

is no other light, so it looks black. The same applies to *all* the other colors of light *except* the red. Therefore as regards those other colors of light, the substance cannot reflect them; in them it looks black, as far as they are concerned, it *is* black. Similarly a blue substance is black to all colors of light except those which have some blue in them, and so on with all the other colors. (These colored substances are ideal substances of pure color. There are very few of them. Most substances are of mixed color just as most light is of mixed color.) Thus experiments like this need to be done in the laboratory with properly prepared substances and apparatus, but a rough approximation may be seen in the common experience of the ghastly sight a beautiful face may present under the mercury arc street lamps.

To summarize, a purely red pigment is red *because* it is black to all light *except* red light; a purely blue one is black to all light except blue light. A substance which is red tinged with a little yellow will be black to all light except red and yellow, and darker to yellow than it is to red.

This, then, it is suggested, is what is really meant by colors being produced "from the variegation of light and shade in black and white," and how else could it have been expressed at a time when the nature of light was only just beginning to be investigated?

This example of the application of science to New-Church teaching is not typical of what can be done because we have not used it to enrich our spiritual knowledge, but merely to remove or prevent an uneasy feeling that, as regards colors the *A.C.* was a little "off the mark." Nevertheless, the subject is far from exhausted and if we were to examine the significance of various colors, and to relate this with other knowledge, we could no doubt make further progress.

THE NATURAL POINT AND OTHER POINTS

BY CHARLES R. PENDLETON, M.A., PH.D.

(Continued) *

VI. THE MATHEMATICAL POINT:

52. It would seem the height of folly for any rational mind to think that the universe could be created from mathematical points.

* See *NEW PHILOSOPHY* for April 1951 for the beginning of this article.

Such points are nothing but imagination. They have no existence independent of imagination. Nevertheless, it is true that there have been many who have thought that they could explain the universe on this basis.

53. Bell, in his *Development of Mathematics*, traces this idea back to B. Cavalieri, an Italian Jesuit who lived 1598–1647 (p. 121). Cavalieri regarded these points, which he called “indivisibles,” as both spaceless and spatial. Individually and separately they had no dimensions, but massed together they filled space.†

54. Condemning such ideas, Bell says:

“If his mystical exposition means anything at all, Cavalieri regarded a line as being composed of points, *like a string of countable but dimensionless beads*, a surface as made up similarly of *lines without breadth*, and a solid as a stack of surfaces without *ultimate thickness*.

“Cavalieri’s method of indivisibles has endured, to the distraction of hundreds of teachers of elementary calculus who must extirpate heretical notions of infinitesimal calculus from their students’ minds” (*Develop. of Mathematics*, 1940, pp. 121–22).

55. F. Cajori, in his *A History of Mathematics* (1897), emphasizes the mistake in this type of thinking: “By the method of Indivisibles, Cavalieri solved the majority of the problems proposed by Kepler. Though expeditious, and yielding correct results, Cavalieri’s method lacks a scientific foundation. If a line has absolutely no width, then no number, however great, of lines can ever make up an area; if a plane has no thickness whatever, then even an infinite number of planes cannot form a solid” (p. 171).

56. We find similar ideas in the Writings: “It is believed that it (the first substance) is so simple that nothing could be simpler, and that it can be likened to a point which has no dimensions, and that from infinite such forms, dimensions exist. But this is a fallacy arising from the idea of space, for from this idea there does appear to be such a minimum. But still, the truth is that the more simple and pure anything is, the more and the fuller it is. The reason for this is that the more interiorly any object is viewed, the more wonderful, more perfect, and more beautiful are the things seen within it; and that in the first substance of all there are the most wonderful, most perfect, and most beautiful things”

† See NEW PHIL., 1929, p. 105.—Editor.

(D.P. no. 6). And further: "It is taught by some that there is a substance so simple that it is not formed of smaller forms, and that from these substances by heaping up (*coacervationes*) there exist substantiates or composites, and at length substances which are called materials. But still there are no such most simple substances; for what is a substance without a form? It is something of which nothing can be predicated; and from an entity of which nothing can be predicated, nothing can be produced (*conflari*) by heaping up (*coacervationes*). That there are innumerable things in the first of all created substances which are the smallest and the simplest, will be seen in what follows" (D.L.W. no. 229).

