conatus*, a series of larger vortex rings are compounded, wherever such vortex points exist in such abundance as to be perpetually in collision. From such vortex rings of different sizes, moving in orbits of the same circulo-spiral figure, but of different dimensions, a finest bullular or foam structure is afterwards framed, which extends throughout the universe. Such a fine bullular or foam structure framed of vortex points and rings Swedenborg calls an ether, or aura. Swedenborg's ether, therefore, is not the same as the ether in the modern use of the term, which de-

notes the purely continuous substance throughout the universe.

In Swedenborg's system the succession is, **FIRST**, the purely continuous substance called the Infinite; **SECOND**, the production, in this purely continuous Infinite of vortex points, which move, and from which are compounded vortex rings proper in several sizes; **THIRD**, from these vortex rings a finest bullular or foam structure is formed in a volume coextensive with the universe. It is this foam structure, third, in the order to which Swedenborg applies the generic name of ether, and to which he ascribes the offices commonly ascribed to an ether,—which he ascribes the offices commonly ascribed to an ether, namely, the general transmission and application of force, and the general storehouse of *materia prima* for the concrete universe.*

This primary foam structure does not necessarily continue homogeneous in texture. Volumes of larger sized bullæ are produced in it, under the action of the great motor energies concerned in the evolution and maintenance of a concrete solar system. In fact, immediately around the surface of the planets bullæ or alveoli of as many as four distinct orders or sizes co-exist and are maintained in intimate and orderly mutual arrangement. Moreover each order of these ether bullæ Swedenborg distinguishes by a name of its own; since ether bullæ of each order possess potencies and offices of their own, and the foam or ether structure of one grade is the specific form and substance in and from which the Infinite acts immediately upon a specific correlated grade or degree of concrete substance, form and sensitive life; thus accommodating its action to the forms and modes belonging to that special degree.

The four ethers or auras thus stand as the very form and substance of the active forces of the universe; and present the Infinite and Divine *in use*; according to the four several degrees of active proceeding and accommodation in the created universe.²¹

*That is, the first element or first aura of the *Principia*.

²¹The specialization of certain sizes of ether bullæ to special functions of force and degrees of use, and the non-interchangeability of function, finds a curious and perhaps profitable analogy in the fact

The coexistence of more than one such grade of alveoli or bullulæ in the same ether field necessarily gives to that field a physical constitution analogous to that existing in jellies;²² whereby it obtains the power to transmit rapid transverse vibrations like a solid, while at the same time substances dissolve as freely in it as if it were an infinite liquid. For instance, in the ether immediately environing the earth, the relatively large alveoli or bullulæ which Swedenborg says constitute the luminiferous and electric structure proper, are as it were embedded in a sort of ether ground of finer constitution and distinct powers, to which latter he gives the name "magnetic ether" and "second aura." The bullulæ or structural units of the electric ether proper are thus held, as it were, enmeshed in a sort of felt work of the finer interstitial bullæ. From which intimate juxtaposition of the two grades of bullæ it follows that electric and magnetic phenomena are so inter-related that it is well-nigh impossible to isolate and study them separately.

Now Swedenborg states certain universal laws concerning the collaboration of the ether and matter in the production of force. *First*, From all the smallest integral bodies of which a given substance is composed there perpetually takes place a radio-emanation of active particles. The production of such a radio-emanant sphere belongs to their nature and potency as concrete forms, and constitutes an important part of their individual use to the universe. *Second*, It is these spheres of radio-emanant particles which specifically react upon the ether, and always are associated with it in the manifestation and pro-

observed microscopically to be organized on the physical basis of a foam structure. This foam has been found to present alveoli of different sizes, the larger alveoli or coarser foam invariably being that which functionated contractibility, while the finer foam functionated sensitive and sensory transmission; and the functions of the two foams, in the same minute particles, were never found interchangeable. *The Living Substance*, G. F. Andrews, pp. 66, 67, 73.

²²*Introduction to Physical Chemistry*. James Walker, second edition, Macmillan & Co., page 220. A jelly consists of at least two substances; the molecules of one substance being held enmeshed in a sort of fibrous network of the other substance.

duction of any of the great general forces of nature into the plane of sensible effect and practical application. *Third*, Generically different integral bodies or forms emanate generically different spheres. *Fourth*, One great difference in the spheres emanating from different substances is in the different sized particles characterizing them. Emanant particles of different size affect or appeal to totally different grades of ether bullæ, and thus primarily affect one ether rather than another. For instance, some bodies, as in the case with iron, are surrounded by a sphere of active particles so small that they are able to affect only the finer or magnetic ether bullæ; while other substance are surrounded by a radio-emanation of relatively large particles, the activity of which appeals immediately and powerfully to the larger bullæ concerned in luminiferous and electric phenomena. *Fifth*, If a radio-emanant sphere, able to affect the luminiferous ether but slightly, fall upon any substance possessing a sphere reacting readily with that ether, the action of the former upon the elastic units or molecules of the latter substance may induce such increased vibration in them as makes their own sphere more active, whence they will apparently act as "resonators" of the light.

Consider in this connection the following statements made by Swedenborg:

"There are corpuscles so small as to emanate and exhale from hard bodies in the form of effluvia."²³

"Corpuscles of this kind, when free, cannot be quiescent, but gyrate continually."²⁴

A wave of such effluvia is continually flowing forth from human beings, animals, vegetables, metals and stones.²⁵

This sphere of emanating corpuscles exhaling from all concrete bodies is never the same for any two bodies, not even for any two bodies of the same kind; this difference being in abundance, size and activity, as well as in generic type.²⁶

²³*Principia*, Part II., Chap. I., 10.

²⁴*Principia*, Part II., Chap. I., 11.

²⁵*Divine Love and Wisdom*, 293; *T. C. R.*, 499; *Tafel's Documents*, No. 302, p. 769.

²⁶*Principia*, Part II., Chap. II., 1.

That there are corpuscles so small that they are able to affect only the magnetic ether, and that such are the corpuscles which constitute the sphere of iron.²⁷

That there are corpuscles constituting a species of effluvia, which are of a size adequate to set up a motion of the luminiferous and electric ether. If these corpuscles are spontaneously moved they excite to a certain distance that motion of the ether which constitutes light.

If such corpuscles do not move spontaneously, that is to say, "*ex se*," or from their own internal cause, but are set in motion by the tremulation of that substance in which they are and from which they proceed, in this case also the ether is set in motion and light is excited, so long as the inducing tremulation continues with sufficient force.

The tremulation of the parent body or substance causes the corpuscles within and around it to run in gyres and eddies; thus the ether both within and without the parent body or substance is put into a vortex or turbine motion, which motion is communicable to a distance. This induced vortex or turbine motion of the ether entering the contexture of adjacent bodies urges the ether and corpuscles there toward the like gyre and eddy. Both light and electricity are induced thus.²⁸

That if such corpuscles have sufficient motor energy not merely to put the ether into the simple undulatory motion of light, but also to excite that quickened interior activity in the bullæ or alveoli thereof, which constitutes the very motion of heat, then heat is produced as well as light.²⁹

III. THE EFFECTS OF THE EMANATION ON OTHER SUBSTANCES.

The action of the radiant sphere upon other substances than those already mentioned is interesting. It then gives rise to a secondary radiation of light, the secondary rays often presenting from ten to fifty times the brilliancy of the primary radiation, spoken of in our First Part. These secondary rays are themselves deflectable by the magnetic sphere,³⁰ and, therefore, they are probably of the nature of an actual emanating

²⁷*Principia*, Part II., Chap. I., 9, 28; Part III., Chap. V., 21.

²⁸*Principia*, Part III., Chap. V., 21.

²⁹*Principia*, Part III., Chap. VIII., 10.

³⁰See *Radio-Activity of Matter*, Henri Becquerel, *Scientific American Supplement*, June 7, 1902.

sphere. It is as if these substances possessed an emanant sphere of particles of their own,—particles that are dense, sluggish, and large enough to be able to act as resonators of the light, while yet they are fine enough to be influenced and stimulated by the force of the fine radium emanation. A particularly interesting point is that the most brilliant secondary radiance arises about paper, wood, and the like class of things, which, according to Swedenborg, possess an abundant, loose sphere, consisting of particles larger than those emanating from metals, and thus more able to set the large bullæ of the luminiferous ether into undulations of light.

All substances, indeed, and even those apparently the most inert, if they remain long in the vicinity of an intensely radio-active salt, become manifestly radio-active themselves, although this induced activity seems to be chiefly of the grosser particles, and disappears in time, if the substance be removed from the neighborhood of the more active body.³¹ One could fancy one's self listening to some new version of the laws of the power and communicability of spheres. It recalls the story of certain individuals, who of themselves were blind to a truth, and even averse to its affection, but who, when brought into the presence of another who was profoundly versed in that truth and ardent with the active love of it, found themselves so affected by the operation of the sphere of the other that for a time they themselves in a way saw that truth, and were affected with the ardor thereof. But so soon as they departed from his presence and were removed from his sphere they returned to their own nature, and no longer either perceived or loved.

Thus, in active substances brought into the neighborhood of radium especially under favorable circumstances, as when they are added to the solution of a radium salt, and the latter is removed, are found to have become radio-active themselves, and that for a long time. Indeed, this secondarily excited ac-

³¹*Radio-Activity of Matter*, Becquerel. McLennan on *Radio-Activity*, *Phil. Mag.*, February, 1902. *Chemical News*, November 13, 1903.—Curie.

tivity is sometimes greater than the spontaneous original activity, and the added substance behaves as a false radium, while the true radium appears to have spent its sphere away to its utter exhaustion of potency.³² The after-history of the two, however, discriminates between the two activities. The induced radiation, however high, seldom long survives separation from the vicinage of the true radium, and almost never survives the intimate mingling with other substances in chemical union. Once lost, moreover, the radio-activity is not recoverable by rest or isolation. But the "true" radium only requires rest and a period of isolation with its own sphere to recover spontaneously its full radiant powers.³³ The latter point is interesting in view of the fact that the freshly prepared radium salt never possesses either a constant or full power of radiation, requiring at least a month of isolation to develop that.³⁴ Indeed, the emanating potency is universally found to be a quantity which varies, not only with the nature of the chemical compound, but also, for the same compound, with its previous history,³⁵ an idea which gives a living interest to the individual molecules even of the same substance!

Some of the physico-chemical changes induced by the radium emanation might be mentioned here. Oxygen, for example, is turned into ozone by its action;³⁶ and a solution of radium salt evolves hydrogen. When the diamond is exposed to the bombardment of the rays *in vacuo*, its superficial layer is transformed into graphite by the action of the Beta, or intermediate particles. Its color interiorly is changed also, and it experiences a quickening of its own radio-activity more permanent

³²*Radio-Activity of Matter*, Becquerel.

³³*Chemical News*, November 20, 1903, and December 4, 1903; *Radio-Active Substances*, Curie.

³⁴*Chemical News*, November 27, 1903.—Curie.

³⁵*Philos. Mag.*, November, 1902. Rutherford and Soddy *On Polonium and the Inducing Character of Radium*. Giesel, *Chem. News*, August 7, 1903.

³⁶*Chemical News*, November 6, 1903.—Curie.

than is usual in substances of the inorganic kingdom,³⁷ and almost reaches the relative permanence of action characterizing substances of organic origin.³⁸ Sea salts, under the action of the radiation, take on various colors.³⁹ Glass is turned violet.⁴⁰ On the globules of the blood serum the action of the radium salts differs according as the globules are rendered acid or alkaline.⁴¹

IV. CONDITIONS FAVORING THE EMANATION.

Of the general circumstances favoring the free radio-activity up to the limit, moisture and heat lead. Both are conditions in which the molecules stand more free and alone, as it were.

In solution the radium molecules give off their emanation to the point of exhaustion; and the more dilute the solution, the more free and swift the radiation.⁴² Thus, if it is the activity of the absorbable emanation we want to work with, the more dilute the solution of the emanating salts, the quicker the results; although a radio-active liquid, if exposed to the air, will give off its absorbed radiation to the air, and become inactive itself, because gases, even more easily than liquids, absorb radiant spheres and take on induced radio-activity.⁴³

A single negatively charged wire in the open air becomes radio-active.⁴⁴ Radio-active carriers are being continually produced from some constituent of the atmosphere, and the penetrating power of the excited radiations due to air is greater than any of the other types of radiation. Moreover, the amount of this atmospheric radio-activity varies greatly with

³⁷*On the Action of Radium Emanations on the Diamond*, Sir Wm. Crookes, *Chem. News*, July 1, 1904.

³⁸*Chem. News*, November 20, 1903.—Curie.

³⁹*Chem. News*, November 6, 1903.—Curie.

⁴⁰*Chem. News*, August 26, 1904, Giesel on the *Emanation Substance*.

⁴¹*Chem. News*, August 14, 1903.

⁴²*Comparison of Radiations*, Rutherford and Brooks, *Phil. Mag.*, July, 1902.

⁴³*Radio--Active Substances*, Curie, *Chem. News*, November 13, 20, 27, 1903.

⁴⁴Elater and Geitel, *Phys. Zeit.*, 1901.

weather conditions. A bright day and a windy day are favorable to its production; and mountain heights accumulate more radio-activity, per unit area, than level planes.⁴⁵ Mineral waters also are radio-active.⁴⁶ All such excited radio-activity can be produced at long distances; and is considered to be due to the literal conveyance of some kind of infinitesimal matter to surrounding bodies.⁴⁷

Heating is also one of the agents which increases the abundance of the emanation; but the after-effects of heating upon the radium molecule appear to be favorable rather than otherwise, since to have been heated seems permanently to raise the limit of radio-activity above that ordinarily obtaining.⁴⁸

It may be noted here that in cases of induced radio-activity the emanations stimulated is found to be of the same order as one or other of its own lower grades of rays. It is probable that the emanation of radium falling upon another substance which possesses even latent potency of emanating rays of its own type, so reinforces that potency that it momentarily, at least, comes to active manifestation. If this be true radium probably follows the law that Charpentier recently found to hold good for the peculiar radio-emanations given off by complex molecules of organic origin. "The greater part of the alkaloïds," he says, "emit N-rays in quantities generally considerable, though varying one from another." "I noted in regard to these substances a fact. . . . Their action upon the phosphorescent screen is reinforced by the proximity of another source of N-rays. . . . *The total action is not simply the sum of the product by the body itself, and of that produced by the accessory source; it is much stronger than this sum.*"⁴⁹

⁴⁵Rutherford and Allen, *Phil. Mag.*, December, 1902; *Chem. News*, March 18, 1904.

⁴⁶*Comparison of Radiations*, Rutherford and Brooks, *Phil. Mag.*, July, 1902.

⁴⁷*Comparison of Radiations. ibid.*

⁴⁸*Radio-Active Substances*, Curie, *Chem. News*, November 27, 1903.

⁴⁹*Electric Action of Many Parts of the Body Upon Certain Phosphorescent Screens*, M. Augustin Charpentier, *Comptes Rendus*, March 21, 1904.

This later finding, as to the effective action resulting from a united action of consonant spheres being greater than the sum of their separate activities can account for,—stimulates through as to a comparison with social spheres among men..

Meanwhile, the emanation capable of doing all this work is continually being produced from the radium without ascertaining diminution of the acting mass. The radio-activity of the radium, as is the case with thorium and other compounds,⁵⁰ seems to be balanced by a continuous regeneration of the acting material. It is in this that we have, Kropotkin says, the puzzle or at least the quiet unexpected fact, of matter radiating apparently without any previous extraneous stimulus to provoke and maintain that radiation, and leads him to sum as the consensus of conclusion from the facts, that "the molecules of which all substances are composed are not something rigid. . . . An atom or a 'corpuscule' is continually being detached from this or that molecule, and it wanders through the gas, the liquid, or even through the solid. . . . Another corpuscle may next take its place in the broken molecule." And it was the indications of such facts as these, when the returns first began to come in as far back as 1899, which led Stokes in his lecture on the *Revival Inorganic Chemistry*, 1900, to declare that "Energetics is now the basis of chemistry; and inorganic chemistry, which had seemed to be dry and dead, experiences a revival in its study of the molecule as a living, moving mass, filled with energy and capable of reacting by virtue of that energy."

We can appreciate the point of view of Balfour, who, in his inaugural address before the British Association, 1904, says that—

"The beliefs of all mankind about the material surroundings in which it dwells are not only imperfect but fundamentally wrong. It may seem singular that down to, say, five years ago, our race has, without exception, lived and died in a world of illusions, and that its illusions, or

⁵⁰*Phil. Magazine*, September, 1902, Rutherford and Soddy, VIII.

those with which we are here alone concerned, have not been about things remote or abstract, things transcendental or Divine, but about what men see and handle, about those plain matters of fact among which common sense daily moves with its most confident step and most satisfied smile."

All these things concerning radium and allied substances have also made the Newchurchman suddenly regard with more alert and affirmative eye such statements as that made in *True Christian Religion*, No. 499:

"If there were not an analogy of free will in every metal and stone there could be no metal or stone, or even a grain of sand, . . . for all these freely absorb the ether, breathe out their native essences, cast off what is obsolete, and reintegrate themselves anew with fresh substances, whence it is that each has its own sphere round about it."

And the statement that the metals in their order correspond to what is good and true gains dignity in our minds, and we seem to catch a flashing vision of that operation of the Divine in ultimates and leasts, which is immediate.

V. SOME OBJECTIONS ANSWERED.

It has been suggested that recent experimental researches in the radium field might lead to a modification of the ideas expressed above, in view of the fact that some scientists claim that radium *does lose weight* by its radiation. But the fact is that even those who have claimed this have granted to radium a life of such long duration that to all intents and purposes we may call its emanation perpetual. And, therefore, I repeat that we have in radium a metal, the molecules of which are throwing out perpetually a sphere of active particles, apparently from their own substance, without ascertainable loss of weight; the molecular radiation of particles being accompanied with the radiation of heat also. The radiation and reintegration of the radium molecules seems to be equilibrated, almost like assimilation and elimination in an organic form.

Moreover, radium molecules exhibit "fatigue" upon excessive stimulation and over-activity; and recovery after a period of rest. Another period of rest needed for spontaneous recov-

ery is long or short in proportion to the amount of over-stimulation; being modifiable also according to the conditions under which it is passed.

Both of these properties, that of radio-activity without loss of weight to the radiant body, and that of fatigue under excessive molecular stimulation, are common in good measure to radium and the metals, and in some smaller measure to the non-metals, to stones, etc.

The property of molecular fatigue in metals is itself very interesting. The molecular organization of metals fatigues under continued electrical stimulus very much as vegetable and animal cells do, and recovers after a period of rest as they do. Moreover, the metallic molecule is susceptible to chemical reagents in the same manner as living animal and vegetable tissue. The action of stimulants and depressants on the electrical response of the metallic molecule is the same as their action on the organic molecular structure of animal and vegetable tissues. And the same chemical agents affect in the same way both the living and the non-living molecular structure.

A metal also can be poisoned, and by the same reagents that poison living molecular structures. In fact, the electrical response of a metal can be "killed" by the same toxic agents that forever destroy living tissue, causing electric response to disappear. And the opposite effect of large and small doses of toxic agents, death or stimulation, is alike in both.

The ground of all this in simple, solid, experimental fact is firm footing. The individual units, the molecules of the metals, in all this response and non-response, act very much like the units of living tissues. They are also alike in their faculty of giving off a radio-active sphere.

Now what does Swedenborg predicate of all the concrete unities of creation, animate and inanimate? What does he say of the specific reception and reciprocation of influx, and of the consequent production of a circle of radiant efflux and *pari passu* redintegration, that characterizes all such concrete bodies or unities? And also what does he say of such properties and potencies and "habits" in the inanimate kingdom, as the analogue of free-will? These questions are answered in

the passages quoted from above, *T. C. R.*, 499, and *D. L. and W.*, 293, which should be consulted and read in full.

It has also been doubted whether the properties predicated of radium, its perpetual emanation without loss, can be justly assigned to any natural substance, but rather to the Divine alone.

This difficulty is answered at once by the concluding statement in *D. L. W.*, 293: "*This the natural world derives from the spiritual world, and the spiritual world from the Divine.*" The properties assigned to radium and the other metals are finite correspondents to their Divine Universal, from which they derive their faculties, and which is as it were present in their form and substance and power, the very ultimate writing of all the laws and principles of Divine activity upon the ultimate "tables of stone" and metals.

In the numbers quoted the universal law of efflux or emanation is predicated of the concrete bodies of the universe, animate and inanimate, and metals are noted with a repetition which lends emphasis to the statement. And it says further that without just this property and power in the kingdoms of nature there could be no creation, and without its operation in the entities of the mineral kingdom the vegetable kingdom could neither begin nor continue to exist.

And these faculties and powers are from the Divine, who created and sustains the universe, and who has endowed all things structurally with a certain finite image of the great activities and operations of Himself, the Creator, who is Infinite.

Further light upon these two questions may be derived from the great doctrine of unities, or integral wholes, outlined both in Swedenborg's scientific works and his theological writings, the doctrine concerning compound structural forms or bodies, which, as concrete entities, present four common characteristics:

1. They are systematic arrangements of volumes of active units or primitive corpuscles, or finites, in such a manner that the forces and motions of the component units are equilibrated within the bounds of the compound integral whole, or body,—such an arrangement always including both bullular and blocks or angular, geometric forms.

2. The interior structure is different for different concrete bodies, but profoundly complex in all.

3. Each such compound entity, considered as a concrete body, is a recipient of influx from the Divine. To that influx it reacts according to the structure; and from that reaction come all its properties, potencies and activities.

4. In such a unit efflux is equal to influx. The influx is received within the concrete body, and the efflux emanates from it. The influx is from and of the Divine, the efflux is from and of the recipient body.

Animal forms are instances of such unities or integral wholes in largest complex. Animal cells are instances in lesser complex of such structural unities recipient of influx. Molecules of living tissues and fluids, as also all molecules of organic chemistry, are instances, in still simpler and more direct form, of such structural unities recipient of influx. Molecules of chemical elements are such structural integral wholes recipient of influx. A molecule of water is such a form; likewise a molecule of oil, of alcohol, and of a metal. These are least recipients in the ordinary world of phenomena. Moreover, there are finer recipients still, for the elemental primordial recipients and the bullæ of the ethers and auras are such.

In all of these instances greatest, lesser, least, and primordial two other points hold good, and alike for animals, animal cells, vegetation cells, living molecules, non-living molecules, and ether bullæ. They are all set in the stream of some circulation, which brings to them the nutrient material to make good perpetually the material losses by their efflux, their offices and their activities. And in all the given instances the play of that nutrient circulation, its attraction to, and into them, seems to have its key in a certain rhythmically alternate expansion and contraction of the concrete body as an equilibrated whole. This, in turn, is dependent upon the action and reaction between the influx and the recipient structure.

This nutrient redintegrative stream is the means of providing for the greater concrete unity, the animal form; the stream of blood or sap for the lesser unities, or cells; the flow of

lymph for the still less, or organic molecules. And the simple and vortex circuits set up in the third and second ethers supply molecules of inorganic compounds and elements, this sort of elemental circuit bringing in its train least primitives of salts or inert angular composites of finites. The bullæ of the ethers also have their sources of animatory expression and contraction by which a fine vortical current of disengaged finites is determined toward them.

Now all these concrete compound integral unities being create, may be uncreated. By dissociative analysis they all may be exploded, as it were, and crushed or destroyed. They are bodies of complex structure, and they can, as it were, perish, die, and go out of existence. Then the corpuscles or finites of which they were constructed pass into other constructions, receiving influx in quite other form and fashion. But while they continue to exist as unbroken correspondents, all the properties and powers Swedenborg predicates of concrete structural forms recipient of influx, are theirs—efflux and influx, radiation and redintegration, animatory action and nutritive circuit. And this is equally true for the animate and inanimate.

Some integral wholes or concrete unities have a definite lease of life. The years that animal unities maintain themselves are but few. With simpler unities the length is greater. The protozoa practically have immortality, a sort of unendingness, pending some violence. Chemical molecules, even the unstable, have an indefinite lease of existence under favorable conditions. The more stable molecules of the inorganic world exist endlessly, giving forth and redintegrating as stated, unless they are the subjects of violence. But they can be destroyed. A molecule of water is totally destructible as a molecule; similarly the molecule of a metal,—but only by violence. It is as if we should say that a man would live on earth to eternity unless violence destroyed his physical body.*

*Not that all death and destruction of natural organic forms is effected by *sudden* violence, for it generally takes place by slow disintegration. But even this in itself is a form of violence to the perfection of natural order, which ever tends to conserve rather than destroy.

Ether bullæ are destructible by violence also, for at every flash of lightning such bullæ are disrupted or exploded, but pending something like that they maintain integral existence, receiving and reciprocating influx,—their efflux being equal to the influx. The fine return current of redintegration “finites” supplying their needs under variation of pressure, etc., is determined toward them from their environment; even by the physical attraction of their alternate motion of expansion and contraction. Bullæ of the primal aura have probably been in jucund integral play since they were first framed. And there are molecules in the earth’s crust also, which I suppose have been in integral existence and activity since that crust was first formed.

The conclusion follows: 1st. That all concrete “unities,” animate and inanimate, all integral bodies,—animal, plant, cell, integral molecules of the non-animate kingdom, and bullæ by the ethers, are compound, equilibrated, structural forms, recipient of influx from the Divine, to which influx they react (from the reflux of the Divine in the primitive substance, the vortex points, of which, at last resolve, they are constituted). 2d. That so long as their integral form is maintained unbroken they receive influx; that so long as they give forth an efflux from themselves; and so long as the nutrient circuits of ethers and floating salts, which their very activity draws to them, perpetually brings material for their redintegration. This outline of Swedenborg’s doctrine of unities or organic forms will no doubt serve to clear up the difficulty mentioned.

And thus the term “perpetual,” as applied to the emanation of radium, means that such emanation continues indefinitely and continually, while radium remains radium. Of course, such a faculty with both natural and spiritual substance from the Infinite and Eternal Divine, and, therefore, in this use of the term “perpetual” there is really no confusion with that which alone is truly perpetual, the Infinite Divine. By Him all things were created and are preserved. For *subsistence in perpetual existence*.

LILLIAN BEEKMAN.

THE CHEMISTRY OF SWEDENBORG.

The chief value of Swedenborg's chemistry lies in the fact that it forms an integral part of his theory of cosmogony. It is a necessary link in that wonderful chain which connects the world of effects with the world of causes; the gross matter of the visible earth with the imponderable *substantia prima* of the universe.

No other system of chemistry occupies such a position. The ancient philosophers, it is true, attempted to explain the origin and composition of matter, but their contempt for observation and experiment led them far astray. They followed the *a priori* method exclusively, and in consequence their physical philosophy was, as Grote says, "little more than an obscure, semi-poetical *Philosophia Prima*, dimly enunciated and only half intelligible." The alchemists, too, sought the connection between matter and spirit, but they were so blinded by superstition that they wandered away from the true path into the byways of mysticism and astrology. Again, the chemist of modern times, in attempting to avoid the fallacies of the metaphysicians, have fallen into an error even more grievous, for they have rejected the *a priori* method of the ancients, and admit nothing which is not based entirely upon *a posteriori* reasoning. Thus they approach no nearer to the First Cause than their senses can carry them.

Swedenborg, with a rare eclecticism, united reason and experience. He combined the Aristotelian method with the Baconian, and thus guided, he was able to penetrate deeper into the secrets of nature than any other philosopher.

To gain a just appreciation of Swedenborg's chemistry it is necessary to study it in the light of his *Principia*; for to one who attempts to interpret it by modern scientific standards, it appears almost wholly unintelligible. Comparisons with modern chemistry may, however, be made with advantage and profit, provided the above necessity be continually borne in mind. Some such comparisons have indeed already been made, as in the provisional identification of hydrogen and oxygen with the third and fifth finites.

It is proposed in the following paper to present briefly some of the most important points in Swedenborg's chemical theory, and to compare them in a general way with the chemistry of the present day. The comparisons are perhaps little more than suggestive hints, but they are sufficient to indicate the value to New Church Science of a more exhaustive study of the subject.

Swedenborg tells us that water was the first purely material substance, the parent, as it were, of all other inert forms. This statement may be verified by many facts discovered since Swedenborg's

time. In the first place water is the most abundant compound in nature. It is the universal solvent, and is everywhere present both in inorganic and organic substances. In the mineral kingdom it is closely connected with phenomena of crystallization; it is a necessary factor in very many chemical reactions, and it is a frequent product of chemical change. In the vegetable kingdom we find even more striking evidence of its chemical importance. Cellulose, for instance, the hard, insoluble framework of all vegetable tissue, may be converted into grape sugar merely through the addition, by chemical means, of a molecule of water. Starch, another widely distributed vegetable product, may be similarly changed. In the animal body the reverse process takes place, grape sugar being converted into glycogen—the so-called “animal starch”—by simple dehydration. In the process of digestion, albumen is turned into peptone by a series of changes, each one of which involves the abstraction of a molecule of water. Many other facts might be adduced which tend to show that there is some intimate connection between the water particle and the composition of all other substances, the nature of which modern theories are inadequate to explain.

The particle of water, as Swedenborg describes it, is a hard, inert globule composed of a crust of fifth finites, within which is a compressed volume of third finites. Ordinarily the particles of water do not touch each other. They are separated by an active subtle matter which is constantly circulating between them, and without which they would have no motion; for, being inert, they possess no activity of their own.

This subtle matter is variously named by Swedenborg. Sometimes he calls it fire, again it is mentioned as heat. Critics have been led by this to assert that Swedenborg believed fire to be an actual material substance, like the caloric or the phlogiston of the early chemists. This, however, is a mistake. Swedenborg merely used the words fire and heat to designate the ether, the activity of which produces these phenomena, in somewhat the same way as we speak of “the light” when we mean the agent by which the light is produced.

No modern physicist would deny the ether occupies the interstices of the water particles. This may even be demonstrated experimentally, for it may be shown (Michelson and Morley, *Phil. Mag.*, XXIV., 1887) that a beam of light is accelerated when passing through a current of water moving in the direction of the source of light, and retarded when the current is reversed. Neither would the modern physicist deny that the water particles are normally separated from each other by a definite interval, which varies directly with the temperature and pressure. In fact the theory of the liquid state of matter rests partly upon this supposition.

According to Swedenborg the pressure of this interfluent ether is the force which maintains the spherical figure of the water particles. If this pressure were removed, the particles would collapse and disin-

tegrate. We have in this a very suggestive hint regarding the nature of chemical affinity. The old alchemists believed that substances were held in combination by virtue of a mysterious attraction due to some property which they possessed in common. Buffon asserted that chemical affinity was identical with gravitation. Newton and the Swedish chemist, Bergmann, denied this. Berzelius thought it was electrical in nature, and at the present day no single theory is very widely accepted. Swedenborg's hypothesis is notable because it excludes any inexplicable *attractive force*, and accounts for the phenomenon on the simple ground of *pressure*.

Common salt, Swedenborg tells us, originated as follows: In the depths of the primeval ocean the weight of the superincumbent water became so great that a large portion of the interfluent ether was expelled. The loss of this ether caused some of the water particles to disintegrate, and their component parts became wedged in the interstices between the particles which remained intact. A new substance was thus formed, consisting chiefly of fifth finites, some of which broke down into fourth finites. Most of the third finites, on account of their volatility, escaped.

The shape of the salt particles would naturally be identical with the shape of the interstices in which they were generated. Reasoning from this, Swedenborg shows that each little elementary crystal of salt consists of eight tetrahedra with concave sides, attached by their apices to the angles of a cube which is also concave laterally. The resulting figure is a wonderful complex of delicate curves and angles looking like some exquisitely perfect lily.

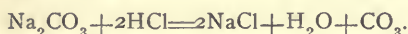
The question has been raised whether a crystalline substance like salt could be formed by simple pressure. In this connection the experiments of Prof. W. Springer are of interest. Prof. Springer found that on subjecting finely powdered potassium nitrate to a pressure of thirteen tons to the square inch, the powder was changed into a transparent crystal, differing from the ordinary crystal of potassium nitrate only in having a somewhat greater specific gravity. Moreover, he found that a mixture of copper filings and sulphur when submitted to a compressing force of thirty-four tons to the square inch, was converted into a perfectly homogeneous mass of copper sulphide, and this without the application of any heat whatsoever. Facts like these are very strong confirmatory evidence of the truth of Swedenborg's theory.

The salt cube, as Swedenborg describes it, is capable of holding in combination six particles of water, one in each of its lateral concavities. These particles are prevented from becoming dislodged by the eight triangular projections, which serve as little anchors, so to speak. When salt is dissolved in water, therefore, each cube combines with six water particles to form a larger particle, which moves freely about in the solution. If, however, there is a deficiency in the

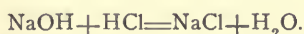
number of water particles, a single one of these becomes enclosed between two saline cubes. The cubes thus begin to combine, the mobility of the solution is impaired and crystallization results.

It is a notable fact that common salt is more soluble in cold water than in hot, a circumstance which modern chemists have not found it easy to explain. It becomes perfectly clear, however, when we regard it from the standpoint of Swedenborg's theory; for when water is heated the interstices between its particles are enlarged to such an extent that the saline cubes do not exactly fit into them. The relation of salt cubes to water particles is thus disturbed, and consequently fewer cubes can be forced into the solution, just as fewer blocks can be made to go into a box when they are thrown in irregularly than when they are piled in an orderly manner.

The structure of the saline cube renders it peculiarly liable to fracture. This fracture takes place, of course, at the weakest points, namely, where the projecting triangular bodies are attached to the cube. A salt particle may thus be deprived of all its projecting points, forming in this way two new substances. The points, or tetrahedra, are called by Swedenborg acid triangles, and are said to constitute the acid of salt (hydrochloric acid). The cubes, deprived of their acid, become alkaline salt. This statement may be verified experimentally. If by alkaline salt we understand sodium carbonate, it may be shown that this combines with acid of salt to form common salt, thus:

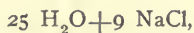


If we interpret alkaline salt to mean sodium hydroxide, the result is similar, thus:



It will be noted that in each of these reactions water is one of the products.

Modern chemistry teaches that common salt or sodium chloride is composed of a metal sodium, and a gas chlorine, and it may be asked how a metal and a gas with the remarkable properties of those two can result from the disintegration of water. According to our theory we have—



which the chemists would tell us is an absurdity. It should be remembered, however, that the change which we are considering took place under cosmic conditions of which we have little knowledge. We certainly cannot reproduce in the laboratory the conditions of temperature and pressure which were present at the bottom of the primeval ocean.

There are many facts which indicate that the same substance may, under certain conditions, exhibit widely differing properties. The allotropic forms of carbon, silicon, boron, phosphorus and arsenic are

but a few instances of this. The isomeric hydrocarbons afford even more striking evidence. One single compound, with the formula $C H$, exhibits (theoretically at least), no less than 302 different forms, the difference depending solely upon the various positions of the atoms of carbon and hydrogen in the molecule. In view of these facts, which are but a small fraction of the number that might be quoted, we are safe in saying that the change from water to salt is not incompatible with observed phenomena.

But it may be objected that the transformation is impossible because according to our calculation :

water particle : salt particle :: 9 : 25,

whereas, on comparing this with the observed molecular weights, we find :

$H_2O : NaCl :: 18 : 58.5$ or as 9 : 29.25,

thus indicating that in our calculation the salt particle is much too light. There are several factors to consider in the discussion of this apparent discrepancy, but until there is a more thorough agreement among chemists as to the exact atomic weights of the chemical elements, comparisons of this sort are inconclusive. Modern investigators have become so engrossed in the pursuit of absolute accuracy that they miss the broad view and see nothing but the details. Errors have thus crept in, and these have been recorded together with the truth, so that at present a real knowledge of atomic weights is impossible.

A great deal might be said regarding Swedenborg's theory of metals, but space forbids more than a brief general description. We are told that the particles of water, acid and salt, *i. e.*, the spheres, tetrahedra and cubes composed of fourth and fifth finites, may, under certain conditions, be converted into metallic particles by the infiltration into their substance of particles of third finites. This change takes place, for the most part, in the bowels of the earth, where the interfluent matter which properly surrounds these particles is excluded. If, as has been suggested, third finites are identical with hydrogen, we see in this theory a very reasonable explanation of the resemblance between hydrogen and the metals. Furthermore, we get a glimpse of the possible reason why hydrogen and the metals change places so readily in chemical reaction. Other intimate relations between these substances might be pointed out, as, for instance, the occlusion of hydrogen by palladium, which has been found to absorb no less than 900 volumes of this gas.

The study and development of Swedenborg's chemistry is as yet hardly begun. In fact, only a portion of his theory is at present available. Nevertheless, what we do know of it is sufficient to indicate that, when more fully worked out, it will shed a great light upon present day chemistry. The identification of carbon and nitrogen with their counterparts of the *Principia* theory will go a long way toward

perfecting our understanding of the subject as a whole. The most promising field of study in this connection appears to be in the correlation of Swedenborg's theory with the Periodic Law. There is no doubt that in his tabulation of the chemical elements, Mendeleef came very near to the discovery of an important natural law, but it seems equally certain that he did not actually grasp it. The Periodic classification contains too many inconsistencies to be correct as it stands, and some new generalization is needed to explain them. A thorough study of the subject in the light of the *Principia* will no doubt be productive of valuable results.

A consideration of the mathematical side of Swedenborg's chemistry must of necessity be omitted in a paper of the present scope. It may be said, however, that no more complete vindication of Swedenborg's conception of the intimate relation between geometry and chemistry can be found than in the history of physical and chemical science during the past fifty years; for chemists, within that period of time, have awakened to the fact that the figure and motion of the minute particles of matter are all-important factors in the determination of its properties. The greater part of the research of the present day is directed toward the discovery of the structure and shape of atoms and the measurements of their orbital and axial motions.

There have been advanced from time to time various hypotheses regarding the evolution of the chemical elements. Most of these are valueless, but some doubtless contain a measure of truth. None of them, however, possesses anything approaching the unity and simplicity and breadth and scope of Swedenborg's theory. This difference arises from the fact that the dominant note in Swedenborg's theory is his acknowledgment of an Infinite Creator. The modern theorists make no such acknowledgment, and thus at the very outset their attempts to solve the riddle of the universe are doomed to failure.

From all that has been said it is evident that Swedenborg's position in chemistry is unique. Midway between the ancient philosophers and the modern savants, he stands alone, an intelligent giant, a veritable colossus, casting his shadow far into the years to come. As Wilkinson has well said: "In him the oldest and the newest spirit met in one; reverence and innovation were evenly mingled. . . . He was one of the links that connect bygone ages with to-day, breathing for us among the lost truths of the past, and perpetuating them in unnoticed forms along the stream of the future."

E. A. FARRINGTON.

Chicago, June 10, 1904.

THE SUN.

O wonderful, sublime and beauteous Sun!
 How marvellous the work which thou hast done!
 The Parent, by the grace of God above,
 Of earth,—created in His boundless Love,—
 And universe with all contained therein;
 Great aged Time long since had bearded been
 When, moved by Him Who was and e'er will be,
 Thou burstedst forth, so grandly, wondrously,
 And into Space the seething mass didst cast,
 Which, waiting God's command, had bound thee fast!

And lo! from fragments of this matter dense,
 Which wildly surged about thee so immense
 And rushed and whirled throughout unending Space
 Thus leaving thee so free in fiery grace,
 God fashioned all the universe so grand,
 And seeing all was good, stretched forth His Hand
 And bade thee hold this vast Immensity
 In perfect poise throughout eternity!
 All things have strength from thee,—thou failest none,—
 God gives Man means of life through thee, O Sun!

HERMANN LECHNER.

NOTES ON THE INTERNATIONAL CONGRESS OF ARTS
 AND SCIENCES HELD AT ST. LOUIS, MO.,
 SEPTEMBER 19-25, 1904.

The size of the Congress, the number of celebrated scholars and specialists in attendance from every part of the world, and the broad scope of subjects discussed, made this meeting a memorable event in the history of human culture. Of what real service it will prove to science in the advancement of learning will depend upon the degree in which the Congress realized the end proposed in its inauguration, an end which will appeal to all readers of the *New Philosophy*, namely, that of unifying science by bringing it into a harmony of its various divisions and under the control of a single universal principle or law. So far as it was an effort toward the attainment of the "universal *Mathesis*," or science of sciences, the cherished ideal of Swedenborg and before him of Descartes; it was a real step forward and upward, in which all lovers of genuine science and true philosophy will rejoice.

How far this end was accomplished can only be determined, of course, by a careful study, first, of the *resumes* of the different sciences in their present day results by their respective authorities, and second, by observing what directive force, if any, upon the future methods of science the deliberations of the Congress will exert. There can be little doubt that each department of science has received some stimulus toward the conducting of its researches more with relation to other branches, or at least with more recognition of these than before; and, from many expressions, we might conceive the hope that there is in present scientific tendencies a growing recognition of the reality of spirit, of the co-ordinate importance of the spiritual world as a part of man's universe, of the futility of seeking a real final cause elsewhere than in a spiritual world, and of the evolution of the world out of the Divine, rather than out of nothing, or out of unintelligent matter. The following notes, partly taken on the spot and partly culled from the papers of the speakers since published, will indicate in some measure in what way these recognitions were made:

Professor SIMON NEWCOMB in his opening address on the "Evolution of the Scientific Investigator" remarked that "cause" is to be sought for in some deeper than visible manifestations: "The real wonders of the oak being concealed in the acorn from which it grew." The human intellect is the really active agent in every branch of endeavor. "If it be true that in nature nothing is great but man, then in man nothing is great but mind." "The problem before the organizers of this Congress was to bring the sciences together and seek for the unity which we believe underlies their infinite diversity. We are coming to recognize the principle that progress in knowledge implies its reduction to a more exact form and the expression of its ideas in language more or less mathematical."

Professor ROYCE, of Harvard, in his opening address in the department of Normative Science, or Methodology, dwelt also on this correlation of the mathematical with the metaphysical terms. The ideal methodology, he said, would be the complete tabulation of knowledge. Knowledge being the knowledge primarily of relations; relations may be traced mathematically through geometry in the ordinal development of the points. Hence arises a theory of forms and the finding relations to be of two kinds, relations of the level (or of latitude = the continuous degrees of Swedenborg?) and relations of the series (or of altitude = the discrete degrees of Swedenborg?). All the universe, he says, reduces itself to these relations, and the study of the universe is the study of these relations. The relations of the level are those of the equation or of quality; those of series are of before and after (prior and posterior degrees of Swedenborg?). The formal identity in geometry corresponds to a formal identity in logic or in the mind's world; geometry, therefore, proceeds from a purely ideal world.

It is interesting to compare this statement of fundamental principles with Swedenborg's "three requirements for knowledge truly philosophical"—experience, geometry and the faculty of reasoning—(*Introd. to Principia*, 2). It may be entirely arbitrary to trace a resemblance between Professor Royce's categories of the "level" and the "series" as those of quality and quantity, respectively, with Swedenborg's "degrees of latitude or continuous degrees and degrees of altitude or discrete degrees (see Swedenborg's *Divine Love and Wisdom*, 184, "That Degrees are of two kinds, those of latitude and those of altitude"), especially as the "continuous degrees" of Swedenborg, being simply the degrees of comparison or of more or less of the same term, may seem to be more properly termed degrees of "quantity" than of "quality," as they are named by Professor Royce. On the other hand, if we take from the category of quantity the idea of bulk and reduce it to number pure and simple as consisting of succession of points, or "before and after," we arrive at the concepts of the prior, mediate and posterior of Swedenborg's discrete degrees. Thus number, as meaning succession, may apply to degrees of end, cause and effect, as a series in order. This may be far from Professor Royce's intended application of his doctrine of "series," but it is an illustration of the possible application of the mathematical principle to the doctrine of degrees, continuous and discrete, and so of the series in Swedenborg's system.

Professor Hoeffding, of the University of Copenhagen, also pointed out the identity of the series in mathematical and in logical ideas. "The mental elements are not as demonstrable as are the material, but we must take them as realities or else science is reduced to nought. There is, however, no unit of mental elements. We cannot calculate mind in numbers."

Professor Ladd, of Yale, in his historical review, spoke of the tendency of philosophy to become more modest and to seek unity with science. The true aim of philosophy should be the unity of the real and the ideal in the totality of human experience. He hoped for a new era in philosophy.

Professor Howison, of the University of California, in speaking of the concepts and methods of philosophy, said that cause is being traced to final cause in purpose and idea, that is, in mind. The One in the wilderness of the Many is the mind, the basis of unity, the harmony of distinct realities. The mistake in the idea of cause has been in taking efficient for final cause. Hence the drift to Pantheism; the One being the sum of the units, pluralism is not at war with the One. The One and the Many are not dependent on time and space. Mind is social as such because it is self-defining, *i. e.*, it asserts the other. There is a cause higher than that of production. Final cause is the sole personal primary reality.

Professor JAMES WARD, of Cambridge University, England, author of "*Naturalism and Agnosticism*," speaking of the Problems of General Psychology, said: "Objective reality is immediately given or immediately 'there,' it is not inferred. We say 'there is,' or in German, 'es giebt.' The subjective factor is experience—'es giebt,' you say, but to whom?" "The subjective factor in experience, then, is not *datum* but *recipiens*. It is not the 'there' but the 'here' to which the 'there' is relative.

"And now this receptivity is not passivity. The concept of pure passivity or inertia (implied in the ancient formula of the *tabula rasa*) is a convenient analytical fiction in physics, but we find no such reality in concrete experience. Every receptivity is activity, and though it is often non-voluntary, it is never indifferent."

This utterance is remarkable in its affirming of the important principle in Swedenborg's philosophy and psychology, that man is a recipient of life but is reactive and exercises a certain spontaneity and activity of his own.

"Of subject activity," says Professor Ward, "three theories have been propounded:

I. Subject activity is a fact of experience, but neither describable nor explicable.

II. Subject activity is not a fact of experience but a transcendent reality, without which psychology would be impossible.

III. Subject activity is neither phenomenal nor real. The apparent originality and spontaneity of the individual mind is for the psychologist at any rate, but the biologist's *tropisms*.

This conative activity is our immediate actual being (compare Swedenborg's, Love is life itself; and a man's life is his love. *D. L. W.*, No. 1-5). We cannot get behind it or beyond, and cannot do away with it. To turn *geistiger activitat* out of the science in order to separate it from the "*Geisteswissenschaften*" is like giving a dog a bad name, taking away his character in order to hang him."

Professor FREDERICK J. E. WOODBRIDGE, of Columbia University, in speaking of the "Field of Logic," said that "no problem of relation is even statable correctly before the type of existence (discrete degree, Swed.) to which the terms belong has been first determined. I submit one illustration, the relation of mind and body.

"If mind and body belong to the same type of existence we have one set of problems on our hands, but if they do not we have an entirely different set. Discussion abounds in confusion because mind and body have been regarded as belonging to distinct types of existence, and yet related in terms of the type to which one of them belongs. The doctrine of parallelism is perhaps the epitome of the confusion." "The ideal logic will be a classification of methods not as inductive or deductive, but according to the categories employed in giving the method direction and aim."

If Professor Woodbridge would study Swedenborg's doctrines of the three discrete degrees of being, their correspondence and their communication by influx and not by confusion, he would be helped in arriving at the classification he desires. In the department of Physical Science we quote some noteworthy observations.

Professor EDWARD L. NICHOLS, of Cornell University, in his address on the Concepts of Physical Science, declares that all physical qualities may be explained in terms of the fundamental concepts, mass, distance, time. He quotes Oswald as teaching that the object of science is to reduce the number of hypotheses, and that the highest development would be that in which a single hypothesis served to elucidate the relations of the entire universe."

Why would not the declaration of Swedenborg that God alone is life and man and the universe are the created recipients of this life in their various degrees of existence and of activity? (See Swedenborg's *Divine Love and Wisdom*, Nos. 4 to 70.)

Professor Nichols quotes the distinction drawn by Chwolson in his *Treatise on Physik*, Vol. I., *Introduction*: "For every one there exists two words, an inner and an outer, and the senses are the medium of communication between the two. The outer world has the property of acting upon our senses, to bring about certain changes, or, as we say, to exert certain stimuli. The inner world for any individual consists of all those phenomena which are absolutely inaccessible, so far as direct observation goes, to other individuals. The stimulus from the outer world produces in our inner world a subjective perception which is dependent on our consciousness. The subjective perception is made objective, i. e., is assigned time and space in the outer world and given a name. The investigation of the process by which this objectification is performed is a function of philosophy."

Here seems to be clearly asserted Swedenborg's teaching that the active element in sensation is from within and not from without. That it is the subject that "objectifies" its perception in time and space would agree with Swedenborg's doctrine of the possibility of an objective spiritual world. In the work on *Influx*, or the *Intercourse of the Soul and the Body*, he says, in preferring the doctrine of Spiritual Influx over that either of Physical Influx or of Pre-established Harmony: "It is according to order that the purer should flow into the grosser, the prior into the posterior, the spiritual into the material; consequently for the cogitative mind to flow into the sight according to the state induced on the eyes by the objects before them (stimuli?), which state the mind disposes also at its pleasure; and likewise for the perceptive mind to flow into the hearing according to the state induced on the ears by speech."

Continuing, Professor Nichols says: "Leaving this objectification to philosophy, therefore, the only speculations in which the physicist is

entitled to engage are those which are amenable at every step to the equally definite axioms and laws of mechanics." Compare here again that very pertinent and interesting exposition by Swedenborg of the Mechanism of the Intercourse of the Soul and the Body in chapter second of the work on "*The Infinite and the Final Cause of Creation.*"

Professor WILLIAM A. NOYES, of the United States Bureau of Standards, is strongly convinced "that we should not be content with rounding out an organic chemistry as a descriptive science nor even with adding to the number of empirical rules which enable us to predict certain classes of phenomena. We must, instead, place before ourselves the much higher ideal of gaining a clear insight into the nature of atoms and molecules and of the forces and motions which are the real reasons for the phenomena we study."

VAN T'HOFF, of Berlin, who has frankly accorded to Swedenborg the initial theory leading to modern stereo-chemistry, in the department of Physical Chemistry, is said to have "conceived the idea of tetrahedral carbon atoms as explanatory of the behavior of substances chemically identical which nevertheless react differently to polarized light, thus creating the science of stereo-chemistry." He read a paper in the section of Physical Chemistry.

In a boldly original address SVANTE ARRHENIUS, of the Royal Swedish Academy of Sciences, proposed a theory of the possible connection between phenomena that are most diverse and separated by exceeding great distances, thus making meteorology a cosmic science. "Negatively charged electric corpuscles pass off from the sun and penetrate an atmosphere producing negative electricity and forming nuclei for the condensation of moisture." The relation of carbon to cold, to vegetation, etc., in the question of the glacial periods was treated in the carrying out of this theory.

DE VRIES, the Botanist and Biologist of Amsterdam, In a paper on Philogeny declared that "he had seen with his own eyes the actual evolution of several new plant forms possessing the character of true species," and that he has procured a vast amount of evidence that "new species arise suddenly from marked variations of the discontinuous sort called 'mutations,' rather than by the gradual accumulation through successive generations, of slight differences due to the ordinary fluctuating variation as Darwin had supposed. On the other hand, Professor WHITMAN, the Zoologist of the University of Chicago, described his study of the evolution of the color pattern on the pigeon's wing where the changes are gradual but stable.

Professor TITCHNER, of Cornell University, the experimental psychologist, was obliged to insist with sober earnest that psychology is in its essence "introspective." "Only those are properly psychologists who are concerned directly with conscious processes," although useful study may be had from the approach by biology and by that of the theory of knowledge.

Of special interest was the utterance of Sir WILLIAM RAMSAY, K. C. B., of the Royal Institution of London, in his address before the section on Inorganic Chemistry: "Up till now the sheet anchor of the chemist has been the atom. But the atom itself appears to be complex and to be capable of decomposition. It is true that in the case of a very few elements has this been proved. But even radium, the element which has by far the most rapid rate of disintegration, has a comparatively long life. The period of half change of a given mass of radium is approximately 1,100 years." We must take it that the disintegration hypothesis of Rutherford and Soddy is the only one that will meet the case. Radium must be reproduced as rapidly as it disappears. . . . Radium must owe its existence to the presence of some other substances, but what they are is still unascertained."

Sadly characteristic of the negative tendency of German theology were the addresses of PROFESSOR PFLEIDERER, of Berlin, who assumed as something universally conceded, that Christianity was at this day denied any peculiar Divine authority among beliefs, and proceeded to argue in favor of pure rationalism as the only basis of religion in the future. Religion, he declared, to be the united concepts of ethics and metaphysics, or of the good and of the true. The religious faith must be evolved from reason and experience without further dependence on Revelation. Revelations are of many kinds, and are to be compared in arriving at the truth. In the same rationalistic spirit Professor ERNST TRÖELTSCH, of Heidelberg University, read a paper on the Philosophy of Religion, in which he spoke of Professor William James's book on "*Religious Experiences*" as "not the last word on religion." He discussed Kant's "*Religion Within the Bounds of the Practical Reason*," and thinks that neither Kant nor James will solve the problems left to the German speculative philosophy. The rational element of religion must rest on what are proved to be the necessary results of religious experience.

Perhaps more depressing than these discussions of "religion" was the treatment of Marriage and the Family in the department of Sociology, where the subject of the conjugal and filial relations was treated as nearly as possible in their purely animal and commercial character, with very little if any recognition of the human form of society, or of any spiritual principle as governing the relation of the sexes, or giving moral value to the family. Perhaps this was because science as such was supposed to know statistics only, and that in its eyes the breeding of the family does not differ by any discrete degree or quality from that of cattle. If the decadence of the "family" in American social life was deplored it seemed to be for no spiritual or human value attaching to the family as such.

If I may attempt a brief synthesis of the ideas put forth in the Congress so far as they have come under my observation and are subject

to any general valuation from the standpoint of a disciple of Swedenborg, I would say that they would seem to reveal in present science a tendency toward the adoption of the following principles:

1. That the ideal of science is a single system in which all things may be viewed from their center and not from the circumference.

2. That the ultimate reality is not yet found in matter, and may never be found there.

3. That the whole of the world, or of beings, is twofold, embracing the spiritual and the natural orders.

4. That these two orders are so absolutely distinct that the science of one must not trespass upon the plane of the other.

5. That there is a parallelism or correspondence between these discrete planes or orders of being and their activities.

6. That the ancient question is at the front to-day, namely, whether the influx be from the natural into the spiritual, or from the spiritual into the natural, or whether the action of mind and body be by virtue of a pre-established harmony (or parallelism). Psychology seems to be in suspense at this moment on this interesting issue with a very decided leaning to, if not a recognition of, the answer in favor of the doctrine of the spiritual influx or "the objectifying activity of mind."

FRANK SEWALL.

REVIEWS.

AN AUTOBIOGRAPHY BY HERBERT SPENCER. *In two volumes; pp. 656, 611. New York: D. Appleton & Co., 1904.*

These large volumes fitly represent the large place held in the present generation of readers by the name and repute of their author; the meagreness of their contents outside of trivial and uninteresting personal details, equally well corresponds to the emptiness of Spencer's work of that which is of substantial and enduring value. The justice of this valuation needs no other vindication than the confession of fruitlessness and failure in answering the great problems of life and the universe, with which the author closes his ponderous annals. "Behind lies the all embracing mystery,—whence this universal transformation, which has gone on unceasingly and will go on unceasingly through a future eternity? And along with this, the paralyzing thought, what if, of all that is thus incomprehensible to us, there exists no comprehension anywhere? No wonder men take refuge in authoritative dogma!" "Lastly, come the insoluble questions concerning our own fate, the evidence seeming so strong that the relations of mind and nervous structure are such that the cessation of the one accompanies the cessation of the other; while simultaneously comes the thought so strange and so difficult to realize, that with death here lapses both the consciousness of existence and the consciousness of having existed." It would seem to have been almost demanded by fair dealing with his

readers that this declaration of the abortive and worthless results of a lifetime devoted to the philosophy of evolution should have been placed at the beginning rather than at the end of these volumes.

It will perhaps be a surprise to American readers to learn from the prosaic details here given of the publication of Spencer's works, that it is owing largely to American patronage that these works saw the light at all or gained the height of their sensational but transient renown. The larger works were published in serial pamphlets, sustained at first by 450 English and 250 American subscribers. Before long the English subscription fell off very considerably and the American ceased altogether. Through Professor E. L. Youmans, editor of the *Popular Science Monthly*, a strenuous effort was made to lift the author out of his financial distress, and the sum of \$7,000 was raised to enable the publications to go on. Notwithstanding the general idea that they were the "popular science" of the day, we learn from the author's frank confession that the serial on the "*Evolution of Ceremonials*" in the work on *Sociology* became so tiresome to the readers of the magazine in which it was appearing that the editor had to beg for its discontinuance.

Notwithstanding the liberal support given to Spencer by Americans it is doubtful if he cherished any special esteem for them in return, if indeed he cherished an esteem for anything or any people outside of what belonged immediately to himself. He visited America and received the honors and lavish hospitalities customarily here bestowed upon foreigners, but in the short chapter devoted to his American tour there is very little expression of any delight experienced in either their country or the people. He congratulates himself in visiting Washington that he did not see the President, "or rather the Vice-President, who was away at Newport, for Mr. Garfield was dead," (*sic*) because he always found it tiresome to converse with uninteresting people. He devotes about a dozen lines to a guide-book list of the sights he saw in Washington, without a comment on any of them, and then occupies a full page in discoursing on the American ice water habit. He goes to Canada, the guest of the proprietor of the Windsor Hotel, and when there complains that the country was borrowing money from England to subsidize its railroads, "while maintaining a finer hotel than any in London!" His farewell dinner in New York was a miserable failure, owing to his being upset by a cold which made it a bore to speak or to hear others speak, and he went home to England worse in health than when he left.

There is much to be learned from these heavy volumes, but nothing of more importance than the fruitlessness and dreariness of a philosophy of Evolution, which recognizes no Divine intelligence and will as its source and guide, and which considers the highest moral motive of men to be that of "generalized expediency."

F. S.

THE NEW PHILOSOPHY.

VOL. VIII.

APRIL, 1905.

No. 2.

THE SENSES.

PART FOUR OF THE ANIMAL KINGDOM, BY EMANUEL
SWEDENBORG.

CHAPTER V. (*Continued*).

THE CAVITY OF THE DRUM OF THE INTERNAL EAR AND THE EUSTACHIAN TUBE.

150. 12. *Experience*. The membrana tympani is elliptical in figure, concave, and connected with a bony ring, which farther back is changed into a bony passage. Some [anatomists] place the foramen where the chorda is; for some persons can blow out a candle through the Eustachian tube. The chorda tympani is a little nerve brought together from the fifth and seventh pairs; it is stretched underneath the membrana tympani like a chord. The head of the malleus is articulated by a hinge joint with the body of the incus, and the longer leg of this with the head of the stapes by an arthrodioid joint. But the stapes adheres by its base to the fenestra ovalis by means of a thin membrane. There are two fenestræ; the fenestra ovalis leads to the vestibule; the fenestra rotunda leads to the cochlea by a closed membrane. There are two foramina. The membrana tympani is pellucid, and flat; towards the external duct it has a slight concavity in the middle; its position is oblique; it is composed of several layers. The outermost layer is a production of the skin or epidermis; the internal is of the periosteum of the same cavity. The little bone, the malleus, forms a depression. The handle appears to be in a thin membranous fold; the membrana tympani serves it as a periosteum.

The little bones have periosteum; the periosteum is continued to the fenestra and the Eustachian tube, where it commingles itself with the internal membrane. Between the incus and the malleus is a thin and small cartilage. The stapes is bound by the point of its thinner leg to the mastoid orifice, by a short ligament. The malleus has three muscles, so also the Eustachian tube.

151. 13. *The uses of the cavity of the drum are*, 1. To receive the sonorous modification or modulation concentrated by the external ear and the auditory tube; 2. to diffuse the same still further into the nerves, membranes, cartilages and bones of the whole head and brain; 3. likewise to distinguish it into parts, but only roughly; 4. to communicate with the labyrinth, in order that the modification may be most particularly distinguished, and being most distinctly received, may be rightly propagated to the brain and all its parts.

152. 14. *Every vibration is insinuated around the edges of the membrana tympani*. 1. The tremor, concentrated in the external auditory tube and in the membranes, or periosteum and perichondria, and thence striking upon the bone itself, does not penetrate except into the circumference of the membrana tympani; elsewhere the wax hinders it. 2. Thus only the tremor, not the air itself [penetrates]. 3. Thus the modification of the air is put to flight. 4. This is also the reason why in earliest infancy there is only a humid circle, which afterwards grows into a tube according to use and the culture of modifications, so that [sound] may be rightly introduced by this way.

153. The wax also softens the membrane and preserves it whole in its own state, at the same time keeping out all the air.

154. *And this tremor, indeed, is insinuated directly into the outermost membrane, which coheres to the periosteum*. 1. For that vibration, according to Winslow, is continued by the periosteum and the auditory tube. 2. The way lies open for it right forward and continuous; 3. but by this way, and thus mediately, it is insinuated into the rest of the membranes of that same drum, and into the inmost membrane. 4. There are filaments which subtend and bind. 5. They are of mutual con-

tact. 6. Thus the communication is mediate and immediate with the internal membrane of this membrana tympani.

155. *The modification extends from the whole periphery to its centre.* 1. That which is insinuated proceeds according to the continuous medium, therefore from peripheries to center. 2. It proceeds from the borders of the membrane and bone, 3. thence also by the handle itself of the malleus and its periosteum. 4. The leg of the malleus is the regulator of this. 5. If we knew the directions of the filaments of the membranes of this drum, then it would appear that there are various directions, and indeed that they tend toward the whole leg or arm; 6. for there is a semi-diameter of the leg.

156. *Thus a sonorous modification is again concentrated by the membrana tympani, which is the reason for the existence of this membrane.* 1. It goes together even into the centre, and perchance to the peripheries of the leg of the malleus. 2. Thus concentration is accomplished.

157. *Thus also the general modification is concentrated, in order that it may harmonize completely in particular and in general.* 1. The general modification passes through the auditory tube, 2. which corresponds to the particular modification; 3. also by the Eustachian tube, to which also that membrane it attached; 4. this formation is solely for the purpose of bringing in the tremor; it is placed under it, 5. and, moreover, it carries it to the other semi-circular plane, where the leg is not.

158. 15. *When the vibration is concentrated in the centre, it is then dispersed by means of the leg of the malleus into the fenestra ovalis, and this indeed with facile power.* 1. For there concurs into one point a concentration of all the vibrations into the membrana tympani, a concentration of all in the auditory tube, a concentration of all in the Eustachian tube, and a concentration of the whole brain; 2. Yea, everywhere into the leg of the malleus as also into the semi-diameter. 3. The leg of the malleus is there invested with the thin periosteum produced from the inmost membrane, therefore the more sensitive. 4. Its extremity is in the very centre [of the membrana tympani], where its lever presses the lever [of the

membrana tympani], it therefore most easily lifts and vibrates, as is well known in mechanics. 5. The articulation effects the same in its little crypt, which is yielding, and there it is membranous and ligamentous. 6. This concentration is the second; in the labyrinth a third and last concentration takes place. 7. Thus there are three degrees of concentration.

159. *When the leg of the malleus is moved, the whole membrana tympani is moved, but mostly in the centre.* 1. This appears from geometry and mechanics. 2. In order that the membrana tympani may be vibrated with a light force; it is hollowed out. 3. For if it were tense it would not thus obey the malleus, 4. nor would the sound be dispersed thence so clearly. This is the prime cause of its concavity.

160. 16. *The membrana tympani spreads this sound through the malleus, incus and stapes, into the fenestra ovalis.* 1. This appears especially from the connection. 2. This no doubt moves.

161. *The membrane also spreads the sound into the entire wall round about, from which it is again concentrated into the fenestra ovalis.* 1. There is a connection of the membrana tympani with the periosteum of the cavity, 2. by a continuation of the membrane, 3. by the nerves, 4. and by the Eustachian tube. 5. A nerve runs through both the membrana tympani and the Eustachian tube.

162. *The membrane thus also spreads the sound into the surface of the fenestra ovalis by two ways, so that there may likewise be a concentration in its centre, as well as in the membrana tympani.* 1. The first way is through the malleus, incus and stapes. 2. The latter adheres by its border to the fenestra ovalis, 3. and strikes the peripheries of the fenestra ovalis softly; hence there is a concentration. 4. Every tremor on the part of the walls flows to the periphery of the fenestra. 5. Thus there must be harmony. 6. It flows also from the walls into the stapes itself, which is surrounded by a periosteum, and is hollow. 7. Hence a certain effect results from several causes.

163. 17. *The inclosed air also contributes to the propagation of the tremor.* 1. It is known that air is inclosed, and

that it enters by the Eustachian tube. 2. This air likewise, set trembling, produces a certain effect. 3. This in the third cause.

164. *This air pushes upon the whole periphery of the cavity; as is evident from the oblique position of the membrana tympani.* 1. That the position of the membrane is oblique, see the authorities. 2. When the membrane pulsates, all the air is driven upwards, thus repelled. 3. Thus the repercussion is perpetual. 4. If the membrane were upright it would drive the air towards the fenestra, and hence there would be no repercussion, but the order, which wishes to run from the periphery to the centre, would be confused.

165. *It follows also from the concave character of the membrane that the impulse against the air is not strong, but gentle.* 1. For the membrane can yield and be reflected; 2. thus, in the closed chamber, can impel its vibrations according to the very manner of the engrossing sound.

166. *Lest anything should hinder, there are two exits for the retreat of the air, namely, through the Eustachian tube, and through the mastoid foramen.* 1. If the cavity should be closed up there would be no new air; 2. Nor could it yield if there were air in it, but there would be a perpetual resistance. 3. Now, however, very close to the head and the foot of the membrane, there are foramina. 4. While the membrane impels the air obliquely, so that it is shocked through and through, then the foramina themselves first receive the air, especially the upper one. 5. This also is the cause of the obliquity of the foramina, and of their position. 6. Besides they are so arranged that they may carry away the pituitæ, and carry them down towards the palate.

167. 18. *The tremor thus concentrated flows, not only into the periphery of the fenestra ovalis, but also into that of the fenestra rotunda.* 1. This takes place first from the whole wall, 2. then anew from the pulsation of the fenestra ovalis, 3. also from the air thence set into vibration; 4. for its membrane is continued to the periosteum of the cavity. 5. Thus the same rule applies everywhere, in order that there may be concentration.

168. *The general tremor is transferred, together with the particular tremor of the second degree, even into all the neighboring periosteæ, into the nerves, and into the bones of the cranium.* 1. Into the nerves, because of the chorda tympani; 2. because the portio dura of the seventh pair extends underneath; 3. because of the fifth pair, which consociates all the organs, and because the seventh pair approaches the whole face; 4. because there is an opening into the Eustachian tube, and a continuation of its membrane, and a commingling with the pituitary membrane; 5. because there is so wonderful a construction of the tube itself that it brings in, carries out, and transfers; 6. because there is a second opening, and through it there is a continuation of the membrane; 7. because the ear is carved in upon the petrous portion of the temporal bones, where there is a continuous hollow and plates, and thus porosity; 8. because one leg of the incus touches the portio dura of the seventh pair in the little trench where the aqueduct of Fallopius lies; 9. because there are ligaments and many tendons. 10. All things concur to the end that when this tremor is spread abroad, a general mode may exist; 11. by the nerves. As to the manner in which these communicate with the second pair, and the tenth vertebral nerve, with the intercostal nerve by the par vagum, see Winslow; thus how they proceed into the whole body.

169. *This tremor is also spread abroad thence into the arteries and into the dura mater.* 1. The membrana tympani is continued to the dura mater, 2. by a continuity of the membrane, 3. by the Eustachian tube, 4. by the arteries near to the clinoid processes. Here that whole sonorous area is meant, where the seventh pair goes forth, where the carotid enters, where the basal sinuses lie and the common channels of the sinuses. 5. For this reason the cerebrum is to be treated of; also the sphenoid bone, which is at the bases of the bones of the cranium. 6. The nerve of the fifth pair also insinuates itself into the dura mater. 7. A movement runs into the preceding 8. The seventh pair also enters the dura mater. See Heister and Winslow.

170. *This second grade of the propagation of modulations approaches the hard nerves, not the soft ones.* 1. If indeed there is a second grade, it is not yet well distinguished and purified. 2. This second grade of propagation approaches the hard nerves of the seventh pair, and 3. it subtends the chorda tympani. 4. It also touches the leg of the incus, and thus it is set in vibration; 5. likewise the fifth pair by the Eustachian tube and by the membrana tympani.

171. 19. *Summary.* 1. The auditory or external tube concentrates the first sonorous rays, and reduces them, as it were, into a confused and indistinct one; for all sonorous modification received by the external ear is carried into the auditory tube, where, by continuous reflexions, it is driven into the walls. This tremor is the first collection, concentration, unification and commingling into a general unit, according to the habit of nature everywhere. This first degree of concentration is spread abroad and propagated into the soft membranes, then into the more consistent, and finally, into the cartilages and bones; wherefore also it passes into the cartilages and bones of the whole head, indeed into those of the whole body, as also appears vividly from the tremulation itself. Thence is the general, under which will be the following particulars: This communication takes place by means of the membranes, cartilages, bones and nerves; for the ultimate composition of the nerve of the seventh pair also enters there; then also the second vertebral nerve, so that [the tremor] may be spread abroad thence into the whole body; the concentration especially effects the distribution; wherefore the auditory tube itself does this where the cartilages are conjoined to its bones. 2. The cavity of the drum concentrates these sonorous modifications anew, and reduces them to its own unities, and it is here that another grade of concentration arises from the former; thus the sound becomes more distinct, emerging from its confused chaos; but it is still gross, as may appear from the membrana tympani, which is gross and multiple. This takes place by various modes, that is to say, by the concentration of the general tremor to the centre of the membrana tympani, the propagation to the fenestra

ovalis, and there similarly to the centre of this by the stapes, and by a continuation of the tremor; likewise by a concentration into the fenestra rotunda at the centre, where two grades are presented at the same time. In order that this grade, which is the second, may likewise pass into all the neighboring parts, and still move broadly, not only into the compages and membranes of the lesser cranium, but also into the meninges and composite medullary and cortical congeries of the brain, and thus more broadly, the membrana tympani is attached to the petrous bone, and thus continued to that which invests the cavity. The fenestra ovalis is similarly attached to the bones, so also the fenestra rotunda. One leg of the malleus strikes that portion of the periosteum to which it is attached. The leg of the incus also strikes the nerves of the seventh pair, where it enters the cavity through the duct of Fallopius, and is continued to the membranes. Especially also the air, by continuous repercussions, strikes the walls. Thus many means conspire to spread abroad this tremor, especially the Eustachian tube. 3. There is a third degree, where a still more purified sound or modification occurs in the labyrinth; for that pulse and tremor, although there is a unity of the prior or more general modification existing in the auditory tube, is nevertheless general relatively to those parts into which sound is distinguished inside the labyrinth. This is to be treated of below.

172. Thus it is to be observed: 1. That many and thus multiple causes concur for one like particular, in order that there may be a certain effect; 2. that previously they were commingled in chaos; 3. and that afterwards they are most artfully distinguished into order and degrees. 4. So that if there should be [still another] labyrinth it would further distinguish the parts which can refer to this general; but such an organism would be still purer, and perhaps might equal the structure of the eye, into which articulate sound [would] concentrate itself.

SWEDENBORG ON THE VARIATION OF ANIMALS.

Among the many noteworthy passages in Swedenborg's manuscript *On the Mechanism of the Soul and the Body*, which will soon be published in English by the Association, is a passage which shows that Swedenborg held the theory of the "variation of animals."

In the course of the argument it is shown that all things were evolved from the first simple in which the Divine Providence had stored all beginnings, "in order that," as is stated at the close of no. 43, "all things might subsequently be produced by derivation (*ut dein per traducem omnia producerentur*). Immediately following this statement, at the beginning of the following number, 44, Swedenborg writes:

"That no animal can be produced without an animal, but that a hundred and a thousand varieties may arise from one animal (*Quod nihil animale produci possit sine animali, sed quod centum et mille varietates ex uno animali prodire possint*)."

In the *Lesser Principia*, Swedenborg still held to a literal interpretation of the account of the creation of animals as given in *Genesis*. In the *Principia* (1734) he is silent on this question, but in this new document he refers to numerous forms of spontaneous generation, perhaps for the first time advances the theory of the creation of animals in vegetables (no. 37), which is so fully developed in *The Worship and Love of God* (1745), and also holds to animal variation, a teaching which I have not found in any other of his writings.

This theory would seem to be most reasonable. Modern science has done so much to prove that *animals have varied and do vary*, that variation cannot be put out of court. But variation does not necessarily involve evolution. Why should it not be held that an indefinite number of *original stocks* of plants and animals have been varying for countless ages? This explains the facts of paleontology, observations on the changes which animals undergo in the wild state and under domestication, and the cases of reversion. The acceptance of such a theory of variation neither favors nor excludes spontaneous generation. However animals and plants arose, it is evident that *variation* has been going on, and is now going on. In all probability there are several causes of variation and also several methods by which it takes place, but to consider them would occupy more space than could be granted at this time.

A. H. S.

PHILOSOPHIA CORPUSCULARIS IN COMPENDIO.

1. Est substantia prima mundi, cum cæteris ei similibus in ordine. 2. Est activitas ejus substantiæ, unde ignis. 3. Sunt auræ mundi, quatuor, quæ sibi succedunt. Hæ particulæ sunt determinantes rerum, et propriæ mundi circumflui.

Ex his per determinationem generantur fluida spirituosa dicta: 1. Ut fluidum spirituosum humanum ex aura prima. 2. Fluidum spirituosum animale ex aura secunda. 3. Ex æthere fonte, unde insecta. Hæc sunt determinantes primæ regni animalis.

Terrestres particulæ: 1. Particulæ omnium minimæ rotundæ ex compressione auræ primæ, unde substantia principalis auri. 2. Particulæ minores rotundæ ex compressione auræ secundæ, quæ est materia reliquorum metallorum. 3. Globuli rotundi inertes, qui sunt constituentes aquarum. 4. Ipsi globuli per se inertes aquæ. Hæ sunt determinantes terrestres suo ordine, et sunt inertes.

Determinantes terrestres alterius speciei sunt: 1. Minima triangula et quadrata formata inter interstitia globulorum primitivorum aquæ; unde salia volatilia. 2. Majora triangula et quadrata formata inter globulos aquæ, per interpositionem primitivorum aquæ: quæ sunt partes salium communium, nitrorum, acidorum alcalium. 3. Sunt ipsæ massæ ab iis formatae. Hæ sunt angulares, proinde inertes, et determinantes omnium.

Subdeterminantes sunt: 1. Olea diversi generis. 2. Spiritus diversi generis, qui confluunt ex particulis salinis minutissimis vel volatilibus una cum primitivis aqueis, quæ superficiem constituunt, interiora occupante æthere.

CORPUSCULAR PHILOSOPHY IN BRIEF.

1. There is a first substance of the universe, with others in their order similar to it. 2. There is an activity of this substance, whence is fire. 3. There are four auras of the universe, following one another in succession. The particles [composing these] are the determinants of [all] things, and the proper [forces] of the circumfluent universe.

From these [auras], by determination, are generated the so-called spirituous fluids: 1. The human spirituous fluid from the first aura. 2. The animal spirituous fluid from the second aura. 3. One formed from the ether, whence insects [arise]. These are the first determinants of the animal kingdom.

Terrestrial particles are: 1. The smallest round particles of all, from the compression of the first aura, whence is the primary substance of gold. 2. Larger round particles, from the compression of the second aura, which constitutes the [primary] substance (*materia*) of the remaining metals. 3. Inert round globules, which are the constituents of the water [globules]. 4. The water globules themselves, *per se* inert. These are the terrestrial determinants in their order, and they are inert.

Terrestrial determinants of another kind are: 1. Least tetrahedrons and cubes, formed in the interstices of the primitive globules of the water [particles], whence arise the volatile salts. 2. Larger tetrahedrons and cubes, formed between the globules of water by the interposition of the primitives of water. These are the parts of common salts, nitres, acids, and alkalis. 3. There are also masses formed from these [determinants]. All of these [forms] are angular, and consequently inert, and they are the determinants of all things.

The subdeterminants are: 1. Oils of different kinds. 2. Spirits of different kinds, which arise from the conflux of most minute or volatile saline particles, together with the water primitives, [both of] which constitute the surface, the ether occupying the interiors.

His mediis conflantur diversissimi generis salix fixa, essentialia, sulphurea, quorum formam, numerum, describere, omnem paginam impleret. Quæ sic *determinata* queunt nuncupari.

Præcipue existunt per chymiam naturalem, et mediante regno vegetabili, in quo formantur bullulæ diversi generis similes, per quas, ab una ad alteram, ab usque radice ad cacumen, datur transitus; quæ bullulæ minores et majores, vel vesicæ sic determinantur ab æthere incluso, imo ære incluso, et circum repentibus salinis sic factis, cum meatibus et ductibus ab uno ad alterum, sed hoc prolixum foret.

Usque tamen ab his determinantibus mediis subdeterminantibus infiniti numeri compositiones formari queunt: præcipue in regno vegetabili; sic bullulæ vel vesicæ tandem fixatæ, ruptæ evolante aura, vel aliter compressæ, dant succos essentielles, et omnem illum saporem in succis, etc.

Hæc vera sunt, quia signum habeo.

NOTE BY THE EDITOR.

The MS. of Swedenborg's *Corpuscular Philosophy* in Brief is contained in Codex 57 of the MSS. preserved in the Academy of Sciences, Stockholm, Sweden, and is listed as no. 55 by Dr. R. L. Tafel in his "Chronological Account," (*Documents*, Vol. III., pp. 859 and 920. It was probably written in the year 1740. .

The MS. is reproduced in Vol. VI. of the *Photolithographs*, page 318. A transcription and an English translation were printed in the form of a small leaflet by Mr. J. R. Swanton, in 1898. In *The New Philosophy* for March, 1899, pages 22-23, the Latin text and an English translation appeared in parallel columns. Another translation in English was published in the *New Church Messenger* for July 25, 1900, pages 49-50.

We have thought it desirable to reprint this valuable and interesting Compendium for the benefit of our readers, especially as Mr. Brown has made some important changes in former translations, and elucidated some of the statements in the light of later study.

By these media are produced salts of great diversity, fixed essential and sulphurous, to describe the form and number of which would fill a whole page. These [salts] may thus be called *determinates*.

These [determinants and subdeterminants] come into existence especially through the chemistry of nature, and the mediating vegetable kingdom, in which are formed similar bullulæ of different kinds, by which, from one to another, there is passage from the root even to the summit. These lesser and greater bullulæ or vesicles are so determined by the enclosed ether, yea, by the enclosed air, and by the saline [particles], which creep around and are arranged [into bullulæ or vesicles], with their openings and ducts from one to another; but to explain this further would be too prolix.

Nevertheless, by these determinants, by means of subdeterminants, compositions of infinite number can be formed, especially in the vegetable kingdom; thus bullulæ or vesicles, having at length become fixed and broken up owing to the escape of the aura, or having been otherwise compressed, give rise to the essential juices; and all the flavor in those juices, etc.

These things are true, because I have the sign.

Comments by the Translator.

In making the above translation, and in preparing the Latin text for republication, I have consulted the transcriptions made by Prof. Vinet and Mr. J. R. Swanton, and the parallel renderings that appeared in *New Philosophy* for March, 1899; also a transcription and translation made recently by Mr. Alfred H. Stroh. There are still a few words not clearly deciphered in the original, but they have been rendered according to the obvious meaning, and it is likely they are approximately correct.

It has been my effort to make the ideas clear to the general reader, while departing as little as possible from the form of the original text. Where this has been done, the interpolations for the most part have been enclosed in brackets. The style of this Compendium is fragmentary and elliptical, and in translating a work of this character it is necessary in part to interpret the author's meaning in the light of his teachings elsewhere. And as I have made important changes in former

renderings, I submit the following references as confirmations, and as suggestions to those who may wish to follow up some of the points in detail:—

1. By the “first substance of the universe,” the activity of which is fire, is meant the first finite; and the remaining finites in their order and series are similar to the first. *Principia*, Part I, Chap. III: 5-7; IV:10, 20; VII; VIII:1, 3; X:1. Part III, Chap. III, IV. *E. A. K.* Part I, No. 584.

2. That insects have a spirituous fluid, which is their “formative substance” or “first determinant.” *E. A. K.* I:97, 266.

3. That water is composed of water globules, and these of their own primitives. *Principia*, Part III, No. 1; *Chemistry*, Part IX, section 1.

In former translations the expression “*globulorum primitivorum aquae*” was rendered “primeval water globules,” which was not justified either by the Latin text or the teachings of Swedenborg.

4. That the water globules are inert *per se*. *Principia*, Part III:1, 2.

5. When it says that “terrestrial determinants” are the “determinants of all things,” it evidently means that they determine the *influx* and *relation* of things prior, and the *form* of things posterior to themselves.

6. That both the water primitives and volatile saline particles constitute the surface of the particles of spirits. *Chemistry*, Part XIV.

7. That the atmospheres are the forces of the universe. *E. A. K.* I:66, II:223; *Divine Love and Wisdom*, 178, 311.

R. W. BROWN.

REMARKS ON MUSSELS, SNAILS, ETC., IN LIMESTONE; AND ALSO ON SLATE.*

BY EMANUEL SWEDENBORG.

1. At Udvala, just outside of the town, there is found a kind of limestone which consists entirely of mussels. It is taken out of the ground a little below the soil in which they are wont to sow their seed. This mussel-stone extends downwards about 1 or 2 ells [a Swedish ell, *aln*, = two feet]; and under it there is the hard rock. When the limestone, as in other cases, is burned

*This is the first published translation of Swedenborg's manuscript, entitled “*Anmarckningar om Musslor, Sneckor etc. i kalksten och*”

into lime (*kalck*), by means of dry and green wood mixed together, a fine lime is produced, which down here at this place is called lime (*lim*).

2. In the parish of Tunhem it is reported that there is found a mussel-stone of the same kind, of which they are also beginning to make lime, as at Udvalla; the place near which it is found is called Addetorp.

3. In the parish of Skarke, near the rectory at Hojentorp, and thereabouts in the hills and heights, there is found a kind of anthraconite or slate, which perhaps may also be used for making lime. In it are found a great many small insects, in some of it in such abundance, that the stone has been altogether coagulated by them.

4. Occasionally, also, some mussels of the smallest kind are found among the insects.

5. At Billingen, near Oglunda church, there is a mountain spot where some petrified snails are also found. These perhaps went into the clay, were compressed by its being flooded over, and afterwards petrified together with it. Such snails are found in abundance round about Billingen, especially during the spring.

6. At the same place slate is also found, as also everywhere on Billingen. It appears to be useful for making slates, as well as for tables and similar objects. The uppermost slate on the mountain is so brittle that it crumbles into many pieces on being touched; but down at the lower part of the declivity, where two powerful springs flow from two beautiful ravines, there is a slate which is hard like Swiss slate, which could be taken

om Skifwer," contained in the *Photolithographs* of Swedenborg's MSS., Vol. I., page 19. Dr. R. L. Tafel does not include this manuscript in his "Chronological Account," although he mentions it elsewhere in the *Documents*, Vol. II., Part II., page 877, saying that the original manuscript is preserved in the Diocesan Library at Linköping. The date of this manuscript is probably about 1716-1717. The Swedish text will be found in the first volume of the edition of Swedenborg's scientific works which is being printed by the Royal Swedish Academy of Science. The present translation is by Alfred H. Stroh.

away in any size one might desire and afterwards be polished for whatever use it might be needed. On its surface it is rough and 1, 2, or 3 fingers in thickness; it might be polished and afterwards made of use. Right beside this place there is also a stream which flows from the highest peak of Billingen with great force, and many mills are driven by it year in and year out. At this place one might very easily establish a mill for polishing stones by means of the water.

7. At Kinnekulle there is also the same kind of slate at the top, which is blacker than that mentioned above, and seems to be more like the Swiss slate used by us.

OBSERVATIONS*

[ON THE HUMAN BODY.]

BY

EMANUEL SWEDENBORG. —

1. The *epigastric region* is between the heart and the umbilicus.

2. The *hypogastric region* is the whole region between the umbilicus and the lower parts.

3. The *membranes of the body*. The outermost membrane is gross like parchment; it is called the *membrane* or cuticle. When it is burned it separates itself from the second membrane and becomes inflated like a bladder; it is incapable of sensation. The second membrane is called the *cutis*, in which there are very many arteries, veins and nerves; it is very highly

*This is the first published translation of Swedenborg's manuscript, "*Observata*," contained in the *Photolithographs* of Swedenborg's MSS., Vol. III., pages 142-145. Dr. R. L. Tafel, in his "Chronological Account," gives it the title, *Observata in corpore humano*, and remarks that in "this paper are contained the anatomical results of the author's examination of the human body;" see the *Documents*, Vol. II., Part II., pages 908, 873. It would appear that although Swedenborg had made

capable of sensation. The third membrane is *fat* (*pinguedo*), whence it is called the *adipose integument* (*panniculus adiposus*); it consists of mere little membranes and vessels, in which the fat is enclosed, which vessels are conglomerated and surrounded by another grosser membrane, in which there are very many blood-vessels. The fourth membrane consists of flesh, and is called the *fleshy integument* (*panniculus carnosus*), by the aid of which the cutis is moved. These membranes, taken together, are called the skin, which is perforated and furnished with *pores*, and the *pores* may be dilated and contracted. From these pores hairs come forth, and some have observed that a *very small gland* lies hidden under every little pore.

4. The *flesh and muscles* are under the skin. Each muscle is surrounded by a cuticle and is thus separated from the remaining muscles. A muscle is divided into three parts: *first*, a *tail* at one extremity, which consists of a whitish tendon, by means of which the muscle is fastened at its extremity, so that it may be moved; *second*, a *head*, or beginning, which is also a tendon, by means of which the second part of the muscle is fastened where the member is moved; *third*, a *belly*, a middle part between the two extremities, which consists of mere fibres and vessels, which are drawn together [when the muscle is contracted], and which have their interstices filled with fluids. Moreover, in the muscles there are found subtle nerves and veins, and also lymphatic vessels like transparent canals, within which there is a yellowish lymph. The *muscles of the head* are in eight pairs; by means of two of them the head may be moved forward, they being extended upwards from the chest; there are four pairs in the back part of the head, so that it may be moved

contributions to anatomy and physiology before writing the *Observata*, he had begun, when he penned it, a more systematic study of human anatomy. The date of the *Observata* should be placed at about 1734, if we may judge from its position in Codex 88 of Swedenborg's MSS., preserved in the Library of the Royal Swedish Academy of Sciences at Stockholm.

The translation is made by Alfred H. Stroh from a copy of the original manuscript in the possession of the Swedenborg Scientific Association.

backwards; there are two pairs at the sides, so that the head may be moved sideways. The *intercostal muscles* (*musculi pectorales*) are between the ribs; by means of them the lungs and the chest may be dilated, and breathing carried on for the sake of respiration. The *muscles of the abdomen*, or belly, cover the intestines. There are *muscles* for the arms and feet.

5. The *cranium* consists of the frontal bone, of the two bones of the sinciput or bregma; of the occipital bone, and of the two temporal bones. They are closely connected like saws [at the edges where] the crenae [or little notches] are inserted. This conjunction itself is called a suture; there are true and false sutures. The *true sutures* are these: the *coronal suture*, which is in the form of a crown, between the forehead and the sinciput, and it connects the forehead with the sinciput; the *lambdoidal suture*, which conjoins the occipital bone with the bones of the sinciput; the *sagittal suture*, which begins at the coronal suture and extends to the lambdoidal suture; it is like an arrow. The *false sutures* are around the temples and are called squamous sutures; there is one on each side of the head, and by means of them the temporal bones are connected with the bones of the sinciput. They not only connect the parts and allow perspiration but also perform the use of preventing the whole cranium from being wounded and falling apart at one time. In infants the sutures are very much perforated, the sagittal suture extending even to the nose. On the top of the head, around the sagittal and coronal sutures, they are open, and the brain is covered by skin only; this is called the *fontanelle* and [the membrane over it] is moved when the infants suck milk vigorously. Outwardly the cranium is covered by the common skin, under which there is a membrane, which is called the pericranium, from which there proceed small filaments which pass through the sutures towards the interiors. When the cranium is divided transversely by saws, it appears to consist, as it were, of three parts; the *exterior* part is called the exterior plate (*lamina*), which can be bent; the second part is called the medullary plate, and it is spongy; the third part is called the interior plate, and it is hard and fragile, so

that it falls apart on being struck, although the remaining plates may remain entire.

6. The *dura mater* or the *dura meninx* is around the [inside of] the cranium; it surrounds the cranium [*i. e.*, the cranial contents], the spinal cord and the nerves; it consists of two little membranes, the inner one being the softer; the outer one adheres by means of vessels to the cranium and its bones, the inner one is conjoined with the *pia meninx* by means of the blood-vessels. The *dura mater* also penetrates towards the interiors of the brain; near the sagittal suture it divides the cranium into two lobes or hemispheres, and is therefore called the falciform process. The same *dura mater* divides the cerebrum and cerebellum and, by means of a fold, effects that the cerebrum does not lie too much upon the cerebellum; for if the cerebrum did lie too much upon the cerebellum apoplexy might easily result. There are also many blood-vessels scattered through the *dura mater* which are called sinuses, of which there are especially four. From the forehead to the cerebellum [there is one] called the sagittal sinus; thence there extends a sinus to the right and a sinus to the left; they are called the lateral sinuses; the fourth arises from the sagittal sinus not far from the sides, and extends even to the pineal gland. Besides these there are innumerable very small sinuses, but they arise from the larger ones. From the sagittal sinus there arise innumerable lateral sinuses, which ramify through that whole membrane. From the lateral sinuses the cerebrum as well as the cerebellum receive very many blood-vessels; from the fourth sinus is formed the choroid plexus.

7. The *pia mater* or the *thin meninx* is thinner [than the *dura mater*]. Immediately next to the cranium, to which it is affixed, it surrounds the cerebrum, cerebellum, medulla oblongata, and spinal cord, which latter it divides longitudinally into two parts. The nerves are also surrounded by this membrane.

8. The *front of the cerebrum* is divided into two hemispheres by the falciform process, so that the brain does not reach all the way to the cranium, but there is a space left. This is in order that the brain may be properly moved; there is a cranial cavity.

9. *Interiorly* the head is divided into the *cerebrum*, cere-

bellum and *medulla oblongata*, which lies under the cerebrum.

10. The *substance of the cerebrum* is divided into parts. There is the *cortical* part or * * * ; it is the exterior part, is of an ashy color, and contains blood-vessels. The medullary part is interior, and is a white substance. Where it ceases there is a harder part, or the *corpus callosum*, which is also the basis and foundation of the brain.

11. We should further observe in the brain the *fornix*, which consists of two extensions from the corpus callosum below towards the cerebellum; it is formed like an arch. In the middle of the fornix there is a certain part of the cerebrum which is thin and transparent; it is called the *septum lucidum*. The ventricles of the cerebrum are cavities in it which exist from the conjunction of the parts; they are round and also angular. They are especially four: the lateral or anterior ventricles, the third ventricle, and the fourth ventricle. For in the conjunctions of the cerebrum and cerebellum there is a cavity, and because the fornix is in that cavity, hence for every part of the fornix there exists a cavity; which cavities are called the lateral ventricles; and because the fornix is more pointed towards its front part, the third ventricle is formed there; under the cerebellum near the medulla oblongata is the fourth ventricle. There is a *cleft* and fissure near the fornix [extending] even into the *infundibulum*; it is like a cone * * * and effects that the penetrating odors may reach even to the higher parts of the head. In each lateral ventricle there extend forwards bodies of the size of a pea, which are called the *corpora striata*; inwardly some of the *medulla oblongata* extends itself, which is called *crura medullæ oblongatæ*, likewise *thalami nervorum opticomum*. In the superior portion of the medulla oblongata are the *nates*, in the inferior portion the *testes cerebri*; the aperture between the higher [bodies] or the nates is called the *anus*; over the anus lies the *pineal gland*.

12. The *cerebellum* has the appearance of a worm; it is of the same substance as the cerebrum.

13. The *medulla oblongata* is like a tail; it extends itself from the cerebrum by two crura, which are called the *crura medullæ oblongatæ*; and from the cerebellum, on the other hand,

it extends itself by parts which are called *peduncles*; below these extends the *annular protuberance*.

14. It extends itself outside of the head through the occiput, or through the occipital bone, and through the whole spine, and is then called the *medulla spinalis*.

15. There are *seven pairs of nerves* according to the ancients, and ten according to the modern [writers]. They come forth from the medulla oblongata. We have: 1. The *olfactory nerves*, extending through the cribriform bone to the nares; where they are most dense they are called *papillary processes*. 2. The *optic nerves* arise from the crura of the medulla oblongata and are conjoined near the infundibulum, and are divided again towards the eyes. 3. The *motor nerves of the eye* come forth under the infundibulum and extend towards the eyes in order that they may move them. 4. The *pathetic nerves* arise subtly in the superior part of the medulla near the cerebellum, and go with the above mentioned nerves to the eyes; the eyes are ruled by them according to pleasure. 5. The *gustatory nerves* are gross and dense towards the tongue; they are said to consist of various nerves folded together; they grow from the annular protuberance, dividing before they leave the brain. 6. The *gustatory nerves* are smaller than the preceding ones; they proceed from beneath the medulla oblongata and extend themselves towards the tongue through the foramen of the cranium, together with the motor nerves of the eyes. 7. The *auditory nerves* arise at the sides of the medulla where it lies towards the cerebellum; they pass to the ears through the petrous bone. 8. The *par vagus* arises below the above mentioned nerves, and proceeds outside of the head through the body, especially to (*super*) the heart, the diaphragm, the stomach and the spleen; by means of these nerves there is harmony of the body and the head. 9. There is the pair of nerves *moving the tongue*. 10. The tenth pair has as yet received no name, since [the anatomists] do not agree concerning its use.

16. The *blood of the brain* enters the sinuses of the brain from the carotid and vertebral arteries. From the sinuses it is taken up by little veins, which always run near little arteries,

and is led away into the *jugular veins*, thence into the *subclavian veins*, and thus from the head back to the heart.

17. The *whole substance* of the brain lies upon a certain bone, which is its base, and is called the *basilar bone*, the *cuneiform bone*, the *sphenoid bone* under the cranium and above the palate, whence it is called the *palate bone*.

18. In this bone there are certain *angles* or *processes*. There is one above the palate; also at the sides [there are those] which are called the *pterygoid* or *wing-formed* processes. There are also two towards the brain, which are much smaller, and are called the *lesser processes*. Between these lesser ones there is a cavity or sinus, which is called the *sella equina* or *sella turcica*, where lies the *pituitary gland*. Near this gland, towards the nose, lies the *cribriform* or *ethmoid bone*, a bone full of holes like a sieve. From the middle of this bone there rises up a point, which is called the *crista galli*, which prevents the two papillary processes† from lying upon each other. From thence also processes go forth which form the two openings of the nose. To the *upper jaw-bone* are connected all the bones of the face, the cheek, the teeth, the parts under the orbits of the eyes. The *lower jaw-bone* is like an arch; there go forth from it upwards two processes which are called the *cornua*; the anterior one is called the *corona*; it firmly holds the temporal tendon or muscle; the lower one is called the *condyloid*; by means of it the jaw is connected with the temporal bone, so that we may masticate our food and speak. In the *jaw-bone* are the teeth; the hollow places in which they are inserted are called *alveoli*; when the teeth are in them they are surrounded by a membrane of a very nervous character, whence is piercing tooth-ache. Of the teeth, the *incisors* are the anterior ones; the *canines* are under the eyes and are called eye-teeth; the remaining teeth are the *molars*. The incisors have one root, the canines have one root,‡ the molars have three roots. Around the teeth there are also arteries, veins and nerves; the arteries come from the external branches of the carotids, the veins from

†The "olfactory nerves" of modern anatomists.

‡The original says that the canines have two roots.

the branches of the external jugular, the nerves from the fifth pair. The lower jaw is moved by four pairs of drawing muscles and by one pair of relaxing muscles; they are under the eyes, at the sides of the palate.

19. The remaining parts of the face are the *cheeks* and the *lips*, which likewise consist of muscles and vessels.

20. The *eye*. In the corner of the eye near the lids lies the *lachrymal gland*, by means of which the eye is continually moistened. From it also through two little openings are the *puncta lachrymalia*, by means of which a subtle canal adheres to the nose, through which the superfluous humor is carried off into the nose, whence there are tears in the nose. The eye consists of *tunics* and *humors*. The tunics are: 1. The *greater* and the *lesser* ones; the greater one is the *adnata*** or the *albuginea*, extending towards the pupil of the eye; under it lies 2. the *tunica cornea*, which is like horn; 3. under this is the *tunica uvea*, which causes the eye to look like a grape, when that grape-like form (*illa uva*) is dissected out. The inner part of this *tunica uvea* is called the *choroid*, upon which is the colored circle or iris. The *lesser* tunics of the eye are those which surround it in part, as, 1. the *retina*, which is like a nest, and soft like flesh; 2. the *vitreous tunic* for the vitreous humor; 3. the *crystalline tunic* and the *tunica aranea* for the crystalline humor. The *humors* are, 1. the aqueous; 2. the crystalline; 3. the vitreous, which is like fused glass.

**The "conjunctiva" of modern anatomists.

ON THE NATURE OF FIRE AND COLORS.*

BY EMANUEL SWEDENBORG.

[It is a question] whether one may judge, with any degree of certainty, respecting the nature of fire and colors simply by a comparison with water and its nature, for although there may be many external similarities for the sake of comparison, nevertheless they may be of quite another quality. Would it not be better, perhaps, to take those very qualities of fire and colors which we know by experiments, and thus, as we think and investigate, direct ourselves to a knowledge of their nature. For, if we proceed by means of other elements, which are more visible to our sight and knowledge, we may soon be deceived into accepting certain notions which in themselves are contrary to the truth.—just as if one were to make conclusions respecting the shape of angels from the shape of men, simply because both are living and have the general senses, such as sight, hearing, etc. As at first * * *

That fire consists in the elasticity, the yeast-like frothing, and the fermentation of the air, seems very likely, since fire is

*This is the first translation ever published of Swedenborg's manuscript "*Om Eldens och fargornas natur*," which is contained in the *Photolithographs* of Swedenborg's MSS., Vol. I., pages 80-85. Dr. R. L. Tafel, in the *Documents*, Vol. II., Part II., page 877, refers to it as being among the MSS. of Swedenborg preserved in the Diocesan Library at Linköping, Sweden, and says that it "contains Swedenborg's first speculations on the nature of fire, air, water, and the arrangement of the particles in the various elements;" the only earlier manuscript on these subjects being the short paper *On the Causes of Things*. In the "Chronological Account," page 892, Dr. Tafel lists *On the Nature of Fire and Colors* as number 14, and assigns to it the date 1717, also giving a brief statement of the contents. The original manuscript fills six pages, folio.

The present translation is a revision by Alfred H. Stroh of the one made by the Rev. C. Th. Odhner, and reported to the Swedenborg Scientific Association in 1901.

nourished by the air and is exuded by it, which is what is meant by fermentation, etc. But it would seem that one cannot say, in all cases, that the exuding produces fire; for experience contradicts this: 1. In vessels, where the air has been rarified many thousand times, one cannot discover the least sensation of heat. 2. If a candle be placed in rarified air its flame will decrease in the same proportion that the air is exhausted. 3. On high mountains, similarly, where the air is so rarified that one can hardly breathe, the flame of the candle is extinguished, or burns quite low, since the air roundabout is rarified. 4. In such places one feels a penetrating cold, which affects every least fibre, while below at the base, where the air is compressed, there is greater heat. 5. Not to mention that in rarified air powder cannot be ignited by the strongest coal-fire.

1. That color and fire are caused by a rapid motion (*hastighet*) 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 color and fire must consist in the exudations of the air, or in its stronger motion; one may now ask: 1. If the air were to be pumped out of a vessel, so that there was left only an ether, and if new air were to be forced in through an opening, whether by that means, the least sign of heat would be caused? But as to this, nothing is known by experience. 2. It may easily happen in our atmosphere that the air has an ether or a respective vacuum, because air presses everywhere. If we suppose a flame to consist of ether, and that the air, by which the flame is nourished, is poured out from various sources of nourishment, we must consider the whole of that space where the flame is to be filled by ether alone, to which, for many reasons, we cannot assent.

2. By *color* I think one must understand an appearance, for otherwise one cannot take the origin of color to be a certain strong motion out of the air into the ether, for one can see: 1. That in the coldest room color is just as visible as in the warmest room. 2. [That it is just as visible] when the elements are in motion as when they are quiescent. 3. That a single

bubble can form many colors in one and the same space, if only its position be changed and the angles varied. So that colors consist only in the angles of refraction, and not in any undulations which have their own activity. 4. Through prisms and glass balls there flows an ether; when it comes out on the other side it is refracted and enters into the air: thus what is lighter enters into what is heavier, so that the motion is stopped rather than increased. It would be otherwise were the air to flow through and be terminated in the ether, according to the opinion.

As regards the *white color of the foam* on water, this seems to have an altogether different quality. The foam consists merely of uneven bubbles which are visible without the microscope. The liquid may be white, red, yellow, or of no color, still the foam is white, which is caused only by the unevenness of the bubbles and of the particles which are transparent. 1. Nearly every liquid becomes white when foaming. 2. Ice, which is transparent, when it is scraped, becomes white as snow. 3. Glass, when pulverized, becomes white. 4. Similarly everything which possesses transparency; which shows that the color white consists in the irregularity of the particles which are transparent, as may be shown by many hundreds of chemical mixtures. 5. But that other colors are caused in the same manner in a [body of] air or ether, will hardly be seen, as they require a certain regularity, or a regular nature of the particles. Hence it will not be possible to judge from the color white as to other colors, since the white is of an irregular nature, but the others of a regular nature. 6. That the water flows in and out of the bubbles, and when on the surface is in the presence of another element, and that this can also take place even in a volume of air, is a different matter.

3. That *sight* takes place by means of the undulations of the ether, as hearing takes place by means of the air; this seems to be an ingenious speculation which can hardly be overthrown, since the proofs agree therewith; similarly a *sound* and an *appearance*. But that it is caused by the *streaming of the air* must be considered somewhat more closely; for: 1. An *appearance*

is found even where there is no air in ethereal as well as in aerial space; in the *ethereal* space from the sun to the atmosphere, in vacua made by the air-pump, in spaces where there is but little air; in the *aerial* space, as is well known; as also in *aqueous* space. 2. A single spark gives light at quite a long distance, in which there can be no streaming of the air. 3. A streaming of the air is felt at once by the hearing, but it is not accompanied by any appearance of light.

This may, therefore, be explained by making a distinction between undulation and tremulation. *Undulation* takes place when the volume of particles vibrates, which also carries with it a minute local or reciprocal motion. If this takes place in the air, a sound is caused by means of it, and there is a similarity of this undulation to water when it oscillates and visibly undulates. But *tremulation* takes place in the same air, when each particle vibrates, but not in volume, or when the surface of one particle strikes against that of another, which may take place with a minute local but reciprocal motion of that particle. It may also take place without local motion, as when the membranes of [soft] surfaces strike against others, which are hard, or of a different quality, which, if it may be imagined as taking place in the air, would produce no sound, but only an undulation in the smaller particles of the ether. But this, like the former, is an hypothesis which needs to be proved by many hundreds of experiments. In the water there is also such a *tremulation* which cannot be called an undulation, as may be shown in the case of persons submerged in water; if a shot is then fired above them they perceive an unheard sound of concussion in the ear, etc., etc., but this is left for further consideration.

4. That heat is similar to watery steam, with the difference that the one belongs to the water, the other to the air, seems to be founded upon an analogy, which cannot always serve for experimentation. It would be better if theories were founded upon the experiments, as was said before, rather than upon analogies, for by analogies one may catch at many ideas and

theories which nature herself disproves in the experiments.

1. As regards heat, there may be some reason and analogy. 2. But it is not so easy to understand this in the case of the *appearance of light*, which is supposed to consist in the undulation of the ether. The colors in the rainbow arise from the flowing of ether through bubbles or drops of water, through which it is refracted, and exhibits various colors according to its angles of refraction; but the *appearance of light*, which is the cause of the colors, cannot be the cause of itself, etc., etc.

5. That the fire in fat, in saltpetre, etc., is similar to water which flows through sand, stones, clay, etc.; this seems to possess as much dissimilarity as similiarity. 1. It is clear that the fire does not only flow in the spaces between [the particles of] fat, oil, saltpetre, and other matter, but that it also flows out of them, and receives nourishment from them. 2. Fat is changed by fire; it is dissolved, goes away and entirely disappears. *Saltpetre, alum, vitriol*, and certain kinds of essential *salts*, are likewise destroyed; some are changed into alkalies, into *capita mortua*, which cannot afterwards be ignited by fire; as a sign that there is a matter which gives birth to fire, and that the fire does not flow between the spaces alone. 3. Metals and stones, when they are pulverized and flow like oil, still do not produce any flame, although the fire can then flow through their interstices. Lead when melted does not even produce any appearance of light. 4. As to oil, melted fat, etc., we do not know whether they have any interstices different from those in water, flowing metal, etc.—unless one is to understand [as such] those small spaces which are upon the particle itself, which, indeed, must also exist upon other substances which do not burn. 5. Thus it will not do to use analogies of water flowing through sand or gravel or clay, but rather ought we to find an analogy in the manner in which the water affects those particles which themselves have water particles within them, namely, that the enclosed water is able to flow forth in the same way that fire flows forth from saltpetre, fat, etc., in which it loosens the particles, so that the enclosed [fire] is able to come forth

and nourish the fire, and thus entirely to destroy the figure and the essential qualities of the particle.

Points 6, 7, 8, 9, will be considered in the same manner.

10. That the ether is 55,600 times lighter than water, may be established by experiments, but it is still uncertain whether one may conclude from this, that ether is swifter or more subtle in the same proportion. Or, contrariwise, if ether is 55,600 times swifter or more subtle than water, it would be difficult to conclude from this, that they also differ as to weight in the same proportion. The reasons for this are the following, which will be left for further consideration: 1. If one makes balls of iron and of wood, of the same size, will one then be able to conclude that the iron balls undulate so much more slowly than the wooden balls, as is the difference between the weight of both? 2. If one makes hollow balls of iron, but solid ones of wood, in such proportion that balls of the same weight occupy the same space, will their motions be the same because their weights are? 3. If from the same material one makes balls of different sizes, large as well as small, and if one fills like spaces with both, will their motions be the same because their weights are? 4. Similarly in the elements, where the particles of one element may be of the same size as the particles of other elements, and yet differ in weight, and consequently not [be the same] in motion. Or else one may form for oneself the idea that one element may have the same weight as another or that there may be but a small difference, and yet they may differ considerably in the motions, either in local, axillary, undulating or tremulatory motion; but this is only suggested for further consideration and examination. 5. Now as regards fire, one does indeed find some difference in weight as between it and air, but not in as great a proportion as might be supposed; an insensible difference would be found if one were to weigh something in the fire and in the air. *From which it may be concluded* that the particles of fire may be of incredibly stronger motion than the particles of air, although not incredibly lighter; similarly [in regard to] ether.

What essentially makes the rapidity of central and tremulatory motion seems to be: 1. The figure; the rounder it is, the more rapid the motion. 2. The size; for the smaller the balls are, the fewer are the points of contact, and consequently the fewer hindrances to motion, etc., etc.

The continuation another time.

EDITORIAL.

We have received for review an essay entitled "Swedenborg's Vortex-Rings and Some of Their Applications in the Realms of Natural Science. With Especial Reference to the Subject of Thought," by E. R. Edson, M. D., of Seattle, Washington. It was originally read before the King County Medical Society; the copy before us is a reprint from *North-west Medicine*, Vol. II., n. 5. Had the author confined himself to expressing his own views on the subject, we would have no special reason for commenting upon his article, but it is "Swedenborg's Vortex-Rings" that he writes about, and, though he states that he owes "the basis of his entire line of thought to Emanuel Swedenborg," whom he considers unsurpassed as a practical workman in the realms of natural science, it is evident that he knows very little of what Swedenborg wrote. We do not know how the essay was received by the members of the medical profession before whom it was read, nor are we informed as to how widely it has been circulated in print, but it cannot but create an erroneous impression of Swedenborg's teaching. We regret that Dr. Edson did not pursue his studies further before attempting to exploit one of the most abstruse doctrines of the New Philosophy.

The essay is divided into three parts, the first of which is a consideration of Elementary Natural Phenomena. After presenting what he considers the primary conceptions of the human mind, as essential to a discussion of this part of the subject,—namely: 1, realization of one's existence, 2, the elementary idea of space and time, 3, matter, or that which oc-

cupies space, 4, motion, or that which measures time, and finally, 5, the more concrete idea of form, he goes on to say:

"If we wish to represent the varying degrees of the motion of matter in its varying states of aggregation, it is evident that we must construct a series of Forms and Motions of Matter. This was Swedenborg's idea, and consequently he thought out a series of forms as a foundation for his conceptions in regard to the phenomena of Natural Science—a scale according to which all motions could be classified as belonging to a certain type or degree. In other words, he demonstrated a type of growth, of evolution, a principle in form, which can be applied correspondingly, to the developmental stage of matter, inorganic and organic, throughout the entire Universe," as did Darwin, for instance, but the latter's work was less broad because limited to biology.

Here we have a very clear statement of what was Swedenborg's idea in constructing his Series of Forms, though the allusion to Darwin would have been made in a different manner, had the Doctor known that his theory of the Descent of Man is diametrically opposed to the teachings of Swedenborg.* The essayist continues:

"Swedenborg began his series of forms with the Straight Line, but should have commenced with the Dot, a mere speck, a Microsphere, representing the unit of growth in any kind of matter. To properly grasp this idea we must conceive of these units or microspheres as representing the result of growth in the evolutionary degree next inferior, or, in other words, that matter and motion, just like space and time, recede on the one hand and proceed on the other to infinity. Such a theory recognizes molecules only as the growth of a more elementary unit, and further, recognizes these elementary units, which may, by their multiplication, produce molecules, to be nothing else than smaller molecules or micromolecules, which again, are resolvable into their chains of component units."

Dr. Edson should have read the *Principia*. He would have been able to see how near to Swedenborg some of his conclusions are, and further, he probably would not have asserted so positively that Swedenborg did not begin with a "Dot." On page 48 of Volume I., of the *Principia*, we read:

*Vide *Worship and Love of God*; also article on p. 193 of this issue.

"Thus does rational philosophy acknowledge some first ens produced from the Infinite, and some simple as the origin of entities not simple. This first ens or simple, we here call the Natural Point."

Not a "microsphere," however, with but one dimension, like the so-called "mathematical point." (*Ibid*, p. 50.)

"Geometry acknowledges that there is a simple point, because it is incapable of finiting it either by figure or by space. Hence it pronounces it to be without extension and incapable of division, and yet of such a nature that by its fluxion into lines, areas and bodies may be produced." (*Ibid*, p. 48.)

Swedenborg was searching for a practical solution of the subject of creation from the Infinite, and, although he borrowed his first point or beginning on the natural plane from the Science of Geometry, he nevertheless endowed it with a new character and significance. It ceased to be the merely hypothetical *ens rationis* of the mathematicians, and was exalted into a living reality, it became "the first ens and seed of things finite," (*Principia*, Vol. I., p. 53), and instead of simply moving in one direction to form a straight line, assumed a most complicated form of motion, the vortical of Swedenborg. The evolution arising in this point is therefore not of the inferior or less perfect to the superior or more perfect, but just the reverse, descending through many degrees of "finites," "elementaries," atmospheres, each compounded of the one preceding it, even to the inert, angular substances of the earth. It is true that Swedenborg mentions the various forms, beginning with the angular, as if one were evolved from the other, but merely for the better understanding of the higher.

Dr. Edson thus describes this series of Forms: 1st, The Dot or microsphere; 2d, the straight line; 3d, the angle, resulting from the reproduction of a microsphere outward from the straight line; 4th, the circle, obtained by infinite reproduction of the angle; 5th, the spiral, from reproduction upward in a spiral form from some point in the circle; 6th, the vortex, which is formed by a lateral growth of the spiral, and is represented by whirlpools, waterspouts, cyclones, and ethereal vortices; 7th, the Vortex-Ring or Swedenborg's Perpetual Vortex as seen in a whirlpool "following a spiral course from

the summit, flowing down around the outer surface of an imaginary sphere and joining the original current below," a truly perpetual type of motion exemplified in cyclonic storms and in the currents of the ether; 8th, the celestial sphere, megasphere, or Swedenborg's Perpetual Spiral Form. "The Perpetual Vortex just described represents almost the perfection of harmonic motion. There is yet one more degree, in principle, of ascent, and that is the principle of harmonious growth from the centre, just like the growth of an apple. The concentric lines represent varying degrees of growth of the inner vortex-ring." This is a form of ethereal motion which is luminous in some instances.

We had hoped to publish in this issue of *The New Philosophy* an article on Swedenborg's Series, or rather Doctrine of Forms, but this must be postponed for a future time. A few quotations from the Scientific Works will suffice to show that, although Dr. Edson describes correctly certain modes of motion existing in Nature, they are not those described by Swedenborg.

"The form proximately superior and prior to and more perfect than the circular is the *perpetually circular*, which more properly should be called the *spiral*; for its determinations are not into continuous concentric circles, nor are they directed by radii or straight lines to a certain common centre, but by continuous spires towards a certain middle circle, holding the place of a centre, over the periphery or surface of which they strive to flow, and by which curved surface, their fluxions continue, or endeavor to continue, and from which by radii, as in a perfect circle, they respect the centre of their sphere. Thus in this form again there is something perpetual and infinite compared with the circular form, as there is in the circular, compared with the angular; for its spire is, as it were, a perpetual circular fluxion, namely, from every point of the circumference, which is the limit of its fluxion, by a perpetual spiral winding towards a certain little spherule holding the place of a centre.*

"The form proximately superior and prior to and more perfect than the spiral form is the *perpetually spiral*, which more properly should be called the *vortical*. * * * For its determinations are not directed by spires, to the surface of a certain circle or sphere, but by means of a perpetual spire, which spire we call vortical, they endeavor to con-

*Oecon. Reg. An. Pars. III; n. 264.

sinuate themselves towards a certain globule or gyre of spiral form holding the place of centre, and indeed towards its surface. * * * By which spiral surface they continue or endeavor to continue their fluxion, * * * and from which they respect the periphery of every circle or the surface of the sphere, by spiral radii, altogether as in a perfect spiral form, and by this circle the verimost centre of the sphere.†

"The Form superior and prior to, and more perfect than the vortical, is the *perpetually vortical*, which, more properly, should be called the *celestial* (or heavenly). * * * Its determinations, by means of celestial spirals, as so many radii, wind themselves towards a certain vortical gyre which holds the place of a centre, and about which they continue their fluxions and from which they respect the spiral form, from this again the circular, and from this the angular. * * * This celestial form is the very beginning of active forces, conatuses and motions, from which all other forces flow."‡

Swedenborg says of the *perpetually celestial* or *spiritual* form, that is most remote from ultimate or earthly things, above every created thing, "and, therefore, incomprehensible, unutterable, inexpressible by the most sublime analysis of the human mind,"** for it is Divine.

Swedenborg's Doctrine of Forms is without doubt one of the most intricate of his whole system of Philosophy. It requires a careful perusal of most of the scientific works in order to attain to any adequate understanding of it. Dr. Edson says, in his preface, that his attention was first called to it by reading Emerson's "Swedenborg, the Mystic," in his *Representative Men*. Turning to the last page of the pamphlet, among the five books mentioned in the bibliography, there given, the only one by Swedenborg is *Worship and Love of God*. We presume, therefore, that these were the only sources of information to which Dr. Edson had access. Emerson quotes from the *Animal Kingdom*, no. 97, note f, and the only place in *W. L. G.* where the series of Forms is given categorically, is in the long note to number 6. In both instances scarcely more than a mere list is given, and the latter

†*Ibid*, n. 265.

‡*Ibid*, n. 266.

***Ibid*, n. 267.

reference omits the last or Spiritual Form. No one could expect to understand the subject from this mere glimpse of it.