57. In another paper,* I have brought evidence to show that Swedenborg, in the *Principia*, had no illusions about Cavalieri's method of analysis. He faced squarely the problem of the infinitesimal which has tantalized mathematicians and philosophers alike from Zeno of the ancient Greeks to the thinkers of today. These infinitesimals must have a kind of space, and yet we cannot form a concept of it. According to Swedenborg's *Principia*, this is the nature of the Natural Point with regard to its space.

58. The Natural Point of Swedenborg's *Principia* is not the same as the mathematical point or the indivisibles of Cavalieri. This can be seen clearly if we list the more outstanding characteristics of the Natural Point, none of which is to be found in the mathematical point.

- I. The Natural Point is produced by the Infinite, the God of the Christian Word (I *Princ.*, Chap. II, nos. 1, 3).
- II. The Natural Point is pure and total motion in the universal Infinite (*ibid.* no. 12).
- III. The Natural Point is infinitesimally small, yet it has something of space or an analogue of space (*ibid.* nos. 8, 14, 15-16, 18, 23). See above (no. 57 note).
- IV. The Natural Point has an external motion, i.e., local motion, which is in the form of a very complicated spiral (*ibid.* nos. 20, 22).
- V. The energy of this motion is derived directly from the Infinite Will to create (*ibid.* no. 1).

* "The Natural Point or the Point of Zeno," see NEW PHIL. 1948, April and October, pp. 180, 262, respectively.

- VI. It is this motion which is the cause of all the qualities of the rest of the created universe (*ibid.* III, nos. 1-5).
- VII. It is a kind of medium between the Infinite and the finite (*ibid.* II, nos. 6, 9, 10).
- VIII. The Natural Point contains all things in itself which can exist in the universe (*ibid.*, Preface).
- IX. The higher forms are more and more perfect than the lower (*Infinite* IV, no. 9, pp. 38-39; *E.A.K.* I, no. 168; II, nos. 312, 357).
- X. The lower degrees of the universe are created from natural points by causing them to fit together in a mass—the first finite—in such a manner that they fill the space by touching one another as well as by their motion (*I Princ.*, III, nos. 9, 12, 16, 19, 20, 21).

59. The careful student of Swedenborg's philosophy cannot fail to see that these qualities of the Natural Point are not the same as those of the mathematical point. He is therefore dismayed to read Swedenborg's statements that the Natural Point is the same as the mathematical point (*ibid.* II, nos. 2, 7). There seems only one conclusion to be drawn. Swedenborg means that there is a similarity between the two. That, as the mathematical point is the beginning of geometry, so the Natural Point is the beginning of the universe. Swedenborg does indeed indicate this (*ibid.*). But it must be admitted that he has over-stated his case in the *Principia*. Other statements are easier to understand, e.g., it "is almost the same as the mathematical point" (*Minor Principia* no. 2, p. 300); "not unlike the mathematical point" (*Some Points bearing on the First Principles of Natural Things* no. 3, p. 532).

60. This conclusion is supported by another statement in the same place, i.e., that the Natural Point is the same as the Point of Zeno. There are similarities between the Natural Point and the Point of Zeno. In fact, the similarities in this case are more outstanding than are the similarities with the mathematical point. But here again Swedenborg seems to have over-stated the case. The Point of Zeno has none of the qualities of the Natural Point as listed above, save only that listed in no. III, the infinitesimal.

61. If the Natural Point were the same as the mathematical

point, and if also it were the same as the Point of Zeno, then these two points, the mathematical point and the Point of Zeno must be identical. But this is not the case. No reliable student of the history of mathematics can be found to state that these two points are the same. Note Bell's objection above to Cavalieri's indivisibles, and his interest in and appreciation of Zeno (*Development of Mathematics*, 1940, pp. 52, 60). Therefore, the only conclusion is that there are certain similarities between the Natural Point and these other two points, and that Swedenborg was over enthusiastic about this similarity when he wrote the *Principia*.