The 2d section of the essay deals more particularly with instances of the "Vortex-Rings" in Nature, and shows that the writer has made a careful study of whirlpools, cyclones, water-spouts, etc. Not only does he find that these are "vortical" in form but that they may assume the "perpetual-vortical" or "spiritual form." He describes and illustrates by wood-cut, an ingenious device by which he himself succeeded in producing the "Seventh Form" of motion in a fish globe filled with water.

Several pages are devoted to the consideration of the magnet and the magnetic sphere, which is correctly designated as vortical in form, but Swedenborg's "magnetic aura" is entirely overlooked.

The 3d section of the pamphlet treats of the subject of *Thought*, which the author believes to be a form of the vortical motion in the ether. But as he thus assigns to thought a purely material quality and operation, his theory is entirely contrary to anything taught by Swedenborg, who everywhere in his philosophy predicates a discreteness of mind and body, spirit and matter.

The basis and structure of Dr. Edson's reasoning may be gathered from the following quotations from his book:

"It is evident to all reasoning minds that thought, in order to exist or manifest itself at all, must have a material structure. If it has no material structure, is not material, then thought does not exist at all. Consequently, the only attitude which we can assume is that thought has a material basis for its existence, and that, like everything else, it is a form of motion."

"Thought is one of, if not the most powerful of all forces existing in Nature. We have seen that the most powerful natural forces act in the form of vortical currents. Consequently, we may reason that thought is no exception to the rule, and that its form is vortical."

"As to what medium or condition of matter is concerned in the phenomena of thought I will say that I believe it to be the ether."

"By means of the eyes we perceive the ether undulations of ordinary light. But in our imaginations we see clearly without the use of the eye. These images are seen as forms of light. We believe that light-waves are ether-waves. Consequently, the light-waves which illumine our minds are also ether-waves."

"Having concluded that thought is in reality a form or perpetually vortical etherial motion, it remains for us to speak of the rate of its motions. . . . It is possible that thought-waves have a vibration rate more rapid than that of the X-rays."

"Actinic rays penetrate soft parts, and we can photograph through the cheek. X-rays also penetrate soft parts, and bone less readily. Thought rays pass readily from one brain to another, and by so doing pass through the bones of two craniums. Now, inasmuch as the penetrating power of thought waves is greater than that of X-rays, the vibratory rate must be greater as well."

"We must, therefore, classify the phenomena of thought with other currents and wave-motions of the ether, that is, in the same general class as that of sunlight and sunheat, electricity and magnetism, and the question now arises, What is the source of this intellectual light? We know that ordinary light and heat emanate from the Sun. Again, the ether or electrical currents which encompass our earth and cause the phenomena of terrestrial magnetism are, I believe, caused by solar radiation. In like manner, we must conclude that the Sun is the source of our intellectual energy. There is more evidence in support of this belief, as follows: According to Swedenborg's theory of the Nebular Hypothesis, the earth, as well as the other planets, was born from the womb of the Sun. . . . If this is, as I believe it to be, true, it follows that there is nothing on or in our earth which did not originally come from the Sun, and consequently even our very intellects had such a source. We may, therefore, say, that since intellectual energy exists on the earth, it must similarly exist on its parent the Sun, and that this Sun, which is commonly regarded as an inanimate body, is really an intellectual centre which radiates intellectual light as well as ordinary light, and that Swedenborg's doctrine in this respect was correct. If we believe this statement, we must further believe that this intellectual light has such penetrating power that it passes through the earth during the night time, for otherwise our imaginations would cease to be illumined during the period of ordinary darkness. It is not difficult to accept this statement when we consider that the ether-waves of wireless telegraphy pass through wood, or the walls of a room, unchanged, that the X-rays pass through our bodies, and that thought-rays pass through the bones of our crania."

"Granting that this intellectual light emanates from the Sun, the question now arises: How do we receive this light? It is likely that these waves are taken up by the terminal protoplasmic processes of the cells of the central nervous system, such as the pyramidal cells of the cerebral cortex." . . .

There is more to the same purport, but we have quoted enough to show that the reasoning is worthy of the result.

We regret that Swedenborg's name is associated with a theory so contrary to his whole system of philosophy and psychology, and we trust that Dr. Edson will pursue his study of Swedenborg's works more extensively that he may become familiar with his system and represent it fairly in any future publications.

It is true that while the soul lives in the body it must have a material basis for its activities in the brain and body, and that that activity of the mind or soul which we call thought has an ultimate activity in the brain corresponding to it, also an activity of the natural atmospheres, corresponding to the proper sphere of the mind, which is not material but spiritual.

Neither can we doubt that thought operates according to the vortical form both in the individual and in the collective mind, for the vortical form is universal in both the world of mind and the world of matter. It is also true, as the writer suggests, that a great mind and its thought is like the centre of a vortex and radiates its activity to other minds, who reciprocate and return. The going forth from a centre and return to a centre is characteristic of the vortical form as described by Swedenborg. Moreover, thought must certainly have its own proper sphere of activity.

But we must take exception to the belief that this sphere is the ether of the material world, which is the proper sphere of light and bodily sight. To believe that the ether is the sphere of thought as well as of bodily sight is to remove the distinctness and discreteness of mind and matter; in a word, the theory is materialistic, and as such is contrary to Swedenborg's entire philosophy. But let his statements speak for themselves. We read in the *Economy of the Animal Kingdom*, Vol. II., No. 232, as follows:

"The auras of the world do not manifest life, but force and motion. They are not susceptible of sensation, but only modify and are modified; they belong to physics, which, according to the philosopher, contemplates nothing abstracted from matter. It is a self-evident truth, needing no argument derived from probabilities, that matter, or any part or extense of matter, cannot think; although even this truth, by the lengthiness of the arguments derived from partial and disconnected

facts adduced in support of it, is frequently darkened, rendered doubtful, and finally denied. If matter cannot think, neither can it feel, hear, see, taste, or smell; for all these are properties of the soul. The eye, merely as an eye, is but a piece of workmanship, or optical camera, accommodated to the forms of the modifications of the ether; that which gives it its visual life must, in fact, be added to it, or exist above it and within it. And the same kind of observation applies to all the other sensories."

It will be clear from these statements that Swedenborg taught something quite contrary to the contentions of the paper under review. We might add similar proofs from all his philosophical works. Swedenborg reasoned from an acknowledgment of a Sun of heaven, from which all wisdom and intellectual light are derived. Without this acknowledgment of a spiritual world and its sun, the scientist cannot but seek for the origin of metaphysical phenomena in the world of nature. Confined to natural light, his reasoning can lead him no farther than the sun of nature as the origin of all things. When he perceives that the light of his understanding does not depart with the setting sun of nature, he must needs conclude that the light of that sun "passes through the earth at night," and furnishes his imagination with its glow. But he overlooks the more obvious conclusion that the light of the mind does not depend upon the dead sun of nature.

It is taught in the passage just quoted that men can have neither sight, imagination or thought without the presence of the soul within, and discrete from, the material body. The soul or mind is subject to the spiritual sun and its atmospheres, with which the natural sun and its atmospheres act in correspondence. This is according to Swedenborg's Doctrine of Degrees, Correspondence and Influx. Consequently the phenomena of the mind are not material phenomena, though they have a basis in material phenomena. The operation is this. Through the ether, images are brought to the eye and conveyed to the brain, where they are impressed upon the cortical substance, which thus constitutes the material basis of memory, but the *sensation* itself is of the mind. It is the mind's eye which is *affected*. The mere affection itself is the recording of impres-

sions upon the organic substance of the brain, and, by correspondence, upon the mind. This we call memory. But imagination is a degree above this, for it is a superior and internal sight, exerted when we reproduce objects in the order in which they have been seen.¹

"The internal vision, or the imagination, exists in the cortical glands."² These are its material basis, and they are excited in sympathetic correspondence with the mind whenever the imagination is active. For in those glands, and their fluids, are the *images* and *objects* which constitute the parts of the memory, from which the *ideas* of the imagination are derived. The spirituous fluid in the glands, Swedenborg says, is immortal, and hence remains, with its precious freight, after the death of the body.³

But thought is a still more interior sight than imagination, as is explained succinctly in the *Rational Psychology*, No. 142.

We can give but a glimpse of the clear treatment of this subject as here set forth according to Swedenborg's enlightened Natural Philosophy, but would recommend a careful reading of the chapters, in the work just quoted from, on the Sense of Sight, the Imagination, and the Human Intellect, where will be found some new ideas on Psychology.

In conclusion, we repeat that it is entirely contrary to Swedenborg's teachings to identify ether-waves with thought-waves, to suppose that thought communication is like the penetration of X-rays through the cranium, or that the phenomena of thought is for a moment to be classified with sunlight, sun-heat, electricity, or magnetism. There is much we would like to say in further elucidation of the subject under consideration, but must content ourselves with what has been shown above.

Certain it is that we cannot approach metaphysics and psychology rationally unless we follow the course pursued by Swe-

¹See *Rational Psychology*, No. 141

²*Ibid*, No. 96.

³See E. A. K., No. 348.

denborg, who began all enquiry with an acknowledgment of a Sun of Heaven.

In the Introduction to the *Worship and Love of God* we read.

"Without the favor and influence of the Supreme Deity, from Whom, as from the only Fountain and highest Sun of Wisdom, all truths flow down as rays into our understandings, enquiry would be vain: wherefore let us with adoration supplicate His presence and His favor."

It is also certain that there is nothing in this work to justify the theories which have been assigned to it in the pamphlet on "Vortex-Rings," and we trust that Dr. Edson will take steps to correct this impression.

SWEDENBORG SCIENTIFIC ASSOCIATION.

ANNUAL MEETING.

The Eighth Annual Meeting of the Swedenborg Scientific Association will be held in the Rooms of the American Swedenborg Printing and Publishing Society, No. 3, West 29th street, New York, N. Y., on Monday, June 5, 1905.

The Board of Directors will meet at 10 A. M.

The Association will meet at 11:00 A. M.

The President's Address will be delivered at 12:30 P. M.

Paper on "The Progress of Swedenborg's Science and Philosophy," by Alfred H. Stroh, 3 P. M.

The public are cordially invited to the sessions of the Association.

All reports and papers will be sent to the President, the Rev. Frank Sewall, D. D., 1618 Riggs Place, Washington, D. C., before June 1st.

By order of the President,

E. J. E. SCHRECK, *Secretary*,
6949 Eggleston Ave., Chicago, Ills.

THE NEW PHILOSOPHY.

VOL. VIII.

JULY, 1905.

No. 3.

SWEDENBORG SCIENTIFIC ASSOCIATION.

EIGHTH ANNUAL MEETING.

THE Eighth Annual Meeting of the Swedenborg Scientific Association, held at the rooms of the American Swedenborg Printing and Publishing Society, New York, Monday, June 5th, 1905.

FIRST SESSION.

MONDAY, June 5, 11:00 A. M.

458. The meeting was called to order by the President, the Rev. Frank Sewall.

459. The Secretary of the Association not being present, on motion, duly seconded, Mr. Alfred H. Stroh was appointed Secretary *pro tempore*.

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

461. The chair appointed the Rev. L. P. Mercer a Committee on the Roll, who subsequently reported the following members and visitors in attendance at the sessions of the Association:

MEMBERS.

Brooklyn, N. Y., Rev. W. H. Schliffer; *Bryn Athyn, Pa.*, Rev. Alfred Acton, Dr. George M. Cooper, Rev. Charles E. Doering, Rev. J. F. Potts, Mr. Alfred H. Stroh; *Cincinnati, O.*, Rev. L. P. Mercer; *New York*, Mr. Walter C. Childs, Mr. Marston Niles, Miss Venita Pendleton, Mr. L. S. Smyth, Mrs. M. K. Walker; *Philadelphia, Pa.*, Dr. Felix A. Boericke; *Washington, D. C.*, Rev. Frank Sewall.

VISITORS.

New York, Mr. F. M. Billings, Miss Nellie Halstead, Miss Kimball, Mr. G. H. Tafel; *Washington, D. C.*, Miss Maude Sewall.

462. The Secretary's Report was read and accepted.

463. The Treasurer's Report was read.

464. The chair appointed Messrs. George M. Cooper and L. P. Mercer a committee to audit the Treasurer's accounts.

465. Mr. Acton *moved* that the price of *The New Philosophy* be made one dollar for members as well as for other subscribers.

466. Discussed by Messrs. Acton, Mercer, Doering, and Sewall.

467. Mr. Acton withdrew his motion.

468. The report of the Board of Directors read.

469. In agreement with the recommendation of the Board of Directors Professor Dr. Gustaf Retzius was elected an honorary member of the Association.

470. Mr. Acton *moved* that this meeting call the attention of the Swedenborg Scientific Association to the decrease of membership as reported by the Secretary; and recommend that the members of the Association personally interest themselves in the work of extending its membership; and that the President, the Treasurer, and the Rev. L. P. Mercer be appointed a committee to supervise the work of extension of membership.

471. The motion was adopted unanimously.

472. The report of the Executive Committee was read.

473. The recommendations of the Executive Committee in respect to the incorporation and name of the Association were discussed by Messrs. Sewall, Niles, Acton, and Stroh.

474. Mr. Stroh *moved* that when the Association is incorporated the present name be retained without change.

475. Mr. Mercer *moved* that the motion of Mr. Stroh and the question of incorporation be referred to the Board of Directors with instructions that, if they find it advisable to incorporate, proper notices be sent out.

476. Mr. Mercer's motion was adopted unanimously.

477. The Committee appointed to audit the Treasurer's accounts reported that they had examined them and found them correct.

478. At 12:30 P. M. the annual address was delivered by the President.

The following reports and communications were read:

479. The report of the Editor of "The New Philosophy" was read.

480. The report of the Committee on the new edition of the "Principia" was read.

481. The report of the Committee on a new edition of the "Animal Kingdom" was read.

482. The report of the Committee on the translation of "The Senses" was read.

483. The report of the Committee on the transcription and translation of the "Lesser Principia" was read.

484. The report of the Committee on the publication of Swedenborg's scientific manuscripts was read.

485. The report of the Committee on the translation of Swedenborg's early Swedish scientific treatises was read.

486. A report by Mr. Alfred H. Stroh on the printing of Swedenborg's scientific works in Sweden and America was read.

487. A communication from the Swedenborg Philosophy Club of Chicago was read.

488. Letters to the President by the Rev. L. F. Hite and Dr. Harvey Farrington on "The New Philosophy" were read.

489. *Voted* to take a recess until 2:30 P. M.

SECOND SESSION.

MONDAY, June 5, 2:30 P. M.

490. The question of the introduction to the new edition of the *Principia* was discussed by Messrs. Mercer, Niles, Stroh, Sewall, and Doering.

491. Mr. Alfred H. Stroh read a paper on "The Development of Swedenborg's Science and Philosophy."

492. The meeting proceeded to the election of officers.

493. The Rev. Frank Sewall, A. M., D. D., was nominated for the office of President.

494. *Voted* unanimously that the Secretary be instructed to cast the ballot for the nominee.

495. Dr. Sewall was declared elected President.

496. The Rev. E. J. E. Schreck was nominated for the office of Secretary.

497. *Voted* unanimously that the Secretary be instructed to cast the ballot for the nominee.

498. Mr. Schreck was declared elected Secretary.

499. The Rev. Charles E. Doering was nominated for the office of Treasurer.

500. *Voted* unanimously that the Secretary be instructed to cast the ballot for the nominee.

501. Mr. Doering was declared elected Treasurer.

502. The following gentlemen were nominated for the Board of Directors: The Rev. L. P. Mercer, Mr. Marston Niles, Mr. Horace P. Chandler, the Rev. Alfred Acton, Dr. George M. Cooper, Dr. Harvey Farrington, Dr. Ernest A. Farrington, Mr. Robert B. Caldwell, Jr., Mr. Alfred H. Stroh.

503. *Voted* unanimously that the Secretary be instructed to cast the ballot for the nominees.

504. The nominees were declared elected members of the Board of Directors.

505. Mr. Stroh *moved* that Dr. Harvey Farrington be appointed Editor of "The New Philosophy" for 1906.

506. The motion was adopted unanimously.

507. Mr. Mercer *moved* that the time and place of the next annual meeting be referred to the Board of Directors.

508. The motion was adopted unanimously.

509. Mr. Acton *moved* that the Rev. John Whitehead be appointed to prepare a new list of subscribers to the new edition of the "Principia."

510. The motion was adopted unanimously.

511. *Voted* by a rising vote that the thanks of the Associa-

tion be tendered to the American Swedenborg Printing and Publishing Society for the use of the Society's rooms.

512. *Voted* that the thanks of the Association be tendered to the Rotch Trustees and the Massachusetts New Church Union for their co-operation with the Association in printing the new edition of "The Worship and Love of God."

513. On motion the meeting adjourned.

ALFRED H. STROH,
Secretary pro tempore.

PRESIDENT'S REPORT AND ADDRESS AT THE
EIGHTH ANNUAL MEETING OF THE SWEDEN-
BORG SCIENTIFIC ASSOCIATION, NEW
YORK CITY, JUNE 5, 1905.

REPORT.

On this, the eighth year of our Association's organization, we may be truly said to have completed a full week-period of progress, and to be entering upon "a new state," inasmuch as the coming year will witness, as we hope, the publication in London of the new edition of the *Principia* now going to the printers after the seven years' of work in revision, and in Boston, the publication by the Rotch Trustees, of the now first completed translation into English of the work on the *Worship and Love of God*, of which only the first two parts have hitherto been published.

Of the character and importance of this latter work I shall speak further on.

The accounts furnished in Mr. Stroh's report of the progress in transcription and translation of the scientific MSS. renders unnecessary any detailed account of this important work here. I will only mention the gratifying fact that the Swedenborg Commission of the Royal Academy in Sweden has printed in all 197 pages of Vol. I. of the MSS., and 202 of Vol. II. No further work in copying the minor MSS. has been done by our Association, but the transcriptions already

made and reported last year have been placed at the disposal of the Swedish Academy in its work of publication.

In accordance with the action of the Executive Committee, a beginning has been made of the publication in fascicles of a number of the smaller scientific treatises in English, which, when completed, will form a volume of *Scientific and Philosophical Treatises of Emanuel Swedenborg*. This is also fully described in Mr. Stroh's report. The first of these fascicles, a pamphlet of sixty pages, has just now been published.

With this fruitful result of our year's labors it is also gratifying to call attention to some marked indications of the growing recognition of Swedenborg's work among the learned of to-day. I will here only mention a lengthy and quite thorough account of the life and scientific significance of Emanuel Swedenborg written by Professor C. G. Santesson, of Stockholm, in a recent number of the *Northern Review* (*Nordisk Tidskrifts*), a leading literary magazine of Sweden. Professor Santesson is quite enthusiastic in his admiration for Swedenborg's scientific discoveries and attainments, and reviews at length "the many and oft-mentioned anticipations of modern discoveries, which, in the eyes of the learned world, cover Swedenborg with so much belated glory." Also in the foremost daily journal of Sweden (*Aftonbladets*) appeared in November last an article on "Emanuel Swedenborg as anatomist and physiologist," by Dr. Carl Wallis, Professor of the History of Medicine at the Royal Medical Institute of Stockholm, who is called by Prof. Gustav Retzius, who sends us the information, "one of the most prominent modern scientific authorities in Sweden." Mr. Odhner has briefly described both of these papers in an article: "Among the Doctors," in the number of *New Church Life* for January, 1905.

But of far wider interest in its philosophical bearings is a truly remarkable document, which, although published in the year 1901, has only at this moment come to our notice. It is the thesis for the Degree of Doctor of Philosophy, read before the Philosophical Faculty of the University of Berlin in February, 1901, by Hans Schlieper, and is entitled *Emanuel Swedenborg's System der Naturphilosophie besonders in seiner*

Beziehung zu Goethe-Herderschen Anschauungen. The writer is a native of Berlin, born in 1875, the son of the banker, Eugen Schlieper, who has studied at the universities of Berlin, Heidelberg and Leipzig, and among others, under the professors, Kuno Fischer, Herman Grimm, Heintze, and Wundt. Of the purpose of his dissertation he says:

"The following pages attempt a brief presentation of one of the most notable philosophical developments whose closing period is related to our literature through Kant's 'Dreams of a Spirit-seer' and the Second Part of Goethe's *Faust*, while the scientifically less valuable writings of the first and middle period have almost disappeared. Swedenborg's Natural Philosophy was obscured by the mystical revelations of his time. His opponents were inclined to confound the two and to dismiss them at the outset without discrimination. The Swedenborgians naturally regarded those writings which were produced before the time of the divine call as of subordinate rank, and yet regarded them too dogmatically to appreciate their historical worth.

"Since more recently the organic nature-systems of Goethe and Herder in their significance for the history of modern philosophy have begun to be recognized, Swedenborg as the forerunner in this field ought to awaken a new interest. We shall endeavor in the following treatise from this standpoint to draw the lines of resemblance between Swedenborg and Goethe which are afforded by the material of the Klettenberg period and the first seventy years."

The author proceeds to treat quite exhaustively of Swedenborg's cosmic system as presented in the *Principia* and the soul-system of the *Animal Kingdom*, referring back to the antecedents in Descartes of the vortical theory, which he, Swedenborg, sought to trace as the metaphysical basis of his anatomy and psychology.

Dr. Schlieper quotes extensively from the *Principia* and the *Animal Kingdom*, bringing out Swedenborg's emphasis laid upon both the inductive and deductive methods. "In order to find the element and the primal substance we must employ analysis, and to derive nature from these, synthesis. They

proceed from different sources but run together. Experience and geometry are the first steps, but these are not all."

The doctrine of the Point, the succession of finites, actives and elementaries, and the series of motions, local, axillary, progressive, and of forms, circular, spiral and vortical are clearly set forth, as well as the relation of actives and passives. The prime relations to Aristotle, Leibnitz and Descartes are shown with the preference given to the latter in the work on *The Intercourse of the Soul and the Body*.

The late arrival of this interesting and able treatise prevents our giving it more than a cursory glance, but we cannot forego the mention of what is of special interest at this time when we are bringing out the complete edition of *The Worship and Love of God*, namely, the author's interesting comparison of this work with Goethe's poem, "der deutsche Parnass," and the many unmistakable instances of the profound influence of Swedenborg on Goethe's whole line of thought in his later years. A graphic picture is drawn of the dramatic scenes of Swedenborg's great prose-poem of Paradise and the Love of the First-begotten, and passages between the two writers are compared, even line for line. Similarly the influence of Swedenborg upon Lavater and upon Herder is traced in minute comparisons, and, unlike Kant's indebtedness to the works of the theological period, here especially is shown the intimate knowledge of the two former with the scientific and philosophic series, including the "de Telluribus." The following is an eloquent allusion to Swedenborg which Goethe makes in his review of Lavater's *Aussichten in the Ewigkeit*, without mentioning his name:

"We wish him (Lavater) good success in his enterprise, but if he will follow our counsel let him leave this overbrooding in these matters. Let him lift his soul and look upon all these results of his thinking as only earthly goods; let him feel more deeply the great Spiritual Whole and find his ego in the Other. Therefore, we would wish him an inner Communion with the worthy Seer of our times around whom was the joy of heaven, to whom spirits spake through every sense and organ, in whose bosom angels dwelt. May his

glory enlighten him, if possible shine through him, so that he may once attain to a true blessedness and learn what was that lisping of the Prophets when 'unspeakable sayings' filled their spirit."

Dr. Schlieper's Dissertation makes a pamphlet of fifty pages, and is published by Gustav Schade, 158 Linienstrasse, Berlin.

The work is of peculiar interest as being apparently one of the first fruits of the critical study of Swedenborg's influence on Kant and other contemporaries instituted by Professor Heinze,* whose lectures were attended by Dr. Schlieper.

ADDRESS.

By a happy coincidence the year that witnesses the bringing out of the new edition of the *Principia* will also see the completion of the translation of the work on the *Worship and Love of God*, including the Third Part, which has hitherto been accessible only in the Latin in the Photolithograph edition of the MSS. Put forth in the elegant and convenient style of the Rotch Fund editions, we may justly expect that this remarkable work of Swedenborg's, so long out of print even in its incomplete form, will now be welcomed by the students of Swedenborg with the eager interest which a new work inspires, and read with a much deeper and truer intelligence and appreciation than was possible when either of the former editions appeared. So strikingly is it in touch with the profoundest researches and the most vital inquiries of the science of to-day, and so vast is the scope of its prophetic insight into all those problems of psychology and of philosophy which are looming up before the learned faculties as never before, that we can do no better than employ the few moments of this annual address in some cursory reflections on the meaning and the importance of this work, which is entitled by the author with the truly mystic name: "*The Worship and Love of God.*"

*See my Introduction to Kant's *Dreams of a Spirit Seer*, translated by Goerwitz. The Macmillan Co., New York.

"Part I. Treating of the Birth of the Earth, Paradise and the Abode of Living Creatures; also of the Nativity, Infancy and Love of the First begotten or Adam: and in

"Part II. 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, and in

"Part III. [Now first published in an English translation.] The Life of the Marriage of the First-born Pair."

A mystic title, I say, for few would suspect that under these poetic masks lie discussions of the most subtle problems of the origin and inmost activities and forms of the material universe, and also the Nature, activity and mutual intercourse of man's soul and his body. In an essay on this work published many years ago under the title of, *A Drama of Creation*,* I have hinted at a comparison as to literary form and certain sublime passages, between this work and the Phædrus of Plato, the Prologue in Goethe's Faust, the Paradise Lost of Milton and the Divina Commedia of Dante. Especially suggestive of the last is the opening line, descriptive of the author's: "Walking once alone in a pleasant grove and observing the trees shedding their foliage, and being drawn to serious thought," and Dante's beginning of his immortal poem: "Midway in the walk of this our life, I found myself in a dim forest." I there called attention to the singular beauty and dignity of this opening of the Third Part:

Cum jam Sola soli relictæ fuit.

"When now she was left alone to her only one."

But I can only call attention now after the lapse of twenty years to these fascinating literary charms of the work,—for undoubtedly it exists as one of the sublimest epic poems of the world,—to emphasize my conviction that the very incongruities of the literary structure, the intermingling of sublime allegoric scenes with the discussion of the most subtle problems of mind and body and their interaction, proves the profoundly serious philosophic and even scientific purpose of the work as the author conceived it, and the entire subordination on his

*In the *New Metaphysics*; Speirs: London.

part of the poetic grace and beauty of the work to the most rigidly logical and exact definition of great elemental powers and processes involved in the birth of the human soul and in the origin of the natural universe.

It was in this same essay that I spoke of this work as the synthesis of Swedenborg's whole philosophical system; and to-day, in the light, especially, of the Third Part now given to us—incomplete even though this is, for it breaks off abruptly in the midst of an explanation of one of the earlier stages of the magnificent vision of the *Limbus*—I can only behold this synthesis extending its vast embrace into the great material universe and its mechanism on the one hand, and so into the very midst of the physical science of to-day, and, on the other, into the purest heights of theology, the inmost ruling and guidance of a Divine Providence in the midst of man's life of free-will, and into the most sacred relations between the essentials that compose the Divine Trinity, and that are effigied in the inter-relation and communication of God and the spiritual world and man upon earth.

If science has been hitherto incapable of entering into these studies of the mysterious nature and action of the inmost powers of the universe, so it would seem has the Church stood aloof from the sublime portrayal given in this work of the relation of the Supreme Being to His eternal and only begotten Son in what is called the Supreme Love, as well as from the representation of the Prince of this world as a kind of opposing Satan or Deity, a fallen Lucifer recalling the mythology of the Greek poets and of the *Paradise Lost* of Milton. It may be for this cause that, as Mr. Gorman has hinted in his introduction to the English edition of the First and Second Parts, the Church has been willing to let this work lie in obscurity as belonging rather to the philosophy and religion of the past than to that of the New Church of the Future. In the clearer philosophic intelligence of the present day I believe it can be shown that this view is a mistaken one; that Swedenborg, publishing this work two years after the date of his spiritual illumination, knew full well the harmony that exists between this use of the symbolic terms of Holy

Scripture and the profound truth of the principles in science and in religion which this work was intended to unfold.

To go back to the anticipations of modern science, which this book in its all-comprehending prophetic womb seems to contain, we think we see here outlined in clear and beautiful order the return to Deity for which the science of to-day seems to be blindly but honestly struggling. No serious student of Swedenborg can fail to recognize the all-sidedness of his system of natural science, proceeding, as it would seem at times, to the very utmost extremes of materialism in its assertion of the actuality of the objective world and the absolute and final testimony of its laws as observed by human experience. He seems to voice with all the earnestness of the investigator of to-day the control in all human learning of the three factors as final and absolute—mechanism, geometry, experience. So emphatically does he insist upon these that it would seem, as we read on, that he will leave no place for the interference of any supernatural power or for the exercise of any free will anywhere. He is a determinist of the most unsparing sort. Such an adorer is he of mechanism and so unyielding in his tracing of mechanical laws as governing all things that we behold the universe, even man himself, nay the very soul, as a splendid machine. But there are degrees in the machinery and in its perfection, and this is according to an ascending order, which rises in series and consists always in a wonderful adaptation of the machine to the power that operates it and to the thing to be done, so that we ascend from the mechanics of physical nature to those of the soul and its organs, and thence into the spiritual spheres that encompass the Supreme Himself, and are the immediate instruments of His Divine Love and Wisdom. And so it is with the introduction of the Soul, that "certain element from above," which Aristotle and Swedenborg alike fall back upon, that the purpose and the whole movement of the machine is made intelligible. Swedenborg has no objection to the view of the universe as a machine; his concern is as to *what moves it and for what it is moved*. And here comes in his sublime and all elucidating doctrine of the Soul and of God.

In his "*Introduction to the Mechanism of the Intercourse between the Body and the Soul*," page 107, London, 1847, he says: "If the reader would speak of the soul as comparable to a machine I have no objection to responding in the same tone, only I cannot allow the comparison with *inanimate* but with *animate* machines!" The animate machine! That is the machine ensouled! And this in one word seems to contain Swedenborg's entire system of the universe, and is the keynote, especially to the wonderful treatise on *The Worship and Love of God*.

And what is the whole trend of modern physical science but toward this ensoulment of the machine? For a long time the physicists have been engaged in finding one subtle power or form within another until they have reached far beyond the sphere of the bodily senses, and can only deal with imaginary masses and forces to which they give names—atoms, electrons, ions, etc., and find in the ether a kind of physical heaven if not a spiritual world from which the forces of the universe proceed. Farther and farther behind they leave the tangible bulk of the old-fashioned time-and-space body, and more and more real and necessary become to them these things of the invisible and imponderable side of the universe. Strange to witness at the very time that the physicist is on the verge of declaring the spiritual nature of real substance and the phenomenal or symbolic character of the materials of science, the so-called psychologists, false to their name, are by some stupid infatuation which they deem scientific, endeavoring to reduce psychic elements and forces to the level of dead atoms and their mechanical interference.

Most striking perhaps of all this eager and persistent penetration of physical science into the higher and invisible planes of the world's mechanism is the theory now advanced by Professor Ostwald, of Leipzig, which, abandoning the futile effort of the ages to find any real source or cause of a world in dead matter, or even in forms of motion,—as if motion were anything unless something is there to move—boldly proclaims the new "element" to be the unit of *energy itself*, whatever that may be, and invites us to explore the certainly interesting

and promising fields of the new science of *energetics*, a science which we may regard as a vast step toward the ensoulment of the machine.

For it is in the work before us that Swedenborg declares this study of the animation or ensoulment of the natural mechanism to be the very 'marrow and essence' of the sciences. He speaks of the intense animation of nature, and while insisting that motion is change, and change involves relations and forms, and *to our finite minds* all the appearances of time and space—still, it is declared in the note to 122, "all the essentials of motion are within the conatus." And hence in the conatus or first energy in the Infinite we must seek the origin of the world. From this conatus in the Infinite, life proceeds into the universe through the successive spheres of the two always corresponding worlds—the interior and the exterior, or that of the soul and of its environment. In No. 213 we read that the forms and spheres of the body of man exists in successive planes or degrees, elsewhere described as the vortical, the spiral and the circular, and these are called the supra-celestial, which correspond to the forms of the soul (*anima*), the celestial which correspond to the intellectual mind (*mens*), and the infra-celestial which correspond to the animus. "But the human body and its faculties are also created as types or forms and powers which correspond with all the active forces in the universe," . . . "the very organs of the senses being fashioned according to the nature of the atmosphere of the world." No. 124. *E. g.*, eye to ether waves, ear to sound waves, etc. Thus we behold the body answering in the series of its forms and faculties on the one side to the atmospheres of the whole external world; and again, within, to the forms and faculties of the mind and soul.

To the student of Swedenborg's *Animal Kingdom* and of his *Rational Psychology*, the views here presented, of the Soul and of its operation in the human body will not be new or essentially different. But what is strikingly new is the allegoric form of the presentation in the figure of the Supreme Light and the Purple Border or *Limbus*, recalling vividly

again the beatific vision in Dante of the great "Rose of Paradise:"

"Within the deep and luminous subsistence
Of the High Light, appeared to me three Circles
Of threefold color and of one circumference;
And by the second seemed the first reflected,
As Iris is by Iris, and the third
Seemed Fire that equally from Both is breathed."

Paradiso, Canto XXXIII.

"Nella profonda e chiara sussistenza," etc.; while these stand, in their immortal array, as spheres about the Divine Eternal Light and Love within. Here we see portrayed the universe as the Image of man, and man as the Image of God. As Dante, again, describes the same sublime conception:

"That circulation which being thus conceived
Appeared in thee as a reflected Light,
When somewhat contemplated by mine eyes,
Within Itself, of Its own very color,
Seemed to me painted with our effigy."

Paradiso XXXIII., 109-145.

The mystery, if we may so term it, of the *Limbus* is, in this wonderful vision, made identical with that of the Only Begotten Son, the Mediator and the object of the Supreme Love. This Son, born from eternity, is not to be confounded with the theological concept of the Son of Mary, born in time, as the Incarnation of the Divine Word on earth. It, as well as the *Limbus* or the Purple Border of the Supreme Light, is to be regarded as the eternal Wisdom of the Love of God, or the Truth by which Infinite Divine Love makes itself an object of man's vision and adoration. For the One Eternal Good loves with a supreme love its own Wisdom and thus conjoins the two essentials of Deity into one; and its love of its own Wisdom is because of its ability to proceed thereby with the accomplishment of its ends. Love revealed and acting in Wisdom may be seen and loved in return. Only through this first revelation of the Infinite in its own in-

finitely various and modified forms of Truth can the finite man approach God either in knowledge or in worship. It is here we find the solution of the mysterious title of the book itself, "The Worship and Love of God." The Truth and Wisdom born eternally of the Infinite Divine Love,—the very first substance and mover of all,—are that Logos or Word by whom all things were made. It is thus "born from eternity," and is the "Mediator" by which all things were made and can return in adoration to the Supreme Love which gave them being. In the terms of Swedenborg's later theological writing it is the Human Divine present in the Heavens before the divine Incarnation on earth and the sole means of conjunction between God and the souls of men as distinguished from the Divine Human of the Lord, which followed, in time, the incarnation and resulted from the purification, redemption and glorification of the assumed human nature of man. The singular resemblance between the representation which Swedenborg here gives of the Supreme Love existing between the Deity and the Only Begotten and the Scriptural expression in the Gospel of St. John of the same Divine relation between the Father and the Son in the Holy Trinity, gives almost a Johannine mark to this closing work of the philosophical series. "The Father loveth the Son and hath given all beings into his hand," are the words of the Gospel, and the same mediatorial office is declared in the immortal Gospel of redeeming love embraced in the words: "For God so loved the world that he gave his only begotten Son that whosoever believeth in him should not perish." There is no doctrine of a redemption by a vicarious atonement, or of Christ as the innocent victim of Divine anger toward mankind; but surely rather that of the Divine Truth itself as Mediator in its union with its own source the Divine Love. Hence the purple color of the Border; this color arising from the blending into one of the two correspondential colors, the Red of Love, and the Blue of Truth. It is by the Truth so revealed to men that they have access to God in knowledge, in worship and in the purifying of their own lives.

For life itself, both Divine and human, or rather all life

as only Divine, consists in the perpetual operation of Love by Truth into Use or Work; and the derived life which is man's, consists, as we are told in this Part III., "of the cognition of truth and the perception of good." No. 119. It is given us to *know* the truth by the influx of knowledges from experience and revelation from without, and to *perceive* or feel the good from the influx of the Divine Love from *within*. In the rational mind of man is the meeting place. There is where the Divine ends of love in each man put on the determinations that are given from the experience of the time-and-space world. It is here that the Divine End, which is Love, finds the reaction, the fulcrum necessary for the exertion of its energy and the doing of its work in the building of a heaven of free and rational immortal souls. For the "Divine Ends were foreseen before times and spaces arose," and times and spaces were created in order that "Ends foreseen and provided may exist in *acts* and thus put on the *reason of uses*, and the form of effect, and so revolve in their gyres," No. 113; for it is by rational series that ends are defined as uses and these determined into acts," No. 134. Here is distinctly defined the mediatorial office of the truth in the rational mind, as that means by which the ends of Divine Love are given shape in the intention of man's rational free will, and so brought out in the conduct of life. This it is "to believe on Him and not perish, but have everlasting Life."

We have no time to dwell on the rich psychological content of this comprehensive statement, the vast philosophical significance of this concept of a time-and-space world as the field for the determinations of the Divine ends in the reason and in the uses of life; and we must rather hasten on to the further stage of the vision where the "supreme light" is beheld as flashing gyres through the purple border and out into a sphere of murky darkness beyond, whence it vanishes away from sight. This belt of darkness through which are seen the scintillations of the Divine Light is the natural mind of man in its state of aversion, since the Fall, from the divine Good of its Origin. It is the plane of man's self-assertion over against God, even to his denial of God and his hatred of the

justice of God, which is the pure Order of heaven. There is the darkness of our life, which, in contrast with the heavenly order, is hell; "there is not justice but the *punishment of justice on account of justice*," No. 119—a sentence worthy the pondering of all our students of criminology and of penal ethics. And in the "flashings" of the light or "its intertwining gyres," which disappear before our human vision in the murky belt of our sensuous life, is depicted the presence, unseen and unknown by us, of the ends of Divine Love working through and in the deep lying currents of our human loves in order to make us freely accept the life of heavenly order whose forms the Divine Truth presents to our rational mind. For we read that it is this "Providence of singulars in things universal which performs such constant gyres," No. 125, and the disappearance of the Divine light before our vision is the short-sightedness of the sensuous mind or *animus*, which sees only the phenomena of matter and delights only in the pleasures of sense.

The work ends abruptly and is incomplete. Why, remains to be discovered. Here again we cannot forbear for more than superficial literary reasons to compare this sudden and momentous transition from Swedenborg's philosophic to his illuminated spiritual vision with the conclusion of the *Divina Commedia*:

"I wished to see how the Image of the Circle
Conformed itself, and how it there finds place;
But my own wings were not enough for this.
Had it not been that, then, my mind there smote
A flash of lightning, wherein came its wish,
Here vigor failed the lofty fantasy;
But now was turning my desire and will,
Even as a wheel that equally is moved—
The Love which moves the Sun and other stars."

FRANK SEWALL.

Washington, June, 1, 1905.

NOTES TO THE ADDRESS.

I. From *Journal of the Chemical Society*, London, April, 1904.

DR. WILHELM OSTWALD'S THEORY OF ENERGETICS AS CONTRASTED WITH THE ATOMISTIC NATURE OF SUBSTANCES.

London, 1904. Faraday lecture; Chemical Society.

About the nature of the elements I find myself on the same ground as Faraday. There is only one difference due to the development of science. Faraday even held at the idea that we know matter only by its forces, and that if we take the forces away, there will remain no inert carrier, but really nothing at all. As Faraday still clung to the atomic hypothesis, he was forced to express this idea by the conception that the atoms are only mathematical points whence the forces emerge, or where the directness of the several forces intersect; here his view coincided with that of Boscowitch.

In the language of modern science I express these ideas by stating:

What we call matter is only a complex of energies which we *find together in the same place*. We are still perfectly free if we like to suppose either that the energy fills the space homogeneously, or in a periodic or grained way; the latter assumption would be a substitute for the atomic hypothesis. The decrease between these possibilities is a purely experimental question. . . .

The only difference between elements and compounds consists in the supposed impossibility of proving the elements to be compounds.

Sir William Ramsey said to Prof. Ostwald that the perplexing discovery of the transmutation of radium into helium might conceivably find an explanation through the theory of energy.

Each element has its form in a relative minimum; the whole will be like a ceiling of a cavern full of hanging stalactites, the end of each stalactite representing an element.

II. THE SOLAR VORTEX ALIKE IN ATOM AND IN UNIVERSE.

A valuable contribution of Professor Serviss in the *Journal and American* of June 5, 1904, points to an objective demonstration of the vortical theory of the universe first propounded by Emanuel Swedenborg in the *Principia Rerum Naturalium*, published in Leipzig in 1734. Referring the scientific reader to the work itself, which may be had in translation in the London edition of 1846, for a full knowledge of this wonderful view of the world's evolution from the Infinite through the production of the first point or element of finite being "whose motion must be spiral as "the perfect form of the perpetual circle," I wish here to quote one or two of Swedenborg's summary statements bearing upon the subject in question.

"In every part of the world there is latent a world: in the microcosm lies the macrocosm; in the least is latent the greatest; the whole vortex in its smallest part, with all the substantials, essentials and modes. The motion of a large system is latent in the least system." (Vol. I., p. 202.)

"The first natural point (or atom) is pure motion in the infinite. In this pure and most perfect motion are contained all those things active and passive which limit things finite and continue to do so throughout their series. . . . If the most perfect figure be circular the most motion must be the perpetually circular, that is the spiral . . . the spiral is the infinitely circular. . . . From the motion of the volume of the particles results their vortical motion into which they naturally flow,—the greatest motion (the universal vortex) lying in the first beginning of the motion." (Chap. VI.)

"The solar ocean existing in the middle of the vortex is the fountain of all the motions which take place between the constituent parts of the world, the soul of its immense body and system and a perfectly active center around which the larger and smaller currents are whirled in a perpetual current." "Nature is a motive force diversely modified; a motive

force diversely modified is mechanism: mechanism is geometry acting; geometry is an attribute of everything endowed with figure and space. Hence throughout the world geometry follows nature from its first origin; from the least dimension to the greatest. Nature therefore is largest in what is least and least in what is largest. From the first particles we may learn the nature of the starry heavens and of the larger solar vortex. But before turning to the larger heaven we must first contemplate the lesser heaven, a world exhibited in elementary nature in the volume and sphere surrounding the magnet." (Chap. X., p. 207.)

Thence Swedenborg proceeds in Part II. to treat of the causes and mechanism of the Magnetic Forces, of the magnet's exhalations, etc.; in a theory rich in interest to the student of the modern phenomena of radio-activity. He says in Chap. I., of Part III., p. 232, Vol. II.;

"The elements, active and passive, operate on a small scale in the same manner as in a large one; in a vorticle round a magnet, as in a great vortex round the sun. They operate in the same manner whether the active center be an insignificant effluvium continually moveable round its axis or whether it be a larger and continually moveable solar vortex. In the heaven of the finite universe, there may be innumerable vortices of this kind; or there may be as many vortices as there are suns or stars."

According to the Russian astronomer Nyren, the nebular theory of the universe is directly traceable beyond La Place, Buffon and Kant to Swedenborg in this remarkable work, as is also modern stereo-chemistry, according to Van't Hoff and Eiloart, first outlined in Swedenborg's *Principles of Chemistry* Published in 1721. See J. H. Van 't Hoff's *"The Arrangement of Atoms in Space. Introduction."*

FRANK SEWALL.

REPORTS.

REPORT OF THE SECRETARY.

To the Swedenborg Scientific Association:

THE minutes and reports of the last annual 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 and October, 1904, the long and exhaustive reports and communications requiring more room than heretofore. In the interest of economy of space, the Secretary proposes hereafter to omit the publication of the list of members as an annual feature of our Bulletins, and to confine himself to reporting changes that need to be made. (See Appendix "A.") In the same interest he will confine his annual report to an enumeration of actual progress made during the year in the publication of Swedenborg's works, until another complete report like that of last year may be deemed advisable. (See Appendix "B.")

During the year eight new members have been received, eighteen have been stricken from the roll in accordance with minute 160, six have resigned, and three have died. The present membership numbers 174.

I regret that the time and place of meeting of the Association this year make it impossible for me to be in attendance.

E. J. E. SCHRECK,
Secretary.

Chicago, Ill., May 31st, 1905.

SECRETARY'S REPORT, APPENDIX "A."

NEW MEMBERS RECEIVED DURING YEAR.

Austin, Dr. A. E., Eldred, Sullivan Co., N. Y.
 Boyesen, Rev. Jos. E., Upplandsgatan 79, Stockholm, Sweden.
 Brown, Chas., 153 Cowan Ave., Toronto, Ontario, Canada.
 Edson, E. R., 4512 14th Ave., N. E., Seattle, Wash.
 Farrington, Dr. E. A., 1626 Walnut St., Phila., Pa.
 Humann, Mrs. L., 12 Rue Thouin (Pantheon), Paris, France.
 Ring, Dr. Chas., 402 S. High St., Urbana, Ohio.
 Stroh, E. F., Bryn Athyn, Pa.

MEMBERS DECEASED.

Kendig, Joseph R., Renovo, Pa.
 Nye, Chas. M., DeWitt, Iowa.
 Welch, Chas. E., Los Angeles, Cal.

MEMBERS RESIGNED.

Gladish, Rev. W. L., Middleport, Ohio.
Hicks, S. H., Bryn Athyn, Pa.
Keefer, Dr. Chas. B., 1110 F St., Washington, D. C.
Rosenqvist, Rev. J. E., Bryn Athyn, Pa.
Swanton, J. R., 300 Florida Ave., N. W., Wash., D. C.
Winslow, Benj. E., 5411 Ridgewood Ct., Chicago, Ill.

MEMBERSHIP LAPSED.

(Minute 160.)

Biggs, M. G., Oreana, Okla. T. (present address unknown).
Brown, Rev. R. W., Chicago, Ill.
Champion, Chas. T., 5624 Madison Ave., Chicago, Ill.
Child, Rev. Thos. (address unknown).
Cutting, Chas. F., Newtonville, Mass. ,
Dickson, W. K. L., Hotel Cecil, London, England.
Duncan, Chas., 1631 S. Broad St., Phila., Pa.
Ford, L. P., Cresford, N. Wales.
Fuller, Miss Louisa M., Jacksonville, Ill. (present address unknown).
Hansen, Peter (address unknown).
Nash, G. V., Bronzwood Pk., Williamsburg, N. Y.
Saul, Rev. J. S., 674 N. California Ave., Chicago, Ill.
Tafel, Rev. L. H., 411 Jefferson St., Homestead, Balto., Md.
Taylor, Rev. James, Berlin, Ontario, Canada.
Wagar, Miss Anna M., Lakewood, Ohio.
Walker, Mrs. Mary K., 275 Clermont Ave., Brooklyn, N. Y.
Gunther, Emil P., 1316 Patapsco St., Baltimore, Md.
Sawyer, Mrs. C. A., 2212 Union St., Berkeley, Cal.

CHANGES OF ADDRESS.

Barnes, Mrs. Emily F., 24 Hammond St., Roxbury, Mass.
Burnham, A. W., 1628 Chicago Ave., Evanston, Ill.
Caldwell, Robt. B., Jr., 1016 Penn Ave., Pittsburg, Pa.
Caldwell, Mrs. R. B., Jr., 1016 Penn Ave., Pittsburg, Pa.
Caldwell, Rev. Wm. B., 1662 Fulton St., Chicago.
Carpenter, Paul, 1664 Fulton St., Chicago.
Cole, Louis S., Glenview, Cook Co., Ill.
Craig, Chas. E., 1250 10th St., San Diego, Cal.
Cronlund, Rev. E. R., 99 Tyndall Ave., Toronto, Ont., Can.
David, Rev. J. S., 465 Mass. Ave., Boston, Mass.
Ebert, Chas. H., Woodland Ave. and Brighton Rd., Allegheny, Pa.
Farrington, Dr. Harvey, 815 Marshall Field Bldg., Chicago.
Gilmore, E. A., Manet Road, Newton Centre, Mass.
Harris, A. E., 147 E. Broadway, Canal Dover, Ohio.

Keep, Rev. R. H., 20 E. Ellis St., Atlanta, Ga.
 Layton, F. S., 6942 Union Ave., Chicago.
 Lechner, Miss Elsa, 612 Summerlea St., Pittsburg, Pa.
 Lechner, Herman, 612 Summerlea St., Pittsburg, Pa.
 Mann, Rev. Chas. H., Elkhart, Ind.
 Meday, C. H., 289 Madison Ave., Pasadena, Cal.
 Owen, Geo. H., 816 16th St., Moline, Ill.
 Peck, Mrs. S. E., 56 Jefferson Ave., Elizabeth, N. J.
 Pitcairn, Miss Agnes, 350 Stratford Ave., Pittsburg, Pa.
 Pitcairn, Mrs. Alex., 350 Stratford Ave., Pittsburg, Pa.
 Schwenk, Mrs. Therese, 111 View St., Meriden, Conn.
 Starkey, Rev. Geo. G., Westcreek, Colo.
 Stockwell, Rev. J. W., 130 E. 46th St., Chicago.
 Vrooman, Rev. H., 5 Park Square, Boston, Mass.

The last published list of members will be found in *The New Philosophy*, volume VII, p. 144.

SECRETARY'S REPORT, APPENDIX "B."

During the year past no further transcriptions of Swedenborg's manuscripts have been made under the auspices of the Association, or reported to it, although some of the scientific works have been printed in the original Latin and a number have appeared in English.

TRANSLATIONS IN MANUSCRIPT.

Dædalus Hyperboreus. Four chapters, by Rev. Emil R. Cronlund.
 PRINTED IN LATIN BY THE ROYAL SWEDISH ACADEMY
 OF SCIENCES.

Miscellanea Observata, Part IV.
Expositio Legis Hydrostaticæ.
Principia Rerum Naturalium (The *Lesser Principia*) has been completed.

Argumenta Quædam Principiorum Rerum Naturalium.
Summarium Principiorum Rerum Naturalium.
 PRINTED IN ENGLISH BY THE SWEDENBORG SCIENTIFIC
 ASSOCIATION.

IN "THE NEW PHILOSOPHY."
The Senses (continued). Translated by the Rev. Enoch S. Price.
N. P. VII, pp. 109-112; VIII, 149-153; 185-192.
Corpuscular Philosophy in Brief. Edited in Latin and translated by the Rev. Reginald Brown. *N. P.*, VIII, 194-197. Reprinted in *Scientific and Philosophical Treatises*, Part II., Fascicle I, pages 59-60.
Remarks on Mussels, Snails, etc., in Limestone; and also on Slate. Translated by Mr. Alfred H. Stroh. *N. P.*, 198-200.

Observations on the Human Body. Translated by Mr. Alfred H. Stroh. *N. P.*, VIII., 200-207. Reprinted in Part II., Fascicle I, of the *Treatises*.

On the nature of Fire and Colors. Translated by the Rev. C. Th. Odhner. *N. P.*, VIII., 208-214.

IN PART II., FASCICLE I, OF "SCIENTIFIC AND PHILOSOPHICAL TREATISES," BY EMANUEL SWEDENBORG. Edited by Alfred H. Stroh.

On the Infinite, the Indefinite, and the Finite.

On the Mechanism of the Soul and the Body.

Observations on the Human Body.

The Way to a Knowledge of the Soul.

Characteristic and Mathematical Philosophy of Universals.

Corpuscular Philosophy in Brief.

For bibliographical particulars see the "Report on the Printing of Swedenborg's Scientific Works in Sweden and America." *The New Philosophy*, p. 256.

REPORT OF THE TREASURER OF THE SWEDENBORG SCIENTIFIC ASSOCIATION, MAY 31, 1905.

To the Members of the Swedenborg Scientific Association:

The report of the Treasurer of the Swedenborg Scientific Association is herewith submitted to you.

On comparing this report with the one submitted a year ago, it will be seen that the membership dues have decreased \$2.01; the subscriptions to *The New Philosophy* have decreased \$22.72, and the special contributions, counting the advertisements, have been \$15.06 more than in the previous year, so that the total receipts, not counting the *Summary of the Principia* and special funds, have been \$9.67 less than during the previous year.

It will be seen that the largest decrease is in the subscriptions to *The New Philosophy*. Of the subscribers, 3 have died, 10 have requested that it be discontinued, and 28 ran behind in their subscriptions and paid no attention to notices sent them, and were dropped from the mailing list. We have, however, added 13 new subscribers, so that the net decrease is 28, the total subscribers now being 217. The Secretary's report will show the variation in the list of members of the Association.

In last year's report attention was called to the contribution of \$50.00 by a member for publishing the *Principia*, contingent on \$2,000 being raised for this purpose before July 1st, 1904. As this could not be complied with, the member requested the return of the \$50.00.

Respectfully submitted,

C. E. DOERING,
Treasurer.

FINANCIAL STATEMENT.

SWEDENBORG SCIENTIFIC ASSOCIATION, MAY 31, 1905.

RECEIPTS.

Balance on hand as per last report, ..	\$126 31	
Membership dues,	\$197 00	
Subscription to <i>New Philosophy</i> , ...	144 52	
Special Contributions,	4 87	
Advertisements,	12 00	358 39
Sale of Summary of Principia,		26 25 \$510 95
		<hr/>

EXPENDITURES.

Printing <i>The New Philosophy</i> , 4 issues, \$199 96		
Paper for <i>The New Philosophy</i> , 5		
Reams,	15 00	
Addressing Envelopes,	4 00	
Express and Postage,	13 98	
Sundries, Stationery, etc.,	6 48	
Paper and Cover for Fascicle I, Part		
II, of Swedenborg's Frag-		
mentary Treatises,	9 00	248 42
		<hr/>
Balance		\$262 53

SWEDENBORG MSS. ACCOUNT.

Balance as per last report,	\$131 22	
Amount charged to S. S. A., prop-		
erly belonging to Phototyping		
Account,	16 87	\$148 09
Expenses <i>De Sale</i> , printing 33 pp.		
and plates,		67 10
		<hr/>
Balance,		\$80 99
" <i>Worship and Love of God</i> " Account:—		
Balance as per last report,		\$13 10
Mr. Welsh's conditional contribution		
to publishing the Principia, .	\$50 00	
Returned to Mr. Welsh,	50 00	
		<hr/>
Total Balance,		\$356 62

RECAPITULATION.

Total Balance as per last report,	\$320 63
Total Receipts,	401 51
	<hr/> \$722 14

EXPENDITURES.

<i>The New Philosophy</i> , Swedenborg Treatises, etc.,....	\$248 42
Scientific MSS. Account,	67 10
Mr. Welsh,	50 00
	<hr/> \$365 52
Balance as per Cash Book,	\$356 62
Audited and found correct.	
New York, N. Y., June 5, '05.	

GEO. M. COOPER,
L. P. MERCER.

REPORT OF THE BOARD OF DIRECTORS.

1. SINCE the last annual report of the Board of Directors, two meetings have been held, one on May 2, 1904, at 3:30 P. M., in Washington, D. C., the other on June 5, 1905, at 10:00 A. M., in New York.

2. At the meeting in Washington, Dr. Harvey Farrington was unanimously elected Editor of *The New Philosophy* for 1905.

3. Professor Dr. Gustaf Retzius, President of the Swedenborg Committee of the Royal Swedish Academy of Sciences, was nominated for honorary membership in the Association.

4. The name of Mr. Robert B. Caldwell, Jr., was added to the Committee on the Publication of Swedenborg's Scientific Manuscripts.

5. At the meeting of the Board held in New York the resignation of the Rev. Alfred Acton from the Committee on the Transcription and Translation of the "Lesser Principia" was accepted, and Mr. Alfred H. Stroh was appointed on the Committee.

6. The nomination of Professor Dr. Retzius for honorary membership in the Association was referred to the Association.

7. All reports and communications were referred to the Association.

ALFRED H. STROH,
Secretary pro tempore.

REPORT OF THE EXECUTIVE COMMITTEE.

THE Committee has held two meetings, one in Philadelphia, one in New York.

The place of the annual meeting being fixed by vote of the Association (M. 440) last year, the time was left to the Executive Committee to decide upon. After correspondence with the members of the Board and considering the obstacles and the advantages presented on either hand, the present date was determined upon, and call issued accordingly. The unforeseen obstacles preventing the attendance of a considerable number, including members of the Board, raise the question whether the time and place of the annual meeting should not be determined by the Association itself, and the members' plans be arranged accordingly in view of fixing a date.

The Executive Committee have placed in the hands of Mr. Alfred H. Stroh the matter of the exchange of publications with the Royal Swedish Academy of Science (M. 445).

In the matter of the incorporation of the Association and adoption of a name, referred to in minutes 447, 450, the Committee would report the following resolution for adoption:

"Voted, that it is desirable that this Association be incorporated, and that the Directors of the Association are hereby authorized to incorporate the same, under the laws of the State of New York, with the corporate name of 'Swedenborg Scientific and Philosophical Association,' for the purposes stated in the Constitution."

As preliminary to the carrying out of this resolution the following Amendments to the Constitution are recommended for the action of the BOARD OF DIRECTORS, and thereafter of the Association:

"Resolved, That Article V of the Constitution be amended by striking out the word 'annually,' changing 'time' to 'times,' and 'place' to 'places,' and by adding the following sentence at the end:

"At any meeting of this Association nine members shall constitute a quorum."

For the reason for these recommendations we refer to the Report of the Committee on Incorporation printed in the Journal of last year's meeting, *New Philosophy*, p. 104.

The proposal of Mr. Stroh to publish a series of translations in English of minor scientific and philosophical fragments and combine them when completed in a volume to be entitled "Swedenborg's Scientific and Philosophical Treatises" was approved by the Executive Committee, and a beginning is made in this series as reported in Mr. Stroh's report. The first Fascicle is presented at this meeting, and the MS. for Fascicle II is in the hands of the printer.

FRANK SEWALL,
C. E. DOERING.

REPORT OF THE EDITOR OF "THE NEW PHILOSOPHY."

FOUR numbers of *The New Philosophy* have been issued since the meeting of the Association last year, comprising in all one hundred and fifty-two pages, thirty-nine of which were translations from Swedenborg. An installment of Prof. Price's translation of "De Sensibus" appeared in each issue excepting that for July, which constituted the usual Bulletin. Larger installments would have been published, but the translator was unable to furnish them.

On account of the large amount of the material furnished by the meetings last year, the editor was obliged to hold over the Communication from the Swedenborg Philosophy Club of Chicago, the List of Members, and the Constitution and By-Laws, until the October and January numbers.

The New Philosophy could be made much more efficient as the official organ of our Association if the members would contribute more freely to its pages. We need more good, solid articles on topics dealing with Swedenborg's science and related subjects, but short articles, notes and comments, are always acceptable, and help to make the paper interesting and instructive. The editor strongly urges the members of the Association to take this matter under consideration.

Respectfully submitted,

HARVEY FARRINGTON, M. D.,
Editor.

Chicago, June 1st, 1905.

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

It is gratifying to your Committee to be able to announce that the revision of the English translation of the *Principia* by the English members of the Revision Committee, Messrs. Tansley and Rendell, is completed, and that the work is ready for the printing; and the arrival of proofs for reading by the American revisors is daily looked for. The Secretary of the English Committee desires especially the services of Professor Riborg Mann in this final revision, and he has kindly consented to give them, as he has already done the chief work in the revision on the American Committee.

The Secretary of the English Committee announces that efforts are being made "to arrange with Prof. Arrhenius, who is editing and furnishing an introduction to the Latin edition of *The Lesser Principia*, for an introduction suitable for inclusion in our English edition of *The Principia*, and intended to bring out the points of contact which it contains with the science of the present day." The Secretary also writes:

"Whilst giving you this information it is not intended to interfere with your right to have the copies for your markets, according to your own policy, that is, without such an introduction. We mention it simply for your information as to our action, which embodies our wishes in this matter."

We congratulate the Association, therefore, on the prospect of seeing the new edition of the *Principia* in print before another annual meeting.

FRANK SEWALL,
Chairman.

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

Rev. Frank Sewall, D. D., President Swedenborg Scientific Assoc., 1618 Riggs Place, Washington, D. C.

Dear Sir:—The Committee on the revision of the *Animal Kingdom* begs to report that the first volume has been completed.

Respectfully,

C. E. DOERING,
Chairman.

Bryn Athyn, Pa., June 1st, 1905.

REPORT OF THE COMMITTEE ON THE TRANSLATION OF "THE SENSES."

Rev. Frank Sewall, President Swedenborg Scientific Association:

Dear Sir:—I hereby report that work of translating the fourth part of the *Animal Kingdom*, entitled in the original, *De Sensibus*, is going very slowly (but I hope certainly) forward. I have now reached No. 22 of Chapter 5, on the *Ear and Hearing*.

Respectfully submitted,

ENOCH S. PRICE,
Committee on Translation of *De Sensibus*.

Bryn Athyn, May 20, 1905.

REPORT OF THE COMMITTEE ON THE TRANSCRIPTION AND TRANSLATION OF THE "LESSER PRINCIPIA."

To Rev. F. Sewall, Pres. Swed. Scien. Association:

I BEG to report that owing to lack of time I have been unable to do any work on the *Lesser Principia* during the past year; and as I see little prospect of being able to resume the work during the coming

year, I would respectfully request to be relieved of membership on this committee,

Respectfully submitted,

ALFRED ACTON,
Chairman.

June 5th, 1905.

REPORT OF THE COMMITTEE ON THE PUBLICATION OF SWEDENBORG'S SCIENTIFIC MANUSCRIPTS.

To Rev. F. Sewall, Pres. Swed. Scien. Association:—

THIS Committee begs to report progress in the printing of the MS. *De Sale*, which was resumed last Christmas. Over half the text has been printed, and about 15 of the illustrations, of which there are about 20 in all.

No printing was done during the summer owing to my absence in England. During that time, however, I made a careful comparison of the MS. with authorities—many of them rare—preserved in the British Museum, and was thus able to clear up several obscure readings. The comparison also showed that the MS. contains more quoted matter than at first sight appears to be the case. Several cases were found where quotations are made without any mention of the source.

Respectfully submitted,

ALFRED ACTON,
Chairman.

June 5th, 1905.

REPORT OF THE COMMITTEE ON THE TRANSLATION OF SWEDENBORG'S EARLY SWEDISH SCIENTIFIC TREATISES.

To the Swedenborg Scientific Association:—

As chairman of the Committee on the translation of Swedenborg's early treatises in the Swedish language, I have to report that the Rev. Emil R. Cronlund, of Toronto, Ont., has undertaken the work of translating the *Dædalus Hyperboreus*; he has thus far translated four chapters of this interesting and important initial work, and expects to proceed as rapidly as his time will permit.

Mr. Alfred H. Stroh will report to you the other little treatises in Swedish which he has recently translated, and which leave but a few minor tracts yet to be rendered into English, the *Algebra* having been translated by Mr. Cronlund some years ago.

Respectfully submitted,

C. TH. ODHNER.

Bryn Athyn, Pa., June 3d, 1905.

REPORT ON THE PRINTING OF SWEDENBORG'S SCIENTIFIC WORKS IN SWEDEN AND AMERICA.

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

THE present report is in continuation of the one sent last year. (See *The New Philosophy*, July, 1904, pp. 102-104.)

There is nothing to report this year concerning the copying of Swedenborg's scientific manuscripts. Up to the present time no further copying has been done, although considerable progress has been made with the printing. The shorter copies of manuscripts which were made by or for the writer, and which are the property of the Association, have, in agreement with the permission of the Association, been retained for use by the Swedenborg Committee of the Royal Swedish Academy of Sciences. That body has continued the printing of the two volumes mentioned in last year's report, as follows:

Of Volume I., Part IV. of the *Miscellanea Observata* has been printed and the *Expositio Legis Hydrostaticæ* is in type, making altogether 179 pages of Volume I. Of Volume II. the *Lesser Principia* has been printed, while the *Argumenta Quædam in Principia Rerum Naturalium* and the *Summarium Principiorum Rerum Naturalium* are in type, making altogether 262 pages of Volume II. The *Expositio Legis Hydrostaticæ* (*An Exposition of a Hydrostatic Law*) has hitherto been accessible in the *Acta Literaria Sueciæ* for 1722, and in an English translation contained in the Appendix to the *Miscellaneous Observations*. (See the *Documents*, Chronological Account, No. 35.) The *Argumenta Quædam in Principia Rerum Naturalium* (*Some Arguments for the Principia*) has hitherto been accessible in the photolithograph and in an English translation by the Rev. Reginald W. Brown, published in Volume III. of *The New Philosophy*. The new title given above has been supplied by the editor, for Swedenborg did not give the *Arguments* a title. (See the *Documents*, Chronological Account, No. 40.) The *Summarium Principiorum Rerum Naturalium* (*Summary of the Principia*) has hitherto been accessible in the photolithograph and in an English translation published by the Association last year. The arrangements for editing and printing have been the same as before.

According to the plans of the Committee, the scientific correspondence of Swedenborg and other materials are to be included in these volumes, and therefore efforts have been made to bring to light unknown letters of Swedenborg. With this end in view notices were inserted in the *Publishers' Weekly* and the *Library Journal*. Anyone knowing of letters by or to Swedenborg, or of any manuscript materials by him, is invited to communicate with the Secretary of the Association or with the undersigned.

Through the good offices and energetic efforts of Mr. Horace P. Chandler the printing of the new edition of the *Worship and Love of God* has been undertaken by the Rotch Trustees and the Massachusetts New Church Union. 115 pages of corrected page-proofs have been finished. Dr. Frank Sewall has continued to revise the materials, and has completed the Second Part and the Fragment of the Third Part. As before, when the material has been finally revised by the writer, the copy is sent to the printer. A number of valuable suggestions have been received from Dr. E. A. Whiston, through whose hands all proofs have passed.

During the past year the Executive Committee approved of a plan to begin the printing of a volume of *Scientific and Philosophical Treatises* by Emanuel Swedenborg; the volume having been planned to consist of two Parts and to be published in fascicles. The First Part has been planned to contain materials on Chemistry, Geology, Physics and Cosmology, the Second Part materials on Anatomy, Physiology, Psychology and Philosophy. The first fascicle of Part II. is in print and fills sixty pages. The treatises contained are:

1. *On the Infinite, the Indefinite and the Finite.*
2. *On the mechanism of the soul and the body.*
3. *Observations on the human body.*
4. *The way to a knowledge of the soul.*
5. *Characteristic and mathematical philosophy of universals.*
6. *Corpuscular philosophy in brief.*

At the beginning of each treatise a foot-note has been added giving the most important historical and bibliographical references. Nos. 1 and 2 have hitherto been inaccessible in English; after some revision Nos. 3, 5 and 6 have been reprinted from *The New Philosophy*, and No. 4 from the first edition of the *Posthumous Tracts*.

The copy of the first fascicle of Part I. has been sent to the printer and will contain:

1. *On the causes of things.*
2. *On the nature of fire and colors.*
3. *Remarks on mussels, snails, etc., in limestone; and also on slate.*
4. *On the height of water and the strong tides in the primeval world.*
5. *On the falling and rising of Lake Venner.*
6. *Swedenborg's Letter to Jacob a Melle.*

No. 4 has hitherto been inaccessible in English; Nos. 1, 2, 3, and 5 have been reprinted from *The New Philosophy*, and No. 6, after some revision, from the Appendix to the *Miscellaneous Observations*.

The publication of the "Memoir respecting Emanuel Swedenborg as a Scientist and Natural Philosopher," which is in the hands of the printer, has been delayed, and some recent materials will be added.

Respectfully submitted,

Bryn Athyn, Pa., May 30th, 1905.

ALFRED H. STROH.

COMMUNICATIONS.

COMMUNICATION FROM THE SWEDENBORG PHILOSOPHY CLUB OF CHICAGO.

To the Swedenborg Scientific Association:—

At the May meeting of this Club the Secretary was instructed to send you a report of our work for the year, and to communicate the greetings and good wishes of our members to the Association in annual meeting assembled. And while we are not prepared to give a detailed account of the actual studies of the Club, as in our report last year, it may prove of interest to state briefly what we have done at our meetings.

Last September we were much pleased to have a visit from President Sewall, who, together with Mr. Alfred H. Stroh, spent an evening with us, and lectured to a gathering of about 50 persons. Mr. Sewall spoke extemporaneously, and gave a most interesting outline of Swedenborg's philosophical system, showing especially the value of his teachings in practical life and religion. He also spoke of the present state of recognition in the world, and, among other things, said:

"Swedenborg's system of philosophy is marvellous in its completeness. He divides creation into two general heads, spirit and matter, or into physics and psychics, and with this clear distinction always before him, he is never confused, as all modern fads are. He began with the physical world in the *Principia*, and advanced toward the psychic world, of which he treats in the *Animal Kingdom*, especially in the part on the *Soul*. Here we find the elements of all true psychology. Here he puts the soul on high like a queen upon her throne. . . . In the *Principia* we have the germs of all physical science, in the other works the germs of all true psychology. It is impossible for us to get away from Swedenborg in our studies. Many of you, no doubt, in the various branches of your labors, find this so. This might be taken as an assumption, but I repeat, that of all great principles that you find elsewhere you will find the germs in Swedenborg's system, wherever they may have appeared before. And it is wonderful when we reflect how everything throughout his writings is in unity with the rest, and how perfect a harmony results when we view all things according to the great doctrine of degrees, as set forth in both his scientific and theological works."

At the conclusion of Mr. Sewall's remarks, Mr. Stroh addressed the meeting upon the subject of his labors in Sweden in the cause of pre-

serving and transcribing the Swedenborg manuscripts, illustrating his remarks with photographs and other interesting mementoes, and exhibiting samples of the works now being published by the Royal Academy of Sciences.

In October the Rev. L. P. Mercer read a paper before the Club and numerous visitors on the subject of the *Worship and Love of God*, giving a very fine resume of that poetic work.

During the winter we continued our studies of the *Economy of the Animal Kingdom* under the leadership of Rev. R. W. Brown, who delivered lectures upon the subjects of fire, heat and light, and color, in connection with the study of the blood.

Respectfully submitted,

W. B. CALDWELL,

Secretary pro tem.

Chicago, June 2d, 1905.

OFFICERS AND COMMITTEES FOR 1905-1906.

PRESIDENT.—REV. FRANK SEWALL, A. M., D. D., 1618 Riggs Place, Washington, D. C.

SECRETARY.—REV. EUGENE J. E. SCHRECK, A. M., 6949 Eggleston Avenue, Chicago, Ill.

(Minutes 248, 290, 399.)

TREASURER.—REV. CHARLES E. DOERING, A. M., Bryn Athyn, Montgomery Co., Penna.

(By-Law 3; minute 160.)

BOARD OF DIRECTORS.

The President, the Secretary and the Treasurer, *ex-officio*.

Rev. L. P. Mercer, cor. Oak and Winslow Sts., Cincinnati, O.; Mr. Marston Niles, 140 Nassau St., New York; Mr. Horace P. Chandler, 53 Devonshire St., Boston, Mass.; Rev. Alfred Acton, Bryn Athyn, Pa.; Dr. George M. Cooper, Bryn Athyn, Pa.; Dr. Harvey Farrington, 815 Marshall Field Building, Chicago, Ill.; Dr. Ernest A. Farrington, 1626 Walnut St., Philadelphia, Pa.; Mr. Robert B. Caldwell, Jr., 1016 Penn Ave., Pittsburg, Pa.; Mr. Alfred H. Stroh, Bryn Athyn, Pa.

(Reference, 475, 498.)

EXECUTIVE COMMITTEE.

The President, the Secretary and the Treasurer, *ex-officio*.

EDITOR OF "THE NEW PHILOSOPHY."

Prof. Harvey Farrington, M. D.

COMMITTEE ON A NEW EDITION OF THE "PRINCIPIA."

Rev. Frank Sewall, Prof. C. Riborg Mann, Mr. Alfred H. Stroh,
Rev. C. Th. Odhner.

(Reference, minutes 429, 439.)

COMMITTEE ON A NEW EDITION OF THE "ANIMAL KINGDOM."

Rev. C. E. Doering, Dr. Harvey Farrington, Mr. Alfred H. Stroh.

COMMITTEE ON THE TRANSCRIPTION AND TRANSLATION OF THE "LESSER
"PRINCIPIA."

Mr. Alfred H. Stroh, Rev. Charles E. Doering.

(Report Board of Directors, 1903, section 3.)

COMMITTEE ON THE TRANSLATION OF "THE SENSES."

Rev. Enoch S. Price.

COMMITTEE ON THE TRANSLATION OF SWEDENBORG'S EARLY SWEDISH
SCIENTIFIC TREATISES.

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

COMMITTEE ON THE PUBLICATION OF SWEDENBORG'S SCIENTIFIC MANU-
SCRIPTS.

The President, the Treasurer, the Rev. Alfred Acton, Mr. Arthur
W. Burnham, Mr. Horace P. Chandler, Mr. Alfred H. Stroh, Mr.
Robert B. Caldwell, Jr.

(Minutes 288, 345-347; *New Philosophy*, July, 1901, p. 85.)

KEEPER OF THE ARCHIVES.

The Secretary.

(Minutes 291, 292, 443.)

COMMITTEE ON INCORPORATION.

Rev. C. E. Doering, Marston Niles, Esq., Paul Synnestvedt, Esq.

CONSTITUTION AND BY-LAWS OF THE SWEDENBORG
SCIENTIFIC ASSOCIATION.

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.

Honorary members may be elected on recommendation by the Board of Directors.

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.

NOTES AND COMMENTS.

THE GLACIAL THEORY.*

SIR HENRY H. HOWORTH'S work on the Drift Beds, entitled *The Glacial Nightmare*, is notable for several things. His own comment is marked by that large common sense which Goethe says is indispensable to a scientist, if he is not to be ranked, by the judgment of a wider range of facts, as the brilliant leader of a false start. It contains a resume,—scholarly, capable and honest, of the gist of observation and deduction made by students of the subject,—a full storehouse of the historical side, and in which, as the author trusts, "justice has been done to some men at least . . . whose keen eyes and whose sound judgment it has been the fashion to decry." It is interesting to lovers of Swedenborg, both because of the strong position he takes against the modern forcing of the Glacial theory, and for the finely accurate summary of Swedenborg's own statement, which is properly credited,—a rare thing, as few of Swedenborg's outside readers are scrupulous in keeping the scientific decalogue which Howorth says "prescribes, *inter alia*, that the man who first makes a scientific deduction is entitled to the credit of it."

Howorth quotes, as the motto of his own investigations, from Adam Sedgwick: ". . . the language of theory can never fall from our lips with any grace of fitness, unless it appear as the simple enunciation of those general facts with which, by observation alone, we have at length become acquainted;" and in the pursuance of study along these lines he has come to stand for the Diluvial theory of Drift phenomena as against the Glacial.

Some quotations illustrating the boldness of his challenge to the reigning theory may be interesting. The preface opens:

It is a singular and a notable thing, that while most other branches of science have emancipated themselves from the trammels of meta-

**The Glacial Nightmare*; by Sir Henry H. Howorth, K. C. I. E., M. P., F. G. S., Sampson Low, Marston & Co., London. 2 vols. 1893.

physical reasoning, the science of geology still remains imprisoned in a *priori* theories.

And later he adds :

I hold that the Glacial theory, as ordinarily taught, is based, not upon induction, but upon hypotheses, some of which are incapable of verification, while others can be shown to be false, and it has all the infirmity of the science of the Middle Ages. This is why I have called it a *Glacial Nightmare*. Holding it to be false, I hold further that no theory of modern times has had a more disastrously mischievous effect upon the progress of Natural Science. It is not merely in the domain of geology that its baneful influence has been felt. We cannot take up a text-book, in which the profound problems of Biology are treated,—problems like the distribution of animals and plants, the pedigree of life, the origin, and beginnings of the human race,—without being impressed with its influence as a factor. In all these and many other inquiries, the postulate of an ice age forms a necessary element of current theories.

The arguments of Lyell and his school, Howorth thinks, are also inadequate to explain “the superficial mantle of gravel, clay, sand, etc., which covers the ragged and ruined surface of the older rocks, and gives to the earth its generally smooth and undulatory outline,” and he continues:—

My own conclusion largely involves a return to the views of those older geologists who wrote before the world was dazzled by the extravagant development of the Glacial theory, and because their careful labors have been recently ignored.

With the argument of Uniformity in Nature’s action at the basis of the Glacial theory, he takes square issue, so far at least, as concerns vigor or intensity of operation; and he cleverly quotes Conybeare’s translation of that argument as applied to geology: “Because a child grows two inches every year, therefore, that is the normal growth of a human being during the three-score years and ten which are his allotted pilgrimage.” For himself he adds:—

My masters, Sedgwick and Murchison, taught me a very different lesson which I have seen no reason whatever to unlearn. They taught me that no plainer witness is to be found of any physical fact than that nature has at times worked with enormous energy and rapidity, and at others much more evenly and quietly, and that the rocky strata teem with evidence of violent and sudden dislocations on a great scale.

That these catastrophes were aimless and lawless I do not believe. On the contrary, they were the result of law, but of a law whose tendency we have not yet perhaps duly measured, and whose key we might perhaps have discovered if we had not been pursuing the fantastic shadows of metaphysical reasoning for so many years. The earth seems to me to be full of evidence of intermittent violence and repose. In facing the solution of the Drift problem I must be taken therefore to postulate, not merely the possibility of catastrophes, but to maintain that they have occurred frequently in the world's history. Secondly, I would claim that while the Glacial theory makes demands upon the powers of ice which are inconsistent with its proved qualities and cannot be made to fit in with the facts which have to be explained, the power to which I appeal makes no demands whatever upon any force but that of which we can establish the competency, both by direct experiment and by theoretical calculation, and, that so far as we know, it explains all the facts. Thirdly, this explanation is one which was deemed satisfactory and complete by the Fathers of Geology, men who were quite as keen observers and quite as keen critics as their descendants, and who were also more independent and less dominated by official orthodoxy in science. For a long time some of the most brilliant masters of our science were advocates of the Diluvial theory as an adequate explanation of the facts. . . . Lastly, I claim to have established the necessity of this appeal on entirely different grounds. [No other so adequately and directly accounting for the general distribution of the Mammoth, etc.—L. B.]

An outline of the theory is given somewhat in detail, showing the auxiliary place of glacial action in the Diluvial operation, which may be summed up in brief as the early existence of glaciers upon the highest lands all over the globe, these glaciers in all latitudes being bordered by wide plains and forests in which lived the mammoth and mastodon and their hunters,—as the apteryx now lives in the luxuriant forests near the great glaciers in New Zealand. Then came the catastrophe caused probably by the sudden upheaval of some of the larger mountain chains, accompanied by vast subsidences of land elsewhere; this breaking up and change of the earth's crust, causing great oceanic waves of translation, overwhelming the land; drowning the living creatures and covering them with continuous layers of loam and clay, gravel and sand, as we find them covered; and also taking up the blocks of stone fashioned by the glaciers and transporting them to various distances, to be helped and piled according to wind

and tide; or scattered widely abroad. He denies strenuously, however, that his work can legitimately be used to support the Bible statement of a Deluge; which indeed he alludes to as "an early example of a widespread tradition, and nothing more." He claims his own work to be simply "an inductive argument from the facts," and merrily says, in allusion to the audacity of his position:—

The men of water had been long ago dispersed and scattered; the men who would dare to appeal to cataclysms and catastrophes are few indeed. Those who would venture to jeopardize their character for scientific sobriety by reviving and extending the views of the geologists of fifty years ago on great diluvial movements, are not to be found anywhere. Whether right or wrong in his conclusions, it is perhaps well that, among the erratic heretics who are careless of prestige and indifferent to conventional opinion, one should occasionally be found to challenge the dominant creed by assailing its foundations.

In the first chapter occur the mention of Swedenborg and a summary of his theory on the subject. After speaking of the innumerable boulders strewing the whole of Northern Europe, —and especially Sweden,—he continues:

The first scientific person, so far as I know, who referred to these moss-grown wanderers was that very remarkable man, Emanuel Swedenborg. The latter part of his life was so entirely devoted to the mystical and visionary schemes which culminated in the foundation of the Church of the New Jerusalem, that it will be news to many people to learn that in his earlier days he was an acute and distinguished man of science, a member of the Academies of Upsala, Stockholm and Petersburg, and that he filled the post of Assessor of the School of Mines in Sweden, and this at a time when Sweden was the nursing mother of modern Natural History. It was this official position that doubtless brought him into contact with the geological aspects of the surface deposits of the North, which he was the first to publish and to treat seriously. *Inter alia*, he not only refers to the boulders which are so conspicuous in Sweden, but he connects them with other phenomena, such as the long whale-backed ridges of sand and stones known to the Swedes as "asar," and he assigns a cause for both.

Then follows an excellent resume of Swedenborg's observation and arguments, as published in 1719-1722, which includes his theory that the sea was the active agent in positing both the asar and the scattered boulders, his deduction as to the

prevalence of the same winds in the Diluvial age as now; the greater height of the ocean then; his appeal to the principles of hydraulics to prove that the sea could have done this kind of work, as its pressure depends on its depth, being more considerable at a greater than at a lesser depth; and its trans-latory power being augmented by the fact that—"although stone, when in the air, is heavier than water as $2\frac{1}{2}$ is to 1, it is only $1\frac{1}{2}$ to 1 when immersed in fresh water, and still less in salt." On these grounds he concludes the phenomena of the boulders and the "asar" to be explained by the operation of the Diluvial waters. With this conclusion Howorth concurs, illustrating and expanding it by many details of recorded observation in the two dignified and interesting volumes of the work before us, a work well worthy of consideration by the students of Swedenborg.

LILLIAN BEEKMAN.

NEW REFERENCES TO THE "LIMBUS."

On page 67 of *The New Philosophy* for 1904, reference was made to the treatment of the "limbus" of Swedenborg in his manuscript *On the Mechanism of the Soul and the Body*, which has been printed by the Association in an English translation. Special attention was called to the active space inside the first elementary particle in connection with the composition and degrees of the "limbus." An extended analysis of this most interesting subject is impossible here, but it may be useful to note a few salient features of the manuscript material.

Swedenborg says in no. 11 of this work: "*That the soul is bound by rules, that it is bound by mechanical rules, and that it may be explored by mechanism and geometry*"; and from what immediately follows it appears that Swedenborg considered all things, and among them the soul, to be created and thus finite, that is, all things save the infinite; and since space and figure are predicable of all things which are finite it follows that they are mechanical and geometrical; thus the soul is natural.

In no. 12 Swedenborg says: "*That the rational soul consists of actives of the first and second [finites], that they form little spaces, and round about there are surfaces from passives or finites*." Continuing, Swedenborg says that the soul is most active, being formed like the first elementary particle with actives of the first [finite] on the inside, and

second finites on the outside; thus there is a most subtle membrane within which are the actives, the soul being thus constituted,—the surfaces being joined together and forming an extense. The soul is thus an expanse which is distributed throughout the body. (No. 13.) The souls of brutes consist of grosser expanses, for they cannot have the actives of the first and second [finites]. (No. 14.)

In no. 15 Swedenborg says: "*That this expanse cannot be dissolved or broken without the parts or the whole betaking themselves into a globe or into themselves, so that it may lie together.*"—"Such a soul flowing together will occupy a least space" (No. 17).—"Such a soul can be hurt by no element or by fire" (n. 18).—"That thus conglomerated, it may expand itself again" (n. 19).—There are many further statements concerning the souls of men and of brutes, the distribution of the soul throughout the body, its activities and means of communication, etc., etc. At the close of the manuscript the immortality of the soul is treated of as follows:

"48. *When the man dies the soul lives*, because it cannot perish, since it consists of such subtle parts, which cannot putresce, neither perish by fire, nor by air, nor otherwise; therefore it remains.

"49. *That by death and by putrefaction* a great part of it perishes, or is dissolved from the remaining nexus; it follows the putrefied parts.

"50. *That the soul after death betakes itself in time more and more into a one* and separates itself from the grosser parts, no otherwise than the blood; the nexus being loosened, it can go together into a one, and in place of the tunic it will remain in one place.

"51. *That the ultimate which thus remains is the soul*, which in the course of time separates itself from grosser things; hence finally going together, it is the living soul.

"52. *That with the angels mediating* it thus comes into heaven; without their mediating I do not know whether it could thus live; therefore it is carried into heaven by the angels, when it has undergone its lustration.

"53. * * *; neither does it harm that parts are separated thence; for that which finally is the residuum is nevertheless the soul."

From this material, and also from other passages where the soul is treated of, it appears that the "soul," as Swedenborg here defines it, is composed of just those substances of which the "limbus" of the theological works would consist, namely, the highest natural substances, or the "purests" of nature. The student of the *Principia* will note that no substances are mentioned as composing it which are lower in degree than those of the sun and the first elementary particle; thus we may conceive of a trine in the "limbus," consisting of the point, the first finite, and the second finite, together with their actives.

A. H. S.





THE SALT PARTICLE OF SWEDENBORG.

The lower figure shows the cubical shape of the crystal, with the eight acid triangles affixed to its corners. In the upper figure the lateral concavities formed by the water globules are well represented.

THE NEW PHILOSOPHY.

VOL. VIII.

OCTOBER, 1905.

No. 4.

IN GENERAL CONCERNING THE MOTION OF THE ELEMENTS.*

BY EMANUEL SWEDENBORG.

1. *In each element, taken separately, there are four kinds of motions.*

1. There is the *local motion* of the particles of each element considered separately, or a translatory motion, which takes place when the particles, or the volume of particles, are borne in one tenor, order and fluxion from place to place through a straight line or some other line; in some elements such a motion is visible or recognizable by its effect, and is called fluidity, and the element is truly moved.

2. There is the *undulatory motion*, which takes place when the volume of elementary particles, considered as to volume, is quiescent, but each particle *per se* is moved in an undulatory

*Now first translated by Alfred H. Stroh from the Photolithographic reproduction of the original, entitled, "*Generaliter de motu Elementorum*," contained in the *Photolithographs* of Swedenborg's MSS., Vol. III., pages 79-83. Dr. R. L. Tafel, in the *Documents*, Vol. II., Part II., pages 872 and 906-907, refers briefly to this manuscript, and states that it is contained in Codex 88, pages 3-7.

"In the Chronological Account" he lists it as number 39, assigns to it the date 1724-1733, and remarks that the subject of the paper, motion, "is considered by the author first in inorganic, and afterwards in organic nature; where he shows how it affects the membranes and tunics in the body."

The manuscript was no doubt written a short time before the *Principia* was published; it is an excellent synopsis of the many works by Swedenborg on the same subject.

manner, one particle acting on another, which motion is not local, as is the former one, but reciprocal; there is indeed a certain transfer of the centre, but there is a return to the same place. Such a motion may also be extended and spread to a great distance; it arises from various causes, especially from the contiguity of elastic particles, or from elastic membranes of the above mentioned particles put into motion.

3. The third motion is *tremulatory*, and it is a motion in the surface of the particle, considered separately, which motion cannot be called local as to the centre of the particle, but only as to its surface. This motion among particles enjoying an elastic surface may also be extended to a distance.

4. There is a certain pressure, or an *effort of the particles arising* from pressure, to this or that quarter, which effort arises from some pressing or moving source, and it extends itself to a great distance by means of the continuity of the particles. Meanwhile the particles are quiescent and remain in their position, but as soon as occasion is given or when there is a decrease of resistance, the pressure is wont to show itself. The case does not differ from that in which a rod, when pressed [at one end], also presses at the other, which is shown as soon as there is a decrease of resistance. Such is the pressure of all elementary particles moved into a vortex, likewise of particles pressed by the mass and altitude of superincumbent particles, etc.

2. *The whole elementary system must, necessarily, consist of smaller and larger particles, of which one [kind] is moved and pressed differently from another, the larger by the lesser order, the lesser by the larger, in which consists their connection and natural fluxion, and from which the varieties of motion are presented.*

1. If a smaller particle be moved locally or in a translatory manner, that is, from place to place, it is carried about within a very small space; on account of which the larger particles may undulate or be moved in an undulatory manner, or reciprocally from place to place according to an exceedingly small interval.

And from the undulation of the larger particle, or third particle, which is still larger, may be moved in a tremulatory manner, or as to its surface.

2. If a large particle be moved in a trumulatory manner, a smaller particle may undulate, and one which is still smaller may be transferred from place to place.

3. One and the same particle may be carried about locally, and also at the same time in an undulatory and tremulatory manner.

4. If a large particle be carried about locally, as a result smaller particles may also be carried into a local motion.

5. The pressure or effort of one element cannot, it would seem, communicate any effort to another element, unless the pressure or effort be in the smaller particles; then also the larger particles ought to be put into an effort thither: but not reciprocally.

3. *In the animal kingdom are exhibited the same motions which were mentioned above, with elements as well as membranes prepared and adapted for the mediation of the enclosed elements, in order that there may be a difference between the motion in an animal body and that in an elementary body, and in order that there may be the same diffusion of motion from membrane to membrane, the enclosed elements also lending aid, which elements put the formed and tense membranes into the same motion.*

1. Local motion cannot exist in the elements themselves, but the element which is involved and invested by the membranes, may be transferred locally from one place to another, either to a fixed boundary, or in a circle, as the blood, and perhaps various other fluids.

2. The membranes may be moved in an undulatory manner, but more or less, however, by the aid of the elements, which are enclosed in the membranes; it seems that herein the one acts upon the other reciprocally.

3. The membranes may be moved in a tremulatory manner, not only because the enclosed elements act in a tremulatory manner upon the membranes, but also because mem-

branes which are equally subtle, contiguous and connected, act upon the enclosed elementary particles.

4. There is also pressure and effort in the membranes and in the elements enclosed in them, which, when they finally receive an unequal resistance, are carried into motion according to the effort and the direction given.

4. *There are in the animal body smaller and larger membranes, just as there are smaller and larger particles in the elementary system, some more subtle, others more gross, which elements, being connected with each other, can transfer a motion impressed from a grosser medium into one which is more subtle, and hence into the most subtle medium, and reciprocally, the enclosed elements also mediating, whence it follows:*

1. That some local motion, or one which is similar to a local motion, in a least membrane, may excite some undulation in a grosser membrane.

2. And that an undulation in a [least] membrane may excite some tremulation in a grosser membrane.

3. And that a tremulation of a grosser membrane may excite an undulation in a more subtle membrane, and so forth.

4. That a motion may thus be transferred from a most subtle membrane into a grosser one, and from a grosser into a subtler one; that a motion can exist in most subtle [membranes] which does not exist in grosser ones, and vice versa, and that there is a connection of motions in the most subtle and in the grossest membranes.

In a word, the same qualities of motion exist in membranes, which exist in elements, and the animal body is membranous and likewise elementary, and there is a complete harmony of both [membranes and elements].

5. *That the membranous system is contiguous and everywhere coherent through the whole animal body, and thus there is a continuous nexus of all things by the membranes.*

1. [The membranous system] clothes all hard things on the inside, as the cranium and the bones.

As also the nerves and fibres, and their tendons taken to-

gether and singly, on the outside and inside of their texture.

As the cerebrum, cerebellum, glands and certain appendices of the brain, etc., and thus, by the particles of a most subtle liquid, the cortical and medullary substances.

2. Also liquids, as the blood and juices, which are enclosed in the membranes, which flow variously, partly within those walls.

3. Also more subtle elementaries, which can all flow and be moved within their membranes according to their quality.

So that, except the bony and fluid [portion], the whole sensitive system is merely membranous.

6. *There are grosser and subtler membranes in the animal body, and there are various kinds of those membranes according to dimension.*

1. The membrane which is bony, as it were, is the hardest.

2. The second membrane is that which clothes the arteries and veins, which usually consists in part of a ramification of nerves; but it should rather be called a skin or tunic.

3. The third is the dura mater.

4. The fourth is the pia mater.

5. There is a fifth, which is still subtle, which clothes the subtler parts of the pia mater, and which here and there proceeds from it into the most subtle places and organs.

6. There is a sixth, which is still more subtle, which in like manner goes forth from the proximate subtler [membrane].

7. As many as are the elements in their order, so many are there grosser and subtler membranes in their order.

7. *One and the same membrane consists of parts, or of grosser and subtler membranes, which include in their order the grosser and subtler elementary particles.*

1. Meninges consist partly of nervous tissue, or there are grosser membranes and tunics, which enclose the arteries and veins and their subtler extensions.

2. [The second membrane] consists of a thinner [tissue], which encloses a juice still more subtle than the blood.

3. There is also [a membrane] which consists of a still

more subtle [tissue], which encloses some subtler element, perhaps the ether.

So that a grosser and a subtler motion may be diffused and spread by one and the same membrane.

8. *One and the same membrane may become thinner and subtler, when it passes over subtler bodies, and extends itself into smaller parts, no otherwise than the nerves into fibres, the veins into ramifications.*

1. When the membrane passes from a grosser nerve into subtler ones, from the subtler ones into the fibres, etc.

2. When the membrane passes from the cerebrum into its cortical substance.

3. When it passes from a grosser cortical substance into a subtler one; still more when it receives humors [?] or [parts] of the medullary substance.

4. When it surrounds the subtler and subtler inmost tendons of the nerves and fibres, and, as it were, divides them infinitely.

9. *That the tension of membranes consists in the contiguity of the elements which expand them.*

1. Thus does the blood expand its grosser parts.

2. The subtler fluid its subtler parts.

3. The elements like the ether still subtler parts.

4. And if contiguity be anywhere absent, tension is also absent; if contiguity may be absent in leasts, it may also be absent in grosser parts; if absent in grosser parts, it is absent in subtler parts.

10. *There is a greater tension if something hard be present, next to which the membranes are stretched, than if something soft be present.*

1. A membrane is made most tense, if it adhere to a bony or hard body.

2. Less tense, if it adhere to a nervous body.

3. Still less tense if it adhere to a softer body.

4. Least of all if it adhere to a little soft body.

5. The tone is best continued near and above harder things. if the membrane be grosser.

6. The tone is also continued in most subtle membranes, if they adhere to something hard, but which may appear soft considered in respect to our senses.

7. But the tone languishes, if something soft and liquid, which is not homogeneous, receive it.

11. *All sense, external as well as internal, consists in the undulation, tremulation and pressure of membranes, gross as well as subtle, and it takes place by a transfer from gross to subtler things, and vice versa.*

1. The subtler senses excite in subtler membranes.

2. The grosser senses in grosser membranes.

3. Very many senses in man exist in grosser as well as in subtler membranes at the same time, participating in both, and motion being continued or derived from one contiguum into another by a connection and stream, as it were. Whence the subtler senses have communication with grosser and subtler senses at the same time.

12. *When there is anything which impels, a membrane is immediately put into motion.*

1. [The membrane is put into a] motion by grosser particles which is similar, in proportion [to their grossness]; and into a motion by the subtler particles proportionately similar [to their subtlety].

2. By saline matters into their motion; by the air into its motion; by the ether into its motion; and so forth.

3. The motion is continued in every direction through the body, in so far as there is an equally subtle contiguity of the membranes through the body and brain; and hence by motions of the kinds mentioned above into grosser and subtler parts.

13. *That the most subtle parts, which are covered by the membranes, are variously configurated.*

1. A part according to a certain natural texture, as in the fibrillæ, muscles, cerebellum, etc.

2. A part according to a texture which is received and formed, as it were, by cultivation and use, as in the cerebrum.

3. Whence also there may be undulations, tremulations, pressures and efforts of various kinds.

THE RELATION OF THE CHEMICAL ELEMENTS
TO SWEDENBORG'S DOCTRINE OF
ATMOSPHERES AND SALTS.

I.

Salts of various kinds play a most important part in the chemistry of Swedenborg. They are the *conjunctive* particles, the "cement," as it were, by which other more mobile forms are united and fixed. They constitute the determining factors of the majority of crystalline forms, the configuration of each type of crystal being dependent upon the saline matter of which it is composed.

Common sea salt or sodium chloride is considered by Swedenborg to stand "at the head of the family of salts." (E, A. K. I, '70). It was formed, according to his theory, at the bottom of the primeval ocean, by the disintegration of some of the particles of water as a result of pressure. The salt particles would of necessity take on the form of the interstices in which they were generated, and would, therefore, be composed of eight tetrahedra united by their apices to the angles of a cube, the whole being hollowed out on each side by the adjacent water globules, as may be seen in the engraving. This constitutes the perfect salt crystal, but under certain conditions, the tetrahedra may become dislodged from their positions and collect together in a free state, when they are said by Swedenborg to constitute pure acid, and are called "acid triangles." The cubes, shorn of their spiculæ, lose their more pungent saline character and become alkaline salt.

In addition to these two forms of saline bodies, Swedenborg describes a third and more refined or higher form. The particles of this type are composed of exquisitely thin triangulolamellar fragments or *ramenta* of saline matter, which, following a regular line of cleavage, break off from the margins

of the salt crystals. The borders of the latter do not, therefore, present a knife-like edge, but are somewhat blunt or obtuse. The *ramenta* are so extremely thin that there is not sufficient space in them to accommodate the particles of the fifth order (5th finites), and hence they are composed entirely of the fourth kind of particles (4th finites). They are concerned chiefly in the formation of oils and ammoniacal salts.

Upon sea salt as a basis, Swedenborg builds his general theory. He divides all salts into three degrees or classes, corresponding to the aqueous, ærial and ethereal atmospheres. (E. A. K. I, 72-76). In each class are to be found the two types of crystalline form, the tetrahedral and the hexahedral. "If common salt or pure acid," he says, "be broken into smaller parts or comminuted by any chemical, natural or artificial process, we then have quadrangular or triangular solids of a shape similar to the preceding but smaller and less compounded, and constituting for the most part, the class of *volatile ærial salts*. If, again, the particles of these volatile ærial salts be divided into similar parts still more minute, there arise the *most volatile ethereal salts*. Hence the reader may perceive that salts are divisible into three generations, families, degrees or orders; and that the saline particles, of whatever order, are all similarly cubical or pyramidal; that they are all hard or inert corpuscles; never movable one among the others without the aid of either aqueous or atmospheric substances; that they are of themselves fixed, and have a tendency to impart fixedness to other things; that they are neither expansile nor elastic; and that they temper in different manners the fluidity of active substances." (E. A. K. I, 72, 73).

The lowest of these three classes of salts contains "fixed, alkaline, acid and essential salts of every kind." (E. A. K. I, 74). The alkaline cubes and acid triangles above described therefore belong here. In the second class are the saline *ramenta*, which, when gathered about a little volume of ether, form oils; from these, in turn, "urinous, gross, sulphurous,

pinguedinous and nitrous-aërial salts" are evolved by coal-escence with fixed salts. (E. A. K. I, 75). In the third or highest class are the angular particles which are fluent in the ether, and which combine with ether bullæ to form spirits or most highly rectified oils. These also unite with lower forms, to produce "volatile, subtile, sulphurous and refined pinguedinous substances." (E. A. K. I, 76).

According to this description the higher forms of primary salts are derived from the lower by a process of comminution. Later, however, Swedenborg appears to have modified this idea somewhat, and attributed to each atmosphere its own peculiar class of salts, derived from it alone. In fact, this modification seems to be required by the doctrine of discrete degrees, for it is not in strict accordance with this doctrine to derive a higher and more perfect form of use from a lower and cruder one.

II.

In order to interpret Swedenborg's chemical terms it is necessary to understand the nomenclature of the period in which he wrote. At that time scientific terms were not used with the same exactness that they are at the present day, but were applied very broadly and with great freedom. The old terminology of the alchemists was still largely in vogue, and the principles, *sulphur*, *salt*, and *mercury*, were still recognized. These names were originally used to express qualities inherent in bodies rather than to designate definite compounds. They were *group-nouns*, so to speak, referring to a similar property possessed by a large class of substances which might differ widely in other respects.

Sulphur did not mean the element which we know by that name, but denoted all those bodies which have the quality of combustibility. These substances were for the most part carbonaceous instead of sulphurous, and when Swedenborg uses the latter term he usually refers to some of the compounds of carbon. In fact, he uses sulphurous and bituminous as

synonyms. Pinguedinous compounds appear to be closely allied to those of sulphur, for sulphur was supposed to be the principle of color as well as of combustion.

Salts, in the language of the alchemists, were all those compounds imbued with the qualities of fixity and dryness. This is decidedly at variance with the modern idea. Present-day chemistry defines a salt, broadly speaking, as a neutral body formed by the union of an acid with a base. The animal oils and many other non-crystalline bodies are therefore salts. Swedenborg, on the other hand, uses the term in a still different sense. His conception of a salt is that of a crystalline body composed of angular particles, and he, therefore, classifies as salts many substances which nowadays would be regarded very differently. The urinous salt of the old writers was ammonium carbonate, and Swedenborg's use of the term makes it appear likely that he refers to compounds related to ammonia. Nitrous-ærial particles are probably related to the salts of the acids of nitrogen (HNO_2 , HNO_3), and thus also indirectly to ammonia. The term volatile salt is used by Swedenborg in the modern sense, *i. e.*, a body capable of vaporization at low temperature, in contradistinction to a fixed or non-volatile salt.

Oils, in the old terminology, included not only the fats and oils, but also all substances of a fatty or oily consistency, even though they bore no relation whatever to true oil. Thus it was common to speak of the syrupy liquid formed by the concentration of a saline solution as an oil; sulphuric acid was also called an oil.

III.

A comparison of the chemical theories of the present day with Swedenborg's doctrine of elements and salts is a difficult matter; in fact, the two hypotheses involve such radically different points of view that it is almost impossible to compare them at all. The distinctive feature of Swedenborg's conception is the doctrine of discrete degrees, which finds

little application in modern chemistry, excepting perhaps in the periodic law.

A collation of present ideas with those of Swedenborg necessitates a reconstruction of the entire tabulation of the so-called chemical elements, and the interpolation in it of many substances now classified as compounds, which are doubtless more elementary than some of the elements themselves. This is a task which students of Swedenborg's science will require years to complete, but even now, although the work has hardly begun, we may see possibilities which lead us to the conviction of ultimate success.

The following attempt at such a reconstruction is offered in the hope of arousing an interest in the subject and of calling forth useful criticism. The suggestions are all purely tentative, for the general idea is but slightly developed, and, in fact, may be entirely erroneous. Nevertheless it may be of some use.

The chief idea involved in the theory—if we may so term it—is that each of Swedenborg's elements or atmospheres (composed of round particles) has associated with it angular particles or "salts" of various kinds, derived directly from it by a kind of orderly decomposition or disintegration brought about by pressure.

According to the *Principia* theory the terrestrial globe, during its formative period, passed through a stage in which its central sphere of fourth finites was encompassed by the fourth element or the air. This gaseous globe was compressed toward its centre by its own weight, together with the weight of the superincumbent ether, until finally the pressure reached a point when new particles, namely, those of water, began to develop in the ærial stratum, not, however, by disintegration, but by a sort of involution. At the period just preceding the generation of water, when the pressure toward the central nidus of the ærial sphere was most intense, let us suppose that some of the air-globules collapsed and their component particles slipped into the atmospheric interstices. This would bring into existence angular bodies, both tetra-

hedral and cubical, perfectly adapted to the curvature of the air particles and capable of intimate association with them; in short, it would give rise to *salts of the air*.

Let us suppose, further, that at a later period of the earth's development, these angular particles combined with each other and with the air particles to produce other more complex substances of various kinds, which we may call *polymers*; and that still later, some of these polymers became infiltrated with third finites, thus producing, according to Swedenborg's theory, metallic particles.

Returning now to the ærial globe, we find that the pressure of the air and ether generated aqueous particles, which continued to be formed until finally a great sphere of water was produced, containing within it an immense volume of fourth finites. This aqueous sphere likewise exerted pressure toward its centre, giving rise to the forms of salt described by Swedenborg in his *Chemistry*, namely, the tetrahedral and the hexahedral forms. These particles also, as Swedenborg tells us, combined with each other and with the aqueous particles to form polymers, and some of these in turn were rendered metallic by absorption of third finites.

The various types of matter thus associated with the fourth element form a series, which, taken as a whole, constitutes a discrete degree in the material universe. This series may be conveniently arranged in the form of a table, thus:

FOURTH ELEMENT.

- I. Salts.
 - a. Tetrahedral.
 - b. Hexahedral.
- II. Polymers.
 - a. Non-metallic.
 - b. Metallic.
- III. Pressure product.
 - a. Salts.
 - 1. Tetrahedral.
 - 2. Hexahedral.

- b. Polymers.
 - 1. Non-metallic.
 - 2. Metallic.

IV.

Let us now take up these various forms one at a time, and attempt to correlate some of the inorganic substances of modern chemistry with them, selecting as our guide the use performed by the substances in nature and their broad cosmical relationships, rather than mere physical and chemical resemblance alone. We must also disregard the present-day distinction between elements and compounds and between acids, bases and salts.

1. *The Fourth Element.* The first question is naturally as to the element itself. Swedenborg calls it air, but atmospheric air, as we know it, is not a homogeneous gas. but a mixture of the gases oxygen, nitrogen, carbon dioxide, water vapor (Swedenborg's 5th element), argon, etc. The only one of these which at all resembles the fourth element is oxygen. Heretofore students of Swedenborg's science have rather favored the opinion that oxygen is identical with fifth finites. This hypothesis seems to have originated with Samuel Beswick, who advanced the theory that fifth finites and the first and second elements, which constitute Swedenborg's air particle, were identical with oxygen and nitrogen, respectively. The atmosphere would thus be composed of molecules containing oxygen and nitrogen, the former occupying the surface of the molecule and the latter its inner space. But the physical properties of air render this hypothesis untenable, and besides nitrogen has no special affinity for oxygen; in fact, its compounds with the latter are unstable. Furthermore, it appears certain that Mr. Beswick erred in correlating nitrogen with the first and second elements. R. L. Tafel (*Emanuel Swedenborg as a Philosopher and Man of Science*, p. 267), while pointing out this error in Beswick's theory, is of the opinion that he was correct in his identification of fifth finites. The facts are more readily explained, however, by

the assumption that oxygen is not a constituent of air, but *air itself*, as Swedenborg understood it. All the functions assigned by him to his fourth element may, with equal propriety, be attributed to oxygen. It is well known that oxygen is the most abundant substance on the globe, constituting nearly one-half of the earth's crust. Furthermore, when air is liquified, the oxygen in it, but not the nitrogen, becomes magnetic. If oxygen means air, this phenomenon is readily understood. For air, the fourth element, contains a volume of the magnetic element in its interior. The principle, the activity of which causes culinary fire, would thus be, not oxygen, but a constituent of it, fifth finites, and this does not seem to be discordant with the facts. Let us assume then that air, as Swedenborg uses the term, means *oxygen*.

2. *The Salts of the Fourth Element.* These should be bodies of angular structure, possessing a marked affinity for oxygen, and found in constant association with it. There is no substance which fulfils these requirements so well as does *carbon*. Carbon is undoubtedly an angular body, probably, as Van 't Hoff has suggested, a tetrahedron. It occurs in nature *chiefly in union with oxygen*, in the form of carbon dioxide (CO_2) or carbonic acid. Bunge says (*Text Book of Physiological and Pathological Chemistry*, p. 14), "Apart from graphite and diamond, the mode of formation of which is still unknown, it may be said that all the carbon on the earth is or has been in the form of carbonic acid, and that carbonic acid is the compound through which carbon must always pass in its innumerable metamorphoses. It is in this form that carbon appears in the cycle of life; in this form alone is it taken up by plants and converted into the numerous combinations of which they are composed. Carbon is introduced into the animal organism as vegetable food, and is excreted either as carbonic acid or in the form of compounds, such as urea, which very rapidly decompose outside the organism and yield carbonic acid. Carbon then leaves the cycle of life in the same form in which it entered, and returns to the atmosphere to repeat the process anew." It is a notable fact that in the inorganic world

practically all the carbon combines, in the shape of carbon dioxide, with certain earthy bases, such as calcium, to form carbonates, and these substances make up the greater part of the immense calcareous strata of the earth's crust. In organic compounds containing oxygen, carbon acts as the *conjunctive* of the oxygen particles, which are almost without exception united to it directly, even in very complex molecules. This is also true in some inorganic bodies, as in the calcium carbonate mentioned above, in which the carbon is not united to the calcium directly, but both are united to the oxygen.

Closely related to carbon, perhaps a polymeric modification of it, is *silicon*. This substance, next to oxygen, is the most abundant form of matter on the globe. Silicon dioxide (SiO_2), the prototype of carbon dioxide, occurs in nature in the form of the common minerals rock-crystal, quartz, agate, sand, etc. In union with water it forms silicic acid, the compounds of which, called silicates, are found as granite, porphyry, basalt, feldspar, mica, etc.

Another angular form closely related to the air is *calcium*. This substance is a metal, probably of the hexahedral type. Its affinity for oxygen and its congeners is marked. With oxygen alone it forms lime, but the latter is not found free in nature on account of its strong attraction for water, with which it unites to produce a hydroxide, the principal constituent of cement or plaster. The compounds of calcium with carbon dioxide (the carbonates mentioned above) are among the most important in the mineral kingdom. The commonest of these are chalk and marble. Other related forms are gypsum, calc-spar, fluor-spar, apatite, etc.

With calcium must be included the analogous substances *barium*, *strontium*, *beryllium* and *magnesium*. The latter is very frequently associated with calcium, both in inorganic and organic nature. There are several well known magnesium minerals, such as magnesite, dolomite, talc, asbestos, meerschaum, soapstone, etc.

3. *The Polymers of the Fourth Element.* The chief non-metallic polymer is undoubtedly *sulphur*. This is borne out

not only by its association with oxygen in nature, but also by their chemical and physical relationship. It appears to be intimately connected with the metals of the series, occurring, in conjunction with them, widely distributed as sulphides.

With sulphur should be included *selenium* and *tellurium*.

Iron appears to be the metallic member of this group. It is constantly associated with oxygen, occurring in nature principally in the form of ferrous and ferric oxides, which are the chief inorganic coloring matters. It is also widely found in union with sulphur as iron pyrites. Iron is an indefatigable oxidizing agent, and is closely related in the mineral kingdom to carbon dioxide and the silicates. Without it plants cannot produce chlorophyl, the substance directly connected with plant-respiration. Bunge says (*Text Book of Phys. Chem.*, p. 22) that "if plants are allowed to grow in nutritive solutions free from iron, the leaves are colorless, but become green as soon as an iron salt is added to the fluid in which their roots are immersed. It is even sufficient merely to brush the surface of the colorless leaf with a solution of an iron salt to cause the appearance of the green color in the part thus painted." The bright colors of many flowers and the gorgeous yellow hues of the autumnal foliage owe their existence to the union of oxygen with iron. In the animal organism iron again is found to be the oxygen-carrier. It is owing to the iron-bearing proteid hemoglobin, which constitutes the red coloring matter of the blood, that the latter is capable of absorbing oxygen from the atmosphere in the lungs, and of conveying it to the tissues. The hemoglobin also takes up the carbon dioxide formed in tissue-metabolism, carrying it to the lungs to be eliminated. A notable property of iron is its magnetism. The pure metal is not permanently magnetic, but one of its compounds with oxygen, the magnetic ore or loadstone ($\text{FeO.Fe}_2\text{O}_3$), is found magnetized in nature. This substance may be produced artificially, and it is also possible to combine iron with carbon to form a permanently magnetic body (steel). It seems probable that the magnetic property of iron is derived from the second element, for

this element must be present in it if we are correct in supposing iron to be a polymer of the fourth element or oxygen. The latter, it will be remembered, contains a volume of the magnetic element in its interior cavity.

There are several analogues of iron which should be classed with it in this place. They are the metals *manganese*, *cobalt*, *nickel* and *chromium*. It is a remarkable fact that every one of these metals is magnetic.

4. *The Pressure Product of the Fourth Element.* This is, of course, *water*.

(a) *The Salts of Water.* It is not easy to identify these disintegration forms. Swedenborg tells us that they constitute sea salt, a body which we know to be decomposable into sodium and chlorine. But it is doubtful whether the cubes and triangles which Swedenborg describes are themselves sodium and chlorine, and we are, therefore, not justified in saying more than that the tetrahedral form or acid triangle is intimately related to *chlorine* and its congeners *bromine*, *iodine* and *fluorine*, while the hexahedral form is an alkaline body connected with the metals *sodium*, *potassium*, *rubidium*, *cæsium* and *lithium*.

(b) *The Polymers of Water.* According to Swedenborg, the simplest metallic modification of the aqueous particle is *mercury*. Probably *zinc*, *lead* and *cadmium* are also related here.

This completes our series. The inter-relations of the substances contained in it may be made somewhat plainer by means of another table.

FOURTH ELEMENT: AIR: *Oxygen*.

I. Salts.

a. Tetrahedral. CARBON: SILICON.

b. Hexahedral. CALCIUM: BARIUM: STRONTIUM: BERYLLIUM: MAGNESIUM.

II. Polymers.

a. Non-metallic. SULPHUR: SELENIUM: TELLURIUM.

- b. Metallic. IRON: MANGANESE: COBALT:
NICKEL: CHROMIUM.

III. Pressure product. WATER (H_2O).

a. Salts.

1. Tetrahedral. ? CHLORINE: BROMINE:
IODINE: FLUORINE.
2. Hexahedral. ? SODIUM: POTASSIUM:
RUBIDIUM: CÆSIUM: LITHIUM.

b. Polymers.

2. Non-metallic. ?
2. Metallic. MERCURY: ZINC: LEAD:
CADMIUM.

V.

Most of the substances important in the structure of the earth's crust, and many forms related to the development of organic nature, are included, either directly or indirectly, in the above table. But there are several bodies, intimately connected with the more interior processes of vegetable and animal life which are notably absent. Prominent among these is nitrogen. This substance apparently bears no relation whatever to the varied types of our table, but seems rather to be associated with forms of a higher order, all of which exhibit a sort of kinship with the third element, the ether. Let us, therefore, assume a series of modifications of this element, similar in every way to the series which we have ascribed to air.

VI.

We will now consider each member of the ether series singly, comparing known substances with it, as we did with air.

1. *The Salts of the Third Element.* These are undoubtedly substances so fine and volatile as to be quite beyond the scope of chemical investigation.

2. *The Polymers of the Third Element.* It is possible to conceive of polymeric ether-forms which might be ponderable. Perhaps *helium* is one of these, for, next to hydrogen, it is the lightest substance known. If this is correct, then *actinium*, *polonium*, *thorium*, *radium* and *uranium* must be its metallic congeners, for not only are these metals intimately associated with ether phenomena, but they are also without doubt polymers of helium: in fact, this gas has actually been produced from radium.

3. *Pressure Product of the Third Element.* This appears to be *nitrogen*, for, although nitrogen is a gas with an atomic weight of only 14, it is characterized by remarkable chemical inertia, a fact which supports the view that it is a pressure product. As a result of this lack of activity, nitrogen exists largely in a free state in the atmosphere, only a small portion of it being in combination with other substances. By far the greater part of this combined nitrogen is found in organic nature. It is a constituent of the higher and more interior organic compounds, and plays a vital part in the metabolism of both plants and animals. It is the element of the proteid food-stuffs which renders them capable of being built up into new protoplasm, and no organism can exist without its proper allowance of nitrogenous pabulum. Food containing carbon and oxygen, but no nitrogen, may serve to produce heat and energy, but no new protoplasmic tissue is ever constructed out of it. The relation of nitrogen to electrical phenomena is obscure. It is a notable fact, however, that during a thunderstorm, ammonium nitrite is produced in appreciable quantities by the electrical discharges in the upper air strata, and falls with the rain. In fact, a great many nitrogen compounds are best formed through the agency of the electrical current.

As a pressure product, the particle of nitrogen should correspond structurally with its analogue of the fourth element, water. It should, therefore, possess an envelope of fourth finites containing within it a compressed volume of second finites, and it seems very probable that this is its actual composition.

(a) *The Salts of Nitrogen.* The tetrahedral salt of nitrogen is probably *ammonia* (NH_3). This gas is distinctly triangular in nature, and is a very fair analogue of the chlorine group of the fourth element series. Its chief field of use is in organic compounds, where it seems to take part in the formation of a large class of bodies, many of them connected with metabolism, acting as a sort of coupler for the more delicate, refined and volatile portions of the molecule.

The hexahedral congener of ammonia is probably the radical *ammonium* (NH_4), which bears a close resemblance to the sodium group. Like the majority of the hexahedral forms, it is clearly metallic in nature, for, although it has never been prepared in a pure state, an amalgam with mercury has been produced which has the consistency of wax and presents a silvery lustre when cut.