62. The only conclusion which may be drawn from the evidence adduced above is that Swedenborg in the Writings was condemning the naturalistic mathematicians (see *S.D.* nos. 4744 and 5141), but that he was not condemning his own earlier ideas. Indeed, he could hardly have written *Intercourse* no. 20 nor *Diary* no. 1603, had he thought otherwise.

63. This conclusion is strongly supported by a passage in the *Economy of the Animal Kingdom* (I, no. 592). Here Swedenborg is speaking of the "elements, monads, primitive and simple substances" of others. He cannot accept these teachings "if that substance is to be conceived of as simple according to the usual description of a simple entity, viz., as destitute of parts, magnitude, figure, internal motion, divisibility." It should be noted that here in the *Economy*, Swedenborg has rejected in one paragraph all the types and qualities of points which are condemned in the Writings. As will be shown later, he could not here have been condemning his *Principia* because he several times after this referred the reader to his *Principia* for a knowledge of the true nature of the first substance of the world.

64. A number of ancient writers brought the idea of points into their systems. Thales (about 624–554 B.C.) begins with his "monadon" from the Greek monas meaning a unit. The Pythagoreans used the word *semeion* and *monad* meaning a point. Plato and Aristotle followed Pythagoras. Euclid used the point in his *Geometry*.* These men undoubtedly influenced posterity, but their ideas, so far as is known, are included in the authors already

* See Heath, *Greek Mathematics*, 1921, pp. 69, 166, 293; D. E. Smith, *History of Mathematics*, 1923, vol. II, p. 274; and Gow, *A Short History of Greek Mathematics*, 1884, p. 150.

considered. As Swedenborg did not mention them in this connection, it does not at this time seem advisable to consider them further.

VII. THE NATURAL POINT NOT A POINT:

65. The Natural Point of Swedenborg's *Principia* is not a point at all, if we use the word point as it is used today in mathematics. The dictionary defines a point, in a mathematical sense, as "That which is conceived to have position, but not parts or dimensions" (*Students' Standard Dictionary*). In regard to parts, the *Principia* shows that it has a figure of motion—internal motion—like the members of the series of finites. It has a center and peripheries (I *Princ.* II, no. 21). It has motion within itself, i.e., it consists of pure and total motion in the Infinite (see above). Swedenborg does say that it is without parts, but by this he means that it is not made up of basic units (*ibid.* 14).

66. In regard to dimensions, Swedenborg says that it is not in space (*ibid.* 12, 14). But nevertheless, he confesses that it has "a kind of extension" (*ibid.* 8-14). It is the paradox of the infinitesimal. Cajori defines the infinitesimal as an infinitely small quantity (*A Hist. of Math.*, p. 169). But it is not zero or nothing. It is so small that a number of them may be ignored without changing the practical results. But an indefinitely large number of them—there is no infinite number—will make a measurable quantity.

67. The difference between a point and an infinitesimal is often confused, but should be kept clearly in mind. In an absolute sense, the point has no dimensions but the infinitesimal has. The infinitesimal is so small that its dimensions cannot be thought of. For if dimensions are considered, the concept is too large, and the idea must be recast until finally the smallness of the infinitesimal is reached.

68. This seems to be Swedenborg's concept of the dimensions of the Natural Point. The great difference between Swedenborg and the geometers is that the latter postulate their points as having nothing but position, while Swedenborg considers his Natural Point to be alive. This is involved in the *Principia*, and is clearly stated in the later philosophical works.

69. It is interesting to speculate why Swedenborg used this

term. Suggestions are as follows: The dictionary lists twenty-one meanings of the word point, none of which fits Swedenborg's concept. The "point of a needle" comes nearest but is wide of the mark. Probably most of these meanings were in use at Swedenborg's time, but mathematical terms were not so well defined as they are today. Newton had invented the calculus less than half a century before Swedenborg wrote, and Leibnitz had claimed the same invention a few years later. In the bitter and acrimonious debate as to the discoverer of this great mathematical discipline, the question of terms played a prominent though secondary part. Newton used the idea of the infinitesimal but apparently not the term. History has decided to use the terms of Leibnitz, while admitting that Newton was the first to make the discovery. Just where the term infinitesimal came from is not clear. Swedenborg wrote toward the end of this controversy, if indeed there is an end to it yet. So there was no established term for Swedenborg to use.