(b) *The Polymers of Nitrogen.* At the head of the list of non-metallic polymers stands *phosphorus*. The relation of this body to ether phenomena is much more readily recognized than is that of nitrogen itself. Phosphorus takes but little part in the formation of the earth's crust, but finds its special sphere in organic nature. Like nitrogen, it is intimately connected with the metabolism of the animal cell, especially with that of the nerve-cell; in fact, it appears to have something to do with the transmission of nerve-impulse. Its function thus appears to be on the plane of the ether, a fact further confirmed by its connection with phosphorescence, as in the glow-worm, the fire-fly, etc.

The gasses *argon*, *krypton* and *xenon* are also polymeric forms, associated with nitrogen in the atmosphere.

The metallic homologues of phosphorus are *arsenic*, *antimony* and *bismuth*. It is perhaps more correct to speak of the first two of these as intermediate or metalloïd bodies, rather than as true metals, for they both possess many non-metallic properties.

Copper and *silver*, in some respects at least, seem also to be akin to nitrogen. The relationship of these two substances to the conduction of electricity, and the special connection of

silver with the phenomena of light, as witnessed in photography, are facts of common knowledge.

THIRD ELEMENT: ETHER.

- I. Salts.
 - a. Tetrahedral. ?
 - b. Hexahedral. ?
- II. Polymers.
 - a. Non-metallic. HELIUM.
 - b. Metallic. ACTINIUM: POLONIUM: THORIUM: RADIUM: URANIUM.
- III. Pressure product. NITROGEN.
 - a. Salts.
 1. Tetrahedral. AMMONIA (NH_3).
 2. Hexahedral. AMMONIUM (NH_4).
 - b. Polymers.
 1. Non-metallic. PHOSPHORUS: ARGON: KRYPTON: XENON.
 2. Metallic. ARSENIC: ANTIMONY: BISMUTH: COPPER: SILVER.

VII.

Two important substances, namely, hydrogen and gold, still remain to be accounted for. They seem to be related to the second and the first elements, respectively.

It has been suggested that hydrogen may be identical with third finites, but this supposition seems hardly tenable. The ether globules, Swedenborg tells us, have fourth finites for their enveloping substance. These finites are derived from the second element, which, in turn, has a crust of third finites. Hence the units of the ethereal atmosphere must be many times greater in diameter than third finites, and yet ether is an imponderable substance which passes through every terrestrial body without hindrance. Nevertheless it cannot be doubted that hydrogen is genetically related to the second element.

Although our present knowledge is too limited to permit of the construction of a tabulated series of compounds of the second element, there is reason to suppose that *hydrogen* is the pressure product of it, or more probably a polymer of this product. The hydrogen atom would thus be composed of an envelope of third finites and an inner volume of first finites. Or, if the atom be considered as polymeric, it would be made up of a number of bodies so constructed. Perhaps the *ions* of the cathode ray—the Thomson's corpuscles—are these bodies.

There are several metals which claim special kinship with hydrogen. They are *ruthenium*, *rhodium*, *palladium*, *osmium*, *iridium* and *platinum*, and no doubt this group should be inserted somewhere in the series.

Finally we have *gold*, of which we can say nothing except that, as Swedenborg teaches (*Corpuscular Philosophy in Brief*), it is related to the first element or the great vortical aura of the universe.

E. A. FARRINGTON.

Communicated to the Swedenborg Philosophy Club of Chicago, September 25, 1905.

A TESTIMONY.

WHAT A DISTINGUISHED AMERICAN PHYSICIAN AND
AUTHOR SAYS ABOUT SWEDENBORG AS A
SCIENTIST.

"The soul
Reason receives, and reason is her being,
Discursive or intuitive."

The world's Laureate ¹(John Milton) never Englished a profounder scientific truth than that above uttered (1657), nor has anyone more strenuously recognized its potency than the Seer of Sweden,—the priceless fruitage of whose toil was by him offered, without price, to humanity upon the altar of his

cerebration (1688-1772), the worth of which is now being recognized by unprejudiced intelligence throughout the earth, regardless of nationality,—altho a century since many received him not, and neither now will the biased ones, laboring under the control of a theory.

The Maine Farmer Publishing Company last year printed and issued the latest edition of Dr. Alexander Wilder's *History of Medicine*, which gives an outline of medical history from its Egyptian origin, with an extended account of the various sects of physicians and the New Schools of Medicine in later centuries,—down to the present time.

The author, Alexander Wilder, M. D., is a citizen of New Jersey. He is past the half century mark on the roadway of life, but is yet hale and hearty. Perhaps it is proper to state that Dr. Wilder is an honorary member of the Anthropological Society of Liverpool, England; Vice-President of the American Academy, late Professor of Philosophy and Psychological Science, member of the Medico-Legal Society, President of "The School of Philosophy," author of various books and brochures, and member of other Philosophical, Reformatory and Scientific Societies.

On the title-page of the book is imprinted, from Dr. Oliver W. Holmes, these appropriate lines: "There are one-story men, two-story men, and three-story men. Fact collectors are one-story men. Two-story men reason about facts. *Three-story* men are those who are described as inspired men."

Anything from Dr. Wilder, especially if in the spheres of physiology and psychology, not only commands attention and thought, but inspires confidence, because of his known worth—without bias.

For these reasons it is with pleasure that I, (with the author's consent), place before the readers of this journal, (and through them for a larger propaganda), the textual transcript of several pages which the author devotes to a discussion of the labor in the fields of science by Swedenborg, concerning whom Dr. Wilder has more to say than of any other single philosopher and investigator men-

tioned in this book of over eight hundred pages of closely, well-printed matter, and he says much about many scientific celebrities,—ancient and modern.

You now see the propriety of my reference to the quotation cited from Dr. Holmes in the first part of this article.

It is not these simple, eulogistic, but true remarks relating to Swedenborg that arrests the action of the casual reader, (for example, myself, merely an ardent admirer of the Swedish Seer), but that the distinguished M. D. and author should at all refer to *Le Prophete du Nord*, a “non-medical man,” in a book, written, one might naturally say, for a “close corporation,” nevertheless a volume of sterling merit, which all would do well to read,—layman as well as the “old line” doctor of medicine. Better yet, he soberly and earnestly refers to him (Swedenborg) as authority in fields of study and investigation specialized by the eminent savants noticed in this book—some mentioned in the excerpt here given from the chapter on “Medicine in the Eighteenth Century.”

Dr. Wilder says:*

“A speculator and investigator into the same subjects among innumerable others was the celebrated Emanuel Swedenborg. In his *Prodromus*, printed in 1734, as well as in his tractate upon the *Red Blood* he has prosecuted a course of study and reasoning analogous to that of Darwin after him. Though Swedenborg was a scientist equal to the profoundest of his time, he attached himself to no class of schoolmen—a circumstance which gave later writers a pretext to ignore him altogether. He, nevertheless, accepted the discoveries which had been made as means to enable him to develop the ulterior principle of things. His studies were without exclusiveness; he *explored every department of learning and brought away treasures from them all.*

“‘His genius,’ remarks Ralph Waldo Emerson, ‘began its lessons in quarries and forges, in the smelting-pot and crucible, in shipyards and dissecting-rooms. He anticipated much of the science of the nineteenth century; anticipated the views of

*The lines italicized in the copy from Wilder’s book are made so by the writer.

modern astronomy in regard to the generation of planets by the sun; in magnetism, some important experiments and conclusions of later students; in chemistry, the atomic theory; in anatomy, the discoveries of Schlichting, Monro and Wilson; and he first demonstrated the office of the lungs.

"He was born when the notions of scholars were bursting from their cocoons of the previous centuries, taking new forms and developing with them new powers to soar; as well as to perpetuate their kind. Harvey had taught the circulation of the blood; Gilbert, that the earth was itself a magnet; Des Cartes, that vortical motion was the secret of Nature; Newton, the universal gravitation; Malpighi, that the all of Nature subsists in its least forms; Swammerdam, Leeuwenhoek, Winslow, Eustachius, Heister, Vesalius, Boerhaave what they had learned by scalpel and microscope. *Swedenborg made himself familiar with all.* He was a very Viking in his aggressive experimentation, thorough in his explorations, analytic in his methods, systematic in his elucidations, and "not to be measured by whole colleges of ordinary scholars.'"

"His scientific works, now translated into English, though perhaps somewhat obscure in their language because of the employing of the terminology formerly in use, *are a perfect mine of treasure for the earnest investigator.* His accomplished translator, Dr. J. J. Garth Wilkinson, of London, speaks in no measured terms of his physiological and other knowledge. 'Science,' he remarks, 'is no tradesman and works not for the improvement of any calling; but solely because truth is good. Such science for the human body has been cultivated by the non-medical Swedenborg.'"

"Dr. Wilkinson likewise claims for him, with good reason, the first suggestion of a rational theory of pathology. 'Strange as it may appear,' he affirms, 'the present science does not present any physiological knowledge of what these pathological states may be. The science which lies as the basis of pathology is not yet opened. Pains, aches, swellings and symptoms in general, glide along the body by terribly broad bridges of structure, of which the anatomist wots not. Well,

there is wanted somebody besides this prim anatomist, to unfold the case. Our Swedenborg, *Licentiate of no College*, is one of the men in whose works we have found a beginning of instruction on this subject. He has wonderfully indicated for us many of the great bridges and highways of vibrations and influences, and in so doing has thronged with living states and forms parts which were previously dispersed, lying in sand-heaps of cell-germs. To the New Pathology, which chronicles the passage of states through Man, he is as yet the most important contributor from the physiological side.’’

“At the very moment, however, when the learning was in the highest repute all over Europe, Swedenborg superadded to his scientific labors the teaching of novel religious and theological doctrines. He even declared with the greatest sincerity that his spiritual senses had been opened, so that he was able to hold converse with spirits and angels, and be the witness of spectacles and concurrences in their world. It may be thought that in his case, as was affirmed of Sir Isaac Newton and others, that his long pursuit of exhaustive analysis had resulted in abnormal mental conditions. Those who knew him personally were of a different judgment. *His scientific works certainly exhibit no such obliquity or aberration.* Many things are recorded of him to show that his memorabilia were not all hallucinations of disordered faculties, *but the testimony of a clear-headed as well as conscientious man.* Indeed, it may be shown, that there have been others in the world of medicine professing, perhaps, with less good reason, that they had attained analogous powers. ‘His dominant end was spiritual and moral,’ says his biographer, ‘and it preserved his mind alive in a long course of physical studies, and empowered him to see life and substance in the otherwise dead machinery of creation.’”

“The effect of taking views so broad, profound, and at variance with the tendencies of the time, was that his works were very generally discredited. Men of titled distinction and professional rank usually treat every one entering upon their special field as an intruder. We remember a clergyman who

would not read our treatise upon the *Soul* on the pretext that the writer was a layman. Another clergyman rebuked the late Gerrit Smith for speaking in the pulpit on a Sunday, because he had not been formally ordained. So, too, the Protestant clergy of Sweden and other countries placed the theological works of Emanuel Swedenborg upon their index. His doctrines, however, now furnish much of the material for sermons and religious essays,—*great diligence being employed to prevent any divining of the source from which it was derived.* Medical teachers followed the same examples. They regarded as an arrant heresy the doctrine, which he had taught so clearly and so conclusively, that disease had no independent existence, but is only disorder of the organism of the body. Indeed, all reform in the profession of medicine has come, and probably it must always be introduced, from outside of its ranks. Nonetheless, however, is it regarded by the titled members as an offense or scandal, and they are ready and zealous to proclaim and inflict woe upon the individual by whom such offense shall have come. Yet, with them truth, though not its apostles, is certain to prevail."

Discussing the formula, CORRESPONDENTIA CORRESPONDENTIBUS CURANTUR, advocated by Dr. Chas J. Hempel in his treatise, "*The Organon of Specific Homœopathy,*" Dr. Wilder says.—"This proposition, (the formula quoted), it will be observed, is in accord, if it does not denote an actual accepting, of the doctrine of Emanuel Swedenborg, that there exists a correspondence between all things spiritual or psychic, and all things physical." The doctor further remarks, incidentally, "Indeed, there has always been a strong partiality of members of the 'New Church' for this 'New Practice' of medicine. 'All things which bring harm to man are called *uses,*' says Swedenborg; but *evil uses*,—'because they are of use to the evil for doing evil, and they conduce to absorb malignities—*thus also for cures.*'*" The 'Homœo-

**Divine Love and Wisdom*, 336.

pathic law,' set forth by Hahnemann, is not accepted, however, by all Newchurchmen. 'An artificial disease is not induced,' says Mr. W. E. Payne, in the *New Church Repository*, 'but the operation is a commingling of like spheres beyond the influence of the law of elective affinity, and consequently a removal of all opposing spheres beyond the circuit of the action of each.' "

Concluding his sober, yet unconsciously encomiastic remarks anent *Le Prophete du Nord*, Dr. Wilder says, "The works of Swedenborg of most interest to the student of medicine and physiology, are his treatises upon the *Animal Kingdom*, the *Economy of the Animal Kingdom*, the *Philosophic Reasoning Concerning the Infinite*, the *Red Blood Generation*, etc. All these have been translated by Dr. Wilkinson. No candid and intelligent person can read any one of them without a sense of profound wonder at the breadth of the writer's knowledge, and the enlarging of his own views and conceptions of the subjects therein treated."

Thus writes a man who does not think and speak under the control of a theory.

It is a fact that the clergy have been addicted to the use of Swedenborg's philosophy in the way mentioned by Dr. Wilder; however, I never before knew that the medical profession was given to the same practice, but I very readily see the right and the propriety of doing so, by either D. D. or M. D., for though the language is Swedenborg's the thought,—the truths, and the potency of their declaration, belong to Nature, from which it was rescued and placed in right verb and word for the use and resolution of man,—yet not as *ipse dixit*.

Such a genius begs no recognition by the mere use of quotation marks,—he needs not the indices accorded to the one-story and the two-story men indicated by Oliver W. Holmes.

STEPHEN D. PARRISH.

Richmond, Kentucky.

SWEDENBORG AND THE SCIENTIFIC SOCIETY OF UPSALA.*

A good general review of the history of the Scientific Society of Upsala is contained in an essay by O. Glas, Upsala, 1877.† When the pest in 1710 had greatly decreased the number of students at the University, Eric Benzelius, the Librarian, persuaded a number of the Professors to meet at the Library once or twice a week in order to cultivate scientific discussion, and also to correspond with Polhem and Swedenborg. Consequently there are many references to Polhem and Swedenborg in the *Proceedings, Letters, and Minutes* of this earliest of Swedish scientific societies. Among other interesting documents are two letters, one by Swedenborg, dated Stockholm, Nov. 27, 1729, and the other by Polhem, dated Stiernsund, April 17, 1728, in which they accept membership in the Society as reorganized. The Society was reorganized a number of times, but Swedenborg and Polhem were more or less connected with it from its inception, as appears from the frequent references to them in the lists of members and elsewhere.

In the letters above mentioned Polhem refers to Swedenborg in most commendatory terms, proposing him for membership in the Society. Swedenborg says that he has been for ten years collecting everything which will serve to throw light upon metals and the mineral kingdom, and was evidently planning the work known as the *Lesser Principia*, if not actually engaged upon it, for he refers to it in almost the exact words by which he entitled the manuscript, "*ex priori et*

*A digest of materials published in *Kyrkans Herald*, July-August, 1903, pp. 111-115, in an article entitled: *Swedenborg och Vetenskaps-Societeten i Upsala*.

†Essai sur la Societe Royale des Sciences d'Upsal et ses rapports avec l'Universite d'Upsal par O. Glas. Upsal, Ed. Berling, Imprimeur de l'Universite, 1877; p. 99.

posteriori principia Naturæ." After printing the *Miscellaneous Observations* at Leipsic and Schiffbeck in 1722, Swedenborg published a prospectus of a large work on *The Genuine Treatment of Metals*, but never published it as first planned. After a long period of silence he published his *Opera Philosophica et Mineralia* in three volumes, folio, at Leipsic and Dresden, in 1734, including not only the collections which he had prepared while working on *The Genuine Treatment of Metals*, but also his conclusions on the magnet and cosmological physics, of what he had written at some length.

Many of the letters and papers sent by Swedenborg to Upsala for use by the Scientific Society, together with other papers of the Society, were transferred by Eric Benzelius to Linköping, when he became Bishop there. And so it happens that many important letters and documents are not to be found where one would expect them to be, in the Library of the Scientific Society and in the University Library at Upsala, but far away in the Diocesan Library at Linköping.

The Scientific Society is planning to celebrate the bi-centennial of its foundation in a few years, and by that time many of the early letters and some of the manuscripts which are photolithographed in Vol. I. of the Photolithographs will in all probability have been published, for the first time, in the series of Swedenborg's works now being printed by the Royal Swedish Academy of Sciences.

ALFRED H. STROH.

ADDENDUM TO THE ARTICLE, "HISTORICAL NOTICE OF SWEDENBORG'S WORK ON CHEMISTRY."

In connection with the article on Swedenborg's *Chemistry* appearing on pages 46-54 of *The New Philosophy* for 1904, the following may be of interest:

Since the article was published the writer has had an opportunity of examining a volume in the Library of the Massachusetts New Church Union, 16 Arlington St., Boston, which contains the *Prodromus*, the *Nova Observata*, etc., and the *Methodus Nova*, etc., accompanied by the *Artificia Nova*, etc.; as usual. The title-pages of the *Prodromus*, *Nova Observata*, and *Methodus Nova* all have the addition, "*Prostans || apud || Ioh. Godofredum Hanischium || Bibliopolam Hildburghusanum. || Hildburghusæ 1754*," which was noticed on page 49 of the above mentioned article.

The volume referred to is bound in grayish mottled paper, with a slip of paper at the top of the back of the volume with the inscription in a hand very similar to that of Swedenborg, "*Prodromus || principiorum || rerum natura- || lium.*"

From this it would appear that the works referred to made their third appearance in 1754.

A copy of Eiloart's "Guide to Stereochemistry," which was referred to on page 50 of the above mentioned article, was found at Baltimore in the Library of the Johns Hopkins University. Besides entering Swedenborg's *Prodromus* in his list of works on stereochemistry, the author also refers to it especially, without, however, pointing out anything new.

In passing it may be noted that the date "1736" accompanying the autograph "Buffon," in the set of Swedenborg's *Opera Philosophica et Mineralia*, referred to on page 52 of the article, is not written "below" but right "after" the autograph. This set is no doubt the same one which is referred to by Wilkinson in his Biography of Swedenborg as having passed through the hands of the bookseller Bohn in London.

A. H. S.

THE NEW PHILOSOPHY.

VOL. IX.

JANUARY, 1906.

No. I.

A COMPARISON OF THE SYSTEMS OF CHRISTIAN WOLFF AND SWEDENBORG.*

BY EMANUEL SWEDENBORG.

1. *Whether God be a spirit.* The celebrated Wolff says in his Natural Theology that he wishes to demonstrate that God is a spirit; but let us first define what a spirit is. 1. Men say that angels or genii are spirits. 2. They say that the soul is a spirit. 3. They say that the devil is a spirit. 4. We say that all things which are active, *per se*, although they be in material things, are spirits. But all these spirits are created and made by the infinite, and consequently they are finite, but not infinite; God alone is infinite; whatever is created by the infinite, that must be finite; there is no medium, except something similar to the finite, which is not yet so finited, that it has the attributes of the finite; but in potency, that is, in its attributes, it is similar to the finite. Therefore, if spirits are

*This is the first published translation of Swedenborg's manuscript, entitled by Dr. R. L. Tafel "*Comparatio Systematum Christiani Wolffii et Swedenborgii*," contained in the *Photolithographs* of Swedenborg's MSS., Vol. III., pages 102-140. Dr. R. L. Tafel, in the *Documents*, Vol. II., Part II., pages 872 and 908, refers briefly to this manuscript, saying in the first reference that it is contained in "Codex 88," pages 41 and 159-206. In the "Chronological Account" Dr. Tafel very briefly summarizes the contents, lists the treatise as number 55, and assigns to it the date 1724-1733. From the nature of the references in the text the date of this manuscript may be placed after that of the *Principia*, published in 1734. The paragraphs are in the original, but the numbering has been introduced by the translator, Alfred H. Stroh.

created, they are finite: if finite, an active being added, they are mechanical and geometrical; therefore, there can be no created spirits, except finite ones, neither can they be finite without possessing geometrical attributes, and consequently being subject to mechanical rules. But as concerns the infinite, it cannot have anything in itself geometrically or mechanically, since it is the cause of every mechanical principle; whence there is no mechanical or geometrical nexus of the infinite and finite; there is a cause, and the effect is immediate; whence there can be no nexus with God except by means of Christ, nor by Christ except in so far as he assumed a body; but there is a nexus of Christ and of the Holy Spirit with the Infinite, but the quality of the nexus is unknown to us. Therefore, finite spirits are mechanical and geometrical; therefore, neither can they be called spirits, except they be finite spirits, which are actuated by their rules. But God indeed, or the Infinite, is not a spirit in any degree as compared with finite spirits; neither can God be called a spirit, except, if you please, the Infinite Spirit; that which may be predicated of the Holy Spirit may not be predicated of the Infinite Father.

2. The rules of Wolff are: 1. *We experience every moment that we are conscious of ourselves and of the things disposed outside of ourselves.* Namely, by means of the elements and organs, which must be in agreement. That this is a material and mechanical something we see from this, that there is something similar in brutes, that the organs are mechanical, and adapted to the motions of the elements.

2. *That we are conscious of ourselves is confirmed by doubt itself, for we cannot doubt except concerning something which exists.*

3. *He who is conscious of himself and of other things by action, is also in action or exists. Therefore it follows that we exist. The knowledge of our existence is confirmed by doubt itself; for by this, that we doubt whether we exist, we conclude that we exist.*

4. *Geometrical truths are known by the same evidence by which our existence becomes known to us.*

5. *That entity, which in us is conscious of itself and of other things, is said to be the soul; it is called the human soul, also human mind. Therefore, the human soul exists.*

6. *We know of the existence of the soul before we know of the existence of the body.* For if the soul thinks or doubts, the doubting or thinking cause or ens is in the soul, which, if it does not exist as cause, the doubting is concerning the body or the thought is concerning the body, hence the causing entity exists before the causate. My opinion is, what is the need of deducing existence, or of arguing that I am; neither is there any place or terminus of doubting in this matter; who can doubt that he is? But man's quality must be enquired into, whether he be rational or not, whether he possess a soul, or whether there be a soul; hence, it must be deduced that: I think, therefore the soul is; but it is not yet clear whether the soul be rational or similar to that of brutes, for brutes also think in their way and possess certain phantasies, but I doubt whether there is a soul, for if I doubt I must affirm or deny, I must discuss arguments, therefore, there is analysis and a certain ratio or analogy in thought. Hence it may be known: I doubt, therefore I am rational or I enjoy a rational soul, which can doubt and affirm, which can weigh arguments, and by analogy or analytical thought can conclude something, therefore I am rational, that is, I doubt, therefore I am rational.

3. *He says that thinking is an act of the soul, by which it is conscious of itself and of other things outside of itself.* Bare thought may also be attached to brutes, which possess a certain imagination, but one which is without analytical enquiry in a distinct and rational argument. In dreams there is thought, but what quality of thought! The soul is not proved by thought, but only by the mode of thought. In simpletons, where the soul hardly operates, there is thought. There is corporeal thought, there is thought of the soul, which together make the rational in the soul; it may thus be said: I think, therefore I am, but not, I think, therefore I am rational; and perhaps many thoughts of the soul have a beginning different

from those which are from the soul, although the first beginning of such thought was in the soul, but afterwards the traces of the thought impressed in the organs of the body may recur as it were spontaneously, without the assent of the soul; for a motion once begun is continued without a new mover, as may be seen in quivering objects; in strings, the finger first moves them, but afterwards a string may be moved either by itself, or by some other similar mover, or by something else, which motion can thus not be said to begin in the soul the second time. but it is from other things.

4. *The mind is said to perceive, when it represents some object to itself; perception, therefore, is an action of the mind, by which it represents an object to itself, as colors, odors, sounds.* But brutes also perceive, as regards colors, odors, sounds; but to perceive distinctly, not only to feel the harmony, but also to know and perceive, this is proper to man.

5. *Apperception is attributed to the mind, in so far as it is conscious of its perception.* Apperception is also the property of the rational-soul especially, but it is also the property of brutes; they perceive through (*per*) organs they apperceive it [the apperception] by their souls; for there cannot be perception with brutes without there being apperception, nor could the contrary be true in any living thing, since there is a terminus to which perception tends. When it has gone through to that terminus there is apperception, which in man, indeed is in the soul, in brutes in their soul; but whether there be a soul or not, may be concluded from the quality and mode of the apperception.

(*To be continued.*)

THE SCIENTIFIC TERMINOLOGY OF SWEDENBORG'S TIME.*

In the time of Swedenborg, chemical science was in a state of transition; alchemy, with its vagaries, had scarcely disappeared from the field and the modern exact science of chemistry was not yet born. For this reason the terms in vogue in Swedenborg's time, and hence used by him in his scientific works, were necessarily more or less derived from the nomenclature of alchemy, and are apt to be misunderstood by modern readers, because they apply to those terms quite different meanings from what was understood by them in the 17th century. The idea of analysis, through the middle ages up to quite recent times, was that nature was to be twisted and torn apart, so to speak, in order to extract from her, her secrets. The words crucible and matrass, still in use to designate certain apparatus, have in their roots this idea of torturing and harassing nature. Cohobation, maceration, trituration, comminution, precipitation, elutriation, sublimation, calcination, filtration and numerous other terms signify pharmaceutical and chemical processes in which a similar idea of forcing a substance into its parts, may be recognized.

Many words have descended, unchanged, from these dark ages to the present times; such are alkali, alcohol, alkahest (the universal solvent), elixir in general, and elixir of vitriol in particular (now known as aromatic sulphuric acid); laudanum, sal volatile, (ammonium carbonate), salt of tartar (potassium carbonate), cream of tartar (potassium bitartrate), butter of antimony (antimonium chloride), spirit of salt (hydrochloric acid), oil of vitriol (sulphuric acid), aqua regia (nitromuriatic acid), aqua fortis (nitric acid), aqua vitæ (brandy). These names were derived from more or less fan-

*Read before the Swedenborg Philosophy Club of Chicago, January 8, 1906.

ciful ideas, based upon a few general principles, or rules, which will now be indicated briefly.

Gebir (10th century), discoverer of distillation, taught that there were only three elemental substances, mercury, sulphur and arsenic. All the metals were referred to various combinations of mercury and sulphur. Some centuries later these elemental bodies were changed to salt, sulphur and mercury, and this idea, with some modifications, continued to Swedenborg's time, for Dr. Willis published a work on chemistry in 1675, in which he affirmed that salt, sulphur and mercury were the basic elements of all things. He ascribed the quality of fixity (permanence through fire) to salt, of combustibility to sulphur, and of fluidity and volatility to mercury.

Hence that part, of any substance, which burned was called its sulphur. The fixed, incombustible residue, was its salt, and the vapor, smoke or gas that went off its mercury. If this last could be condensed into a liquid, it was apt to be called its spirit. Everything was composed of salt, sulphur and mercury in varying proportions.

During Swedenborg's early years, Lefevre and Lemery, extended the number of elements and gave them somewhat different functions. The elements were divided into active and passive, and were increased to five. The active were mercury or spirit, sulphur or oil, and salt; the passive were phlegm and earth. In 1715 a work on chemistry by Homberg reasserts these principles and refers all combustible matters to sulphur. The word oil was also at this time applied to all thick or viscid liquids, no matter what was their composition. Dr. Stephen Hales, in 1727, describes air as a subtle, elastic fluid with acid, sulphurous and saline particles floating in it. The whole subject was in controversy, however, for the "Skeptical Chemist," by Robert Boyle, published during Swedenborg's early life, throws doubt upon the three-fold elemental constitution of nature.

About this time the amounts of vapor given off from solids began to be collected, and measured. One hundred and eight cubic inches of vapor, gas or air, for instance, were derived

from one ounce of iron and one ounce of the oil of vitriol; this gas was the element hydrogen, and was inflammable, but must have been very slightly examined, as it was not differentiated from air. Thirty-three cubic inches of air were derived from one cubic inch of dog's blood, but apparently no effort was made to determine its constitution.

In spite of the iconoclastic efforts of Boyle, astrology, mythology and chemistry continued to be mingled by many writers, and terms derived from astrology and mythology continued to be used throughout the time of Swedenborg. The colored show bottles in the windows of apothecaries were marked with a maltese cross, if they contained a blue color to indicate that the color was due to copper; it was derived from the astrological sign of Venus, to whom copper was referred. which was a circle joined to a cross, the circle indicating gold and the cross, with sharp points, a hypothetical substance called acrimony. The points of the Maltese cross symbolized its sharp, corrosive nature. That some notions of this kind were still extant as late as the 19th century is shown by the fact that Hahnemann, in 1838, supposed that he was obtaining the hypothetical substance to which lime owed its causticity by distilling slaked lime and a solution of fused bisulphate of potash. A small quantity of a clear liquid was obtained which he called *Causticum*, and which, notwithstanding his erroneous idea, has proved itself to be a valuable remedy.

Lead was referred to Saturn and given his sign, because Saturn devoured his own children, and lead fused with, and, as it were, devoured other metals. Hence arose the name saturnine salts for lead salts, saturnine colic for lead colic. Iron was referred to Mars, and a refined oxide of iron, used for polishing and sharpening tools, is still called *Crocus Martis*. *Crocus* refers to Spanish saffron (*Crocus tinctoria*), which it resembles in color.

The product of a sublimation was generally called flowers; thus we have flowers of sulphur for sublimed sulphur, and the flowers of zinc for the oxide. (Also called *lana philosophica* or *nihilum album*.) Owing to the transitional state

of science, to the lack of any one authority, and also to the fact that Swedenborg was far ahead of his time in knowledge, it may not always be possible to know just what was meant by certain of his terms, but at least something may be done towards clearing the matter up, and a consideration of the subject will at least put us on our guard against too easily reading our modern chemical knowledges into the old names.

In the *Economy of the Animal Kingdom*, page 18, the salts of the blood are spoken of as vitrolic, aluminous, nitrous and sea salt. Vitrolic as an adjective was at one time applied to any glassy or crystalline salt, but, at this date, was restricted to sulphates, and hence is correct. Sea salt is common salt and is also correct. Alum and aluminous were names applied by Pliny and Dioscorides to an astringent salt of unknown constitution, but the element aluminium was not known until 1828; aluminous, as here used, cannot be identified and probably refers simply to the austere taste of evaporated blood. The same may be said of nitrous, for nitrous as then used meant anything having the qualities of saltpetre or nitre, which does not occur in the blood.

By salts of tartar is meant the carbonate of potash; it does not exist in the blood, but would be produced in its ash by the action of heat.

The term phlegm, used by Boyle, refers to the volatile (aqueous and gaseous) parts of blood. Caput mortuum is the name applied to the residue in a retort after distillation.

E. A. K., page 19. That Swedenborg and other writers of his time used sulphurous to indicate the combustible portion of matter, now known to consist chiefly of carbon, is shown by soot being spoken of as "sulphureo-solid particles." Soot is quite pure carbon.

E. A. K., page 24, "the sulphur discoverable in the urine" refers to the organic carbonaceous part, from which sulphur is practically absent.

E. A. K., page 26, "cruor" is blood clot; crassamentum refers to the contracted clot after the serum has been squeezed out; "Nitre" is potassium nitrate. (saltpetre); Aqua regia, so-

called because it dissolves gold, the king of metals, is nitromuriatic acid. Oil of sulphur is sulphurous acid (not sulphuric). Oil of vitriol is sulphuric acid. Nitre per deliquum is saltpetre exposed in a funnel to a moist air until it deliquesces and drips through in a saturated solution. Aqua vitæ is brandy.

E. A. K., page 27. "Spirit of nitre" is here shown by the context to be simply nitric acid, although that name was, and at the present day is, used for a solution of ethyl nitrite in alcohol. "Spirit of vitriol" is sulphuric acid of the Nordhausen or fuming variety, made by distilling ferrous sulphate. "Spirit of salt" is hydrochloric acid. Vitriol refers properly to any crystalline sulphate, but here probably means cupric sulphate. Artificial vitriol is copperas or the sulphate of iron (ferrous sulphate). Natural vitriol is blue stone or cupric sulphate.

E. A. K., page 29. The analysis of ox blood here given is typical of the analytical work of the time. It is said to consist of a large proportion of phlegm (watery vapor formerly called spirit of mercury), a certain quantity of sulphur, (combustible matter with very little sulphur in it), and a little salt.

E. A. K., page 36. Turning from the authors whom he quotes, to Swedenborg himself, we find upon the first page of the Induction, a higher conception and a fuller knowledge of the whole subject. "With a view to the composition of the blood, there are conveyed to the serum through the medium of the chyle, in water as a vehicle, spirits, oils and salts of every kind." Spirits here refers generally to all volatile principles or substances capable of distillation. Oils to thick viscid fluids including liquid fats and dense aqueous saline solutions. Under oils would undoubtedly be included albumin and gelatine, the very basis of animal life. Salts is here restricted to its proper meaning, namely, mineral matters. Sulphurs in the plural in the same paragraph is plainly not to be understood in the modern elemental sense, but as the combustible part of organic matter. Fixed and urinous salts would be the non-volatile salts (sodium, potassium, calcium

and magnesium phosphates, chlorides and sulphates) and ammonium carbonate, a volatile salt not existant in the blood but produced by the process, from the decomposition of urea and other nitrogenous matter. In regard to the "fugaceous spirit," on page 37, I am inclined to think that Swedenborg is ahead even of the present time, and that by means of a good condensing apparatus, an odorous, volatile, organic substance dissolved in water could be obtained by distilling the blood, which would correspond to this "fugaceous spirit." At least the halitus arising from warm blood corresponds in odor to a distillate from fresh blood.

Of the various processes spoken of on page 38, digestion refers to maceration at a gentle heat, in a solvent. Extraction is treating a dry residue (*caput mortuum*) with a solvent. Luc-tation is agitation to expose to the action of the solvent. Plethora applies to an overplus of the blood or fluids of the body as a whole. Ceneangia is the opposite of plethora, or general anæmia. Diapnoëa is an old term for sweating. Diæresis means simply a solution of continuity, or, in other words, a break in the tissues.

In the Theological Writings there are a number of scientific terms used, relating to medicine and other branches, that need to be gone over and explained, but which would, in their entirety, make this article of undue length. In the *True Christian Religion*, No. 346, occurs a number of terms relating to diseases of the eye which would be quite unintelligible to an oculist of the present day, because the same names are now used in quite a different sense. A note on that and the succeeding page, found in most editions of *T. C. R.*, is necessary to a proper understanding of the text.

A reference to these may be useful: *Spurious faith* is compared to a defect of the sight arising from an opacity of the cornea, and hence the most superficial or outermost of all obstructions to the sight. The inflowing light (truth) is mixed with the falses (shadows or obscurities on the superficial layers of the cornea).

Harlot faith (truths falsified) and *Adulterous faith* (goods

adulterated), are compared to a disease caused by opacity of the crystalline lens which Swedenborg calls *glaucoma*, but which is now called *cataract*. The word *glaucoma* is still much used, but in an entirely different disease from the one here described.

Faith closed up, or *blind faith*, or faith in things mystical is compared to the disorder of the eye called *gutta serena* (the "drop serene" of Milton in *Paradise Lost*, Book III.) and *amaurosis*; these terms refer to blindness without any discoverable organic defect; that is, the eye appears natural in color and its tissues uninflamed and yet sight is gone. As the interior diseases of the eye became better known from the use of the ophthalmoscope, the term *amaurosis* became more and more limited, and what Swedenborg here calls *amaurosis* is now called *atrophy of the optic nerve*, and is one of the most deep-seated causes of blindness, without the outer appearance of the eye being changed.

Erratic or wandering faith, which is a faith in several gods, is compared to *cataract*, using that word in an obsolete sense. In some inflammations of the middle structures of the eye the fluid in the anterior chamber of the eye loses its transparency and obstructs the inflowing light. This is what is here referred to. The other terms in paragraph 346 are sufficiently explained in the text.

In *Conjugal Love*, 253, occur a number of names of diseases, some of which have probably been misunderstood from lack of explanation.

Lipothymia refers to the languid state of body, which is almost but not quite fainting. *Syncope* was fainting, *lipothymia* the state of languor that preceded it. Such would be the state of those affected with Addison's disease, pernicious anæmia and other chronic debilitated states of the body. The word *imposthume* which is used in some translations is an old name for abscess and chronic ulcers. The *iliac passion* means an acute obstruction of the intestines. This condition causes the intestine to writhe and twist in its efforts to open the obstruction, hence the idea of passion or suffering. It might be due to a number of causes. The *cæliac flux*, or affection, as it is

translated in some editions, is an old name for lenteric diarrhoea or a diarrhoea due to intestinal catarrh, chronic in its nature, which allows food undigested to pass from the body.

The obsolescence of scientific names, used in the works of Swedenborg, has always been an obstacle at the very threshold of their study, and it is hoped that this essay will be of some use in making the antiquated expressions intelligible.

J. B. S. KING.

SWEDENBORG'S INFLUENCE UPON GOETHE.*

The interest recently awakened among European scholars in the scientific and philosophical writings of Swedenborg and their influence upon modern thought and culture, after a long period of seeming obscurity and neglect, is an interesting episode in the history of culture. Honored by the faculties of his own time for his bold and fertile mathematical and physical theories and elected to membership in the Royal Academies of Science in Paris, St. Petersburg and Stockholm, his philosophic significance soon became obscured from popular vision by his claim to seership and to the mission of a spiritual prophet. A hundred years later a new interest was awakened by the publication in London of an English translation of the *Opera Philosophica et Mineralia*, embracing the *Principia* and the *Regnum Animale*. It was especially Swedenborg's doctrine of man as the type, and hence of the human form of society, together with the doctrine of correspondences, or the spiritual analogies of nature, that awakened a response in Emerson's poetic mind, as, also later in that of Henry James, the father of Henry James the novelist, and of Professor William James the psychologist. Indeed, Swedenborg may be said to have furnished the substance of what is most valuable in Emerson's Essays on the Imagination and on Nature. It was the new

*A paper read before the American Philosophical Convention. Reprinted from *The Harvard Illustrated Magazine*.

spiritual view of the Universe as of a world ensouled, that opened to Emerson a vision not only of the fount of poetry but of the ideal human self-realization. Emerson, indeed, was one of the first to recognize and to pay a splendid tribute to the contributions of Swedenborg to human learning, calling him "a colossal soul who lies vast abroad upon the times." But he wrote wiser than he knew, for neither his own scientific knowledge nor the science of his day was adequate to any true estimate of the significance of Swedenborg's theories. With the deeper researches of science and the critical tracing of philosophic thought during the last fifty years, the world is far better prepared than in Emerson's day to make an estimate of the real philosophical value of the theories advanced in the *Principia* and the *Regnum Animale*, and even of the inner-world revealings of the *Arcana Cælestia*. As instances of this latest recognition of Swedenborg's deserts among the leading European scholars in the several fields covered by his treatises, I will only mention here the admissions by Van t' Hoff and Eiloart of Swedenborg's anticipations in his *Principles of Chemistry* of the modern crystallography and stereo-chemistry,* anticipating Pasteur's doctrine of the "crystallizing properties in molecules" by a century, and Haüy and de l'Isle and other early crystallographers, by fully sixty years. In cosmical science the Russian astronomer Nyren has accorded to Swedenborg a projection of the nebular theory prior to those of Kant and Laplace.†

In anatomy and physiology Dr. Gustav Retzius, the celebrated anatomist of the Swedish Royal Academy, has paid tribute in an address before a Congress of European Anatomists at Heidelberg in 1902 to Swedenborg's profound discoveries in relation to the brain and the blood; and a commis-

*See Eiloart's "Guide to Stereo-chemistry,"—Van t' Hoff's "Arrangement of Atoms in Space." Intro., p. 1.

†See Art. "Swedenborg and the Nebular Hypothesis: a Contribution to the so-called Kant—Laplace Nebular Hypothesis." Transl. from the Vierteljahrschrift der Astronomischen Gesellschaft. Leipzig, 1879, p. 81 in New Church Review, July, 1897.

sion of the Academy, including men of such renown as Retzius and Svendte Arrhenius, is now engaged in bringing out a complete edition of the as yet unpublished MSS. of their illustrious former academician.

In psychology and metaphysics Professor Vaihinger, of Halle; Heinze, of Leipzig, and du Prel, of Munich, have discovered the influence exerted upon Kant by his knowledge of Swedenborg's doctrine of the two worlds and their relation by correspondence, finding here the real solution to the relation of the *Ding an Sich* to its phenomenal sense-perception. Not only is Kant's æsthetic, with the subjectivity of time and space concepts, and the relationship of the ideas of the reason to a corresponding and symbolic sense-perception very easily traceable in Swedenborg, whom Kant confesses to have read with persevering diligence, but both du Prel and Heinze have shown in their introductions to their editions of Kant's *Vorlesungen* "ueber Metaphysik" and "ueber Psychologie" that Kant's idea of the spiritual world and of the soul's immortality are in places almost transcriptions from Swedenborg. A year after Swedenborg had published in London, in 1769, his little treatise *de Commercio*: or the Intercourse of the Soul and the Body, (in which he declares his doctrine of the two worlds absolutely distinct but in every particular parallel and corresponding, the one that of spirit, the other of nature), Kant pronounces his inaugural address in assuming his professorship in Koenigsburg, having for its subject the Two Worlds—the world of sense and the world of ideas,—*Mundus sensibilis et Mundus intelligibilis*. In view of the interest shown by Kant in the promised appearance of this same work by Swedenborg, it is no improbable assumption that the great fundamental doctrine of Swedenborg, of the duality of the Universe in discrete degrees or planes of existence, together with its unity by the absolute correspondence of these degrees and their harmonious interaction,—that this lay at the bottom of all Kant's subsequent creation of an idealistic system of philosophy, and of a world of real *noumena* or realities lying behind and within the world of visible and symbolic phenomena.

This introductory sketch of Swedenborg's varied achievement is not without its very close and vital relation to the subject proper of this paper: Swedenborg's Influence upon Goethe. Goethe's acquaintance with metaphysics was largely derived from Herder and Schiller. While through the latter he became interested in Kant, the cold intellectuality of the *Critique* left him unmoved, and he longed for a view of the universe warmer with life. His scientific studies looked in the direction of a soul-inspired unity and harmony of things. For a time Lavater, the projector of a science of phrenology, appealed to him, and here he began those studies of the *Thierschadel*, of organic life and the development of species along a line of ascent according to the human type pervading all things in which he leaves Lavater far behind, and finds himself in a very essential agreement with the *Oeconomia* of Swedenborg. Goethe's fragment on the *Cranium* is a reduction of the opening chapter of Herder, who may easily have derived his knowledge of Swedenborg through Kant at Königsberg;* but it would appear from other grounds that Goethe's acquaintance with Swedenborg was far more direct than through Kant or Herder, especially as Kant reflects far more the Swedenborg of the second, or Seer period, than of the first, or Scientific. The occasion of this intimate acquaintance of Goethe with Swedenborg was his residence in Frankfort in the early '70's, and his near association while there with Fraulein von Klettenberg, whom he came to regard with affection and reverence as a kind of spiritual godmother. It was this deeply spiritual but intellectual woman who led Goethe into the treasure house of Swedenborg's *Arcana*, and it is to this introduction that he owes his adoption of the great underlying principles of the works of Swedenborg's First Period: the *Principia* and the *Economy of the Animal Kingdom*. The fragment entitled the "Peace of Heaven," a translation of the chapter from Swedenborg's *Arcana* found among the Klettenberg papers, was for a

*For Swedenborg's relation to Herder see Dr. Schlieper's Address *cit. inf.*, p. 28.

time supposed to have been Goethe's own translation; these papers include also a lengthy poem which is almost a paraphrase of a chapter of Swedenborg in the "Marriage Love." But, more remarkable than this, as showing the close intimacy of Goethe with what Swedenborg had written, is the comparison drawn by Dr. Hans Schlieper in his Doctorate's Dissertation before the university of Berlin, 1901, between one of the least known but most profound and enigmatical of all Swedenborg's writings,—the work entitled "*De Cultu et Amore Dei*," with Goethe's poem *Der Deutsche Parnass*, or "The German Parnassus."† This work of Swedenborg published in London in 1745, bore the mysterious title: "*The Worship and Love of God: treating of the Birth of the Earth, Paradise and the Abode of Living Creatures also of the Nativity, infancy and love of the first begotten or Adam; and of the Marriage of the First-Born; of the Soul, of the Intellectual Mind, of the State of Integrity and of the Image of God.*" It was published in parts, the first two of which were later published in English, but the entire edition Latin and English has long been out of print. By a happy coincidence, at the time a scholar at Berlin is bringing to light the interesting relation of this work to Goethe's whole career, a complete edition of the work, including the third part, now translated for the first time into English, is going through the press in Boston under the careful and competent editorship of Alfred H. Stroh, of the University of Pennsylvania.

Dr. Schlieper has pointed out (pp. 38-43) not only the resemblance between Goethe's *Fragment on the Cranium* and Swedenborg's *Economy of the Animal Kingdom*, but he traces a most striking parallelism running through chapters of the *De Cultu* and the *Deutsche Parnass*, line for line. The theme is that of the birth and growth of the human mind in a pure

†Emanuel Swedenborg's *System der Naturphilosophie* besonders in seiner Beziehung zu Goethe—Herderschen Anschauungen—Inaugural Dissertation von Hans Schlieper aus Berlin. Berlin: Gustav Schade. Linien Str. 158.

world in which reigns a perfect unity and harmony between spiritual forces and intelligences, and the phenomena of nature. In time this pure development is invaded by certain rebelling forces of the self-assertion of nature, and of the reason of sense: these to subdue or to bring into final harmony with the perfect law of the eternal Good is the life-problem. A single quotation from the many parallels drawn by Dr. Schlieper will have to suffice, Swedenborg's *De Cultu*: 73: "He (the enemy) creates queens and calls them Aganippides, from that fountain which the hoof of his victorious horse has burst open; and thus he inflames all with new desires and blinds all by his snares and enchantments."

Goethe: *Der Deutsche Parnass*: 171-176 "Do ye water here Silenus' horrid beast? There the Aganippides are fouling it with their rough thick lips; There is stamping with clumsy feet until the muddy waters flow!"

The unity of the type through nature's development, the presence of the infinite in the least as well as in the greatest. —the presence of all natural and spiritual potentiality in the first "point" or atom of a created world,—these are the points of contact between Goethe and Swedenborg, traced by Dr. Schlieper through not only this poem but through Goethe's whole system of natural science. Says Dr. Schlieper: "Swedenborg proceeds from this thought, which also underlies Goethe's view: From every face looks forth the spirit, nature has translated herself into a bodily shape and character, for bodies present their souls under a certain type. *Life* in union with nature brings forth the *Cause*, and the cause in which both nature and life live, begets the *work* which is the complex and the copy of the Nature." (P. 39.) This is a rather poor setting of Swedenborg's doctrine of the discrete degrees of End, Cause, and Effect, embodied respectively in God, Spirit, and Nature; and equally in the human trine of will, intellect, and work;—but it serves to indicate how profoundly the structure of Goethe's world-view was governed by Swedenborg's generalizations.

The familiarity of Goethe with Swedenborg's *De Cultu* is

also unmistakably manifest from the following passage from *Wilhelm Meister*: Boston ed., p. 318: "The friend was acquainted with my habit of looking on my body as an outward object: he carried forward my attention from the human body to the kindred objects of creation: *he led me up and down as in the Paradise of the first man.*"

The *Deutsche Parnass* may be regarded as an epitome of Faust, and the Monologue of Faust, in view of what we have already seen, finds its clear interpretation in Goethe's own experience in his acquaintance with Swedenborg. The whole subject of the Monologue in its reference to Swedenborg is very thoroughly treated by Johann Niejahr, of Halle a. S. in an article *Kritische Untersuchungen zu Goethe's Faust*, in *Euphorion*, Vol. IV., pp. 272-287.

This Monologue with which the Drama of Faust opens, begins with the familiar words:

I've studied now Philosophy
 And Jurisprudence, Medicine
 And even, alas! Theology,—
 From end to end, with labor keen:
 And here poor fool! with all my lore
 I stand, no wiser than before:
 I'm Magister, yea, Doctor-hight
 And straight or cross-wise, wrong or right,
 These ten years long with many woes
 I've led my scholars by the nose,—
 And see,—that nothing can be known!
That knowledge cuts me to the bone—
 I'm cleverer, true, than those fops of teachers,
 Doctors, Magisters. Scribes and Preachers.
 Neither scruples nor doubts come now to smite me.
 Nor Hell nor Devil can longer affright me.

Wherefore from Magic I seek assistance
 That many a secret perchance I reach
 Through spirit-power and spirit-speech,
 And thus the bitter task forego
 Of teaching things I do not know—
 That I may detect the inmost force
 Which binds the world and guides its course;

In germs, productive powers explore
And rummage in empty words no more!

Ah me! this dungeon still I see
This drear accursed masonry,
Where even the welcome daylight strains
But duskly through the painted panes—

With glasses, boxes round me stacked,
And instruments together hurled,
Ancestral lumber, stuffed and packed;
Such is my world: and what a world!

Alas! in living Nature's stead
Where God his human creature set,
In smoke and mould the fleshless dead
And bones of beasts surround me yet!

Fly! Up and seek the broad free land!
And this one Book of Mystery
From Nostradamus' very hand
Is't not sufficient company?

Here Niejahr identifies Swedenborg, the scientific scholar, with *der Weise*. The Monologue is the cry of longing to break the bands of dogmatic philosophy and to plunge into the experience of a real vision of the whole world, including the spiritual as well as the mere natural and animal side. *The Nostradamus' Book of Mystery* or *Arcana* is the *Arcana* of Swedenborg,—the *Sign of the Makro-Kosmos* is the doctrine of the Two Worlds:

"Fly! Up and seek the broad, free land!
And thus one Book of Mystery
From Nostradamus' very hand
Is't not sufficient company?
When I the starry courses know
And Nature's wise instruction seek
With light of power my soul shall glow
As when to spirits spirits speak!"
In these pure features I behold
Creative nature to my soul unfold:

What says the Sage now first I recognize:
 "The spirit-world no fetters fasten:
Thy sense is shut, *thy* heart is dead:
 Disciple up! untiring hasten
 To bathe thy breast in Morning—red!"

The Unity of Nature under the influx of an organic spirit world is seen in the splendid lines which follow like an echo from Swedenborg's doctrine: that all nature is a ladder of *uses* or *mutual services* by which the created universe, having proceeded from God, returns again to God in its gradual evolution or ascent from the lowest mineral or atom, by its inherent altruistic or use motive, up to the highest heaven of regenerated human souls. (See *Divine Love and Wisdom* 65.)

"How each the Whole its substance gives
 Each in the other works and lives!
 Like heavenly forces rising and descending
 Their golden urns reciprocally blending,
 With wings that winnow blessing
 From heaven through earth I see them pressing
 Filling the All with harmony unceasing!"

Niejahr finds in the "starry courses" allusion to Swedenborg's "*De telluribus*," and in the *Erd-Geist*, an example of Swedenborg's doctrine of each earth being in invisible association with its own spirits,—a society of whom may take the form of a single spirit, and, if permitted, communicate with man.

With equal thoroughness has Max Morris, of Charlottenburg, in an article on "Swedenborg in Faust" published in *Euphorion*, Vol. VI. p. 491, traced the Swedenborgian elements contained not only in the First but in the Second part of Faust.

Says Morris; "In the progress of the Faust poem come the Greek mythologies and the heaven of the Catholic saints into place. But at the very beginning Goethe had given all these their tone and meaning by the metal he has thrown into the casting from Swedenborg's vision of the spirit world." In everything that Swedenborg is able to tell about his spirits,

however trifling and ridiculous some of the details may appear,—there is at the bottom the grand view of the Universe as a whole. I give a short sketch of this Total View in the words of Kant in his *Dreams of a Spirit-Seer*. "All men stand in the same inward relation to the spirit world. One spirit reads in the memory of another the things which this other beholds there clearly. Although the relation of spirits to one another is not that of real space, still it has that appearance. In this imagined space there is a complete community of spirit natures. Distance counts for naught when it is as easy to speak with an inhabitant of Saturn as with a departed human soul. All depends on the relation of inner states and their conjunction by agreement in what is good and true. . . . The whole outer man corresponds to the whole inner man. As different powers and faculties compose that unity which is the inner man or soul, so different spirits form a society in which each individual spirit finds its place and is that part in the body of the larger man that corresponds best to his own peculiar genius. All spirit societies together, and the whole world of all invisible beings, appear at last under the form of the *Maximus Homo*. In this measureless man there is an inmost and complete community of each spirit with all, and of all with each."

"Wie all sich zum ganzen webt
Eins in dem andern wirkt und lebt."

becomes here very manifest in spite of the affected levity of Kant. I have not hesitated to introduce the long citation since to produce Swedenborg's own mighty picture of the universe in its totality would have required endless quotations. The ascending and descending heavenly powers which from heaven pierce through all the earth,—these are the spirits of Swedenborg as are those of the involving spheres mentioned above.

Pages are covered with citations from Swedenborg parallel with Goethe's description; of the infants in heaven; of the "blessed boys" who, born immediately into heaven at their

natural birth, ask the privilege to look down into earth through the vision of the mature earth-disciplined spirit; of instruction of spirits in heaven; of the throwing off there of the earth-swaddlings of the senses' memory; (Swed. A. C. 2494) also of the various angelic ministrations to the resuscitated spirit on its entering the other world, as described in Swedenborg's *Heaven and Hell*. [See "On the First State of Man after Death."—Nos. 491-498. Compare *Faust* Part II: Act V: Scenes VI, VII.]

That these glimpses of the spirit world Goethe obtained not through Paracelsus or Pico di Mirandola as Bayard Taylor and others have assumed, but directly from Swedenborg and through intimate acquaintance, is evident from passages like these in Goethe's letters. To Charlotte von Stein he writes, Oct., 1781: "Through Grimm's eyes will I like one of Swedenborg's spirits behold a vast stretch of country." To Frau Rath about the same date: "If one will, like the spirits of Swedenborg, see through other eyes, then one had better choose the eyes of children." To Lavater, Nov. 14, 1781: "I am more inclined than ever to believe in a world outside of this visible one, and I have sufficient power of life and poetry to feel my own limited self broadened into a Swedenborgian spirit-universe." And in Goethe's review of Lavater's *Aussichten in die Ewigkeit*, in the Weimar Ephemeriden (Vol. 37, p. 81) he writes of Lavater: "We wish him success in his enterprise, and if he will accept our advice he has pondered quite enough, nay already too much, on these things. Let him now lift his soul and gaze upon all this thought product, like so much earthly stuff, and feel more deeply the Spirit-Whole and only the Other in the Self. To do this we wish him the inmost fellowship with the honored Seer of our times around whom was the bliss of heaven, to whom the spirits spake through every sense and member, in whose bosom angels dwelt. May their glory enlighten him and if possible so shine through him that he may know what happiness is and have an idea what is the speech of prophets when the unspeakable things fill the spirit."

Besides these passages adduced by Max Morris, many of

which are quoted in the interesting article "Swedenborg in Goethe's Faust," contributed by the late Emanuel F. Goerwitz, translator of the only English edition of Kant's *Traume eines Geistersehers*, to the New Church Review, Boston, April, 1902, there are many others given by Loeper in his Commentary on Faust. Enough is here given I think to show how real and how powerful was the influence exerted upon Goethe by his intimate knowledge of Swedenborg. If we were to designate the influence by a single word it would be that to which German philosophy attaches an almost solemn significance, *Weltanschauung*. It was the view of the world in its completeness, embracing spirit and nature, God, heaven, earth and hell, and all under the aspect of unity and of a benignant law; and a view not born of intellectual theory, not of a world of categories, but a world born of actual experience of the soul's pragmatic knowing through the attainments of its intense desire.

"And grasps me now a long unwonted yearning
For that serene and solemn Spirit-land."

This desire of Goethe's to behold in picture the Whole could be granted by no scholar of his time, surely not by the cold rational idealists of Germany nor by the wooden-minded common sense skeptics of England. As Plato in his Republic (Book X: 614) needed the man Er to guide him through the mysteries of the intermediate world of spirits and heaven and hell; and as Dante needed his Virgil for the same kind of guidance, so Goethe needed a conductor; but no longer through a world of myths and shadows, but a world of intense reality, the very vital fount of the world we see, of the life we live:

"The troubled heart to joy unsealing
With impulse mystic and divine
The powers of nature here around my path revealing."

This guide through the *Geisterwelt* Goethe found in Swedenborg because he had found him already a guide through every path of earthly knowledge whether of the body, of the

organic or inorganic world. Here alone could be harmony where both worlds were seen: here was the unity of which all mere rational intellectualism or material empiricism was but a fragment. Here is the Event—the *Ereigniss* to which all creation moves. This is the *Weltanschauung* that Goethe found in Swedenborg and that enabled him to write the tragedy of the humanity of the XIX Century.

One word in conclusion, to add one final trait of Swedenborg in the Second Part of Faust, mentioned by none of the above cited authorities but, more deeply than any, testifying to the profound moral impress which Swedenborg's doctrine of heaven as a kingdom of *uses* or *mutual service* left upon Goethe's mind. It is in Faust's finding the "fair moment" not in sensual pleasures, not in learning, in wealth, in imperial power nor in the contemplation of the beautiful, but in the good of service to his fellow man, in the redemption of waste lands and the providing of happy homes. Here in the life of service is found the secret law of the universe, of the order of heaven, of the progress of society, of the attainment of human happiness, of the divine purpose of creation.

Ah, still delay—thou art so fair
The traces cannot, of my earthly being,
In aeons perish,—they are there!—
In proud fore-feeling of such lofty-bliss
I now enjoy the highest moment,—this!

With these words Faust dies and his soul is carried into the spirit-world, and, through angelic ministrations protecting him from the infestations of evil, is born upward into heaven.

Says Max Morris in concluding his essay on Swedenborg in Faust: "The Swedish seer has secured a kind of immortality through two Germans. He whom Kant has made worthy of a humorous discussion, and whose thought has become a part of Faust, he lives for that period of time which we in mortal fashion name eternity!"

It would not be an unprecedented turning of the scales in historical values if it should prove that that alone shall live in

both these Germans, to even an earthly age, which in substance was divided from that *Weltanschauung* obtained by them through the Swedish Seer.

BIBLIOGRAPHY.

PREPARED BY MR. SEWALL.

SOURCES.—For the extent of Swedenborg's world survey:

(a)—In Anatomy—

Emanuel Swedenborg als Anatom und Physiolog auf dem Gebiete der Gehirnkunde. Eröffnungsrede des Vorsetzenden Prof. Dr. Gustav Retzius an dem Anatomen-congresse in Heidelberg. Mai. 1903. Verlag Fischer in Jena.

(b)—In Brain-Physiology—

Address of Dr. Max Neuburger before the convention of Naturalists and Physicists in Hamburg. Vienna Medical Weekly. 1901. No. 44.

(c)—In Astronomy and Solar Physics—

Swedenborg and the Nebular Hypothesis; A contribution to the Kant-Laplace Nebular Hypothesis by Magnus Nyren, Ph. D., astronomer at the observatory of Pulkowa. Russia Vierldjahrschrift der Astronomischen Gesellschaft, Leipzig. 1879, p. 81.

(d)—In Chrystallography and Stereo-Chemistry—

Eiloart's Introduction to Van t' Hoff's *Arrangement of Atoms in Space*, in "Guide to Stereo-Chemistry."

(e)—In Psychology and Metaphysics—For Kant and Swedenborg—

Professor Heinze of Leipzig in *Abhandlungen der Sachsischen Gesellschaft der Wissenschaften*, Leipzig, 1894.

Professor Vaihinger of Halle a. k. *Commentar zu Kant's Kritik der Reinen Vernunft*. Bd. II. also Kant-Studien, Vol. I, p. 477.

Archiv. für Geschichte der Philosophie, Berlin, 1895.

P. von Lind. *Kant's Mystische Weltanschauung*. Munich, 1892.

Carl du Prel. *Kant's Vorlesungen über Psychologie*, 1889.

Kant's Dreams of a Spirit-Seer, tr. by Emanuel F. Goerwitz, edited with introduction and notes by Frank Sewall. The Macmillan Company, 1900.

Kant's Inaugural Dissertation of 1770 on "The Two Worlds," with an introduction by William G. Eckoff, Ph. D., New York; Columbia University, 1894.

Der Augenblickliche Mysticismus Kants.—Robert Hoar. Brugg, 1895.

Swedenborg's De Commercio. Intercourse of the Soul and the Body. Treating of the "Two Worlds," publ. 1769, the year before Kant's Inaugural Address on the same subject.

Swedenborg's *Arcana Cœlestia* (containing chapters on *Heaven, The World of Spirits and Hell*); also separately "*Heaven and Hell*,"—New York. Swedenborg Publishing Society, 3 W. 29th Street.

(f)—For Goethe and Swedenborg—

Emanuel Swedenborg's System der Naturphilosophie besonders in seiner Beziehung zu Goethe, Herderschen Anschauungen Inaugural Dissertation. Hans Schlieper; Berlin, Gustav Schade. Linien str., 158, 1901.

Swedenborg,—*De Cultu et Amore Dei*;—*The Worship and Love of God.* Complete. Engl. Trans. about to appear. Whiston, 16 Arlington Street, Boston.

Goethe,—*Der Deutsche Parnass.* Werke, Stuttgart, 1850, Vol. II, p. 23.

Kritische Untersuchungen zu Goethe's Faust,—Johann Niejahr. Euphorion, Vol. VI, p. 491.

Loeper,—*Commentary on Faust.*

Goethe's *Letters*; To Charlotte von Stein; To Lavater; *et al.*

THE DEVELOPMENT OF SWEDENBORG'S SCIENCE AND PHILOSOPHY.*

A prime necessity in the orderly investigation of any subject is "genuine doctrine;" if the investigation is to be successful, certain introductory truths and guiding principles must first of all be procured. They may be, and generally are, assumed from the studies of previous investigators in the field, or formulated directly from a comparative study of the facts. Swedenborg in his examinations of nature and the human body, both assumed the guiding principles of others and formulated new ones of his own; thus, after working for thirty-five years, he was finally prepared to write his greatest philosophical work, the *Worship and Love of God*, in which all his previous results are epitomized. To review the steps in the gradual development of Swedenborg's system of science

*Read at the Annual Meeting of the Swedenborg Scientific Association New York City, on June 5th, 1905. The early portion of this paper was written for a meeting of the Principia Club of Bryn Athyn in May, 1902.

and philosophy in his own mind, as recorded in his letters, manuscript and published works, is the purpose of this paper. But before beginning the analysis of these materials let us take a general view of them.

It cannot be too much emphasized that Swedenborg's marvellous teachings concerning the human form would have been impossible had he not first arrived at an understanding of the degrees of substances and matters in nature, their motions and peculiar properties. He himself tells us directly, and in many places by implication, that it is absolutely necessary first to understand the *macrocosm*, or nature as a whole. if we wish to understand its epitome, the *microcosm* of the human body. In his physiological works we find Swedenborg again and again recurring to his principles of nature, set forth in his *Principia*. Where did these principles originate? There is sufficient evidence to show that many of them are rooted in the fertile soil of Greek philosophy. Swedenborg was led to receive them, recognized their value, and having cultivated them was blessed with a wonderful fruitage. We know that he read Plato, also Aristotle, whom he calls "the philosopher"; he refers to the doctrines of Anaxagoras and others. Throughout his works there is a wealth of classical allusion and direct quotation from the ancient authors.

Take, for instance, the universal law that "nature is similar in greatestes and in leasts." A little reflection will show how such a precious seed of ancient philosophy would grow and expand in the mind of an earnest enquirer until the whole of nature would be seen to be a theatre of order and harmony. "Greatestes and leasts!" The very expression involves the doctrine of *unities*, which Swedenborg so wonderfully developed, proving that an atmosphere has certain properties because the leasts which compose it have similar properties, and, in the body, that the lungs as a whole perform their offices because they are composed of unities which are least lungs. Again, if there be "greatestes" and "leasts" and "intermediates" in the composition of things, it is but a step to the formulation of a doctrine of discrete degrees; they will be "dis-

crete" because of their component particles differing in degree of composition and consequently in size. If we think of the degrees as being one *below and after* another there is the conception of *successive* order, while if we conceive of them as being one *within* the other there results the conception of *simultaneous* order, and this is exactly what Swedenborg teaches in the *Worship and Love of God*, using the identical terms. If there be a conception of successive degrees, which Swedenborg had as early as 1716, the doctrine of *series* follows as a corollary; similarly, the doctrine of *society*; both are applied in the *Animal Kingdom* in the most minute manner, and with what illuminating results! If these laws will illumine such a comparatively external subject, what will they not do when the interior series of uses in the body are examined! By applying them Swedenborg was enabled to explain the interior architecture of the brain and nervous system. The doctrine of the "active and passive" is another case in point. We cannot conceive of anything to which it does not apply; there is always something which acts and something which is acted upon. The student of the *Principia* knows of what transcendent importance this doctrine is in that work, and in the human body it is exemplified in the whole and in every part; the membranes and solid portions are the passive, the bloods are the active, and, in the highest sense, the body is the passive and the soul is the active.

Swedenborg not only grasped the importance of the precious laws derived from antiquity, but also constructed new ones; the path which he followed is blazed all along the line from his first statement *On the Causes of Things* through the various stages of the bullular hypothesis and culminating in the *Principia*, thus covering a period of eighteen years, which will be examined presently in some detail. While bearing in mind that Swedenborg was heir to what was best in ancient cosmological philosophy, it should be noticed that he was a wide reader and an earnest student of the works on science and philosophy written in modern times. Although himself an ardent experimenter and close observer, Swedenborg finally devoted most

of his time to eliciting the causes from the experiments and observations of others, but it should be observed that he did this towards the close of his scientific career, *after* he had formulated his principles and when trained in the methods of the sciences. But although dwelling in the sphere of causes and ends, Swedenborg never became a mere *a priori* reasoner after the manner of the metaphysical scholastics, but in many places lauds experiment, and guides himself by it constantly. He clearly saw that truth which the Writings teach as follows:

"All theoretical matters are to be drawn and concluded from experiences, and are also to be confirmed by them. Unless experimental things, as it were, lead man's hand, he may be deluded in theoretical matters." (*Last Judgment*, posthumous.)

Swedenborg's science and philosophy in the beginning was nourished within the cherishing precincts of an old university. It was greatly influenced by the English experimental school, it was formed both at home and abroad, much of it being written on the continent near the libraries of great universities. Briefly noticing that Swedenborg's father was himself an official of the University of Upsala, the Alma Mater of both father and son, that Eric Benzélius, Swedenborg's brother-in-law, was librarian there, the founder of the Scientific Society, and the man who first directed Swedenborg's studies in the field of natural science, for which he showed a strong bent, that Swedenborg on leaving the university was already deeply interested in "particles," as appears from his letters, let us follow him to England where his "post-graduate" work began. The works he studied in England, according to his letters, were those of Bacon, Boyle, Newton and Locke. Thenceforward Swedenborg worked for many years on the foundations which those men had laid. After preliminary work in astronomy, mathematics, and mechanics, we find him attacking the ultimate problems of the constitution of matter, the formation of the earth, motion, the chemistry and physics of color and light, and so forth; at every turn we are constantly reminded of the early Greek physical philosophers and their enquiries into the nature of earth, air, fire and water.

During this same period Swedenborg was also busy with the duties of his employment as an Assessor in the College of Mines. He wrote on mining, commerce, manufactures and coinage, and for many years his attention was directed to these subjects in his duties as a member of the House of Nobles. A man of the world, a gentleman and scholar, a traveller who spent twenty-two years of his life in foreign lands, Swedenborg's real interests were always centered upon interior things, first those of the natural and afterwards of the spiritual world; his view was always being turned to higher and higher subjects; he began with the examination of the earth and ended his journey in the sacred precincts of theology.

As an Assessor in the College of Mines Swedenborg had abundant opportunity for studying the action of fire, and concluded that there were fire particles in the air; the light of the fire was a disturbance in the ether caused by the motion of the fire-particles, which is good modern chemistry and physics, but was totally opposed to the theory of phlogiston and Newton's corpuscular theory of light and colors which were everywhere received. In Swedenborg's first paper on the nature of matter, entitled *On the Causes of Things*, we find brief discussions of such subjects as these: the equilibrium of the planets; the most universal matter, consisting of round particles; the origin of matter; the ether, air, rain, etc. Beginning in this way and extending his studies to the strata of the earth, and the action of water everywhere, it was very natural for Swedenborg to pass over into the field of cosmology and general physics. The stages of his progress may be seen in the *Miscellaneous Observations* and in the work commonly called the *Principles of Chemistry*. Here the real philosophy takes definite shape. The first conception is that all things are in series; there is a series of particles, beginning with mathematical points and ending in water, salt and earth. The nature of physics and chemistry is declared to be a peculiar mechanism, which is geometrical, and determined by the various relationships of particles which differ in position, figure, weight and motion. In addition Swedenborg held at this

period that the earth was formed of mountains of salt and stone which originated at the bottom of the sea, that the presence of shells in the strata of the earth is explained by the supposition that the strata were formed in the water, that in the beginning the earth moved much more rapidly about its axis, and that its orbit was nearer the sun than later on, all of which permitted a perpetual springtime, during which living things arose.

With the publication of the *Principles of Chemistry* and the *Miscellaneous Observations* in 1721 and in 1722, Swedenborg begins a new period in his scientific career. He publishes nothing until thirteen years later. From a prospectus on a new work, which was to be called *The Genuine Treatment of Metals*, we learn that he was busy with metallurgical questions and intended to publish a great work in seventeen parts. In 1729 he writes to the Secretary of the Scientific Society of Upsala that he has been collecting materials for ten years on metals and the mineral kingdom, which he is also thinking of using in the formation of principles of nature *a priori et posteriori* (*ex priori et posteriori principia naturæ*) which he proposes to use in connection with explaining the magnet. This is a new motive. The reference to principles of nature is in Latin and is almost the same as the title of the work commonly called the *Lesser Principia*, which Swedenborg had no doubt been drafting and planning at this time, as was his habit. The reference to the magnet at once calls up the second part of the *Principia*, which deals with that subject at length. In the *Lesser Principia* we find a scheme of points and particles similar to that in the earlier works, but very much elaborated. The undulatory theory of light is developed, the nebular chaos of first substances is described as giving rise to the planets, and the theory of creation of living things as given in *Genesis* is literally accepted. A few years later, in 1733, Swedenborg travelled to Leipsic and Dresden, where he published in 1734 three volumes folio, the *Principia*, the work on *Iron* and that on *Copper*, in which were crystallized the results of fifteen years of work. In the *Principia* the scheme

of particles is still further elaborated and the subject of fire is adequately treated, having been omitted in the *Lesser Principia*, although its treatment is promised in an Appendix. Much space is devoted to magnetism, while light, heat, electricity and the *ignis fatuus*, etc., are all explained in a way so modern that Swedenborg is still ahead of the times. The doctrines of the active and passive, of kinds and degrees of motion, of composition and transmission of force, are all inwoven with a grand scheme of the creation of the universe from points, first substances, and by means of a solar chaos, treated at much greater length than in the *Lesser Principia*, but not differing from it essentially.

Shortly after publishing the *Principia* in 1734 Swedenborg entered upon a third period in his scientific and philosophical studies. He published a work entitled *On the Infinite and the Final Cause of Creation* and *On the Mechanism of the Operation of the Soul and Body*. This work holds that God is the Final Cause and Creator of nature, that He is infinite but the creation finite, that the soul is created and therefore finite, that everything created or finite is natural, mechanical and geometrical, and that therefore the soul is also natural, mechanical and geometrical. Swedenborg always believed in the existence of God and the immortality of the soul, but it is quite clear from this work, and especially from a short treatise which will be considered presently, that he did not at first conceive of a grand trine of the Divine, the Spiritual World, and the Natural World. This came in his later scientific works, especially the *Economy of the Animal Kingdom* and the *Worship and Love of God*, but the works written immediately after the *Principia* do not teach the later doctrine. His earlier conception was the following series: God or the Infinite, the first natural point which is a *nexus* between the Infinite and the finite, the first finite, the second finite, and so forth all the way down to the mineral kingdom; then there is a grand return or revolution through the vegetable and animal kingdoms up to man, who is conjoined to the Infinite Creator by love and worship. The soul and the angels are on the plane of

the first and second finites. At this period Swedenborg writes in Codex 88: "Concerning nature and created things, that they are all geometrical and mechanical;" "that the soul, the angels, and man, with his internal and external senses, are mechanical and natural." In the treatise *On the Mechanism of the Soul and the Body*, which has just been published, Swedenborg states this position still more plainly. He says:

11. *That the soul is bound by rules; that it is bound by mechanical rules, and that it can be explored by mechanism and geometry.* No one can deny that the soul is created, that it is finite, that it is not infinite. If it is not infinite, but created, it must be finite, for whatever is created cannot be infinite, and whatever is not infinite must be finite. It will have either space or figure, or the appearance or likeness of space and figure, therefore no rules are possible except mechanical and geometrical ones; if not, it would be something of the infinite, it would be something of the non-created; if it be bound by rules, they cannot be others than those which arise from geometry; therefore it is natural. The angels ought to know of what quality the rules are. Why should they not, since the soul is angelic? Wherefore the soul, in this state, cannot know what its quality is, but it will know in the following one what it is, of what quality it is, how large it is.

12. *That the rational soul consists of the actives of the first and second [finites]; that they [i. e., the actives] form little spaces, and around them there are surfaces of passives or finites.* * * *

16. *When this expanse is dissolved it cannot be broken without its gathering itself together and forming a globe, either as to its parts or as to the whole of it, in order that it may be together.* * * *

18. *Such a soul cannot be injured by any element or fire.* * * * Neither can ether or elementary fire operate upon it; only the first element can do this; from the first element it will have sense and proximate action, not from the others.

There is much more to the same effect, from all of which it is quite clear that the soul is a most refined mechanical, geometrical, and natural expanse on the plane of the first aura, or the first and second finites or degrees of natural substance, and that it is immortal. Towards the close of the treatise Swedenborg writes:

48. *When man dies the soul lives* because it cannot perish, since it consists in such a subtle part, which cannot putrify, nor perish from fire, nor air, nor otherwise; therefore it remains.

49. *That by death and putrefaction a great part of it perishes, or is dissolved from the remaining nexus and follows the putrified parts.*

50. *That the soul after death betakes itself more and more and in time into a one* and separates itself from the grosser parts, no otherwise than the blood, which, when the nexus is loosened, can go together into a one, and in place of the tunic remain in one place.

51. *That the ultimate which thus remains is the soul*, which in the process of time separates itself from the grosser things, and, ultimately going together, is the living soul.

52. *That, angels mediating*, it thus comes into heaven; without their mediating I know not whether it could thus live; therefore it is carried into heaven by the angels, when it has undergone its purification.

53. *When the body dies it all becomes flaccid, together with the very membranes*, on account of which these most subtle things can withdraw into themselves more and more, since all the parts are fluid, and at length withdraw in such a manner that they betake themselves into a one, in which one space the actives partly betake themselves together, partly being separated, they display the entire soul flown together into a one which cannot be separated from any earthly thing. It ought of necessity to flow together in this way when the remaining [gross parts] are dissipated; neither does it harm that some parts are separated thence, for that which ultimately is the residuum is nevertheless the soul.

Students of the teachings of the Writings concerning the "limbus" will at once draw the parallel between it and the soul which Swedenborg here describes. The soul of the Writings in the strict sense is the human internal above the heavens, but the limbus, consisting of the "purests" of nature, is just such an expanse as is described in the treatise *On the Mechanism of the Soul and the Body*. It has seemed important to dwell upon this subject at some length, not only because the material is new, but also because some of the questions which students of the psychology of the scientific works are asking can be solved in no other way. Swedenborg nowhere else defines the soul in such definite terms.

Having completed his physical investigations Swedenborg passed over to anatomy, physiology and psychology. His one aim was to find the soul, and he endeavored to do it by minutely examining her kingdom, the human body. It is indeed true that in the little work on *Tremulation*, written before the *Mis-*

cellaneous Observations, the human body is treated of, but this is specifically in connection with tremulations and other forms of motion and not from the later standpoint. In the work on the *Infinite, etc.*, there is some anatomical material, and in the later portion of the work the cortical substance is recognized as the special seat of the soul, a position never abandoned but prominent in all the later works on the nervous system and the brain. But it seems that with a short manuscript entitled *Observata* Swedenborg records his first distinctly anatomical observations, perhaps made in connection with dissection, for the title means "things observed." After many works of a preliminary nature, Swedenborg published in 1740-41 his *Economy of the Animal Kingdom*. This is a truly inspiring work; in the most fascinating style the results of the *Principia* are employed in the exploration of the vascular and nervous systems, resulting in a physiology and psychology of unsurpassable quality. Beginning with the year 1736 Swedenborg began to have dreams which he wrote down. They have not been preserved, but some which he had a number of years later have been preserved, and he tells us that for several years he had been guided in his writing by dreams. Certain it is that there is a different quality in the works beginning with the *Economy* as compared with those which went before; there is an added insight and power. In the *Animal Kingdom* Swedenborg adopted a new method of presenting his subject. Instead of treating it *a priori*, or from interiors to exteriors, he now treats it *a posteriori*, from exteriors to interiors. This work was planned to treat of the whole human body and finally of the soul; many portions were sketched and drafted, but the plan was never completed. In the year 1743 Swedenborg's spiritual eyes were opened and another period in his life set in, that of a special preparation for his spiritual work. In October, 1744, the *Animal Kingdom* was abandoned and a new work begun, the *Worship and Love of God*. In it are summed up all previous results, not only those of inorganic, but also of organic nature. The method is *a priori*,

beginning with the creation of things and ending in the wonderful Third Part with heaven itself and the spiritual Sun.

We have seen some of the steps in the development of Swedenborg's scientific system. Clearly it should be studied chronologically according to the series which Swedenborg himself followed. If this be not done the relations of the parts forming the beautiful whole will not be seen, and confusion will result. What a story we shall some day be able to read when *all* of the materials are printed, when the manuscripts now inaccessible have been printed and studied.

ALFRED H. STROH.

THREE PLASTER CASTS OF SWEDENBORG'S SKULL.

EDITOR OF THE NEW PHILOSOPHY:

In Dr. R. L. Tafel's *Documents concerning Swedenborg*, Vol. II., Part II., pp. 1202-1208, is contained a long note on *Swedenborg's Skull*. Three plaster casts of the skull were made years ago, and of the one in Finland, in the possession of the Nordenskold family, Professor Gustaf Retzius had five plaster casts made in the summer of 1905, the original cast having been brought to Stockholm for that purpose by the present head of the Nordenskold family in Finland. Three of the casts were entrusted by Professor Retzius to the undersigned for distribution in America, and the casts have been duly accepted by the Swedenborg Scientific Association, the Academy of the New Church, Bryn Athyn, Pa., and the Massachusetts New Church Union of Boston.

ALFRED H. STROH.

University of Pennsylvania, Philadelphia, January, 1906.

NOTICE.

FOR SALE.

For the Benefit of the Swedenborg Scientific Association.

A very choice site for country house or camp on one of the most beautiful lakes of New Hampshire, beautiful scenery and finest social neighborhood; easily accessible but thoroughly rustic and secluded. Price to suitable party \$1,000. Enquire of Editor of *New Philosophy*.

THE NEW PHILOSOPHY.

VOL. IX.

APRIL, 1906.

No. 2.

ON VARIOUS KINDS OF SOIL AND MUD.*

BY EMANUEL SWEDENBORG.

In Westergyn are found various kinds of soil and mud which may be employed for many uses and purposes. In the parish of Rhyda, a short distance from the rectory, in a beautiful grove, there are three springs which flow forth in a row; out of the first there flows ordinary spring water, out of the second or middle one a medium mineral water, and out of the third a mineral water which is still stronger but with the same taste. The stones which these two kinds of water run over are of a reddish or vivid orange color, as at other mineral springs; the mud or ochre just below is also of the same color and might be removed in large quantities. Down below there is a marsh in which all the kinds of water are gathered, where the same mud becomes coal-black, and settles itself to the bottom in layers which are $\frac{1}{2}$, 1, $1\frac{1}{2}$, or 2 feet thick. Underneath there is a sandy bottom of white and fine sand, quite serviceable for hour-glasses, and still further below there is a stony bottom. I have also examined the stones, upon which there is some glitter of a silver color, as if some silver had been laid on the

*This is the first published translation of Swedenborg's manuscript, entitled "*Om atskillig slags Jordmohner och gyttior*," contained in the *Photolithographs of Swedenborg's MSS.*, Vol. I., page 94. Dr. R. L. Tafel does not include this manuscript in his "*Chronological Account*," although he mentions it elsewhere in the *Documents*, Vol. II., Part II., page 878, saying that the original manuscript is preserved in the Diocesan Library at Linköping. The date of this manuscript is probably about 1717. The translator is Alfred H. Stroh.

stones, for it differs in color from ordinary glitter. There are also found in the same marsh or dam fish which hide themselves in the mud, so that they cannot be easily caught by nets or similar contrivances; their color is blackish, and in this they differ from the ordinary fish. The uppermost mud is used for dyeing the finest black, which is just as permanent and beautiful as the Parisian. and which has the great advantage over the other in that linen and clothing may be dyed in cold water, so that there is no danger of burning as is seen in the case of other dyes. First one takes water and cooks in it the bark of the alder, and afterwards one dips the cloth in it, which they here call *beta*. Afterwards one takes as much of the black mud as of the bark and cooks them together a proper time, and lets it cool, and when one draws the same cloth through it, then one has the black color which is beautiful and permanent. The cloths which were dyed black in this manner many years ago are found to have kept their color unchanged up to the present day. Furthermore, it seems that in this place there is a healthful and beautiful air, which is considered to come from the three salubrious springs. Those who dwell in the vicinity insist that for the last fifty years they have not known of any creature having died for them, or of any ailment in man or beast.

DR. HANS SCHLIEPER'S BERLIN UNIVERSITY
ADDRESS ON SWEDENBORG'S NATURAL
PHILOSOPHY.

Prefatory Note by Translator

Dr. Schlieper's address came to my notice through Mr. Alfred H. Stroh, who procured a copy of it for my examination from the Library of the University of Pennsylvania. I send to the *New Philosophy* but a fragment—the opening pages—but sufficient to show the author's purpose and manner of treatment, the whole address being too long for insertion in our pages.

FRANK SEWALL

Title:

EMANUEL SWEDENBORG'S
System of Natural Philosophy,
Especially as related to
the Views of
GOETHE and HERDER.

Inaugural Dissertation
on
Receiving the Doctor's Degree
from
The Philosophical Faculty
of the
Frederick-Wilhelm-University at
Berlin,
February 16th: 1901:
by
Hans Schlieper,
of Berlin.

Berlin:
Gustav Schade (Otto Francke),
Linienstrasse-158.

Dedication:
To my dear Parents.

It is my endeavor in the following pages to furnish a brief sketch of a very remarkable philosophical development whose closing period is connected with our literature through Kant's "Dreams of a Spirit-seer"¹ and the Second Part of Goethe's Faust, while the recollection of the less valuable scientific writings of the first and middle period would seem to have almost disappeared. Swedenborg's Natural Philosophy has been clouded by the mystical revelations of his old age. The Swedenborgians naturally regarded the works produced before the time of the divine call as of inferior rank, and at the same time treated them too dogmatically to allow their historic worth to be questioned.

Now that more recently the decided significance of the organic nature systems of Goethe and Herder has begun to be recognized,² Swedenborg claims a new interest as the forerunner in this direction. In the following treatise it shall be my endeavor from this point of view to trace the relationship between Swedenborg and Goethe with that accuracy, which the rich and varying material of the Klettenberg period and of the early 70's renders possible.

Originally a Cartesian, as the very numerous influences of this philosophy show, Swedenborg developed in the midst of

¹For the English Translation of Kant's *Traume eines Gesterschers*, see *Dreams of a Spirit-seer*, etc., translated by Emanuel Gorwitz, with an Introduction and Notes by Frank Sewall. London: Swan, Sonnenschein & Co. New York: Macmillan Co.

²Comp. Dilthey, Schliermacher 1, p. 169-76. Haym, *Romantic School—Influence on Schelling*, p. 582, 594, 609; on A. W. Schlegel's *Aesthetic*, Comp. N. Pichtos, *The Aesthetic of A. W. Schlegel*. Berlin, 1894. p. 18.

an empiric,³ and especially through the study of Leeuwenhoek, Boerhave and Swammerdam, out of the Cartesian rationalism the conception of the evolving spiral, which, he later seeks to maintain as the metaphysical foundation of his Anatomy and Psychology. Without doubt Descartes' Vortex was here the model. Oetinger's opinion (Philos., Schriften II., 158) that the Observations on the Magnet had given the first suggestion is contradicted by the publication meanwhile of the *Principia rerum naturalium* in the year 1720,⁴ which sets forth a concise first outline of the system but without that reference to magnetism. A further analysis of this outline and of the complete presentation of 1734,⁵ to be given further on, will furnish as the essential turning point a commencing inclination from the mechanical to the organic view of nature, which became complete in the Anatomical works of the 40's.

As for the further sources of Swedenborg's doctrine, besides those named and Aristotle, Wolff especially claims our notice..

Although he became acquainted with him as we may judge from Princ. p. 452. and from evidence of the *Itinerarium* (edited by Tafel, Tübingen, 1840, p. 215, Sect. II., p. 3) only some time after the projecting of his own philosophy, still he adhered to him from that time on on account of their related principles: The Treatise *de Anima*,⁶ edited by Tafel (Tub., 1849), shows most clearly the Wolffian influence. In his relation to Wolff Leibnitz comes less into notice; he is mentioned polemically only. Locke is occasionally favorably mentioned. In general, the Diary of Travel, above named, affords a lively picture of Swedenborg's manifold acquaintance.

The year 1745 marks the beginning of the visionary and spiritistic period, and at the same time the decline of his power

³Comp. the writings *Prodromus rerum naturalium*, 1720, and *Miscellenea observata circa res naturales*, 1722.

⁴Photolithograph Edition, Stockholm, 1870.

⁵*Principia rerum naturalium. Opera philosophica et mineralia*. Tom I. Dresden and Leipzig, 1734.

⁶*The Soul or Rational Psychology*: translated from the Latin by Frank Sewall. Pp. 388: 2d Ed.: New York, 3 W. 29th: 1900.

of exact thinking. Generally speaking, we shall find these later writings liable to Kant's reproach of dullness.⁷

That first outline of the system in the year 1720 began at once with the natural point: the *Prodromus philosophiæ ratiocinantis de infinito et causa finali* of 1734 seeks to answer the preliminary questions regarding the relation of the finite to the infinite. The standpoint regarding this question is here, as everywhere, up to 1745, that of the half-skeptic. "Those mysteries which lie beyond the reason cannot be opposed to reason, although their nature cannot be unveiled by this reason." Finite and infinite appear at first wholly separate from each other. We can apply to the infinite neither the space notions such as those of the geometrical maximum or minimum, nor the time notion like that of eternity (p. 18). Hence there is no sense in asking about the *Quale* or nature of the infinite. If one will ask about the infinite one can only refer to its existence, or, in other words, to the origin of the finite (p. 28). But here arises a difficulty. On the one hand there can be no

⁷A bibliography contains:

a) The Bibliographical Index to the published writings of Emanuel Swedenborg, London, 1897.

b) The Anonymous Works: Em. Swedenborg's Leben und (theologische) Lehre, Frankfort, 1880, p. 94.

Both incomplete but supplying each other's deficiencies.

The well known Essay of Emerson naturally needs supplementing in many places and correcting in some.

[Observation by Translator.—The Charge of "dullness" by Kant and Emerson's complaint of the "sandy wastes" of Swedenborg's style reflect the lack of a spiritual insight enabling them to see those realities and their law and system, which it was Swedenborg's mission to lay down with scientific precision; by the side of which mission brilliancy of style and cunning ratiocination, of which Kant shows such mastery in his "Dreams," finds no place. Swedenborg's power of exact thinking in the years after his illumination is demonstrated by his able contributions on financial and social questions to the discussions, in the House of Nobles, of national affairs, which won the high eulogy of Baron Sandal, General Tuxen and others after his death. See *Tafel: Documents concerning Swedenborg*. J. Spiers: London.—F. S.]

mediate between the infinite and the finite, for this would have to be infinite, and at the same time distinct from the first finite (p. 107); but on the other hand, causes and effects (endpunkte) cannot be connected without an intermediate, or they cannot be brought into a relation, one to the other (p. 112), without something uniting them. This combination can only be met by the admission that the mediate or uniting link is both infinite and inconceivable (p. 113). Hence we must regard the finite as an endless kingdom of degrees. If there is a finite it must exist in series of degrees of perfection or of greater and smaller in succession, and so it must be gradual; without degrees there can be no finite properly so called" (p. 135). The infinite acts in every place of this finite: "it is the maximum and the minimum in all" (p. 21). It is related to the world as soul to the body (p. 160). Hence everything natural is also divine (p. 159), and the worship of nature leads to the true knowledge (p. 82) and the true worship (p. 45) of God. The knowledge of nature, however, means the knowledge of its primal element, which, as the immediate product of the divine, is not indeed an infinitely perfect, but still a finitely perfect (p. 132), in which all the intermediates, even to the end, are concentrated, enclosed and disposed (p. 80)."

From the foregoing we see the scientific method which Swedenborg in conscious agreement with Wolff, defended especially in the prefaces to his works. In order to discover any element or its first element we must employ analysis; but to construct a world out of these, synthesis. These ways diverge in various directions, but they all run together. (*Regn. animale*, p. 2, 3; *De cultu et amore Dei*, Sec. 53, note. Experience and geometry are the first premises, but they alone are not sufficient. We move about in nature as in a labyrinth, where we must determine the plan of the whole from the course of the few paths known to us (Princ. p. 4). Those who expect to succeed from experience alone are like the night-birds of prey; they take darkness for light and feed

upon carrion. (*De Commercio an. et corp.* ed. Tafel. 1843, p. 12.)

It is true that the world of our senses is the only true world. "Every one who thinks that there is another world, flees away into the hidden as to a place of refuge, where he may cover up his ignorance and pass for a philosopher in the eyes of the literary world." But only the intellectual vision (*Visus rationalis*: *Oec.* I. sec. 579) can lead one to the mathematics of universals, which is the goal of all sciences, the *scientia scientiarum*. (*Oec.* II, sec. 212.) This is what Leibnitz and Descartes had already demanded. This universal mathematics is like the spider in the midst of its nature-like web. The moment an insect flies into the spider's net she is aware of it, and devours her prey in the quickest way. (*Princ.* I: 19.)

Together with reason there remains, indeed, the Bible as source of knowing (*Prodromus. phil. rat.*, p. 159); but its revelations cannot disagree with reason.

End of the Fragment.

Further quotations from Dr. Schlieper's review of the scientific and philosophic series of Swedenborg's works are hardly necessary, for the reader is familiar with these works themselves; the above passages show the faithfulness and thoroughness of the reviewer's endeavour. What is of vastly greater interest is Dr. Schlieper's tracing of Goethe's acquaintance with Swedenborg's *Arcana* through Fraulein Klettenberg in Frankfurt in the early 70's, and the resulting very striking instances in the *Faust* drama of the profound influence which Swedenborg's writings had had upon Goethe's whole *Weltanschauung*, or world survey. This I have endeavored to treat of with greater fulness in my address on "Swedenborg's Influence upon Goethe," delivered before the American Philosophical Association, at the Opening of the Emerson Hall of Philosophy at Harvard University, on December 27, 1905. This address was published in full by the request of its editor, in the *Har-*

vard Illustrated Magazine, for January, 1906, being Vol. VIII: no. 4, also in *The New Philosophy* for January.

FRANK SEWALL.

P. S.—In a letter received from Dr. Schlieper in acknowledging a copy of my Harvard address, he speaks of his abiding interest in Swedenborg, and gives me a number of interesting and valuable notes regarding what may be called the "Swedenborg revival" in Europe.

F. S.

PROF. REYNOLDS'S THEORY OF THE STRUCTURE OF THE UNIVERSE.

One of the most ingenious theories as to the nature of material universe is that advanced by Osborne Reynolds, professor of engineering at Owen's College, Manchester, England.* It has been suggested that this theory resembles the teaching of Swedenborg on the subject, but as will appear from the brief sketch given below, the resemblance is only a superficial one.

Prof. Reynolds claims to have discovered a doctrine of the atmospheres that will explain, satisfactorily, all physical and dynamic phenomena, such as gravitation, cohesion, friction, cohesion, elasticity, the freedom and mutual constraint of molecules, the transmission of light, etc., etc. By an intricate series of calculations, experiments and deductions, reaching over a period of twenty years, he arrived at the conclusion that the only medium possessing the requisite characteristics was one consisting of solid spheres, infinitesimally small, of a density ten thousand times that of water, and so close to one another as to be unable to change neighbors, though constantly in relative motion with one another. Thus each spherule would be

*See Reynolds's *Submechanics of the Universe*, especially Vol. III, and for a brief account, *On an Inversion of Ideas as to the Structure of the Universe* by the same author, Cambridge University Press, 1902.

in relation with twelve others, or form the center of a nucleus of twelve others. This he calls "normal piling of the grains."

Instead of an attenuated, elastic ether throughout all space, we would thus have an atmosphere of hard, inelastic particles, and, since they extend indefinitely, there can be no mean motion of the boundary; to all intents and purposes they are enclosed within a gigantic sphere, whose walls are irresistible. But there is space enough for the particles to move and change position to a limited degree, "normal piling" may be disarranged and "abnormal piling" result. This is what happens when matter is formed. For, according to the author, an atom of matter consists of a nucleus of twelve grains of spherules in normal piling, surrounded by a layer in abnormal piling, or as he terms it, a "singular surface of misfit." Instead of atom, however, he prefers to call this unit a "negative inequality," because it is a negative aberration from the vast "normal."

Matter, therefore, is less dense than the medium surrounding it. Wherever there is matter, there is inequality and consequent "strained normal piling," because, being less dense, it requires relatively more space. The pressure exerted by the circumambient medium constantly tends towards restoring this strained relationship, and hence comes the force of gravitation, the reverse of the Newtonian theory that this is an attractive force.†

Electricity, magnetism, the cause and transmission of light, etc., are all explained along similar lines, but we have not space to particularize further. But it may be asked, if space consists of these countless, inelastic grains or spherules, how can the earth travel through its zodiac, how can any solid body move? It is difficult to give the professor's explanation of this

†In framing this theory, Reynolds made use of the phenomena of *dilatancy* of granular media discovered by him in 1882. If a bag be filled with shot so closely packed that their interspaces are at the minimum, in other words, if they be in "normal piling," they will occupy less space than when this arrangement is destroyed by distorting the bag, and increasing the interspaces.

in a few words. It must be remembered that according to his system, matter is practically nothing more than inequalities in the grand medium of the universe, and to get closer to the real motion as he sees it, he uses the word "propagation." This takes place along the "singular surfaces of misfit" above referred to, which he says, have all the characteristics of a wave boundary. He illustrates this action by a well known experiment in physics. If several billiard balls be placed in a row touching one another, and another set of balls of equal size and weight be rolled successively down a slightly inclined plane so that they impinge against the end of the row, at each concussion a ball will leave at the other end without the others of the row being disturbed. The whole row of balls will move forward by the diameter of a ball, each time a ball strikes in front. This, according to Reynolds, is what takes place wherever matter exists and is moving through space, but the "balls" are incredibly small and their movements incredibly swift. To quote:

If the medium is stationary and the molecules are moving with the earth, the grains within the surfaces do not partake of the mean motion of these surfaces, being replaced continuously by other grains by the action of propagation, by which the singular surfaces in their motion are continually absorbing the grains in front and leaving those behind without any mean effect on the motion of the grains. And thus there is perfect freedom of motion of the molecules of aggregate matter, although the grains which constitute the nuclei are changing at the rates expressed by twenty miles a second. To be standing on a floor that is running away at a rate of twenty miles a second without being conscious of any motion is our continual experience; but to realize that such is the case certainly is a tax on the imagination. Such motion has all the character of a wave in the medium; and that is what the singular surfaces which we call matter are—waves. We are all waves

It is evident that this learned physicist has set about building a mechanical universe, one that will run "of itself," and from a purely mechanical standpoint his system seems very plausible. But, aside from the fact that he begins with a unit which is the basis of all matter, and that his explanation of gravitation resembles Swedenborg's in that it is due to press-

ure and not attraction, his system is diametrically opposed to the *Principia*, and lacks entirely the essential characteristic of Swedenborg, the responsible pliability compatible with an influx of living force, which governs and controls from within.
H. F.

SWEDENBORG RECOGNIZED AS THE FIRST SCIENTIST TO EXPLAIN THE PHENOMENA OF LIGHT.

The *Journal of Philosophy, Psychology and Scientific Methods*, published at the "Science" Press, in its issue for February 15, 1906, contains in its "Notes and News" the following:

"In the number of *Nature* (London) for January 11, Mr. Charles E. Benham, of Colchester, points out that the theories of Rennford and Young to account for the phenomena of light and heat are anticipated by some sixty years in the 'Principia' of Swedenborg, published in 1733. Part III., Chapter VIII., of the 'Principia' contains the following: 'Whatever the ether presents to an organ by means of colors, the air presents to us by means of undulations and sounds. Thus nature is always the same, always similar to herself, both in light and in sound, in the eye and in the ear; the only difference is that in one she is quicker and more subtle; in the other slower and crasser.' Other references are to Part III., Chapter V., No. 21, and Chapter VIII., Nos. 8, 9, 10, 16."—F. S.

SWEDENBORG'S SERVICE TO SCIENCE.

An article in the *Baltimore American*, noticing Swedenborg's birthday, speaking of his great service to the world in his teachings about the other life, made some criticism of his followers and their blind acceptance of all his teachings, even his scientific and philosophical speculations. In answer to

this the Rev. L. G. Allbutt called attention to Swedenborg's eminent service in the field of science and philosophy and to the "Swedenborg Scientific Association" and its object to further the cause of true science as opposed to such false conclusions as those of Haeckle and others who attribute the universe to merely natural causes and eliminate the thought of a Divine Creator." This was followed by a rejoinder from Mr. Day and a reply from Mr. Allbutt, four open letters on each side being printed in the *American*. Mr. Day's objection to Swedenborg's science is based mainly on the prepossession that everything in science is changing and things true are comparatively new, and nothing could be expected of worth from a man who wrote 150 years ago. He misses entirely the point that Swedenborg's real contribution to science is *doctrinal, philosophical, and that his philosophy is unique in that his inductions are made from scientific facts, and that his synthetic principles are of service to all subsequent science as furnishing a doctrine of classification and explanation.*—N. C. Messenger.

PSYCHOLOGICAL REFERENCES IN SWEDENBORG'S
MANUSCRIPT, "CODEX 88."

It has often been pointed out that Swedenborg's later scientific and philosophical works cannot be properly understood without consulting the earlier works; the later works being those which were written after the *Principia*. After the work on the *Infinite, etc.*, Swedenborg spent five years in preparing a new work, the *Economy of the Animal Kingdom*. He writes on the cover of Codex 88, in Swedish: "I finished writing my work in Amsterdam on the 27th of December, 1739, on the stroke of 12." Immediately beneath this note, in Latin, is the plan of work which Swedenborg mapped out for eight years:

"1740 On the Brain.

1741 On the Muscles, Glands and Nerves.

1742 On the Eye, Ear, Tongue, Trachea, Lungs.

1743 On the remaining members, or on the Viscera of the body.

1744 On the members devoted to Generation.

1745 On the Causes of Diseases.

1746 On the passions and affections of the animus and mind.

1747 The City of God."

The quotation may be consulted in the original in Vol. III. of the *Photolithographs*, p. 141. In the same volume are extracts from "Codex 88," showing what Swedenborg was engaged upon for some time prior to the *Principia*, and especially for the period after the *Principia* and up to the *Economy of the Animal Kingdom*. This period has so far received but little attention, although it is of absorbing interest, for it illustrates the steps which Swedenborg took in passing from his cosmology and physics into anatomy, physiology, psychology, and theology. Some consideration was given to the theology of this period in an article in *New Church Life*, 1905, entitled *Swedenborg's Theology from 1728-1738*, and the psychological portion is briefly considered in a note, *New References to the "Limbus,"* in *The New Philosophy*, 1905, pp. 267-268, as also in the article in the January number on *The Development of Swedenborg's Science and Philosophy*. In amplification of the subject some further references in "Codex 88" will now be noticed.

By far the most important contribution in the Codex is the treatise *On the Mechanism of the Soul and Body*, because in it there is given a connected treatment of the psychology which Swedenborg set out with. But still more definite statements are to be found in a treatise entitled by Dr. R. L. Tafel *A Comparison of the Systems of Christian Wolff and Swedenborg*, the first instalment of which appeared last issue. Swedenborg quotes from Wolff and here and there adds his own observations; and similar observations are contained in various fragments which are reproduced immediately after the *Comparison*. (See pp. 102-140.)

In No. 1 of the *Comparison* we observe that all spirits are created, that the soul is a spirit, that everything created is finite, that everything finite is mechanical and geometrical. On p. 105 Swedenborg says that the figure of the soul is "screw-like or spiral, with cones, so that it can thus be moved differently for every tremulatory motion." There are further references to the polar cones, to centre and circumference, etc., from which, and also from the sequel, it is clear that the first finite of the *Principia* is referred to. Then follows a treatment of the hyperbola, with a drawing, and the conclusion, p. 107, "from which it follows that this spiral curvature in the soul is hyperbolic, and diversely hyperbolic according to compression and dilatation." The "first element inflows into the cones, which according to the tremulatory motion of the membrane is put into a similar motion; thus the soul can be put into motion by this element, and can put it into motion; in these things consists the most subtle sympathy, and the communion of souls, of angels, and their correspondence with our soul." Then follows a particular treatment of the composition of the soul and the interior fluids and membranes in terms of the finites,

actives and elements, together with a diagram of the soul, etc., every word of which is of profound importance in the detailed analysis of Swedenborg's psychology.

After this follow several pages on tremulations, the senses, sensations, and various states of the mind. On pp. 134-136 are contained a number of paragraphs on the constitution and condition of the soul after death, the difference between the souls of the good and evil; the souls of brutes; the souls of different kinds of angels; the communion of souls, etc., etc. "The soul receives the impressions of the elements differently after death, than in the body; they are other in quality." The souls of the angels are elastic and they are happy, but the souls of the evil are not elastic and they are tormented. The souls of brutes do not have actives within, but the first element, "whence also their soul consists in this that they know the quarters, the south and the north, because there is the magnetic element, that is, their most subtle; hence [a brute] can perish, but it lives for some time." Subtler angels may exist which have within only first actives [not also second actives] and hold on their surfaces the second finites and the first element. The grosser devils consist of fifth finites and the first and second elements; they suffer continually from fire and the aerial element; in subtler things they have no sense. The communion of souls is by means of undulations; "the motion in one is felt in another, although the distance be from star to star."

On p. 139 the following order of membranes is given: "NB. The *membranes* are: 1. That of the soul. 2. Of the imagination and memory. 3. Of the senses. 4. Of touch. 5. The pia mater. 6. The dura mater. 7. The tunics and thus the cranium."

It is certain that the evidence which is contained in this manuscript will define the psychology of Swedenborg's scientific works as it has never been defined before.

A. H. S.

REVIEW.

"REASON IN BELIEF:" A NEW WORK BY DR. SEWALL.

A Philosophical and Rational Vindication of the Christian Faith in answer to the Agnostic and the Scientific Criticisms of the present day, is the aim of the volume just published by the English house, Elliot Stock, 62 Paternoster Row, London, under the title, "*Reason in Belief; or Faith for an Age of Science*," by Frank Sewall, M. A., D. D. It embraces twelve chapters covering a review of the relations of faith and reason in the religions of the past and including the discussion of the *Personality of God: the Possibility and the Nature of Revelation: the Bible: Incarnation: Why? How? Man or Spirit: The Spiritual World: Miracle and Law: Evil, Sin and Salvation: Heaven.*

The treatment is purely along philosophical lines and in the language of current discussions and without ecclesiastical leaning; but Swedenborg's philosophy, brought in by name, especially the Doctrine of Degrees, is made a prominent factor in the discussion throughout and its practical value in meeting problems of present day thought is thus shown. The book is very handsomely printed in large type, making over two hundred pages, and may be ordered through any of the New Church Book Rooms, or through the general trade. The publishers price in London is five shillings.

SWEDENBORG LECTURES BY JOHN WHITEHEAD, A. M.,
TH. B.

To be delivered at Metaphysical Hall, 30 Huntingdon Ave., Boston, Mass.

The Rev. John Whitehead, of Detroit, Mich., will deliver a two months' course of free lectures, which will be one of the ablest expositions of the teachings of Swedenborg, both scientific and theological, that has ever been given to the public. Its exhaustive nature and admirable arrangement of subjects is shown by the following resume: admirable arrangement of subjects is bound to attract wide-spread interest.

The Soul and its Kingdom; Swedenborg's Search for and Finding of the Soul will occupy five lectures, April 1st, 8th, 15th, 22d, and 29th. *The Garden of Eden and the Origin of Evil* will be treated of in four lectures, as follows: May 6th, The Source of Life and of Good. May 13th, The Source of Wisdom. May 20th, The Source of Happiness. May 27th, The Origin of Evil.

THE NEW PHILOSOPHY.

VOL. IX.

JULY, 1906.

No. 3.

SWEDENBORG SCIENTIFIC ASSOCIATION.

NINTH ANNUAL MEETING.

The Ninth Annual Meeting of the Swedenborg Scientific Association, held at the rooms of the American Swedenborg Printing and Publishing Society, New York City, Saturday, April 28th, 1906.

FIRST SESSION.

SATURDAY, April 28, 11:00 A. M.

514. The meeting was called to order by the Rev. Frank Sewall, A. M., D. D.

515. The Secretary of the Association not being present, the Rev. Reginald W. Brown, on motion, duly seconded, was appointed Secretary *pro tempore*.

516. A letter from the Secretary, the Rev. E. J. E. Schreck, to the President of the Association, declining a re-nomination to the office of Secretary on account of his being unable to attend the Annual Meeting, was read.

517. On motion, duly seconded, it was unanimously voted that the Association express its appreciation of the faithful and efficient services of the Rev. E. J. E. Schreck, who has acted as its Secretary during the past six years.

518. The minutes of the last Annual Meeting, as printed in *The New Philosophy* for July, 1905, were voted approved, the reading of them being dispensed with.

519. The Chair appointed Dr. George M. Cooper a Com-

mittee on the Roll. The Committee subsequently reported the following members and visitors in attendance at the sessions of the Associations:

MEMBERS.

Brooklyn, N. Y., Mr. E. C. Brown; *Bryn Athyn, Pa.*, Rev. Alfred Acton, Rev. Reginald W. Brown, Dr. George M. Cooper, Rev. C. E. Doering, Mr. Alfred H. Stroh; *New York, N. Y.*, Mr. Walter C. Childs, Mr. E. S. Maclean, Mr. Marston Niles, Miss Venita Pendleton, Mr. L. S. Smyth, Miss M. A. Walker; *Philadelphia, Pa.*, Dr. F. A. Boericke; *Washington, D. C.*, Rev. Frank Sewall.

VISITORS.

Bryn Athyn, Pa., Mrs. Geo. M. Cooper, Mrs. Chas. E. Doering, Mrs. H. Stroh; *New York, N. Y.*, Mrs. Halsted, Miss Halsted, Miss M. M. Robinson, Rev. Wm. H. Schliffer, Emanuel Schliffer.

520. The Secretary's Report was read.

521. On motion, duly seconded, it was voted to print the List of Members of the Association as contained in Appendix "A" of the Secretary's Report.

522. The Treasurer's Report was read.

523. The Chair appointed Drs. Geo. M. Cooper and Felix A. Boericke a Committee to audit the Treasurer's accounts.

524. Communications were read from Mr. Chas. Grant and Brother Chrysostom.

525. The President informed the meeting that Mrs. Emily F. Barnes, of Winter Hill, Nashua, N. H., wishing to further the uses of the Association, had offered for sale an island very desirably situated in New Hampshire, the proceeds of the sale to be devoted to the uses of the Association.

526. The President of the Association was requested to convey to Mrs. Barnes the thanks of the Association for her generous offer.

527. The Report of the Board of Directors was read.

528. The Chairman of the Executive Committee reported verbally that the only action taken by the Committee during the year was to set the time and place of the Annual Meeting.

529. It was stated that the Report of the Editor of *The New Philosophy* had not yet been received. [Subsequently the Secretary received the Report.]

530. The Report of the Committee on the New Edition of the *Principia* was read.

531. The question of the relations of the Swedenborg Scientific Association and the London Swedenborg Society in the new edition of the *Principia* was discussed by Messrs. Acton, Stroh, Doering, Sewall, and Niles. [For subsequent action see minute 555.]

532. The Report of the Committee on a New Edition of the *Animal Kingdom* was read.

533. [The Report of the Committee on the Translation of *De Sensibus* received after the meetings is printed on p. 91.]

534. The Report of the Committee on the Transcription and Translation of the *Lesser Principia* was read.

535. The Committee on the publication of Swedenborg's scientific manuscripts reported progress.

536. [The Report of the Committee on the translation of Swedenborg's early scientific treatises received subsequent to the meetings is printed on p. 92.]

537. A Report by Mr. Alfred H. Stroh on the printing of Swedenborg's scientific works in Sweden and America was read.

538. The Report of the Committee on Incorporation was read.

539. The Rev. C. E. Doering read the following preamble and resolution:

At the annual meeting of the Swedenborg Scientific Association in 1901, Mr. C. Hj. Asplundh presented an address in which he urged the necessity of copying and printing the unpublished scientific Manuscripts of Swedenborg. As a result of that address co-operation and help were solicited from the General Convention of the New Jerusalem. The Swedenborg

Society, and the Academy of the New Church. The first and last of these bodies responded and contributed \$300.00 each, so that the copying was begun as well as the printing of *De Sale*. All of the manuscripts mentioned in Mr. Asplundh's address and others have been copied.

Since then, as you are all well aware, the Royal Swedish Academy of Sciences appointed a committee to take up the publication of Swedenborg's scientific works, and fortunately for them at that time, Mr. Stroh, the agent of the Phototyping Committee was in Sweden and gave his personal attention to furnishing data and advice to the Swedish Academy's Committee, which has resulted as Mr. Stroh's report shows, in his seeing through the press at the present time, three volumes of Swedenborg's Scientific works. Last year with the aid of the Academy of the New Church Mr. Stroh was enabled to go to Sweden and give the work his personal supervision.

That this work may continue uninterrupted it is advisable that he again be sent to Sweden and supported there until this valuable work now undertaken is completed.

The whole New Church is interested in this work and ought to do everything in its power to facilitate it, but as has been stated by Mr. Stroh it is in danger of being interrupted unless he is in Sweden to see it through the press. Moreover, if the Swedish Academy is sufficiently interested in the publication to furnish means we ought to be in the attitude of assisting them, and as Dr. Retzius has asked Mr. Stroh to come to Sweden and continue the work, it only seems fair and reasonable that we should support him in it, and I would, therefore, offer the following resolution:

Resolved, That this Association memorialize both the General Convention of the New Jerusalem and The Academy of the New Church, in order that these bodies may have an opportunity of contributing towards this important work.

540. At 12:30 P. M. the President delivered his Annual Address.

541. *Voted* to take a recess until 2:30 P. M.

SECOND SESSION.

SATURDAY, April 28, 2:30 P. M.

542. The meeting proceeded to the election of officers.

543. The Rev. Frank Sewall, A. M., D. D., was nominated for President.

544. *Voted* unanimously that the Secretary be instructed to cast the ballot for the nominee.

545. Dr. Sewall was declared elected President.

546. The Rev. Reginald W. Brown was nominated for Secretary.

547. *Voted* unanimously that the Secretary be instructed to cast the ballot for the nominee.

548. Mr. Brown was declared elected Secretary.

549. Rev. Chas. E. Doering was nominated for Treasurer.

550. *Voted* unanimously that the Secretary be instructed to cast the ballot for the nominee.

551. Mr. Doering was elected Treasurer.

552. The following gentlemen were nominated for the Board of Directors: The Rev. L. P. Mercer, Mr. Marston Niles, Mr. Horace P. Chandler, the Rev. Alfred Acton, Dr. Geo. M. Cooper, Dr. Harvey Farrington, Mr. Edward Congar Brown, the Rev. E. J. E. Schreck, Mr. Alfred H. Stroh.

553. *Voted* unanimously that the Secretary be instructed to cast the ballot for the nominees.

554. The nominees were declared elected members of the Board of Directors.

555. Mr. Acton moved that,

Whereas, The relations of this Association with the London Swedenborg Society in the revision and publication of the English translation of the *Principia* have not been clearly defined; and,

Whereas, The action of the London Swedenborg Society clearly indicates that the Society has undertaken the whole responsibility, both in the revision and in the publication of the said work; therefore, be it

Resolved, That the Association while desirous of co-operat-

ing with the London Swedenborg Society, and of meeting any obligations under which it may be in regard to the sale of the *Principia*, does at the same time disclaim all responsibility in the publication of the same; and be it also

Resolved, That the President be instructed to write to the London Swedenborg Society informing the Society of the above preamble and resolution.

556. The motion, being duly seconded by the Rev. C. E. Doering, was carried.

557. It was voted that the recommendation of the Board of Directors, that the present name of the Association be retained when incorporated, be approved.

558. Mr. Niles offered the following resolution:

Resolved, That the memorial of the Rev. C. E. Doering relating to the proposed sending of Mr. Stroh to Sweden be accepted and approved; and that the General Convention and the Academy of the New Church be furnished each with a copy of the same, and that this Association hopes that these bodies may find it possible to assist in the objects of the memorial.

559. The motion was duly seconded.

560. Mr. Acton moved that Mr. Niles's motion be amended by adding the words: and that the President and Treasurer of this Association be appointed a committee to present the proposals contained therein to the General Convention and to the Academy of the New Church, and to respectfully request assistance from these bodies for the purpose of their accomplishment.

561. Mr. Acton's amendment being duly seconded was put to vote and carried.

562. Mr. Niles's motion as amended was put to vote and carried.

563. The Report of the Committee on Incorporation was re-read, and the advisability of incorporating under the laws of Pennsylvania was discussed.

564. Mr. Congar Brown moved that the Association incorporate under the laws of Pennsylvania.

565. The motion being duly seconded, was afterwards withdrawn.

566. The proposed Charter and By-Laws for the incorporation of the Association under the laws of Pennsylvania was read and discussed.

567. Mr. Congar Brown offered the following resolution:
Resolved, That it is the sense of this Association that the Association be incorporated upon the general lines of the plan outlined in the Report of the Committee on Incorporation presented at this meeting, and that the Board of Directors be authorized and empowered to take such steps as may be necessary to carry this purpose into effect, and upon such incorporation being effected to turn over to such incorporated body all property now held by this Association or to which it may be entitled.

568. Mr. Brown's motion being duly seconded was put to vote and carried.

569. *Voted* that the time and place of the next Annual Meeting of the Association be left to the decision of the Board of Directors.

570. The Auditors reported that they had audited the Treasurer's Financial Statement and found it correct.

571. *Voted* unanimously that the thanks of the Association be tendered to the American Swedenborg Printing and Publishing Society for the use of the Society's rooms.

572. Mr. Alfred H. Stroh read a paper on "Swedenborg's Methods of Work."

573. On motion, duly seconded, the meeting adjourned subject to the call of the President.

REGINALD W. BROWN,
Secretary.

PRESIDENT'S ANNUAL REPORT AND ADDRESS.

MODERN PRAGMATISM AND SWEDENBORG'S DOCTRINE OF DEGREES.