70. But Swedenborg must have discovered that the term "point" was misleading, because he discontinued its use shortly after writing the *Principia*. In a review of his *Principia*, entitled *Some Points bearing on the First Principles of Natural Things*, written about the time the *Principia* was published, Swedenborg used the term "Point" to apply to the first of creation. In *The Infinite*, written about the same time (1733), Swedenborg does not use the term point in this sense, or, at least, I have not been able to find it. And this is remarkable because this work is a further development of the philosophy of the first of creation. After this, the term "Point" meaning the First is used apparently a few times—at least, once in *The Fibre* no. 191, and once in the Writings, *Divine Wisdom* I.

71. In the *Principia*, Swedenborg uses other terms for the first of creation, though, unfortunately, they are seldom used at the present time. Most prominent of these is the term "Simple," e.g., I *Principia* II, no. 4, etc. Another is *First Ens*, *ibid.* 1, 2, 3.

72. In *The Infinite*, in addition to "Simple" and "First Ens," Swedenborg uses the terms "First or Primitives" and "Leasts or *Minima*" (IV, no. 2, pp. 31, 37, 38, e.g.). This is an important fact because we find these two terms used in the Writings also to denote the first of creation.

73. In the *Economy of the Animal Kingdom*, Swedenborg uses

the term "First Substance of the World" (I, nos. 584, 592, II, nos. 271, 276); in *The Fibre*, the terms "Simple" and "First Natural Forms" (nos. 266a, 272); in the *Rational Psychology*, the terms "Simple" and "Supreme Form"; in the *Animal Kingdom*, the terms "Simple" (I, nos. 202h, 180b) and "Least" (I, no. 44i); and in the *Worship and Love of God*, the term "the First Substance of the World" (no. 6).

74. It would appear that Swedenborg discarded the term "point" to describe the First of creation after he wrote the *Principia* and its Summary and "Some Points bearing on the First Principles of Natural Things," because it is not a point, and to so label it is misleading.

VIII. THE PRINCIPIA IDEAS NOT DISCARDED:

75. Although Swedenborg discontinued the use of the term "point," he did not discard his early philosophy of the First Substance of Creation, because he refers back to the *Principia* a number of times, and in at least one of these, the reference is to the nature of the Natural Point itself.

76. In the 1902 English edition of *The Infinite*, on page 31, Swedenborg says: "But as to what the simple seems to have been, we have treated of this subject at some length in our *Principia*, in the chapter on the elements." The translation is inaccurate, for the reference is not to any specific chapter. The Latin is: "Sed quale jam ipsum Simplex fuisse videtur, de hoc aliquantum est actum in *Principia de Elementis*" (*The Infinite* IV, no. 2, p. 38; Latin ed. of 1884). The last three words are an abbreviation of the longer title of the *Principia*.

77. In no. 241 of the second volume of the *Economy*, written in 1740, Swedenborg refers back to his *Principia*; also in no. 352 where the reference is to the atmospheres, their forces and their modifications (no. 352, p. 394).

78. In the *Rational Psychology*, written in 1742, he seems not to have referred to the *Principia* directly, but he refers to others of his previously written works, including *The Cerebrum*, the *Economy of the Animal Kingdom*, and *The Fibre* (see Acton's translation, Index, s.v., *Swedenborg*). *The Fibre* refers to the *Principia* in nos. 264, 265b, and 264a.

79. In the *Five Senses*, which Swedenborg finished in July 1744

(translated by E. S. Price, 1914), Swedenborg refers to his *Principia* six times. He uses the two words "Principia Philosophica" which are also taken from the title of the *Principia* and undoubtedly refer to this work, though they were correctly translated Philosophical Principles. The references in nos. 256, 267, 279, and 284 are to the atmospheres, especially the ether.

80. The reference in no. 262 is of great interest. Here Swedenborg refers to some of his very early spiritual experiences: "It is to be observed, that according to an admonition of the night, I ought to refer to my Philosophical Principles, and to consider the levity, the gravity, and the activity inscribed on the pure; and it was said that thus it is given me to fly wherever I wish."