In the several lines of work of our Association, the reports of the present meeting, while they seem to show less immediate production than in former years, indicate nevertheless a steady progress looking to substantial results in the near future. In the coming year we think we may confidently hope to see placed before the public in becoming form, the new and first complete translation and edition of the work on the Worship and Love of God—*De Cultu*, etc. This work is the one referred to by Dr. Hans Schlieper, of Berlin, in his philosophical dissertation of 1901, on *Swedenborg, Goethe and Herder*, as exhibiting such remarkable coincidences of expression with Goethe's poem, entitled *Der Deutsche Parnass*, as to give rise to the belief that Goethe must have been a student of this, as he is well known to have been of others of Swedenborg's works. The work *De Cultu* covers so wide a range of topics foremost in the studies of present day psychologists and biologists, that we may feel assured that the value of the work, if only as affording suggestion and stimulus to scientific thought, is no less real to-day than it was in the time of Goethe and Herder. The revised *Principia*, we learn from the English committee, has been in the hands of the London Swedenborg Society for some months past, ready for the printer, but waiting for some further verification of names and dates. It would seem safe, therefore, to expect that before another annual meeting, we may see this important work again in the market and in a greatly improved edition.

If our own production seems somewhat slow in its progress, we can hardly say the same of the truly splendid work so vigorously going forward in the hands of the Swedenborg Committee of the Swedish Royal Academy of Sciences under the special leadership of Dr. Gustav Retzius. The edition of

the *Lesser Principia* now first being published from the original MSS. in very handsome quarto pages, is well toward completion.

Mr. Stroh's careful researches, both in the Royal Academy Library at Stockholm and in the universities of Oxford, of Paris, of Leyden, of Greifswald, and of Upsala, and Lindköping, have brought to light interesting documents and facts which will contribute essentially toward the production of a complete biography and bibliography of Swedenborg, of which we still stand greatly in need.

Another fascicle of the volume of *Swedenborg's Scientific and Philosophical Treatises*, most of them never before published or now out of print, has just appeared, being the second of our series. With this series completed and the larger works now in hand by the Royal Academy Committee in Stockholm, and the issuing of the Latin work *De Sale* now in progress in our own Committee, we may expect at no very distant day, to see our wishes realized in having everything left of Swedenborg's Scientific and Philosophical writings in form for permanent preservation and for translation and study as the future need shall arise.

The reading of a paper last December at the opening session in the newly completed Emerson Hall of Philosophy at Harvard University, before the American Philosophical Association (see *New Philosophy* for January, 1906), on the subject of "Swedenborg's Influence Upon Goethe," was an occasion for showing how Swedenborg's doctrine of the two worlds had produced a real effect in forming the *Weltanschauung* of not only Goethe but of Kant before him, and the same doctrine bids fair to form a constantly more real factor in the modern contest of the monistic and the dualistic theories of Being. The concept of a "parallélism" existing between the psychic and physical planes of man's life, is already feeling the effect of Swedenborg's doctrine of the *discrete degrees* between spirit and matter and of their *correspondence*. But what will impress many who are observing the present currents of philosophical thought, as a remarkable meeting-ground of Sweden-

borg's thought with the most recent speculation of our time, is the so-called theory of Pragmatism, of which Professor William James is the most prominent exponent, and which is claimed to afford the basis on which is to arise an entirely new school or era of philosophy, not to say of science and of theology as well. It may seem, therefore, not untimely for us to glance briefly at this topic, which we may best entitle "Modern Pragmatism and Swedenborg's Doctrine of Degrees." The meeting-ground referred to is the apparent similarity existing between the pragmatic doctrine of experience or utility, as the final test of truth and reality, and Swedenborg's doctrine of use as the ultimate or third discrete degree of knowing, in which the two interior degrees, the first of will and the second of intellect, find their actuality. There are doubtless minds among us who would be disposed at first to hail with delight such a bold affirmation as that of Professor James and his followers that the *will* to believe has the most vital part to play in the arriving at what shall be the truth to us, while also neither will nor thought have attained a substantial value or verity, until proved in the actual experience of the uses of life. But before hailing with too much enthusiasm, the new doctrine, let us examine a little more in detail, what this latest pragmatism is and what it legitimately leads to.

THE PRAGMATISM OF WILLIAM JAMES.

The changes that have come about in the realm of physical science in recent times are fully kept pace with by the changes in men's notions of mind and of knowledge, or of those things that make science possible. Knowledge, indeed, was once supposed to mean our knowing of things. It belonged to Kant chiefly—at least since Plato—to enquire into our knowledge of the knowing power and process itself; to inquire what it is "to know."

And now, last of all in the discussions with which the air of the "schools" is filled, what is that which is *known*, when we do know it? What is that which we get *at* by the process of

knowing, whatever that process may be? If we call the thing arrived at, the truth, then what is the truth?

It is in answering this question that a new line of thought has come into prominence, and one of sufficient seeming importance to be dignified by such an authority as Professor James with the name of a school; in fact, as the "schools of Chicago and of Oxford."*

The general name by which this new school of thought is designated is *Pragmatism*, and, perhaps, the simplest way to define this word would be to compare it with the similar term Dogmatism; and we might say that as Dogmatism is the test of reality by theory or the sight of reason, so Pragmatism, from *Pragma*, fact, or what is done, is the test of reality by practice or in the sight of complete experience. Professor James, who has come to be, perhaps, the most important representative of the new doctrine because carrying it to its widest extremes of application and in the most radical way, differentiates between the Pragmatism of his own methods of *Radical Empiricism*, which has more to do with the process in our experience in arriving at truth, and, on the other hand, that side of Pragmatism especially developed by Schiller, of Oxford, which considered the truth in relation to its *consequences* or practical *results*, which is now generally known as Humanism. James's definition is: "truths have practical consequences," and, so far as any system or method is concerned, if it does not look to practical consequences, it is of no account whatever as a value or as a cash-asset in human knowledge. The English definition, called by Schiller the Wider Pragmatism and also Humanism, is, that the truth consists in consequences and particularly in their being good consequences. Says James in his essay on *Humanism and Truth*.†

The old science held that the anatomy of the world is logical and its logic is that of the university professor.

**Journal of Phil. Psych. and Scientific Methods*, 1904, p. 570.

†*Mind*, Oct., 1904.

But amid the general multiplicity of scientific theories, the conception has dawned in us that

The truest formula may be a human device and not a literal transcript. Scientific as well as theoretical ideas are admitted, even by those who call them true, to be humanistic. These changes in ideas of truth gave rise to Dewey's and Schiller's views.

We understand, therefore, that the essential thing, whether in Pragmatism or Humanism, is the office of the *will* in arriving at reality or truth as well as in controlling the use of it in conduct; the former more truly Pragmatism, the latter Humanism. It will be difficult for some of us to realize in this prospectus of a new philosophic school, all that "upheaval" and making over of the entire philosophic landscape which Professor James seems to anticipate in launching his theory of a world or pure experience.* The doctrine of the influence of the will and of conduct upon our knowing and believing, is not new or revolutionary. Not to dwell upon that august statement of it in the sacred words: "He that doeth the will shall know of the doctrine whether it be true," we may, at least, mention the "practical reason" of Kant's Critique as a discussion preparing our minds, surely in some measure, for the new conception of the nature of our knowing and of its object. But James, it is true, treats lightly of Kant. He treats him with the same kind of delightful raillery with which Kant himself treats the "dreams of metaphysics" in his *Dreams of a Spirit-Seer*;" with the difference, however, that Kant affected the role of the humorist as the only safe way by which he could introduce, in that day, his notion of the *mundus intelligibilis* of the two worlds; whereas James ridicules Kant as being of no significance whatever except as a hindrance in the way. He would fain go back himself to where the sensible Englishman Hume left off, and taking up his material of pure isolated sensations, see what he could do with them in building up a world of pure experience. And so regarding Kant as a fossil having no living relation with modern thought, "our conception of

**Journal of Phil. Psych. and Scientific Methods*, 1904, p. 533.

knowing," says James, "by no means came down to us through him, it rather goes round him." But even if Kant is visible enough to "go round," it will be worth our while to glance for a moment at his pragmatism.

The practical reason of Kant is nothing else than that activity of the mind in arriving at truth, in which the incentive or mover is moral rather than intellectual. The pure intellect can reason only from things experienced through sense perception from the phenomenal world. But this kind of knowledge is inadequate for the explanation of the universe and for the realization of man's being viewed morally. The heart cries out for certain living realities which the fragmentary and contradictory testimony of the senses can never give. These are the knowledges of God, of the Soul's Freedom and of Immortality. Now these knowledges of the practical reason, for they are such as the pure or intellectual reason can never furnish from the mere pabulum of sense-perception, together with the imperative sense of the "ought" are surely pragmatic or traceable to will in their source and looking to the will's satisfaction in their results. For all these knowledges tend, according to Kant, to the attainment of happiness, not the individual happiness selfishly regarded, but the happiness of the whole community of souls, or as James would call it, world of spirits. Such a final happiness is inconceivable without our accepting as true these great knowledges. I do not know that Kant goes to the extreme of saying that this hunger of man's moral nature for these truths actually makes them truths, which would be like a man's creating his food out of his hunger, if he is only hungry enough, and which seems to be the only practical outcome of James's upheaval, if there is an outcome; but at least these great postulates of Kant as belonging to the practical or moral reason of men helps vastly in removing the obstacles to religious faith which might remain if the sense-perception verdict were all a man had to rely upon.

But we will all admit that this practical reason of Kant falls far short of an elaborate new construction of the system of knowledge such as is proposed by the pragmatists, especially

by James in his, as we may call it, genetic side of the pragmatic knowledge, that is, the side of pragmatic knowledge in its making. What are, then, the ingredients of our knowing? For, as will be seen, the ingredients of our knowing and the ingredients of the things known or of reality, are internally the same.

The modern doctrine of pragmatism seems to have been first stated systematically by Charles S. Pierce in an article in the *Popular Science Monthly*, for January, 1878. It is thus stated: "The soul and meaning of thought can never be made to direct itself towards anything but the production of belief. *Thought in movement has thus for its only possible motive the attainment of thought at rest.* But when our thought about a thing has found its real in belief, then our action on this subject can firmly and safely begin. Beliefs are, in fact, really rules for action." . . . "To determine a thought's meaning we need only determine what conduct it is fitted to produce; that conduct is, for us, its sole significance." (*J. Ph.*, 1904, p. 673.) Thus James defines the original motive of pragmatism; but he adds this to it which has since become, perhaps, the larger part of the doctrine, namely, his process of arriving at the belief. James says that Pierce's doctrine should be expressed more broadly:

The ultimate test of what a truth means is indeed the conduct it dictates; but it inspires that conduct because it first foretells some particular turn to our experience which shall call for just that conduct from us.

That is, if we read backward only the meaning of this "but." "truth is what shall guide conduct; but truth as arrived at by the pleasure of our will in seeking such conduct; *i. e.*, truth is the product of our desire."

The effect of the will on our conviction and so on our knowing the truth is most forcibly stated by James in his essay entitled the "Will to Believe." It is here that he discusses the matter of the "live and the dead hypotheses," the live one being that which has some practical interest for us, that appeals in

some way to our will, and, therefore, in the choice of which, as true, our will cannot help being a factor. He discusses the forced choice in a dilemma, which is, nevertheless, a choice. But there are all the passional influences in the choice; these are options between opinions in which the passional influence is inevitable. There are two motives or reasons for thinking which all are aware of; we must think to avoid being imposed upon; we must think in order to gain truth; but is there still another ground of our thinking? Science has so fallen in love with verification that it would seem as if thought had no other object but to verify statements or theories *technically*. She cares nothing for the truth itself, only for her mechanical process of verifying it. But says James:

Human passions are stronger than technical rules; or, says Pascal: "Le coeur a ses raisons; que *la raison* ne connaît pas," and, however, indifferent to all but the bare rules of the game the umpire, the intellect, may be, the concrete players who furnish him the materials to judge of, are usually each of them in love with some pet live hypothesis of his own.*

But are there not also some questions that we cannot afford to wait to have answered by technical tests of science? "The moral question is one that asks not if a thing is, but what would be the good *if it did exist*." Here, then, at least, is moral truth in the making. "The question of having moral belief or *not* is decided by the heart."

Then, there are questions of personal relations. Do you like me or not? . . . The insistence of some mens bring about the result that women love them. . . The desire for a certain kind of "truth" here brings about that special "truth's" existence.*

Further, our organization lives only by members acting on the belief that the will of all is seeking a certain result. The result when reached is thus the product of this common desire, a seeking,* and so we find that there are "truths dependent on our own personal action."

**Will to Believe*, p. 21.

**Ibid*, p. 24.

**Ibid*, p. 24.

We cannot forbear here to protest against the use of the term truth in any such manner as is done in this whole argument of James. The mistake is so palpable of his mistaking facts for truths that we wonder how he could unblushingly dwell at length before his hearers on an argument based upon so clear a misnomer. Facts are realities, if you please; they are certainly actualities, but they are by no means truths, nor is any one of them a truth, because not a fact exists that may not be changed from reality to non-reality, from "truth," if you choose, to non-truth, by a change of its relations, real or conceivable. Truth is what sees and arranges facts in relations and makes them to be realities or not. Or truth is that spiritual light in which the mind makes its judgment of natural things, or sense perceptions. Truth is also the means or the way by which the end-purpose seeks to actualize itself in effect.

Truth is, therefore, strictly, always in the relation of efficient or instrumental *cause* to the result, the *effect*, or fact. We can speak of a law or a process as *true*, because it is the tool which the will-purpose uses in attaining its object. We can speak of true causes and of true methods and of true laws; but to speak of true products, or of true facts is certainly tautologous. For if a fact, a thing done is done; that is the end of it; it cannot be either true or false, for its whole nature is in simply being done. When we come to use facts for some further results we shall find them either true or false according to the relations in which we place them, or the use to which we put them. The fact that I have filled a three pint can with three times as many cranberries as I put in the one pint measure is a fact, but nothing more. It does not become a truth except as it becomes a universal law in which the variable cranberries disappear and only the "three times one are three" remain. So let us leave Professor James with his "truth" realized or reached in the man loved by many women because he so strongly desired their love, and proceed to other phases of his discussion, which are certainly more noble and inspiring in their nature if not more convincing in their results.

"But what," says Professor James, "is the religious faith? Science says things are; morality says some things are better than other things, religion says the best things are the most eternal things, and that we are better off even now by believing this. . . . Why should nature forfeit the *ability to be on the right side* by refusing to believe that which cannot be disproved even if it cannot be proved; when my belief is a condition to my enjoying the benefit of the right side?*

And as to the divine claim to our recognition he argues that the mere mechanical explanation of the universe does not satisfy the heart's seeking, and so far falls short of the heart's reality.

"The only force of appeal to us which either a living God or an abstract ideal order can wield, is found in the 'everlasting ruby vaults of our own human hearts, as they happen to beat responsive and *not* irresponsible to this claim. *An ineffective a priori order is as impotent as an ineffective God.*"

We all feel the empirical force of this argument, and just as truly see, theoretically, the fallacy and falsity that underlies it; for God as a reality, as having any "efficiency," is here surely depicted as a result of the heart's beating in a certain way. The knowledge of God, like all other knowledges, is treated of as a product, a certain "fruitful relation of our mind with reality."

It would be unjust, however, not to pause and recognize the strong and agreeable appeal which James does make for the acceptance of a belief in God on the ground of the humanistic side of pragmatism; that is, on the ground of the result as affecting our own conduct and happiness in this immediate life. He says:

If there be a God, it is not likely that he is confined solely to making differences in the world's latter end; he probably makes differences all along its course. Now the principle of *practicalism* says that the very meaning of the conception of God lies in those differences which must be made in our experience if the conception be true. . . . So far as our conceptions of the Deity involve *no* such experiences, so far

* *Ibid*, p. 24.

they are meaningless and verbal scholastic entities, as the positivists say, and fit objects of their scorn. But so far as they do involve such definite experiences God means something for us and *may be real*.

Thus while the concept of God is still a dependent one, and its reality made dependent on our will, still the showing up of the utter inefficiency of a being of mere nominal but no experiential attributes, such as his "absoluteness," or his self-derivation, or his "simplicity," is very forcibly and wittily done. As he says, we hope truly, "the old monarchical notion of the Deity as a sort of Louis the Fourteenth of the Heavens is losing now-a-days much of its ancient prestige." In general, I think we shall probably find James at his best in showing up the profitable side of pragmatism in his address on "The Pragmatic Method," delivered before the Philosophical Union of the University of California in the year 1898. (Reprinted in the *Jour. of Phil. Psy. and Sci. Meth.*, December, 1904.)

But lest we should be drawn too far in the humanistic paths of our field and away from James's Pragmatism as dealing with the production of truth by a will process, as set forth in his essay on the world as pure experience, let us turn to a hasty sketch of his doctrine as here set forth.

"I give the name of 'radical empiricism' to my world-view," he says. Empiricism is known as the opposite of rationalism. Rationalism tends to emphasize universals and to make wholes prior to parts in the order of logic as well as in that of being. Empiricism, on the contrary, lays the explanatory stress upon the part, the element, the individual; and treats the whole as a collection, and the universal as an abstraction. My description of things accordingly starts with the parts and makes the *whole* a being of the second order!

Here the student of Swedenborg will hardly fail to have recalled to his mind that Relation where Swedenborg tells us that he was once in amazement at the numbers of men who ascribe creation to nature, asking regarding all things below the sun and above it, "What are all these but the works of nature," and their answering, *in a lower tone of voice*, when asked why they do not ascribe these to God since God has created

nature, "What is God but nature?" He describes the visit made to a distinguished philosopher who brought forth four books which shone with the glory of his reputation, and declared that he was now about to bring forth from his treasures and communicate to the world disquisitions of the deepest wisdom, which would be comprised in these heads: 1. Whether nature be derived from life or life from nature. 2. Whether the centre be derived from the expanse or the expanse from the centre. 3. Concerning the centre and the expanse of life.* It would seem from the words of Professor James just quoted that he was now quite ready to take his stand upon the circumference or the expanse, and thence derive *his* centre, and also to plunge his consciousness into nature and derive his life thence. But as his circumference and his nature are both those really of his own choosing, *his* centre and *his* life will be but one out of many, and so we have a pluralism of minds and a pluralism of worlds; and the pluralism of Gods would follow, were not God by this time quite ruled out of the question. Says James of his new system:

My description of things accordingly *starts with the parts and makes the whole a being of the second order*. It is essentially a mosaic philosophy, a philosophy of plural facts (?) like that of Hume and his descendants who refer these facts neither to substances in which they inhere nor to an absolute mind that creates them as its objects. But it differs from that Humian type of empiricism in one particular which makes me add the epithet radical. To be radical an empiricism must neither admit into its construction any element that is not directly experienced nor exclude from them any element that is directly experienced. For such a philosophy *the relations that connect experiences must themselves be experienced relations, and any kind of relations experienced must be as "real" as anything else in the system*.

From this general statement he goes on to show how ordinary empiricism has been in the habit of neglecting the conjunctive and magnifying the disjunctive relations. Experience has been too much pulverized into mind dust. As a result, resort has been had to some trans-experiential agents of

*T. C. R., 35.

unification; substances, intellectual categories and powers, or selves. This resort would have been unnecessary if empiricism had only given due credit to conjunction, taking it at its face value. *Radical empiricism*, as I understand it, does full justice to conjunctive relations, without treating them as rationalism always tends to treat them, as being true in some supernal way; as if the unity of things and their variety belonged to different orders of truth and vitality altogether." (*Ibid*, 1904. p. 535.)

This looks like the veriest monism, an absolute rejection of the doctrine of discrete degrees or orders in the realm of Being. It makes experience an absolute *continuum*; feeling, thought, object sought, object realized, truth, reality, are all only the several stations along the flow of the stream of consciousness. All hangs upon this, he says, this fact of "continuous transition." "Through a hole here" (or, we may add, through the admission of "a *discrete degree* between mind and matter") "all metaphysical fiction pours in." Our experience is, then, a "personal continuum" as distinguished from the permanently disjoined of the ordinary empiricism, and from the rationalist's absolute, and substance, and from all other "fictitious agencies of union." This would exclude, therefore, Swedenborg's doctrine of discrete degrees and their correspondence, and his accompanying doctrine of influx from higher to lower, a doctrine which must have formed the very intellectual or philosophical atmosphere in which the author was nurtured in the home of his father, Henry James, Sr., a profound and life-long student and apologist of Swedenborg's philosophy. Let us see, therefore, to what "fruitful relations with reality" this continuum of experience in the radical empiricism will bring us.

The knower and the known, always disjunctive in the history of philosophy hitherto and needing to be bridged over in transcendentalism by the absolute, becomes in the radical empiricism the "same experience taken twice over in different context," two pieces of actual experience belonging to the same subject. The *known* is the possible experience to which the conjunctive transition would lead if prolonged. Knowledge is idea or image realized in acts. (p. 537.)

The Harvard Memorial Hall has acquired, we may surmise, a kind of immortality by figuring as it does as the favorite illustration of the author's discussion. Sitting in his study the professor sees or acquires the image of Memorial Hall. That image is however only a virtual knowledge of the building. It can only become actual, or the Hall or the Reality itself by a process of conscious transition from mental image to sense-perception in actual walking to and into the Hall and finding it real to the touch. This is the test of reality, and this process if not gone through each time we accept anything as real, is, nevertheless, assumed as a possible experience, and on the possibility of this experience by a continuous transition our knowledge of reality rests. Thus "the first experience knows the last by *continuous* experience. . . . Knowledge is *made* by relations that unroll themselves in time."*

"Whenever certain intermediaries are given such that as they develop towards their terminus there is experience from point to point of one direction followed, and finally of one process fulfilled, the result is that *their starting point becomes the knower and their terminus the known*. These unions by continuous transition are the only ones we know of." These are all that these unions are "worth," all that we can ever practically mean by union, by continuity; like Lotze's substance, to act like one is to be one. *To be experienced as continuous is to be really continuous* in a world where experiences and reality come to the same thing." They will be absolutely real experiences if we have no transphenomenal absolute ready to derealize the whole experimental world by a stroke!"

We pause here to take breath and to assure ourselves as to which end of the rope we at present constitute at this stage of our knowledge of the professor's pragmatism, whether at the end of the knower or of the thing known. The question, how can one thing know another, is not answered by simply reducing things to the same plane except that be a knowing plane. We can talk of the solution of a problem because there the several things are in one plane of mental conception, and they can combine and dissolve and enter into endless combinations,

**Ibid.* p. 539.

but we cannot solve questions by dissolving mind into bricks and mortar, and turning ourselves into the reality of the objects we touch. The journey of the Professor across the yard to his favorite Reality, Memorial Hall, seems, too, quite unnecessary, unless all the laws of physics as well as metaphysics are overturned in the great upheaval of pragmatic philosophy. For surely the ray of light reflected from the Memorial Hall upon the retina of the professor's eye is every bit as material, every bit as "real" and "true" as is the brick wall he feels when he has walked over to satisfy the feeling which desires the sense of reality—in the grosser touch. All physical sense is touch, and the sun, ninety-two millions of miles away in space, is just as immediate to my sense when I see it as is the nearest object I can place before my vision. Why, then, talk of continuous steps toward realization when the step is instant and is accomplished, not in going from my own room across the college yard, but is accomplished in the soul's immediate response to the stimulus's appeal to the sensory?

But again, we ask, how can mind know a material object until we are sure that the object of our knowledge is a material one?

As I have often endeavored to point out, and from no new upheaval of thought, what the mind knows or recognizes is mind; and in knowing an object of sense perception, the mind simply extracts into itself so much of that object as is of its own nature; that is, its idea. Ideas can dwell together in all sorts of relations in mind because that is *their* native atmosphere, but ideas cannot by and continuum be brought into any special or other relation to things discretely lower or material order; and to reason as if they could, is to upheave our conceptions indeed, but only into a most ungainly and unfruitful mass.

One is tempted, moreover, to bring the professor to a practical test of his own theory by asking him to tell us in some kind of experiential terms what he actually means by his "experience of continuous transition," and by his "flow of consciousness." Now, if my idea of Memorial Hall only gets reality by my going over to and touching the building in very

act, and if, on the contrary, my idea of a unicorn, which I as clearly see, as an image in my mind, as I do the mental image of the Hall, has not reality or truth because I cannot go to that mythical and venerable beast and put my hand on him, then we would ask what is the actual experimental terminus in which this idea of a "continuous transition as of a flow of consciousness" finds its reality. Is this "flow of consciousness" as visible and as tangible a thing as Memorial Hall, or is it rather of the nature of the unicorn, something we can think about but not touch?

Now, I hold that in all Professor James's discourse, here and in his psychology, about the "flow of consciousness," he is dealing with a concept just as imaginary as a unicorn. There may be such a thing as a flow of consciousness such as Professor James describes; so there may be such a thing as a unicorn; but I do not *feel* that one is any more a real experience to me than the other. We do not, I venture to say, know ourselves as a "flow." We are unconscious of ourselves as a "transition," continuous or otherwise. And what, by the way, would be a consciousness of transition? We can never be conscious of ourselves but in our place, and in one time; we can be conscious of ourselves as changed, and we can be conscious of relations new to us—as immediately new; but this is not the consciousness of *the transition*; that would be a *consciousness of the gap* between our state and another. It would be being conscious of ourselves when and where we are not; and all that Professor James tells us of the positive nature of conjunction will not help us out of this terrible brink if we should fall down into it in the process of a "conscious transition." For consciousness is itself that which looks down upon the process and analyses it and describes it by the various terms at its command in the intellectual outfit of our understanding, but itself is above time and space; it is *the* transcendent and ever Here and Now; where it is, is always here; when it is, is always now.

And so of the "flow." What does the professor mean by "flow of consciousness?" Does he mean that which physics

means by a flow, the moving of a mass altogether, each particle moving with all the other particles? And if so, there is no transition or change of the single particle into anything else but merely a change in its relations. There is no transition as of leaping over a chasm from one rock to another, and finding one's self different by virtue of the leap. We do not feel ourselves by immediate knowledge, other than in the consciousness we have at each single moment; thus there is no *feeling* of flow. But reflection and thought tell us of change and of progress, and so on. We have various faculties given us in our intellectual outfit of which Kant—poor fossil that he is—tried to give us some faint idea and appreciation by which we can make use of these successive experiences of immediate consciousnesses. But to acquire knowledge by this process is, says Professor James, the old discarded rational method with which we as pragmatists will have nothing more to do.

Says James: "As radical empiricists, we will know nought but the realities afforded by immediate consciousness."

It becomes necessary, however, to use the remembered experience of the "other" or the object, when we cannot immediately realize that other. And thus we are able to form systems. (Here we seem to be verging on Kant.)

Experience, as a whole, wears the form of a process, whereby immediate particular terms lapse and are superseded by others that follow upon them by transition, which, whether disjunctive or conjunctive in content, are their experiences and must, in general, be accounted at least as real as the terms they relate.*

In the experiential world a function can only be fulfilled in one way; only transitions and arrivals happen as events; the only function that an experience can perform is to lead to another, and the only fulfilment we can speak of their reaching is a kind of end! "

Conceptual experiences are thoughts and ideas that know things in which they terminate. But thought paths make wonderful short cuts through the conceptual experiences to their terminus, substituting the remembered experiences for the

**Ibid*, p. 541.

things themselves. Thus thought paths may lead to nowhere because substitutes for nothing actual. When they re-enter reality and terminate, we substitute them always, and thus we pass the greater number of our hours. This is why experiences taken together form a quasi chaos. "The dangling members of purely subjective, non-substitutional experiences finding no terminal in the perceptual world, exist, indeed, *with* one another, and with the objective world, but no interrelated system can ever be made of them."

A criticism of James's theory of cognition by Strong in the *Philosophical Journal* for May, 1904, is worth noting here. James resolves cognition, he says, into almost physical relations of resemblance and operation. Cognition is entering into relation with reality, which we do when we have a feeling which resembles it and enables us to act upon it. A mental state knows a reality, not by passing outside of itself, but by being externally related to it. It is related by having a feeling which resembles it and brings us into right practical relations to the reality; we say when we consider the relation of the two respectively, that the feeling knows the reality. Thus James says, "the feeling of Q knows whatever reality it resembles, and either directly or indirectly operates on; hence we know things *together*. There is no self-transcendancy; in our mental images they are our physical fact." These are admissions of the profoundest philosophical import, whether the writer of them knew, or not, all he was committing himself to. What he is describing in a blind way is the knowledge which the end has of itself in its actualization, through cause, in effect. The purpose feels itself together with its effect, or the end attained. The end attained is attained only by means of the truth as cause, the truth here, as always, being simply the form of good, or that means by which good attains the actualization of its ends.

This immanence of the idea in things by which alone is possible the extraction of idea from them is expressed very truly by Huxley himself, when he called our vision of a true the visual brain event, and declared this to be a sort of "physi-

cal idea." "So," says Strong, "is our perception of a thing in itself a perception of it as to its *idea*; or it is the perception of an object like an object in our memory."

SWEDENBORG'S DOCTRINE OF DEGREES.

From this survey of Professor James's Pragmatism we shall probably conclude that he has gone a long way aside from his father's Swedenborgianism only to bring in a confused doctrine whose only saving element is the remnant, however abused, of Swedenborg's doctrine of discrete degrees. This remnant is in the doctrine of the ultimate as being that in which the end is actualized and becomes to us known reality. But this known gets its reality, according to James, from no plane or degree higher than itself, but only by being continuously connected with a series of experiences on its own plane. Knowledge is but a level road with the knower as its beginning and the known as its end. Whereas in Swedenborg, every thing known has its reality from the two discrete degrees within it, of cause and of end. Our consciousness is immediate, but it is immediate knowledge not of a flow but of an inflow; rather it *is* the inflow of the feeling of end, *through* the intelligence of cause, *to* the sense of fact, a thing done. I "know" a chair, not because the chair is one end of a rope of which my mind is the other, but because into my visual image of a chair flows instantly a certain forming principle of relation and association from the intellect of mind; and into this principle of relation flows a certain subtle consciousness in the soul of the end or motive which gave the chair its first conception or being. The Reality of the known object, therefore, consists not in its being one end of a series of facts, but one fact which is the ultimate vessel or containant of two interior, discrete degrees of being, those of *cause* and *end*. According to Swedenborg, every act of knowledge is threefold and simultaneous, not a continuum in latitude, but a series in altitude; lowermost is the ultimate fact to sense; next above, the intellect's apprehension of the idea; and inmost and highest the living

knowledge itself which is the spontaneity of the soul finding its satisfaction in its ultimate on the plane of action where its motive may become conduct and use. Thus the action of the mind in knowing is the activity of its own three heavens or planes of spiritual being; the highest of which is the heavenly knowledge of ends, the intermediate the heavenly knowledge of causes, and the lowest is the heavenly knowledge of effects and of use. And the one vital principle which is the knowing activity itself, instead of being a continuous flow of shocks, one upon another of things on the plane of sense or of nature, is the perpetual inflow of life from the divine or the common universal End. The supreme "will to live" and to create—down into the created forms through and in which this supreme will will find its ultimatum in use or work.

Briefly stated, Swedenborg's doctrine is this:

Discrete degrees differ from continuous degrees which are like degrees from soft to hard, from dense to rare, etc., because these latter are known from sensual or ocular experience (such as that of the continuum of Professor James's consciousness), while the former are not so known but only abstractly. Still without a knowledge of these *discrete* degrees nothing can be known of causes, and hence no real knowledge of anything can be obtained, and yet "to know them without application to things which exist is to know them only as abstractions.*

Here, then, is Swedenborg's Pragmatism in its first distinction from that of Professor James. Knowledge is a knowledge of interior, hidden principles (the relations, disjunctive and discrete which Professor James rejects), which, however, can only be known or become actual knowledge in use when experienced in their application to things which exist.

This application Swedenborg makes in saying that all things which exist in the world of trinal dimensions or are called compound, consist of discrete degrees; such is the muscle of the body, which is, I. composed of minutest fibres; II. gathered into motor fibres; III. these into the muscle: so the nerve is a

*See *Doctrine of Divine Love and Wisdom*, 189.

threefold formation; he says every vegetable and every mineral thing is constructed in a threefold order, a first, an intermediate, and a last. And from these visible knowledges he says we may conclude as to the invisible realm of nature, the imponderables of light and heat, the atmospheres in their several planes, of air, ether and aura; *thence to the things of mind or of love and wisdom.* (Sec. 19.)

All these in their order, says Swedenborg, *are as ends, causes and effects*, and the first degree (the end) is in all the subsequent degrees, and is the principal and sole governing one in all the subsequent ones. (195.)

"The end is the all of the cause, and through the cause the all of the effect: wherefore end, cause, and effect are called the first, the middle, and the ultimate end, also the cause of the cause is the cause of the thing caused, and there is nothing essential in causes but the end, and nothing essential in motion but effort; also that there is only one substance which is substance itself."

From this Divine which is the substance in itself, or the only and sole Substance, all and everything that is created, exists; thus God is all in all in the universe, and all things in the universe are created from the divine love and wisdom which are Substance and Form itself. Hence the created universe is an image of the Divine.*

All the perfections of life, of powers and forms, ascend and descend according to these degrees or planes of end, cause, effect or love, wisdom, and use. The very thoughts of the several heavens of which each mind is, as it were, a miniature, are distinguished according as they are thoughts of ends, or of causes, or of effects, and the distinction is drawn even between the thinking *of* ends, causes, and effects and thinking *from* these; the last is the higher form of mental activity. "To think *from* ends is a property of wisdom; to think *from* causes, of intelligence; to think *from* effects, of science."

Real knowledge, according to Swedenborg, can never be attained in any system which regards the effect or the *thinking from effect* as the basis of knowing, nor in one which sees in the spontaneity of *the individual* wills, the creative deity

**Ibid*, 198.

which shall form the plural worlds of human knowing. Rather does our mind know things only by virtue of an intelligent power of apperception or of unifying sensuous images in relations of intellectual form, and by the soul's immediate consciousness of the end from which this form sprang into being. All is instantaneous; but it is so by virtue of the soul's part in that divine life which sees all things *sub specie aeternitatis*, or sees things in their relation to end, without the intermediate succession of time. It is the knowledge of the world viewed from its centre, which is the only true knowledge; and it is the capacity of the soul to so view things and according to its capacity to do this that the mind of man can know reality.

FRANK SEWALL.

1618 Riggs Place, Washington, D. C.

REPORTS.

REPORT OF THE SECRETARY.

To the Swedenborg Scientific Association:

The minutes and reports of the last annual meeting, together with the Constitution and By-Laws of the Association and lists of officers and committees, and changes in membership, were published in *The New Philosophy* for July, 1905.

During the year five new members have been received, the names of four have been stricken from the roll in accordance with minute 160, five have resigned. The present membership numbers 170, and one honorary member.

I regret that the time and place of the meeting of the Association this year makes it again impossible for me to be in attendance.

E. J. E. SCHRECK,
Secretary.

Chicago, Ill., April 23d, 1906.

SECRETARY'S REPORT, APPENDIX "A."

LIST OF MEMBERS OF THE SWEDENBORG SCIENTIFIC ASSOCIATION, APRIL 28, 1906.

Acton, Rev. Alfred, Bryn Athyn, Pa.
 Akerman, Wm., Wells, Kans.
 Austin, Dr. A. E., Eldred, Sullivan Co., N. Y.
 Bailey, E. F., 39 High St., Fitchburg, Mass.
 Barger, Gerrit, Voorburg, The Hague, Holland.
 Barnes, Mrs. Emily F., Winter Hill, Nashua, N. H.
 Barron, C. W., Cohasset, Mass.
 Barton, Miss Mary L., 947 T St., Wash., D. C.
 Barwell, J. W., Waukegan, Ill.
 Bauman, Stacy, Faunce, Pa.
 Becker, Dr. Henry, 1330 King St., W., Toronto, Can.
 Bellinger, Peter, 226 Dunn Ave., Toronto, Can.
 Bennett, J. H., Terang, Victoria, Australia.
 Bigelow, John, 21 Gramercy Park, New York City.
 Boericke, Dr. F. A., 1011 Arch St., Phila., Pa.
 Boericke, Dr. Wm., 1812 Washington St., San Francisco, Cal.
 Boggess, Dr. W. B., 4919 Centre Ave., Pittsburg, Pa.
 Bostock, Edw. C., 4737 Maripoe Ave., Pittsburg, Pa.

- Bowers, Rev. John E., 37 Lowther Ave., Toronto, Can.
Boyesen, Rev. Joseph E., Upplandsgatan 79, Stockholm, Sweden.
Brickman, Rev. W. E., Berlin, Ont., Can.
Brown, Chas., 153 Cowan Ave., Toronto, Can.
Brown, Edmond Congar, 166 Cleveland St., Orange, N. J.
Brown, Rev. R. W., Bryn Athyn, Pa.
Caldwell, Robt. B., 46 Leopold St., Toronto, Can.
Caldwell, Robt. B., Jr., Coshocton, Ohio.
Caldwell, Mrs. R. B., Jr., Coshocton, Ohio.
Caldwell, Rev. Wm. B., 1662 Fulton St., Chicago, Ill.
Campbell, Richard K., Dept. Commerce and Labor, Wash., D. C.
Carman, Dr. L. D., 1351 Q St., N. W., Wash., D. C.
Carnes, Mrs. E. F., 1902 Walker St., Houston, Tex.
Carpenter, Paul, 1664 Fulton St., Chicago, Ill.
Carriere, Rev. C. L., 2128 St. Louis Ave., St. Louis, Mo.
Carswell, Robt., 1534 King St., W., Toronto, Can.
Chandler, Horace P., 53 Devonshire St., Boston, Mass.
Childs, Walter C., 18 Overlook Terrace, Yonkers, N. Y.
Cline, Samuel, Crossville, Tenn.
Cockerell, Mrs. D'Arcy, Chelmsford Rd., Berea, Durban, Natal, S. Af.
Cole, Louis S., Glenview, Ill.
Collom, Rev. J. E., 1126 Maple Ave., Los Angeles, Cal.
Cook, Geo. E., Oakdale, Md.
Cooper, Dr. Geo. M., Bryn Athyn, Pa.
Cornell, Mrs. A. F., 1347 4th St., San Diego, Cal.
Cowley, Dr. Wm., 6015 Centre Ave., Pittsburg, Pa.
Cranch, Dr. Edw., 109 W. 9th St., Erie, Pa.
Cranch, W. A., Erie, Pa.
Crane, Thos. S., 70 Nassau St., New York City.
Cronlund, Rev. E. R., 99 Tyndall Ave., Toronto, Can.
Cunningham, W. M., 174 N. 4th St., Newark, Ohio.
Czerny, Rev. Andrew, 99 Holland Rd., Stockwell, London, Eng.
Daboll, John, Waltham, Mass.
David, Rev. J. S.
Davis, Roy S., Primos, Pa.
Dibert, W. S., Box 232, Garrett, Ind.
Doering, Rev. Charles E., Bryn Athyn, Pa.
Ebert, Chas. H., 5501 Elmer St., E. E., Pittsburg, Pa.
Edson, E. R., 4512 14th Ave., N. E., Seattle, Wash.
Farrington, Dr. E. A., 1626 Walnut St., Phila., Pa.
Farrington, Dr. Harvey, 815 Marshall Field Bldg., Chicago, Ill.
French, Prof. Thos., 40 Brantford Pl., Buffalo, N. Y.
German, E. S., 1013 N. 2d St., Harrisburg, Pa.
Gidiere, Capt. J. J., 427 Carondelet St., New Orleans, La.

- Gilmore, E. A., Manet Rd., Newton Centre, Mass.
Glenn, Gerald S., Bryn Athyn, Pa.
Glenn, Mrs. R. M., Bryn Athyn, Pa.
Goddard, Rev. John, Newtonville, Mass.
Gould, Dr. P. A., Gibsonburg, Ohio.
Grant, Chas., Berger, N. Dak.
Gray, W. N., Stoneham, Mass.
Grosh, Mrs. Mary H., 344 W. Woodruff Ave., Toledo, Ohio.
Gross, Philip, 126 Grand Ave., Milwaukee, Wis.
Hanlin, Dr. S. B., Pomeroy, Ohio.
Hanlin, Dr. W. A., Middleport, Ohio.
Harris, A. E., 38 Bickerstaff St., Boston, Mass.
Harris, John, 147 E. Broadway, Canal Dover, Ohio.
Hay, Rev. H. C., 15a Beacon St., Boston, Mass.
Hite, Rev. L. F., 22 Mt. Pleasant St., Cambridge B, Mass.
Hobart, Miss Carrie A., Hendersonville, N. C.
Houghton, Dr. H. L., 56 Bay State Rd., Boston, Mass.
Humann, Mrs. L., 12 Rue Thouin (Pantheon), Paris, France.
Iles, Henry W., Lyndhurst, York Rd., Southend-on-Sea, Eng.
Janicke, Wm., Leona, Kans.
Keep, Rev. R. H., 182 Juniper St., Atlanta, Ga.
Keith, Dr. F. S., Newton Highlands, Mass.
Kent, Dr. J. T., 1334 Hinman Ave., Evanston, Ill.
Klein, Rev. D. H., Glenview, Ill.
Knudsen, K., 2202 Ridge Ave., Phila., Pa.
Kurka, R., Amboy, Wash.
Landenberger, Rev. L. G., 3741 Windsor Pl., St. Louis, Mo.
Lechner, Miss Elsa, 612 Summerlea St., Pittsburg, Pa.
Lechner, Herman, 923 Nolan St., San Antonio, Tex.
McKallip, Mrs. M. J., 5316 Ellsworth Ave., Pittsburg, Pa.
McLaughlin, S., 450 E. 10th St., Los Angeles, Cal.
McRae, Dr. W. W., Corinth, Miss.
Macbeth, Geo. A., 717 Amberson Ave., Pittsburg, Pa.
Mackenzie, John, 1437 Waveland Ave., Chicago, Ill.
Manby, Rev. C. J. N., 10 Englebrektsgatan, Stockholm, Sweden.
Mann, Rev. Chas. H., Elkhart, Ind.
Mayhew, Rev. W. H., Yarmouthport, Mass.
Maynard, A. T., Glenview, Ill.
Meday, C. H., 289 Madison Ave., Pasadena, Cal.
Mercer, Rev. L. P., Oak and Winslow Sts., Cincinnati, Ohio.
Metcalf, John T., 276 Clinton St., Brooklyn, N. Y.
Metcalf, W. H., 119 College St., New Haven, Conn.
Morse, Richard, Cliff St., Arncliffe, Sydney, Australia.
Neuberger, Dr. Max, VI Kollergerngasse 3, Vienna, Austria.

- Nicholson, Ezra, 2415 Detroit St., Cleveland, Ohio.
Niles, Marston, 350 Broadway, New York City.
Niles, Wm., La Porte, Ind.
Norris, Mrs. E., 4717 Ben Venue Ave., Pittsburg, Pa.
Norris, Mark, 1003 Mich. Trust Co. Bldg., Grand Rapids, Mich.
Nussbaum, Rev. Chas. A., 1911 N. 12th St., St. Louis, Mo.
Owen, Geo. H., 2009 7th Ave., Moline, Ill.
Parker, Edgar, 502 S. 44th St., Phila., Pa.
Patch, Dr. F. W., Framingham, Mass.
Peck, Mrs. S. E., 136 Jefferson Ave., Elizabeth, N. J.
Pendleton, Miss Venita, Bryn Athyn, Pa.
Pendleton, Rev. W. F., Bryn Athyn, Pa.
Peters, Mrs. B., 83 Lee Ave., Brooklyn, N. Y.
Pitcairn, Miss Agnes, 350 Stratford Ave., Pittsburg, Pa.
Pitcairn, Mrs. Janet, 350 Stratford Ave., Pittsburg, Pa.
Pitcairn, John, Bryn Athyn, Pa.
Potts, Rev. J. F., Bryn Athyn, Pa.
Potts, Miss Alice K., Bryn Athyn, Pa.
Prince, John T., West Newton, Mass.
Raymond, Geo., Fitchburg, Mass.
Reed, Rev. James, 12 Louisburg Sq., Boston, Mass.
Ring, Dr. Chas., 402 S. High St., Urbana, Ohio.
Roehner, W. F., 2439 N. College Ave., Phila., Pa.
Roschman, Richard, Waterloo, Ont., Can.
Roschman, Rudolph, Waterloo, Ont., Can.
Scalbom, Oscar, Glenview, Ill.
Sellner, Anton, 336 6th Ave., New York City.
Schoenberger, Jacob, 249 Craig St., Pittsburg, Pa.
Schott, Colon, 104 E. Court St., Cincinnati, Ohio.
Schreck, Rev. E. J. E., 6949 Eggleston Ave., Chicago, Ill.
Schwenk, Mrs. Therese, 111 View St., Meriden, Conn.
Sewall, Rev. Frank, 1618 Riggs Pl., Wash., D. C.
Smith, C. G., Jr., 3218 K St., Wash., D. C.
Smyth, L. S., 3 West 29th St., New York City.
Spamer, C. A. E., 215 N. Charles St., Baltimore, Md.
Spiers, Rev. J. B., 301 S. Pine St., Richmond, Va.
Sproat, Miss Carrie, Chillicothe, Ohio.
Starkey, Rev. Geo. G., 543 S. 13th St., Denver, Colo.
Stephenson, Rev. John R., 628 Rebecca St., Pittsburg, Pa.
Stroh, Rev. Alfred H., University of Pa., Phila., Pa.
Stroh, Emil F., Bryn Athyn, Pa.
Stockwell, John W., 130 E. 46th St., Chicago, Ill.
Sugden, Eben, 238 W. 73d St., New York City.
Synnestvedt, Rev. Homer, Bryn Athyn, Pa.

- Synnestvedt, Paul, 5747 Holden St., E. E., Pittsburg, Pa.
 Tafel, A. L., 913 S. 49th St., Phila., Pa.
 Thompson, D. L., 394 Yonge St., Toronto, Can.
 Thompson, Dr. Wm. H., 361 Cedar Ave., Cleveland, Ohio.
 Thurston, Dr. Rufus L., 260 Clarendon St., Boston, Mass.
 Tomhagen, Dr. J. A., 2433 Hermitage Ave., Chicago, Ill.
 Van Buskirk, Mrs. V. H., Penn Ave., Peoria, Ill.
 Vance, Dr. B., Springfield, Ill.
 Vrooman, Rev. H., 5 Park Sq., Boston, Mass.
 Wagner, Adolph, 3856 Flora Bldg., St. Louis, Mo.
 Warren, Rev. Samuel M., 4 Milton Rd., Brookline, Mass.
 Werner, Percy, St. Louis, Mo.
 Westberg, Nils, Skipparegatan 5, Stockholm, Sweden.
 Wetherbee, J. Q., White Cottage, Readington Rd., Hamstead, London, Eng.
 Whiston, Dr. E. A., 16 Arlington St., Boston, Mass.
 Williams, John, Urbana, Ohio.
 Woodward, Dr. H. Wells, 1110 L St., Wash., D. C.
 Worcester, Rev. Jos., 1030 Vallejo St., San Francisco, Cal.
 Wunsch, Henry, 555 Congress St., Detroit, Mich.

HONORARY MEMBERS.

- Retzius, Professor Dr. Gustav, Stockholm, Sweden.

NEW MEMBERS RECEIVED DURING YEAR.

- Brown, Rev. R. W., Bryn Athyn, Pa.
 Grosh, Mrs. Mary H., 344 Woodruff Ave., Toledo, O.
 McRae, Dr. W. W., Corinth, Miss.
 Sellner, Anton, 336 6th Ave., New York City.
 Sugden, Eben, 238 W. 7th St., New York City.

MEMBERS RESIGNED.

- Craig, Chas. E., 1250 10th St., San Diego, Cal.
 Ferrett, Mrs. Jane L., 82 Booraem Ave., Jersey City, N. J.
 Flitcroft, Wm., 510 River St., Paterson, N. J.
 Layton, F. S., 6942 Union Ave., Chicago, Ill.
 Whitehead, John, 581 Cass Ave., Detroit, Mich.

MEMBERSHIP LAPSED.

(Minute 160.)

- Alger, Rev. W. R. (present address unknown).
 Burnham, A. W., 1628 Chicago Ave., Evanston, Ill.
 Cox, M. H. P., Kirkham, Md.
 Liljeqvist, Hj., Eskilstuna, Sweden.

SUMMARY.

Total membership, May 31st, 1905	174
New members	5
	— 179
Members resigned	5
Membership lapsed	4
	— 9
	—
Present membership	170

SECRETARY'S REPORT, APPENDIX "B."

During the past year no further transcriptions of Swedenborg's manuscripts have been made under the auspices of the Association, although some of the scientific works have been printed in the original Latin, and a number have appeared in English.

TRANSLATION IN MANUSCRIPT.

Dadalus Hyperboreus. The translation, by the Rev. Emil Cronlund, is completed to the end of Article II, as reported in the "Report of the Committee on Translation of Swedenborg's Early Swedish Scientific Treatises." *The New Philosophy*, pp. —.

PRINTED IN LATIN AND SWEDISH BY THE ROYAL SWEDISH ACADEMY OF SCIENCES.

Nine Letters of the *Correspondence* of Swedenborg, Eric Benzeliuſ, Christopher Polhem, and others.

Prodromus Principiorum Rerum Naturalium (*Principles of Chemistry*) has been nearly completed.

Principia, Part III.

PRINTED IN ENGLISH BY THE SWEDENBORG SCIENTIFIC ASSOCIATION.

In General concerning the Motion of the Elements. Translated by Mr. Alfred H. Stroh. *N. P.*, VIII., 269-275.

A Comparison of the Systems of Christian Wolff and Swedenborg, Nos. 1-5. Translated by Mr. Alfred H. Stroh. *N. P.*, IX., 1-4.

IN PART I., FASCICLE I, OF "SCIENTIFIC AND PHILOSOPHICAL TREATISES," by Emanuel Swedenborg. Edited by Alfred H. Stroh.

On the Causes of Things.

On the Nature of Fire and Colors. (Translated by the Rev. C. Th. Odhner.)

Remarks on Mussels, Snails, etc., in Limestone; and also on Slate.

On the Height of Water and the Strong Tides in the Primeval World (Translated by the Rev. J. E. Rosenquist.)

On the Falling and Rising of Lake Venner.

For further information concerning the printing of the scientific works see the "Report of the Printing of Swedenborg's Scientific Works in Sweden and America." *The New Philosophy*, pp. —.

For the Secretary,

ALFRED H. STROM.

FINANCIAL STATEMENT.

SWEDENBORG SCIENTIFIC ASSOCIATION, APRIL 28, 1906.

RECEIPTS.

Balance on hand as per last report, ..	\$262 53
Membership dues,	\$143 00
Subscriptions to <i>New Philosophy</i> , ..	112 07
Special contributions,	2 94
Advertisements,	6 00
	<hr/>
	\$264 01
Sale of S. S. A. publications, 13 Summary, 3 Fasc. I, Pt. 1, 61 Pt. 2,....	18 78
	<hr/>
	282 79
	<hr/>
	\$545 32

EXPENDITURES.

Printing <i>New Philosophy</i> , 3 issues,..	\$133 61
Paper for <i>New Philosophy</i> , 3 issues,..	15 00
Cover for <i>New Philosophy</i> , 3 issues,..	9 00
Envelopes, <i>New Philosophy</i> , 3 issues,..	2 88
Addressing envelopes,	4 00
Expressage and postage,	13 62
Sundries, stationery, etc.,	2 14
	<hr/>
	\$180 25
Printing Fascicle I, Pt. II,	\$58 82
Printing Fascicle I, Pt. I,	40 87
Paper and cover for Fasc. I, Pt. I,....	9 00
	<hr/>
	108 69
Reprint President's Annual Address, ..	2 70
	<hr/>
	291 64
Balance	\$253 68

SWEDENBORG'S MSS. ACCOUNT.

Balance as per last report,	80 99
De Sale, printing 32 pp.,	51 53
	<hr/>
	29 16

"WORSHIP AND LOVE OF GOD" ACCOUNT.

Balance as per last report,	13 10
TOTAL BALANCE,	<u>\$295 94</u>

RECAPITULATION.

Total balance as per last report,	\$356 62
Total receipts,	282 79
	<u>\$639 41</u>

EXPENDITURES.

<i>New Philosophy</i> , Swedenborg's Treatises, etc.,	\$291 64
Scientific MSS. account,	51 83
	<u>343 47</u>
Balance as per cash book,	\$295 94

STATISTICS.

Membership.

Total, May 31, 1905,	174
New members,	5
	<u>179</u>
Members resigned,	6
Membership lapsed,	4
	<u>10</u>
PRESENT MEMBERSHIP,	169

Subscribers.

Total, May 31, 1905,	217
New subscribers,	9
	<u>226</u>
Dropped by request,	10
Dropped, as no attention paid to notices,	7
	<u>17</u>
PRESENT LIST OF PAYING SUBSCRIBERS,	209
Free, 55; exchanges, 16.	

ACCOUNTS DUE.

49 members owe for dues,	\$57 00
67 subscribers in arrears, owe,	48 20
	<u>\$105 20</u>
Total outstanding dues and subscriptions,	\$105 20
Audited and found correct this 28th day of April, 1906.	

GEO. M. COOPER,
F. A. BOERICKE.

REPORT OF THE BOARD OF DIRECTORS.

1. Since the last annual report of the Board of Directors, two meetings have been held, one on June 5, 1905, at 4:25 P. M., in New York, the other on April 28, 1906, at 10:30 A. M., in New York.

2. At the meeting in 1905 it was voted that the place of the next annual meeting be New York, the time to be referred to the Executive Committee.

3. Messrs. Charles E. Doering, Marston Niles, and Paul Synnestvedt were appointed a Committee to investigate the question of incorporation of the Association.

4. At the meeting in 1906 the Committee on incorporation reported the results of its investigations.

5. It was voted that the present name of the Association be retained when incorporated. (See Minute 475.)

6. It was voted that all reports and communications be referred to the Association.

ALFRED H. STROH,

Secretary pro tempore.

REPORT OF THE EDITOR OF "THE NEW PHILOSOPHY."

Three numbers of *The New Philosophy* have been issued since my last report, the July, 1905, containing the proceedings of last year's meeting, the October, 1905, and the January, 1906. April of this year is now in press, and will be ready in a few days. As far as my time would permit I have endeavored to make *The New Philosophy* something more than a mere bulletin, and have solicited articles from members of the Association. I desire to thank those who responded, and especially our worthy President and Mr. Alfred H. Stroh, whose contributions have added much to the interest and practical value of the paper.

The translations from Swedenborg have fallen far below what they ought to be, which is greatly to be regretted. Prof. Price, on account of other duties, has been unable to continue his translation of *De Sensibus*, and no installment of this work has appeared since last April. The deficiency has been made good, in part, by the publication of two or three smaller treatises translated from the original by Mr. Stroh, but they have not amounted to more than twenty pages in all. We hope to be able to continue *De Sensibus* with our October issue. I would suggest that the serial publication of another of the works of Swedenborg now being translated by the Association, be undertaken, in order to prevent further waste of valuable time. Even if half the

pages of each issue of *The New Philosophy* were to be devoted to this very important work, it would require several years for the completion of any single treatise, and if there are interruptions, the final publication in book form is postponed far into the future.

HARVEY FARRINGTON, M. D.,
Editor of The New Philosophy.

Chicago, Ill., April 26, 1906.

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

From the English members of the Committee on the Revision of the *Principia* we learn that the complete revised copy has been some four months in the hands of the Swedenborg Society, ready for the printer, but that the Society is still waiting for certain verifications of names and dates before beginning to print. Proofs will be sent to our committee as soon as printed. The English Committee are still considering the matter of an Introduction to be prepared by an eminent scientific scholar, but as yet no one has been determined upon. It is thought that this will not delay beginning to print. \

Respectfully submitted,
 FRANK SEWALL.

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

To the Swedenborg Scientific Association:

The Committee on revising the translation of *The Animal Kingdom* begs to report that stress of other work has prevented continuing the work on the revision for the present.

Respectfully submitted,
 C. E. DOERING,
Chairman.

REPORT OF THE COMMITTEE ON THE TRANSLATION OF "DE SENSIBUS."

*Rev. Frank Sewall, President The Swedenborg Scientific Association,
 Washington, D. C.*

Dear Sir:—In regard to the translation of *De Sensibus*, all I can say is that the work is moving very slowly forward.

Wishing you a very useful meeting, I remain,

Yours sincerely,

April 27, 1906.

ENOCH S. PRICE.

REPORT OF THE COMMITTEE ON THE TRANSCRIPTION AND TRANSLATION OF THE "LESSER PRINCIPIA."

To the Swedenborg Scientific Association:

The history of the work hitherto done on the *Lesser Principia* has been recorded in the previous reports of this committee. (*The New Philosophy*, 1902, pp. 128-129; 1903; pp. 93-94; 1904, p. 101; 1905, pp. 254-255.)

The copy of the text and also the translation of Nos. 1-72 is now in my hands, having been turned over to me by the Rev. Alfred Acton.

Very recently permission was received from Professor Gustaf Retzius, President of the Swedenborg Committee of the Royal Swedish Academy of Sciences, to use all plates of illustrations made for the Stockholm edition in the publications of the Swedenborg Scientific Association. This includes the illustrations for the *Lesser Principia*, of which there are 99. When a favorable opportunity to print an English translation of the *Lesser Principia* is found, the expense may thus be lessened considerably. The work would fill about 200 pages, octavo.

Respectfully submitted,

ALFRED H. STROH,
Chairman.

University of Pennsylvania, Philadelphia, April 26, 1906.

REPORT OF THE COMMITTEE ON THE TRANSLATION OF SWEDENBORG'S EARLY SWEDISH SCIENTIFIC TREATISES.

To the Swedenborg Scientific Association.

The Rev. Emil Cronlund, of Toronto, Ont., has continued to work on the English translation of Swedenborg's *Dædalus Hyperboreus*, and has made considerable progress during the past year. Thus far, the following articles of that magazine have been translated.

- 1.) Introductory addresses to the King, and to the Readers.
- 2.) Swedenborg's Table of Contents to the *Dædalus* for 1716.
- 3.) A Description of Assessor Polhammar's Instruments for assisting the sense of Hearing.
- 4.) A Description of another similar instrument.
- 5.) Assessor Polhammar's Experiments on the qualities of Sound.
- 6.) Experiments yet to be made in Sweden in regard to Sound.
- 7.) Description of a Megaphone.
- 8.) A first description of a Hoisting Engine.
- 9.) A second device for Hoisting.
- 10.) Polhammar's device for Hoisting, at "Blankstoten."
- 11.) Thoughts of Prof. L. R. on the manufacturing of Salt in the

Northern countries.

Beyond this the Committee has nothing to report.

Respectfully submitted,

C. TH. ODHNER, *Chairman.*

REPORT OF COMMITTEE ON INCORPORATION.

The undersigned, who at the annual meeting in 1905 were appointed a Committee on Incorporation, respectfully report to the Board of Directors as follows:

After conference with others, and after weighing the advantages of incorporating in New York and elsewhere, we have come to be of opinion that the advantages of New York are outweighed by those of Pennsylvania, and we do so recommend.

We submit for your consideration and criticism, both general and otherwise, a form of Charter which we think meets substantially the Association's requirements, as also a draft of By-Laws.

Mr. Synnestvedt has been disabled by pressure of business from conferring fully with the undersigned, and is not present to sign any report. We have received a letter from him which contains valuable suggestions availed of in this report, and which we desire may be read to the Association.

We are much indebted to Mr. E. Congar Brown, of the New York bar, for help in coming to the above conclusions.

Respectfully submitted,

C. E. DOERING, *Chairman;*

MARSTON NILES.

Dated April 28, 1906.

REPORT OF THE PRINTING OF SWEDENBORG'S SCIENTIFIC WORKS IN SWEDEN AND AMERICA.

To the Swedenborg Scientific Association:

The present report is in continuation of the one sent last year. (See *The New Philosophy*, July, 1905, pp. 256-257.)

During the past year some additional copying of the scientific manuscripts has been done by Miss Greta Ekelof, and while visiting Stockholm last summer I continued the work of comparing with the original manuscripts the copies already made. In a future report I shall present to the Association a complete table, showing exactly what materials have been copied for the Association and for the Swedenborg Committee of the Royal Swedish Academy of Sciences.

Last summer the following plan of publication of the scientific works now being printed in Stockholm was made. According to it there will be seven large volumes, which will contain:

I. Small geological treatises, the *Miscellaneous Observations*, and the correspondence of Swedenborg, Eric Benzeliuſ, Christopher Polhem, and others.

II. The *Prodromus*, or work on *Chemistry*, the *Dædalus Hyperboreus*, and various small treatises.

III. The *Lesser Principia*, *Summary of the Principia*, *Arguments for the Principia*, and Part III. of the *Principia*.

IV. The first work on the *Brain*, together with small works.

V. The *Economy of the Animal Kingdom* and its Indexes, together with small works.

VI. The second work on the *Brain*, together with small works.

VII. The *Animal Kingdom* and its Indexes, together with small works.

Three volumes are now well under way. Besides the works reported on in former reports a number of the letters for Vol. I. have been printed; the *Chemistry*, for Vol. II., begun last summer, is almost printed; Part III. of the *Principia*, for Vol III., (formerly referred to as Vol II.), is printed. In all about 700 pages have been printed, and much work has been done to prepare for the press the remaining volumes. When this edition of the scientific works is finished it will be possible to prepare the much needed *General Index* of the scientific works, and a thorough and extended chronological *Biography* of Swedenborg. In fact, the final publication of two such works has been seriously discussed and planned both in Stockholm and America. When we have these three publications, the edition of the scientific works, the *Index*, and the *Biography*, which should include all the documentary materials and be fully illustrated, the exact study of Swedenborg's Philosophy will be placed upon a correct basis and receive a great impetus.

Turning now to the printing in America, progress may be reported on the *Worship and Love of God*, in press at Boston. Part I., including the marginal notes, is nearly completed. Fascicle 1, Part I., of the *Scientific and Philosophical Treatises* has been lately published. It fills 63 pages and contains the following treatises:

1. On the causes of things.
2. On the nature of fire and colors.
3. Remarks on mussels, snails, etc., in limestone; and also on slate.
4. On the height of water and the strong tides in the primeval world.
5. On the falling and rising of Lake Venner.

The matter of the exchange of publications with the Royal Swedish Academy of Sciences, placed in my hands by the Executive Committee, (*The New Philosophy*, July, 1905, page 252), was taken up in Stockholm last year in September, when a proposal that there be an exchange of publications was made by letter to Professor Gustaf Retzius, the President of the Swedenborg Committee, who said that the proposal would be duly considered.

The publication of the "Memoir respecting Emanuel Swedenborg

as a Scientist and Natural Philosopher," the printing of which was begun, has been indefinitely postponed, in order that it may be made more complete.

In June I intend to sail for Europe on a third mission to Sweden to continue the work now in hand. Students of the scientific works of Swedenborg and of the Writings of the New Church frequently have their attention directed to questions concerning the text, or to historical questions, which cannot be answered from sources in this country, but very easily in Sweden, where the manuscripts themselves and other sources are preserved. It is to be hoped that all such questions will be noted and sent to me in Stockholm, where I may be addressed in care of the Library of the Royal Swedish Academy of Sciences.

Respectfully submitted,

ALFRED H. STROH.

University of Pennsylvania, Philadelphia, April 26, 1906.

COMMUNICATIONS.

LETTER FROM THE SECRETARY.

Rev. Frank Sewall, President Swedenborg Scientific Association.

My Dear Dr. Sewall:—This is the second year, in succession, that I am unable to attend owing to the time and place of the annual meeting, and as the prospects are that the present policy regarding the meetings will be continued, I find myself under obligation to decline a renomination to the office of Secretary.

I send you by express all the papers in my possession that belong to the Association.

With best wishes for the continued and increasing success of the Association, I remain,

Very sincerely yours,

Chicago, Ill., April 23, 1906.

E. J. E. SCHRECK.

OFFICERS AND COMMITTEES FOR 1905-1906.

PRESIDENT.—REV. FRANK SEWALL, A. M., M. D., 1618 Riggs Place, Washington, D. C.

SECRETARY.—REV. REGINALD W. BROWN, Bryn Athyn, Montgomery Co., Pa.

(Minutes 248, 290, 399.)

TREASURER.—REV. CHARLES E. DOERING, A. M., Bryn Athyn, Montgomery Co., Pa.

(By-Law 3; minute 160.)

BOARD OF DIRECTORS.

The President, the Secretary, and the Treasurer, *ex-officio*.

Rev. L. P. Mercer, cor. Oak and Winslow Sts., Cincinnati, O.; Mr.

Marston Niles, 350 Broadway, New York City; Mr. Horace P. Chandler, 53 Devonshire St., Boston, Mass.; Rev. Alfred Acton, Bryn Athyn, Pa.; Dr. George M. Cooper, Bryn Athyn, Pa.; Dr. Harvey Farrington, 815 Marshall Field Building, Chicago, Ill.; Mr. Edmond Congar Brown, 166 Cleveland St., Orange, N. J.; Rev. E. J. E. Schreck, 6949 Eggleston Ave., Chicago, Ill.; Mr. Alfred H. Stroh, University of Pennsylvania, Philadelphia, Pa.

(Reference, 475, 567.)

EXECUTIVE COMMITTEE.

The President, the Secretary, and the Treasurer, *ex-officio*.

EDITOR OF "THE NEW PHILOSOPHY."

Prof. Harvey Farrington, M. D.

COMMITTEE ON A NEW EDITION OF THE "PRINCIPIA."

Rev. Frank Sewall, Prof. C. Riborg Mann, Mr. Alfred H. Stroh, Rev. C. Th. Odhner.

(Reference, minutes 429, 439.)

COMMITTEE ON A NEW EDITION OF THE "ANIMAL KINGDOM."

Rev. C. E. Doering, Dr. Harvey Farrington, Mr. Alfred H. Stroh.

COMMITTEE ON THE TRANSCRIPTION AND TRANSLATION OF THE "LESSER PRINCIPIA."

Mr. Alfred H. Stroh, Rev. Charles E. Doering.

(Report of Board of Directors, 1903, section 3.)

COMMITTEE ON THE TRANSLATION OF "THE SENSES."

Rev Enoch S. Price.

COMMITTEE ON THE TRANSLATION OF SWEDENBORG'S EARLY SWEDISH SCIENTIFIC TREATISES.

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

COMMITTEE ON THE PUBLICATION OF SWEDENBORG'S SCIENTIFIC MANUSCRIPTS.

The President, the Secretary, the Rev. Alfred Acton, Mr. Arthur W. Burnham, W. Horace P. Chandler, Mr. Alfred H. Stroh, Mr. Robert B. Caldwell, Jr.

(Minutes, 288, 345-347; *New Philosophy*, July, 1901, p. 85.)

KEEPER OF THE ARCHIVES.

The Secretary.

(Minutes, 291, 292, 443.)

COMMITTEE TO PRESENT PROPOSALS RELATING TO THE SENDING OF MR. STROH TO SWEDEN.

The President and Treasurer.

(Minutes 558-560.)

THE NEW PHILOSOPHY.

VOL. IX.

OCTOBER, 1906.

No. 4.

THE SENSES.

PART FOUR OF THE ANIMAL KINGDOM, BY EMANUEL
SWEDENBORG.

CHAPTER V. (Continued from Vol. VIII, p. 192.)

173. 20. *The uses of the Eustachian tube.* 1. It exists in order that it may convey the sounds of the larynx by a short cut into the ear, before the auditory duct is fully formed as in infancy. 2. Thus that it may inaugurate the larynx into speech. 3. That it may concur with the exterior approach, so that, while the second is being perfected, they fully combine into one third. 4. In order that it may propagate the general tremors of the auditory tube distinctly into all parts of the cranium and temples. 5. In order that it may receive the tremors of the cavity of the tympanum, or the second degree of modification, and likewise may distribute them. 6. For two degrees of tremor like the fluids in the arteries, flow in opposite directions; nor does the more particular impede the general, and *vice versa*; therefore, that tube is osseous, cartilaginous and membranous; it is traversed by nerves; it is formed for conveying sound. 7. Thus in order that auditory duct may by this way convey the tremors into the cavity of the tympanum, and may thus concur with the membrana tympani. 8. In order that it may transmit the air, always fresh, into the

cavity of the tympanum. 9. In order that it may give to the air a reflex impulse, and thus to the membrana tympani the power of acting upon the air. 10. In order that it may draw off the pituitae of the cavity of the tympanum towards the palate or nares. 11. Probably also it opens outside the membrana tympani, as with those who are able to pass tobacco-smoke or air through this passage; this is to be inquired into. 12. In order that it may affect the deaf by way of the membrana tympani; for if you seize with your teeth a beam fastened to stakes, having your ears stopped, the sound creeps through by this way, and shows that the membrana tympani is so placed for the sake of the tremor of the auditory duct, which tremor is dashed in by another way, a way by the membrana tympani being denied; for that membrane is constructed wholly in order that it too may discern a particular from a general, and thus may communicate it to the wells of the cavity, without the motion of the little bones; from this thing it is seen that not only the pulsation of the little bones, but also the tremefaction of the membrane of the cavity run together into the fenestrae. 13. In order that it may conjoin all the tremors of the larynx, trachea, lungs, palate, nares and dura mater; in a word, all the tremors which traverse the pituitary membrane, with the membrane of the cavity, for the pituitary membrane there commingles itself: just as the auditory tube conjoins the exterior membranes and the periosteum. 14. Thus by these two causes, producing one thing the effect cannot fail to become certainly known; for two approaches are thus given in the cavity of the tympanum. 15. Not to mention a superior opening through which also the tremor flows in.

174. 21. *Many very necessary rules occur here.* 1. That there can be no distinct and regular particular without its own general, under which it may be, to which it may be referred; just as are the substances so are all the accidents of the substances, for substances are subjects of their accidents; hence, rules being given, as to how the particular is referred to the

general, in the substances, as in the peritoneum, (which see), rules exist as to how their accidents may find place, for they coincide. It is difficult to give the causes of accidents without

General Rules. the binding of the mind to substances as to their subjects. 2. Whatever happens in continuous things, or in the membranes, nerves and cartilages, a similar thing happens in contiguous things, as in waters, atmospheres and *vice versa*; wherefore a modification passes over from the contiguous into the continuous and *vice versa*. 3. But whatever is modified according to its form, the same modification falling into another form is otherwise separated and distinguished,—form is the basis. 4. Therefore, in order that there may be hearing and sense, it is necessary that there be an organ or an organic form, constructed wholly according to the nature of that sense. These are the general rules.

175. 22. *Mutations of state arising in the membrana tympani, and thus in the subsequent parts, which depend upon it.* These things are to be observed here.

176. *There are many causes of mutations, namely, three in every degree of concentration.* 1. This will appear in the following. 2. Thus it is perceived how many things are in a sound.

177. *The first cause of the mutation of state is quantity and its degree; this in general.* 1. Namely, that the sound may be higher and lower, stronger and weaker. 2. This produces accent. 3. As in song. 4. As in speech. 5. In speech it naturally applies itself to, and conforms itself with, the affections, or with the causes of the changes arising from their qualities. 6. As, for instance, what is expressed when one is angry, when timid, when proud, when pious, when impious. 7. Indeed it often applies itself to one word, which expresses something similar. 8. Thus the cause of affections arising from diverse qualities conforms itself with the qualities which concur with it. 9. This is apperceived especially in song, where at one time a low sound rules, at another a strong one. 10. But the foundation lies in the affections of the mind.

178. *Another cause is quality and its degree and differences.* 1. For thence is harmony. 2. Thence is art, musical and natural. 3. For celerities have a harmony among themselves. 4. This harmony the soul knows and feels. 5. Art wills to receive this harmony, and it imitates and lays down rules. 6. It is most harsh if the part be not natural, and afterwards it rids the thing of what is artificial: if the part be artificial, unless elevated to its own degree, it does not easily accord (*succedit*). (See page 99 [infra page].) 5.* If only we can take something from the ocean how much we, the learned, may hear. 6. This is the reason why I do not wish to let myself into an abundance of particulars; it is enough if we explore common causes. 7. Whole centuries are not sufficient for one thing.

179. *Such as is the harmony such is the affection, and such as is the affection such is the change of state; in all the organs there are changes of state; in these their perfection consists.* 1. Unless [the states] were changed, nothing would be perceived but the one. 2. There would be no variety. 3. Thus nothing could be described as to what kind it is.

180. 23. *There are many changes of state in the ear, especially in the membrana tympani, whence sound is further propagated.* 1. How changes of state according to all degrees momentarily happen, while we are ignorant of them, can thence be perceived. 2. First the leg of the malleus is bound to the membrane, and the membrane is concave (*incavata*). 3. The leg of the malleus by means of its muscles can turn, and can thus flatten out the membrane from its concavity according to its turning. 4. That the head of the malleus can be turned and twisted somewhat appears from its muscles; thence the effect rebounds into a concavation and remission of the membrane. 5. Wherefore also the membrane is elliptical in order that it may be more fully drawn to the sides. 6. Wherefore a nerve runs through it, which changes the state of

*Here occurs a repetition of the numbers 5 and 6 of the subdivisions.

the membrane according to the affections of the brain. 7. Therefore that membrane is composed of so many lamellae, which can be folded in various ways, and can put on another variety according to every affection (*affectum*). 8. Therefore the exterior membrane takes on a state of the first degree, and the interior membrane a state of the second degree; they come to agreement by means of the intermediate membranes, for the latter apply themselves as media. 9. Therefore so many muscles are given to the malleus, in order that it can otherwise change the state by extending and contracting itself, for it is obedient to the brain. 10. Therefore blood vessels run through the membrane, in order that the membrane may change its state both by the muscles and by the vessels. 11. The same is the case with the nervous filaments just as in the face and countenance. 12. Therefore a muscle is attached to the incus in order that it may likewise change the state of the stapes in a convenient manner. 13. Therefore that muscle is inserted where the nerve of the portio dura of the seventh pair enters.

181. *But to hunt out distinctly all the harmonies, and thence arising affections, is an infinite and not a human work.* 1. Wherefore I pass by the distinctions. 2. As well as the particulars. 3. Still less do I descend into geometry and analysis. 4. Every single one of these things demands its own volume. 5. Every one requires a universal science. 6. Hence we see how unskilled we are; we glory over art, which is nothing respectively to the things which lie hidden. 7. Nature manifests these things, but still very grossly. 8. Sometimes culture and art extinguish nature herself.

182. *This alone: that the affections of the mind arising from diverse forms of ideas, especially those related to the understanding, excite those very affections which are said to be of the mind, which all induce their own mutations, different from those which proceed from sonorous harmony.* 1. Sounds do not penetrate even to ideas. 2. They do not penetrate further than the labyrinth into a kind of rational sight. 3. The form

of the ideas gives the affections themselves of evil and good, etc.

183. *There are also corporeal communications like as of the brain, between the sensations and motions or between the harmonies and changes of state, as has been told in other organs of the senses; as between the membranes—the exterior ones or those of the auditory tube, those of the membrana tympani and of the muscles; but these are subtilties and have been treated in regard to other organs of the senses.*

(See page 99 where these things have been transposed.)

NEW WAYS OF DISCOVERING MINES, OR SOME HITHERTO UNKNOWN MEANS FOR THE DIS- COVERY OF MINES AND TREASURE DEEPLY HIDDEN IN THE EARTH.*

BY EMANUEL SWEDENBORG.

PREFACE.

Every effort to enrich a country in the way of adding to its number of new mines and hitherto undiscovered metalliferous veins seems to be unsuccessful, because no treasure, either above or beneath the earth, outweighs the luxurious and extravagant costs connected therewith; so that more is uselessly thrown away with one hand than can be scooped up with both. It is something like presenting gold and other valuables to one

*This is the first translation ever published of Swedenborg's manuscript "*Nya Anledningar till Grufwors Igenfinnande eller nagra an oopfundna Grep till at opleta Grufwor och skatter, som i jorden diupt aro giomda,*" which is contained in the *Photolithographs* of Swedenborg's MSS., Vol. I., pages 106-119. Dr. R. L. Tafel, in the *Documents*, Vol. II., Part II., page 878, refers to it as being among the MSS. of Swedenborg preserved in the Diocesan Library at Linköping, Sweden. From Documents 86, in Vol. I. of the *Documents*, we learn, page 314, that in 1719 Swedenborg submitted this paper to the Royal College of Mines, "which was favorably received by those whom it concerned." The duplicate which Swedenborg sent to Eric Benzelius, and which it photolithographed, was "read, February 5th, 1720," before

who sinks them into an abyss, and offers his treasures, as it were, to a rich Neptune or to some crew of his. The best metalliferous veins and the richest streaks would be to stop extravagances, to practice Economy, to see that debit and credit correspond; every one should economize for himself, and thus be freed from the taxes we have imposed upon ourselves. So long as we unnecessarily spend more gold and silver on the body than double the amount our silver-mines yield, and so long as shiploads of our metal and products are squandered, more than would be consumed by us in the space of a year, it does not seem to be an urgent necessity to point out, as was said, ways and means of finding new valuables, for this would be to feed and foster luxury which in the same proportion would increase. At the poor Silver-Works of Sahla diligent search is being made for the thinly distributed silver in its walls, every trick being used to obtain it, and the colleges are being daily annoyed in this way, while an order forbidding the misuse of the aforesaid silver and gold would be a doubly richer metalliferous vein than all our Silver-Works in Sweden taken together; not to mention all other extravagances which render our rich country poor. But so long as a gold glittering fop and an imbecile coxcomb (excepting those entitled thereto) has the idea in his brain that the only worth and esteem is that which is seen on the surface, and that one's merit must be

the Scientific Society of Upsala, according to an annotation on page 1 of the original. In the "Chronological Account," page 898, Dr. Tafel lists the paper as number 22, assigns to it the date 1719, and remarks that "the principle that the author endeavors to set forth in this dissertation is that from every metal there proceeds a sphere, which in time penetrates the whole of the stratum of the earth around it, and determines the nature of the vegetation which grows on the surface. He holds also that there is a correspondence between the upper strata of the earth and the lower; so that from the configuration of the upper, you can judge of the nature of the lower, strata. These features, he holds, ought to be made the subjects of scientific inquiry; and he shows in what manner this inquiry ought to be carried on." The original manuscript fills fourteen pages, quarto. The translation is by the Rev. Joseph E. Rosenquist.

shown by the gold one wears, and that one's happiness and peace must consist in a miserable and empty personality, so long any perceptible change in this matter can hardly be expected; though others see that all this hurts the credit of both the public and the individual; and, therefore, the noble metals together with the kingdom and the neighbor are submerged; in this, those, with whom we deal, take great pleasure mingled with contempt, similar to those who are managers of some public theatre. Still it is to be expected that some change in this state of affairs will take place, now that we can think more freely and possess better judgment, and are permitted to see for ourselves, no more fettered by a sovereign's caprice which one out of politeness must submit to, thus producing only an imitation and counterfeit, and not a product of one's own enlightened understanding. These are the economical means for the discovery of new treasures, the most essential and practical; the physical will now follow, which in time may discover something and be of use to a country.

* * * * *

1. It would be a noble art to be able to judge from the surface as to what riches and valuables might lie hidden within the earth. Most mines which have come to light and permitted themselves to be discovered by us have been found on a bare spot, in the daylight, where no soil, sand or earth has been found on the surface; when it has glimmered in the eyes, perhaps when somebody has happened to kick the dust away, or a ram or a bull has been digging away in a plain with his horns, or when someone has wanted to dig a foundation for a house, or has been trying to find running water for a well, a metaliferous vein has often been accidentally found. Such accidents have been the causes of our wealth in Sweden; but consider what treasures are buried deeper down, what noble metaliferous veins, overgrown with forests and vegetation; the sand, clay and soil which to a depth of many ells have deposited themselves on the surface upon which we drive, walk and toil every day, without that of which nature itself is willing that we should partake having ever been revealed to our sight.

2. The curious world has discovered an art of finding deep metallic veins which art is founded upon faith and superstition, and is called *Slagruta* (the magic wand) which is made out of a double or split hazel-bough, and is so carried between the fingers that it can turn in or out, and then when one comes to a place where there is a valuable metal or a mine, the said wand turns itself and strikes the place which is thus marked. But as this procedure is in favor only with the more vulgar, and gives even them no satisfactory proofs, it must be relegated to those things which belong to superstition and be abandoned by the school of the learned.

3. It is otherwise a truth clear as daylight, that above all places and crevices where metallic ore, metalliferous veins or other treasures are to be found, there stands a vapor, like a stream, above them, so that a strong light which is seen far away in the night emanates therefrom. How common it is in Bergslagarne to observe over the mountains, in the woods and in other places, fires shining in the darkness, sometimes in one place, sometimes in another, and which disappear as soon as any one approaches nearer; which is undoubtedly a clear indication that such a vapor emanates from rich metalliferous veins of silver, copper, (perhaps also of iron), from which flows as a stream a sulphuric and a volatile salt which together produce a luminous, shining appearance in the darkness. It sometimes happens that this vapor concentrates and causes its particles to form a mass, which, like a fire, flies away and then presents the appearance of a flying dragon; from which one judges that in those regions there are places where treasures of silver and gold are hidden.

4. It is also well known that where treasures are to be found in the earth, there signs in time show themselves which serve as indications. Sometimes there flows a subtle quicksilver, which is the concentrated particles of the subtle metallic salts; sometimes it infects the air, so that those who pass over such a place become demented or receive injury to their health, or are maimed as to the body. It may be that the effect of it is the

magic wand, namely, that when one walks over such a vapor the joints in the fingers are rendered lame and limp, and the spirits in the blood torpid, so that for this reason the wand must necessarily fall forwards and show that he has now come upon the vein itself.

5. In brief, if we were endowed with such perceptions as could penetrate the finest of our air, if we could see those particles which therein are heterogeneous, if we could smell them as the greyhounds do, or otherwise perceive them in the fibres, in the blood, in the flow of the spirits, in the will, in our imaginative nature; then it would be noticed in many thousands of places what treasures lie beneath us, what wealth we are stepping upon, and how the earth hides from us her most important things, which she never intends to reveal to us; we must, therefore, consider how we, notwithstanding, can find them out, that is, how we can tell from one thing or another what metals and riches may be hidden below the surface.

6. As now the earth continually sends out from itself vapors and particles of that which lies underneath, and so the surface is all over covered with vegetation, soil, clays, loam and stone colored in every hue; it cannot be otherwise than that these things must be full of such particles with which the earth beneath has furnished them; those things and the vegetation which is found above the metal vapor, are said to be altogether impregnated therewith, have derived from it their nature both as to growth and being; have appropriated to themselves a certain hue, or else a change in veins and pores, or in some other way which would be noteworthy. That such effluvia effect a change can hardly be denied. If, therefore, some one were so well acquainted with nature, that he could separate both greater and smaller particles, if he could discern the difference in all vegetables, in all kinds of soil, in gravel and sand. etc., then it would soon be possible to see on the surface of the earth what could be dug up out of it. I, therefore, wish to give to the curious world the following hints:

7. All places where deserted mines are to be found, where

it is known that silver, copper or iron ore is to be found, are well noted; then one ascertains if there be the smallest difference in anything that grows or otherwise lies on top of it, 200 or 300. Such mining places are to be found in our Sweden alone; a number of which lie idle for want of water; others because of dangerous and poisonous vapors, some on account of woods, others because the ore is too poor. But it is useless to make an investigation at a mine which is being worked, because there smoke and fire, and the fact that people and horses are there present, may cause other changes than those which alone are hoped for.

8. 1. From *grasses* and *herbs*; it is not to be denied that the effluvia which consist of salt and sulphur, and composites of a like nature which are to be found in all growing things, effect some special change in such things as grow on top of it; that the grass and herbs themselves derive from them some peculiar nature, are given a special inclination; receive a hue from the more abundant sulphur, thrive more or less; are changed in their pores or in other of their ramifications. He therefore, who intends to form some judgment from such signs, must first spend some time in the investigation of all kinds of herbs, their nature, form, shape and color, which is best accomplished if he takes time to gather 200 or 300 individuals of each kind, and examines each one of them, and notices in what way one differs from another; from what kind of a root one has sprung as compared with another; in a word, if he takes a rose or a flower and every day examines a few hundred of the same kind and makes comparisons between them; as soon as he then comes upon a place underneath where he knows there is some metal, he can at once tell, if there be some difference discernible; if the vapor causes another color, other twigs, different roots, another form, if they thrive more or less, etc., from which he afterwards may judge of what is underneath, and thus find the wealth and treasure which otherwise would never have been discovered.

9. 2. From *New Plants*. In places where certain sulphurous

and salt vapors issue forth new and unusual plants, grasses and herbs are often noticed. In marshy places they differ from those found in dry places; on places abounding in stones, they differ from those found on the surface of the ground, and it may be that in such places an herb, grass or plant now and then may be found which does not occur anywhere else, or which does not thrive except in such effluvia, a fact verified by those who have sought ore in West Indian mines, where an herb or new plant has been discovered only above those places which have ore underneath. That the metal itself can produce new species of plants and supply an herb with all its necessities is known from this, that if gold or silver be dissolved in its menstrua and something be mixed therewith something like a plant with little twigs and boughs called *arbor philosophica* is at once produced thereby.

10. 3. From *trees* and *larger shrubs*. Also trees which grow on top of such places may be examined as to their nature and character. It may be noticed, for instance, whether some change can be found in them; whether the leaves are formed in a different manner, as also the fruit and the seed vessels; the bark around it; the trunk itself or its interior; the rings which are formed annually; what the color in all these places is like, what difference in odor and taste; how they thrive; whether there be any different juice, oil or resin found in them. As they now exist only from such nutriments as come to them from vapors from the ground it will be found that trees which grow above them do not thrive but shrivel up and clothe themselves with mosses, like those which grow in marshes and similar places.

11. 4. From stone mosses. The stony surface itself covers itself with a thin layer of moss, and, as it were, endeavors to clothe itself with earth, which is added to from time to time. This moss comes partly from rain and *vitro* from the air, partly from effluvia and matters which are added from beneath. On observation it will, therefore, be found that every stone is covered with its own kind of moss, one different from the other;

one is green, another white, red, brown; one kind of moss wreathes about and spreads like lichens; another acts differently, elevates itself immediately and gathers air and soil on itself. From all these may be gathered indications which might help to find metals hidden underneath.

12. 5. From *twigs, leaves on the ground, stumps and rubbish*; if it has been noticed that certain trees, twigs, and other things which have altogether been turned into stone, derive their nature from the vapor which surrounds them and thus petrify; what may not happen when in addition a vapor uninterruptedly plays in and out; and if in such a case some peculiarity should be found this may be noted until something similar be observed in some other place.

13. 6. From the earth and soil it may also be noticed what difference there is in the earth and soils which lie over such places and the effluvia mentioned; namely, of what color they are, their odor, taste, weight, composition, and how unyielding they are; for as effluvia for a long time have flowed into and impregnated them with sulphur and salt, some effect of this must necessarily be noticeable; hence it is seen that different parts of the soil are of a red, others of a brown, white, gray or black color, according as the vapor must have tinged them.

14. 7. From clays. Also from clay, different kinds of lime and other things; for as the vapor has been playing through it so many thousands of years it is undeniable that it must have left evident signs and changes as evidences of itself, which cannot be noticed in any other way than by means of a thorough search; namely, if one first of all makes oneself perfectly familiar with all kinds of clay, learns to know each kind as to its taste, color, weight, etc., and then applies oneself to deserted mines, where one knows that some metal is to be found underneath, and then ascertains what differences they offer, then one shall be able to see these differences, and this the better, the greater his knowledge of these things is.

15. 8. From *sand and gravel*. In some places streaks of ore, or other treasures, are covered with sand to a depth of a

few yards; but as the vapor plays through this it leaves particles and signs in its wake. Therefore, it may also be noticed if the grains of sand and gravel have appropriated something of this vapor; if their color has been changed; if they have hidden some glitter of the ore in themselves, from which one may judge of the character of the earth beneath.

16. 9. From *stones*. With regard to stones it is certain and needs no further demonstration that they to a great extent show that particles impregnate and color them in various ways. Some stones are purplish red, have an agreeable odor, as amber; some are green, blue or brown on the outside, according as the vapor issues forth from the ground and colors them. A number of stones in the ground may also be found which are full of metal, being the *matrices* of it, from which it may be judged that a similar streak of ore exists underneath, and it often happens to be so. As now the very stone contains these signs in case some metal exists underneath, this investigation can best be made at such places where there have been mines. It is, therefore, necessary that it be well observed of what color these stones are, what kind of color as to taste and odor, touch, etc., what kind of stone moss they are covered with; how this forms its spirals and gyres, how the stone looks inside; what difference there exists in the pores; how the ground around it is affected by contact with it.

17. 10. From *water*. From water which gathers over such places one may also with some certainty conclude if effluvia have been playing through it. If a thin covering be found on it, as on the waters of Surbrun; if any sulphurous odor or taste be noticeable when it is agitated; if there be any difference in weight, color or some other characteristic common to other waters; for in most places where mines are, standing water is found, which sometimes is green, sometimes bluish, and sometimes of a different color, according to the vapor of the metal which has been absorbed. If only one who is good at this kind of work comes along, who knows how to discern such things, something may be concluded from it.

18. 11. From frost in the ground, ice and snow. It may also be that even the winter and the cold weather may furnish a guide to the discovery of such things; one has reason to believe this, because in the winter the moist subtle and most volatile salt is more forced from out of the ground than during the summer. If, therefore, at such places where mines exist underneath it be observed of what nature the frozen ground, the snow and the ice are; if they occupy these places earlier than other places; if they are of greater or lesser duration; if there be any difference as to color, taste, hoar frost, particles, figures, etc., etc.,

19. 12. From *little creatures* and *insects*. When sod and mosses are removed from stones or a boulder from out of the ground, one observes how many millions of insects creep and swarm under them, having their homes and republic there; one kind is different from another, as well in color, figure and limbs, as also in character and being. And as every kind of insect must necessarily have its own element in which to thrive and live, one does not thrive in the odor of another; one kind must necessarily have a granite to live under; others require a sand-stone, or a lime-stone; others a wet marsh, others a dry; some require ceretin herbs and roots, from which they derive their life, grow up and live. On one animal are found insects altogether different from those on another, so that it may be judged from the *insect* itself on what sort of animal it has been and grown. Therefore, it may be concluded with reasonable certainty that certain insects thrive where such effluvia flow forth day after day, they being there as in their element, are there born, sustained, and spend their old age and time there, etc. Therefore, also from such humble things we may derive information as to those things from which the community may profit.

20. 13. From certain *spirits of salt and sulphur* such things may also be discovered; namely, if certain vapors composed of salt or other things are placed over such places, it often happens that one from their agitation, movements, smoke, changes

of color and odor may see, whether anything exists underneath or in the neighborhood, with which it does not agree; something concerning which chemistry has proofs and can furnish new ones in a chamber where there is a collection of ores. But as it is not accessible nor to be found in all places, and, besides, is expensive, this is only mentioned, without hope of obtaining from it any knowledge of that which is looked for under the ground.

21. In brief, from all such things which are products of the earth, which derive their growth from salt and sulphur, one must be able to judge; if, therefore, God the Most High, had gifted us with senses 100,000 times finer, we would without trouble, by means of an odor or a flamy light alone find how effluvia flow forth like streams out of the rich metaliferous veins, how high the metal sends its particles from out of itself; but as no knowledge of this has been given to us, we must find out other ways which our understanding points out. But as a subtle observation is required to make use of the means which have been pointed out, he who desires to do this work must be a good chemist, at least a good connoisseur of that which he would discover in hidden nature.

22. And it is reasonable to believe that this will be admitted, especially since proofs as clear as daylight show the same in ways much more gross and sensible than those now adduced. As, for example, a magnet which usually is a coarse and rough stone; how is it not moved and turned to the streaks where iron-ore is found! Yea, experience knows how to relate with certainty, that the vapor of the metal is sometimes so strong, that it forms itself above and places itself in small lines, spires and tubes, forms twigs and boughs and issues forth as it were in little plants, which are a pure and solid metal, and which as it were announce that underneath there exists a streak and rich vein of the same. If a piece of iron be hidden deeply under clay or mud, after some time it will be found that all along the iron bar a streak of rust or something similar to it is exhibited; in Gota Elf, on this side of Trollhattan, some

iron bars were some time ago fished up which were buried half a yard or so under the mud and clay; a distinct line of rust along the whole bar was seen upon it on the bottom. The finders have themselves related it to me. In view of all this, what a noble and curious investigation would it not be, and worth the while to spend some time and work on, namely, to find out in this subtle way what lies hidden in the earth! And it is to be supposed that, if the world long endures, people will sometime consider this and encourage those who are able to bring practical results out of such investigations.

SWEDENBORG'S PRACTICAL LIFE AND SEARCH FOR THE SOUL.

REV. JOHN WHITEHEAD, WALTHAM, MASS.

It is supposed by many that Swedenborg was a man who lived in the realm of the unreal, that he was a mere visionary who gave loose reign to his imagination, which ran riot, producing the most fantastic and distorted images. To correct this notion we may look on the man in his workshop, on him as a man of practical affairs, an accurate observer, a laborious investigator, a keen and analytical reasoner, having a broad comprehension of the relation of one thing to another in the objective world. The son of a Swedish bishop he received a liberal education, and after his graduation from the Royal University of Upsala he traveled in Europe for several years, perfecting his education through association with the most learned men of his time.

On his return to Sweden he was appointed Assessor Extraordinary in the Royal College of Mines. This office in-

volved the supervision of the mining industries of Sweden, which at that time, as in our own day, consisted chiefly of copper and iron ore. Swedenborg held this office for a period of thirty years, and during all that time was actively engaged in the development of these great industries. He familiarized himself not only with all the methods of mining copper and iron, and the smelting and extracting them from their ores, as the industry was carried on in Sweden, but he made himself familiar with all that was then known on the subject throughout the world. In 1734 he published three large folio volumes, one on iron, another on copper, and the third on the elements of the world. The volumes on iron and copper were for half a century the standard works in Europe on those industries. The volume on the elements of the world, or the *Principia*, is an attempt to explain philosophically the origin of the elements and of the solar system. Swedenborg is now acknowledged to be the first philosopher who has given a rational view of the origin of the solar system. His theory in some respects is similar to that of La Place, but in other important points radically differs from it. Swedenborg teaches that the sun was formed first and threw off from itself the masses which finally formed the planets.

In the early part of his career, Swedenborg was deeply interested in mathematics, and wrote several treatises on the subject. He also invented many things, and in association with Christopher Polhem carried out many mechanical works for the Swedish government. One of his notable performances was the transportation overland, a distance of seventeen miles, of several war vessels, which were used in the siege of Frederickshall.

By profession Swedenborg was a mining and mechanical engineer. In viewing the operations of nature he looked on them from the mechanical and mathematical side, observing the laws, the order, and the connection of the parts. He ever built his conclusions on the solid foundation of fact. Swedenborg, however, did not remain contented in the development

of his office and business of mining engineer. He was, early in life, fired with the desire of finding the causes of the phenomena in nature. His *Principia* is an attempt to discover the origin of the solar system and its material elements. In this notable work he develops, in a most remarkable manner, the theory of the ether and atmosphere, and the origin of the chemical elements. He gives therein a theory of electricity, of heat and light as different modes of motion in the particles of ether. The latest views of scientific men are closely approximating those given in the *Principia*.

Although Swedenborg's practical business was that of mining engineer, he will forever be known rather as a philosopher, especially for his great works in the field of physiology. In these treatises, some of which have never been published, he displays a marvelous insight into the functions and uses of the various organs and structures of the body, making discoveries, many of which have been verified by later investigators.

What was the chief end which animated the labors of Swedenborg, labors so great that Emerson calls him "one of the mastodons and missouriums of literature?" He says, "his stalwart presence would flutter the gowns of a university." "Swedenborg is systematic, all the means orderly given, his faculties work with astronomic punctuality." "He is not to be measured by whole colleges of ordinary scholars."

In treating of the soul, Swedenborg says:—

I am strongly persuaded, that the essence and nature of the soul, its influx into the human body, and the reciprocal action of the body, can never come to demonstrate without the Doctrine of Order, and the Science of Universals, combined with a knowledge of anatomy, pathology, and psychology, nay even of physics, and especially of the auras (or atmospheres) of the world.

He then goes on to say:—

This, and no other, is the reason that with diligent study and intense application, I have investigated the anatomy of the body, and princi-

ally the human, so far as is known by experience; and that I have followed the anatomy of all its parts in the same manner as I have investigated the cortical substance. In doing this I may, perhaps, have gone beyond the ordinary limits of enquiry, so that but few of my readers may be able distinctly to understand me. But thus far I have felt bound to venture, for I have resolved, cost what it may, to trace out the nature of the human soul. He, therefore, who desires the end, ought also to desire the means. (*Economy of the Animal Kingdom*, 214.)

And finally he declares:—

I do not undertake this work for the sake of honor or emolument; both of which I shun rather than seek, because they disquiet the mind, and because I am content with my lot; but for the sake of the truth, which alone is immortal, and has its portion in the most perfect order of nature; hence in the series only of the ends of the universe from the first to the last, which is the glory of God; which end He promotes. (*Ibid.*, 218.)

When we get a distinct idea of the object of a writer, we can follow him with a definite and clear understanding of the road in which he is leading us, for his purpose directs his steps even to the most minute particulars. Swedenborg, as we have seen, lays bare the purpose and end governing his studies in the anatomy and physiology of the human body, namely, his intense desire to gain a knowledge of the soul itself, which originally formed the organism, and which continually operates into and through its body after the formation. In this investigation he recognizes continually two distinct things.

First, the soul, the active operative life, the creative power, manifesting wise and intelligent purposes, both in the first formation and in the future use of the organism. While yet in the unconscious stage, as an embryo, there is a wonderful directive intelligence at work in the formation, directing it in such a manner as to the perfectly adapted to the use of the future animal. This creative life is the soul.

Second, the body is formed by the soul, as an instrument adapted most perfectly to bringing forth its life manifestly

into the world of nature, that it may execute its purposes and exercise its will in the field of the world.

The method of investigation pursued by Swedenborg was the analytical method. He gathered first all the known facts of observation, and using all the sciences, mathematics, mechanics, physics, and chemistry, he marshalled the facts into order, and made his rational deductions therefrom. After gathering his facts from the greatest observers of his day he makes his deductions, arranges them in the form of definite propositions, like the statements, propositions, and theorems in geometry, after which follows an elaborate and convincing proof of every statement made.

In order to show Swedenborg's method, and the way he looks at the two things distinct yet united, the living soul and its body, we will quote from the *Economy of the Animal Kingdom* on the Formation of the Chick in the Egg. We must attend especially to his discrimination between the formative substance or the soul, and that which is formed or the body. This difference is like that between the weaver and the fabric, or between the workman and the product, like the difference between the cause and the effect. The one is operative within, and in itself is invisible to the eye, the other is produced without, and is visible to the senses. That which is invisible to the outer senses is the power producing and controlling, that which is visible to the senses is the product, manifesting the marvels and the intelligence of the workman. But let us hear Swedenborg himself:—

THE CHICK IN THE EGG.

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.

All things, thus produced successively, are fashioned in anticipation of, and according to, the use they are afterward to perform.

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.

According to the nature and state of this formative substance, and suitably to its intuition or representation, causes flow into their effects.

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.

All the circumstances here recorded are most plain proofs of an infinite and omnipotent Divine Providence. (*Ibid.*, 247.)

These are some of Swedenborg's propositions, which he proceeds to prove by arraying facts and reasons to sustain his position. We will adduce here only a brief illustration of his method, that it may clearly appear that he does not make rash assertions without rational support and proof. To show the perfection of this formative substance, he proves that it is the first of the formation; because it commences the thread and carries it through all changes to the last. It is the most perfect; because everything proceeds in the most regular, orderly and distinct manner. It is the most universal; because it ensures and provides both for the general good and the good of every particular part.

In its own little world it possesses a certain species of omnipresence, power, knowledge, and providence; omnipresence because it is the most universal substance, the all in all of its kingdom, forming all things and everywhere present and operative; possessing power and knowledge because it goes from principles to causes, from causes to means, from means to effects, from use to use, from end to end, through the mysteries of all the mundane arts and sciences; so that there is nothing, but it evokes and summons to assist in building and completing its kingdom. In the animal kingdom, therefore, in whatever direction we turn our eyes, we meet with wonders that overwhelm us with astonishment; so that it would seem that to this force or substance, starting from its principles and proceeding from order to order, no possible path were refused, but its course lay through all things. That it possesses a species of providence is shown by the fact that one thing is prepared for another, and all are arranged for the purpose of bringing the soul into effect through the body. (*Ibid.*)

In viewing the formation of the chick in the egg, Swedenborg saw a representation of the universal mode of production of every creature; for he frequently affirms the principle that in each and every thing there is an image of the whole. From the study of one thing we may gain light bearing on other things. So in the formation of the chick in the egg he saw principles at work which, in like manner, operate in all formations. Let us review his method of investigation.

Swedenborg has been generally regarded as a visionary, as a man dwelling in the region of pure imagination, whose contributions to literature are mostly in the nature of recording visions which are regarded as mere hallucinations. The best way to dispel this erroneous belief is to visit him in his laboratory, and see him at work as a practical man of science, observing and marshalling into order the facts of science with the greatest precision. No scientist before or since his time has been more particular in procuring a groundwork of facts as the basis of his scientific work. In his physiological works he gathers all the known facts from the greatest anatomists. On these he builds a rational superstructure, deducing the causes operating in the structure, and the uses of the organs and viscera of the body from the structure, position, relationship, and forms of the tissue and organs. His method is the analytic, reasoning from facts to causes, ascending from the known to the unknown, proving by cogent reasons every statement he makes. There is nothing in his writings that savors of assumption and unfounded statement. In fact, one of the difficulties to many people in reading his writings is the severely rational, analytical method which constantly deals in proofs as logical as any system of mathematics.

In his investigation of the solar system he proves it to be one coherent whole in which the lower is produced from the higher, the sun, and is sustained by it all, depending on the sun not only for its origin in the first place, but continually for its sustenance and continued existence. The sun as the centre is not only the origin of all the substances of its system

of worlds, but through its atmospheres it continually governs them and sustains them in the order of existence. This it does through its atmospheres, through which it transmits its forces—gravitation, magnetism, electricity, light, and heat—by which the world is continually sustained, yea moved, in its eternal gyrations on its axis, and round its parent, the sun.

Wherever we touch this marvelous author we find him seeking the deeper things of nature, searching for hidden causes; but ever basing his reasoning on well known facts of observation. He planted his feet on solid ground. In order to rise from effect to cause, he formulated several new doctrines which he used as a guide and compass in directing his steps through the maze of knowledge of nature, which like a vast sea are difficult for the untrained mind to traverse without some guide which will teach how to keep a straight course. These doctrines are the doctrine of series and degrees, of correspondence and representation, by which causes can be traced to their effects, and effects to their causes.

In studying the physiology of the human body, Swedenborg had a keen perception of the uses of all things, therein discovering the uses of organs and parts not even yet understood by men of science. This faculty he strengthened by the use of mathematics, mechanics, and the sciences of physics and chemistry. In his investigation of the brain, its parts and motions, he anticipated many modern discoveries, so that the celebrated Retzius, one of the greatest authorities at the present day, expressed regret at not knowing of Swedenborg's work before writing his own.

One of the last of his scientific works, is entitled *The Soul, or Rational Psychology*, in which he unfolds his thoughts concerning the soul and its future existence. In the composition of this work, he is presenting his own rational thoughts and conclusions on the subject, just as Spencer and other learned men give theirs. I wish to direct attention to some of the things he there teaches.

The real test of a knowledge of the soul as it is in itself

lies in the direction of what is said of it after the death of the material body. There are indeed two phases of the study of the soul, one is the study of it in the effects seen as it operates in its kingdom, the physical body. This form of the science properly belongs to the domain of psychology and physiology. What can science or philosophy reveal with certainty about the real nature of life after death? Swedenborg in his physiological and psychological studies was constantly on the alert to discover the nature and operation of the soul in the body, and as a philosopher he gives us many sublime and noble conceptions from the psychological side of the study. He treats of the senses as means by which the soul gains a knowledge of the world of nature, of the intellect, and the affections; of those qualities of mind which ennoble man and elevate him above the animal creation, of those qualities which drag him down to the level of beasts and even below them, of the intercourse or relationship between the soul and the body. In his studies, the physiological and anatomical side was ever before his mind, but unlike the physiological psychologists of our day, he also kept clearly in his mind that there was another side to the shield. He saw most clearly that the active intelligent force working in the physical, and manifesting itself through the physical, was a distinct substantial entity. It was not the result of the activity of the material particles, but was the producing cause of this physical activity. The soul thought, the mouth spake that thought, the soul willed and the body executed that purpose and intention. What was this thing in itself as separate from its body which it had created? He pursued this question with tireless energy throughout his scientific and philosophical career. Did he solve this question at last in a satisfactory manner? I quote a few statements written at the very highest point of his philosophical development. To the question what is man, he says:—

The external shape is not what makes man, for the ape is human in face and still is an ape. The external form of the body is not man, for

he brute animals enjoy similar organs. Speech does not make man, for the parrot talks, and still is not a man. The *animus* (the lowest degree of the mind) is not the man, for the brutes enjoy a similar *animus* and are affected as man by the loves of their body and the world.

But that which enjoys a rational mind, namely, that it can think, judge, freely choose, and will, that creature is man. Also a man is esteemed as such by all according to his rational mind. . . . The greater the intellect or the more elevated the rational mind, so much the greater is the man. (Rational Psychology, 344, 345.)

Then in speaking of this rational mind he says:—

In the rational mind there is the face of the soul, just as in the body is the face and likeness of the *animus*. (*Ibid.*, 348.)

This mind indicates what the soul is. If the soul be not spiritual and immortal, such a mind can by no means be formed in which the spiritual and natural are conjoined. (*Ibid.*, 349.)

He then distinguishes between the soul and the body, and says:—

That spiritual [essence] which flows into the rational mind is the interior and superior man; but the natural which flows in from the *animus* is the external man. . . . The external is the same as an animal, but the internal is the same as an angel. (*Ibid.*, 350.)

Now the question is, What is it that dies, and what is it that lives at the transition which we call death? Swedenborg is here speaking according to the philosophical ideas he had developed through the use of his natural reason, and the religious ideas in which he had been trained. He says:—

Anything is said to die or be destroyed when that which is proper to its form perishes or is dissolved. (*Ibid.*, 489, p. 305.)

By death that is given back to the earth which was taken from the earth. That remains which is purely animal, namely, the soul which is alone what lives, and it lives in the body according to its organic forms. (*Ibid.*, 492, p. 306-7.)

The question arises therefore, What lives die, or what organic connections are dissolved? (*Ibid.*, 493, p. 307.)

It is beyond question, that the common life of the body dies, or that the general nexus of all its parts is dissolved; likewise the external sensory organs, touch, taste, smell, hearing, sight, with the organs of each, as also the internal sensory, with the intellect and the rational mind, that is, the cortical glands with the changes of their states. (*Ibid.*, 494, p. 307.)

The soul is *immaterial*. . . . The soul is *spiritual*, and in the spiritual form those things are infinite which are finite in inferior forms. (*Ibid.*, 498, p. 311.)

If we examine forms in their order, it appears that as the form becomes higher, or ascends to something superior, there is always something of perpetuity added. (*Ibid.*, 499, p. 311.)

Since, therefore, the soul is the inmost and supreme of all forms, . . . it cannot be touched or injured by the lower forms. (*Ibid.*, 501, p. 313.)

The soul is that very substance in which form has its being; its intelligence is that distinguishing faculty and quality of the forces and modifications (of its substance). Thus from form, and also from intelligence itself, it may be deduced and clearly seen that the soul is immortal. (*Ibid.*, 510, p. 318.)

If, therefore, the soul exists after the body is dissolved, what is the state of the soul after death?

In 512 and 513, in dealing with this subject, it is perfectly evident that Swedenborg had some relics of the old idea of death and the resurrection of the material body, the soul remaining in a very obscure state between death and the resurrection. Of the state of the soul and its form after death, he says:—

But it is asked, What is to be the form of the soul in heaven, whether similar to the bodily form, or another which is called angelic? And then whether the angelic form is the human? This indeed I do not think, that we are to put on the human form, for such a form exists solely for use in the lowest world. In heaven souls are like birds, nor do they have intercourse with any earth; they have no need of feet or arms, hence neither of muscles, that is of flesh and bone, for they are spirits.

Then he enumerates all the physical parts and functions of the body—brain, viscera, heart, lungs, etc.—and says:—

All these things will serve no use as soon as we become spirits and angelic forms. (*Ibid.*, 521, pp. 325-327.)

What form we shall have, we can no more know than the silkworm, which when a miserable worm crawls over its leaves, but after its long endured labors is turned into an aurelia and flies away a butterfly. . . . So with ourselves. We are grossly ignorant about the nature of that purest aura which is called celestial, and in which souls are to live.

He then proceeds to give a number of conjectures presenting the idea that the soul at any time can put on any form it wishes; but finally, seeing he is in the region of pure conjecture, he says:—

When we live as souls, perhaps we ourselves shall laugh at what we have guessed at in so childish a manner. (*Ibid.*, 524, p. 329.)

I have quoted these passages from Swedenborg's psychological writings to show the limitations of the human reason, and to help in defining the limits of purely natural investigation in determining the nature of the soul and the life after death, as distinguished from the effects of the soul and life displayed in the plane of the human body and in the world.

The soul has two kingdoms in which it dwells: (1) The physical body by which it operates in the plane of nature; and (2) the spiritual body by which it operates in the spiritual world. What we wish to show here is that the human reason has its limitations, and that of itself it can attain to no certain knowledge of the life after death. This Swedenborg shows in his curious conjectures in regard to the form of the soul after death, and the nature of its life. These ideas he shows in his theological works to be altogether erroneous.

The science of psychology has an important field in the investigation of the effects of the soul and the qualities of the soul displayed in its physical kingdom. Here human reason has a magnificent field for the display of its powers. Here Swedenborg showed a remarkable power of analytical reasoning from effects to causes, but when he transcends the proper

boundary of his field of investigation, and deduces by mere reason the nature and conditions of the soul in the life after death, he falls down as many another philosopher has done, from the sublime to the ridiculous.

In viewing the limitations of human reason we must not conclude that because reason cannot attain a certain and sure knowledge of the soul itself and its life after death, that there is no other way of attaining that knowledge. Reason indeed often makes this conclusion, as Spencer does in his "First Principles of Philosophy," in which he lays down the doctrine that what reason cannot attain by its logical deductions is not only unknown but is forever unknowable. What is this unknowable he says belongs to the domain of religion; what is known belongs to the domain of science. He strips religion naked of truths and knowledges, and makes it a cult having no knowledge and no possibility of a knowledge of any subject with which it deals; no knowledge of God, of the life after death, or the reality, existence, or nature of the soul. What earthly or heavenly use would such a religion be? Prayer, praise, and worship of an unknown and unknowable being would be simply an act of the merest ignorance, which no enlightened person would for a moment undertake.

But Spencer is not satisfied with his logical conclusions, for he says, although this unknown is unknowable, there is some subconscious element in our nature that gives us the feeling that *it is*, though it cannot teach us *what it is*. Therefore the only thing we can affirm is that back of the *known* there is, and always will be, this *unknown* whose qualities and attributes we can never know; and he affirms that this vague affirmation is the only real verity in the domain of religion. This position nullifies all the positive side of religion, that is, man's relationship to God and the life after death. Religion in this view can do nothing for us which a purely materialistic science cannot do.

In regard to the nature of life as viewed by Spencer, Fiske says of his definition that, it is incomparably the most pro-

found and complete definition of life that has ever been framed; and the chapter in which it is set forth and illustrated would alone entitle Mr. Spencer to a place among the greatest thinkers that have ever lived. What is this definition of life?

Life is the definite combination of heterogeneous changes, both simultaneous and successive, in correspondence with external coexistences and sequences.

He explains this as follows:—

Life is the continuous adjustment of internal relations to external relations. (First Principles, p. 84.)

Fiske says:—

The continuous maintenance of an equilibrium between the organism and its environment is the process in which life essentially consists. Life, including all intelligence as the highest known manifestation of life, is the continuous establishment of relations within the organism, in correspondence with relations existing or arising in the environment. (Cosmic Philosophy, II., p. 67.)

If we examine this definition of life we shall find two things, the force without the organism, and the changes within the organism. One of these stands in the relation of cause, and the other in the relation of effect. Which is the cause, the force without, or the activity within? This is the important question. The definition says, the life within is a correspondence with the forces without. Fiske says: The life within, including intelligence, is the correspondence with the relations in the environment. From which it is evident that life is the effect of forces in the environment. That which corresponds, or responds to a thing, is an effect, that which produces the response or correspondence, is the cause. The cause of life, therefore, according to Spencer and Fiske, is the force without the organism, bringing the organism into correspondence with itself.

Let us illustrate this with examples: Take a soap bubble, for instance. The inside force is a ball of air in great activity,

the outside force is the resisting atmosphere. The thin film of water is kept in form by these two opposing forces. The inside is the acting force keeping the form in motion, the outside is the resisting medium which by its reaction keeps the form intact. The moment the inside force is reduced to correspondence with the outside force the bubble bursts, because there is no superior force to keep up the activity on which the form of the bubble depends.

It is the same with life in an organism. If we notice Swedenborg's view of the operations of the chick in the egg, and the soul in the body, the active force is within the organism, moulding, building, forming, and using the organism to operate into the environment to bring the environment into correspondence with itself. So long as the superior force is within, the organism is intact, but when the outside force prevails, the organism perishes, and death ensues. The inside force is the cause, not the outside force; hence we may see that Spencer's definition of life is a definition of death; for when the inside is reduced to correspondence with the outside, death results; but when the outside is reduced to correspondence with the inside, life exists. In the chick in the egg the inner force is the soul organizing, forming, and building its body, when formed, the soul or inner force is constantly at work bringing outside forms and forces into obedience to itself to renew and rebuild its form, so that it may keep up the activity of the organism in correspondence with itself. Swedenborg's view of life as an inner substance and force is rational, Spencer's is a definition of death.—*N. C. Review.*

NOTE AND COMMENT.

At the meeting of the General Convention in Cincinnati last May, a memorial was received from the *Swedenborg Scientific Association* asking the Convention's aid in furnishing a stipend to maintain Mr. Alfred H. Stroh in his research and editorial work abroad in connection with the Swedenborg Committee of the Swedish Royal Academy of Sciences for bringing out the unpublished philosophical and scien-

tific MSS. of Swedenborg. The appropriation asked for was voted unanimously.

Our readers will be interested in a little book on dietetics by Dr. J. B. S. King, of Chicago.* Although designed primarily for the use of the physician, it is so clearly written and so free from needless technical expressions that it may be readily understood and made use of by anyone who is seeking for practical information of this important subject. Probably the most valuable feature of the work is found in the chapter on "The Daily Amount of Food." Most people eat more than they really need, especially of foods, the waste products of which are difficult of elimination, and therefore clog the tissues, and in themselves constitute a source of discomfort and ill health. The author shows that even the standards accepted by our foremost authorities on dietetics, are based upon human appetites and desires rather than the actual requirements of the system, as shown by the recent discovery of Horace Fletcher, and confirmed by exhaustive experiments by Professor R. H. Chittenden. Mr. Fletcher found that by thorough and prolonged mastication the daily amount of food could be reduced by about one-half and without the least detriment to health and vigor, in fact, with an actual increase in this respect. Swedenborg was one of the first, if not the first, to recognize the importance of the saliva in the process of digestion. (See A. K., Vol. I, n. 71.) He was the only one who has maintained that the subtle essence of nutritive substances are absorbed by the tongue and conveyed at once to the brain. By prolonged chewing, not only is the food ground into finer particles, but the saliva is more intimately mixed with it and better opportunity is given for this absorption. Hence a larger amount of the nutritive constituents are extracted. It is interesting to note in this connection, the evident confirmation of another truth also dwelt upon by the great Swedish philosopher, namely, that the normal system desires those things which will be of the greatest use to it. One of the benefits to be derived from this mode of eating, Dr. King writes, is: "Instinctive knowledge of what supplies the needs of one's system and the proper quality of it. After a time some things that you were fond of will grow distasteful, which will show that they are not good for you, and some plain foods that you were indifferent to become attractive."

*Practical Observations Upon the Chemistry of Food and Dietetics, by J. B. S. King, M. D., Professor of Chemistry Hering Medical College, former Professor of Chemistry, Hahnemann Medical College, Secretary International Hahnemannian Association, member of the American Institute of Homoeopathy, etc. Chicago, The Blakely Printing Co. Pp. 140, 16mo.



B
4468
S84N4
v.7-9

The New philosophy

PLEASE DO NOT REMOVE
CARDS OR SLIPS FROM THIS POCKET

UNIVERSITY OF TORONTO LIBRARY