81. In many other places, Swedenborg's philosophical works refer back to other of his works than the *Principia*. The *Five Senses* has over sixty references to Swedenborg's works; *The Fibre* has forty-four, *The Cerebrum* thirty-three, and *The Worship and Love of God* twenty-seven. With others not here included, the total would probably amount to two hundred or more. A large part of these references is of the type "see my . . ." for further information on this subject.

82. Swedenborg's earlier works are thus remarkably tied together into a cohering system of philosophy, and the nature of the "First of Creation" is probably the most important part of his whole system. The nature of the Natural Point not only determines the nature of all the rest of creation, but it also determines Swedenborg's idea of the Creator.

83. It would be a mistake to assume, however, that Swedenborg made no changes in his system of philosophy. Several times he notes a mistaken conclusion, and occasionally he expresses a doubt. But these are very few in number and are of relatively little importance. Nowhere does he suggest any change in his conception of the "First" of creation. This is very important because of the fundamental nature of these concepts.

IX. THE NATURAL POINT IS NOT NATURAL. IT IS SPIRITUAL:

84. As indicated, Swedenborg dropped the term "Points" as descriptive of his First Substance quite early in his philosophical works. The reason for this has also been suggested. Later he

dropped the term "natural" also, i.e., he discontinued the words "natural point," but he continued to use the term "First," even throughout the Writings.

85. In the earlier works, we do not find the opposition between spiritual and natural such as is found in the Writings. But in the later philosophical works, this distinction is beginning to appear. In *The Fibre* no. 266, he says of the perpetuo-vortical or celestial (celestial here is below the spiritual), that "this form is the supreme of all natural forms." The same is said in *The Fibre* no. 269; and in no. 267 he says that the "PERPETUO-CELESTIAL, properly to be called the SPIRITUAL" is "above all created nature."

86. But in other places, Swedenborg contrasts the spiritual with the organic. Such is the usage in *The Fibre* no. 304. But in the succeeding number he says that "the first form which is also the first form of nature . . . is a celestial and spiritual form, properly the soul. . . . This also is eminently organic. . . . The spiritual form is the soul" (no. 305).

87. In still other places, furthermore, Swedenborg contrasts the natural with the spiritual. *The Fibre* no. 269 contrasts the "natural forms" with "vital," "spiritual," "angelic forms and human souls." *The Senses* no. 631: "One is physical and natural, the other moral, and the other spiritual."

88. The *Worship and Love of God* draws a distinction between the natural and the spiritual, much the same as do the Writings (no. 24 note, p. 42). Here we have the sun of the world and the Fountain of Life. See *Economy* II, nos. 241-42.

89. In the following sections, it will appear that the "spiritual form" of the later philosophical works, especially described in *The Fibre*, has very much the same qualities which we find described in the Writings.

90. It would appear from the preceding paragraphs, that Swedenborg was changing his terminology about the time he wrote *The Fibre* (1742) and *The Senses* (1744). This was not a sudden change, and it may even have been unknown to him.

91. Students and admirers of his early works have often wondered why Swedenborg used the term "first natural point" to denote the first of creation, since this form was so obviously above the immortal soul (see Sections XI-XIV below). It is suggested that this was done because of the influence of his time, most likely

the works of Wolff which he is known to have studied at the time he revised his *Principia*.*

X. NATURE AND NAMES OF THE FORMS:

92. The doctrine of forms springs from the *Principia*. There it is shown that there is only one substance, the Infinite; and that the Natural Point is a form produced by motion in the Infinite. These forms would be imaginary were it not for the Infinite. They are not imaginary because the Infinite is real.

93. From this fundamental is derived by necessity the idea that all finite substances are forms and, consequently, that all finite quality is determined by the finite form. This can easily be shown in scientific things, as sound, light, etc.

94. These ideas are contained in the later philosophical works where Swedenborg many times uses the term forms to mean substances; as explained in *The Fibre*: "Nor is this ascent merely an ascent of forms, but it is also an ascent of substances, forces, modes, qualities, and accidents—none of which would exist without forms" (no. 271; also *W.L.G.* no. 66 note, p. 144).

95. The same teachings are found in the Writings. "The Divine Truth itself is the only Substance; derivatives are nothing but successive forms thence derived" (*A.C.* no. 7004^e). "Quality can only be derived from form" (*T.C.R.* no. 53; see also nos. 367 and 753).

96. Form is produced by a flowing or fluxion of the next higher forms. This is obvious in the *Principia*. It is also clear from *The Fibre* nos. 264, 264a, and other numbers. The most interesting teachings are in the Writings: "And wonderful to say, there is a gyration according to the forms [of the heavenly societies] of which the angels and spirits are not sensible. . . . The brain is formed according to the form of the fluxion of heaven" (*A.C.* no. 4041; see also *Divine Love* XIX and *A.E.* no. 1208², *D.L.W.* no. 344).

97. Swedenborg first discriminates between form and figure. "Form is . . . the fluxion of parts, points, substances, forces. Thus we have the form of motion, the form of modification, and the form of substances—all of which forms coincide." "Figure, however, is the limit of the extense . . . of such fluxions. . . .

* See Dr. H. Lj. Odhner's article "Christian Wolff and Swedenborg" in October 1951 issue of the *NEW PHILOSOPHY*.

It is sometimes called external form" (*Fibre* no. 262; see also *Ontology* nos. 10, 14).

98. Swedenborg then gives a rule for arriving at a knowledge of the higher forms from the known form, the lowest degree. It must be remembered, however, that creation proceeds from above downward, and never the reverse, and that Swedenborg's doctrine of forms, wherein he gives this rule, does not teach that the higher is derived from the lower. What it does teach is that by using the lower form as a starting model and making certain changes according to the rule given, the next higher form may be seen.

99. The rule is this: Take the lowest form, angular motion or fluxion. Make the point of least motion in this form perpetual and infinite. The circular form is then discovered. This may be seen illustrated in books on plain geometry where they measure the area of the circle. This passing upward from the angular to the circular is the known model from which a knowledge of the higher forms may be obtained, as follows: Take circular motion or fluxion, make the point of its least motion, i.e., the center, perpetual and infinite, and you have a model of the spiral form. Start with the spiral form of motion and apply the same changes, and you have an idea of the celestial form of motion or fluxion. From the celestial, by the same process of perpetualizing and infiniting, you arrive at some idea of the spiritual forms of motion or fluxion. See *The Fibre* nos. 263-67. But the form above the spiritual is different. It is the Divine Form itself. It is indeed called the perpetuo-spiritual, but Swedenborg warns us that it is "not properly a form, but pure essence, Life, Intelligence, Wisdom, and most utterly abstracted from space, time, matter, figure, motion, change, destruction" (*Fibre* no. 268).

100. It has been assumed by some that the spiritual form of Swedenborg's philosophical works is of an entirely different nature from the other forms of this series, because Swedenborg says that it is not spatial. The description of the spiritual form is considered later (Section XIII). The problem of space is a large one and will, it is hoped, be considered at length elsewhere. Here it is important to understand that Swedenborg teaches that the spiritual form belongs to the same series as the lower forms, and is to be understood by the same rules. The Doctrine of Forms in *The Fibre* (nos. 261-68) makes this clear. *First: The SPIRITUAL FORM* is included in the series which begins with the ANGU-

LAR, continued with the CIRCULAR, the SPIRAL, the VORTICAL, the CELESTIAL, and ends with the SPIRITUAL. *Second*: The SPIRITUAL form is the PERPETUO CELESTIAL (no. 267), just as the CELESTIAL is the PERPETUO SPIRAL, and so down to the SPIRAL which is the PERPETUO CIRCULAR (no. 264); and the CIRCULAR which is the INFINITELY ANGULAR or the PERPETUO PLANE (no. 263). *Third*: Swedenborg says that they belong to the same series. "For if we progress by a series like the one we have just instituted, it follows that the spiritual form refers itself to the celestial, just as the latter refers itself to the vortical, and so on to the angular" (*ibid.* no. 267).

101. Swedenborg declares the essential similarity between the spiritual form and the others of this series in a somewhat different way in *The Fibre* no. 304: "Forms in the animal kingdom are as many as are the forms in the animal world, which latter have already been treated of; nor do they differ in the nature of their fluxion. Hence they also are celestial, vortical, spiral, circular, and finally rectilinear or angular. But because they have in addition this property, namely, that they are living, these forms are called vital, and the first of them spiritual, but the rest organic." Again, in the *Worship and Love of God* no. 66 note, Swedenborg indicates the unity of this series. In speaking of the soul, he says that its "form is spiritual; from this form are derived the rest, which, by successive generations of one from another, put on the quality of the following [i.e., the lower] forms, . . . called inferior or posterior." See also other passages listed in Section XII.

102. That the spiritual is in fact to be understood from the celestial form of motion or fluxion made perpetual and infinite, seems to be determined beyond question by Swedenborg's comments at the conclusion of his series of numbers on the doctrine of forms. The lowest are geometrical and easily understood; the mediate are more difficult, but still they may be understood; the higher are intrinsically incomprehensible to finite minds. Nevertheless, they can be described and understood to some extent because they are of one finite nature. Swedenborg says: "Such is the ascent of forms from the lower to the higher; nor is this ascent merely an ascent of forms, but it is also an ascent of substances, forces, modes, qualities, and accidents—none of which would exist without forms. When we thus raise ourselves from inferior forms to superior, we are said to ascend into a superior,

prior, more universal, simpler, purer, and more perfect nature, sphere, potency world, aura, ether; nay, to superior heavens. . . . In each degree, when forms are carried up by this ladder, something earthly, material, and finite is cut away and put off, and a certain celestial, perpetual, and infinite is superadded and put on. . . . Until at last nothing except what is perpetual, infinite, eternal, pure, holy, that is, Divine, remains" (Fibre no. 271). Swedenborg reverses his progression in no. 272: "We have striven toward these principles by the analytic way; from them, thus searched out, that is to say, from first things, let us now descend by the synthetic way to things postreme or lowest. . . . In the same order, then, it follows that from the Divine proceeds the spiritual, from the spiritual is created the celestial, from the celestial is produced and flows the vortical, from the vortical the spiral, from the spiral the circular, and from the circular the angular. Thus by a long series of succession and derivation, or by six degrees [1. angular, 2. circular, 3. spiral, 4. vortical, 5. celestial, 6. spiritual] there is produced from the most perfect that which in itself and its own nature is more or less imperfect."

103. *The Fibre*, no. 273, continues: "In order that we may represent to ourselves an idea of the generation and derivation of such forms, or of one from another, it is necessary that we hold to the idea of the existence of the superior forms within the several inferior. . . . Therefore, when a number of superior forms unanimously associate together, and enter into, determine, and constitute one form, which is then called a substance per se, there comes into existence a proximately lower form; and when these latter forms similarly associate together and enter into one form, there comes into existence a form still lower, and so on. . . . Thus one form flows into the other, and that which is prior is always more internal, and that which is posterior is always more external, and hence more remote. Thus the first form is *toto coelo* distant from the last, though inmosty residing in it. Hence it follows, that in the compound there is nothing substantial save that first and one which is called simple substance." It seems clear that Swedenborg is referring to the natural point, not only because in the *Principia* he calls the Point a simple (I *Princ.* II), but also because throughout this series, he refers these forms to this same work (see the next Section).

104. Although delineated by the rule for the series, the higher

forms cannot be easily comprehended. "The qualities which are predicable of the celestial form can hardly be expressed by terms or expressions applied to inferior forms, except by way of analogy or by eminence; for they transcend the common ideas of our mind and even rational analyses and philosophy" (*Fibre* no. 266a). "We cannot express by adequate terms, nor even by figures, things into which we do not penetrate. From the roots of a given number or figure, extract by means of the infinite calculus roots, one after another to the fourth or fifth power; or raise them four or five times to higher powers; then unfold or resolve the equation or demonstrate it by figures or in numbers—a thing you will certainly never attempt. And, therefore, that which is thus extracted or raised is not perceived as to its quality, but only as to the fact of its existence" (*ibid.*).

105. Summarizing: We must not confuse form with figure. Swedenborg explains how we may arrive at some comprehension of these forms, and gives them names so that they may be easily identified. The lower forms can be understood, the higher ones with more difficulty, and the highest are impossible to comprehend. Nevertheless, they are all of one fundamental type, and one rule applies to all of them. The spiritual form is the highest finite form, the others follow in order down to the angular. The spiritual form, because of its transcendental qualities, will be considered more fully later.

XI. CORRELATION WITH THE PRINCIPIA:

106. The forms described in *The Fibre*, written about 1741–42, are an elaboration and fulfillment of the teachings of the *Principia*. Swedenborg very definitely states this.

107. "The manner in which the central gyrations are effected cannot be easily expressed in words nor represented by figure—though I have attempted to represent it [the spiral form] in my *Philosophical Principia*" (*Fibre* no. 264a). The fluxion of the spiral form "has been abundantly shown in my *Philosophical Principia*, where I have taken pains to delineate the very form of its fluxion" (*ibid.* no. 264). The phenomenon of the magnet has its origin in the ether whose form is vortical, as "has been shown at sufficient length in my *Principia*" (*ibid.* no. 265b).

108. Swedenborg also names the *Principia* entity which has the form described in *The Fibre*. The angular form is the salts

or the terrestrial substances or mother (*Fibre* no. 263, iv). The circular form is the air (*ibid.* no. 263, iii); the spiral form is the ether (*ibid.* no. 264c); the vortical form is the magnetic aura (*ibid.* nos. 265, 265b); and the celestial form is the first aura (*ibid.* nos. 266, 266b).

109. The spiritual form is more difficult to correlate with the *Principia* entities. In no. 267 of *The Fibre*, where Swedenborg treats of the "PERPETUO-CELESTIAL, properly called the SPIRITUAL," there is given no correlation with the *Principia*. There is only the "incomprehensible, ineffable, and inexpressible" nature of this form. But in the *Principia* there are three entities above the first aura. These three are, the second finite, the first finite, and the first natural point. These three must then be the spiritual form. Or should there be three spiritual forms?

110. In the work on *The Fibre*, it is explained that sometimes these entities are given a higher status; thus the whole group is stepped up one degree: "A universal rule for the derivation of forms [*is*]. . . . That the form of parts of individual substances or units is, in themselves, always superior to the form of the volume or of the parts or of such units among themselves" (no. 274). So water is circular (*Senses* no. 270); air is spiral (*ibid.* 271); ether is vortical (*ibid.* 282). The magnetic aura is not identified (*ibid.* 290), and the first or universal aura is called spiritual (*ibid.* 264).

111. It is supposed by some that it is a misinterpretation of the Latin to say that the first aura is called spiritual. Professor Price, who translated the work on the *Five Senses*, renders this number (264) as follows:

112. "We are never admitted into the knowledge of these things unless we consider that as many prior atmospheres in order, so many sensations; wherefore, there are three natural atmospheres to which is to be added a supreme [*suprema*]: namely, 1. air, 2. ether, 3. the celestial [aura], 4. finally, the universal spiritual [*universum spirituale*] (aura) which is the supreme [*supremum*]" (*Senses* no. 264).

113. It is suggested that this translation is a misinterpretation of Swedenborg's meaning because the words in class 4 are all neuter gender, while "atmosphere" and "aura" are feminine gender, and that the "universal spiritual" is an undefined supreme.

114. But there are several considerations which are against this:

I. The neuter adjective is often used as a noun of wide meaning. II. The sequence is so close that the meaning seems obviously to be as Professor Price interpreted it. III. The opposing interpretation would require two supremes; the *first* is feminine gender and could only refer to the supreme atmosphere; the *second*, *Supremum* being neuter, refers to something else. The sequence of ideas does not bear this out. IV. In the five pages which follow this number, Swedenborg considers each of the four atmospheres and compares them with his doctrine of forms; the fourth is now neither the feminine atmosphere nor the neuter indeterminate, but the supreme form (*Forma Suprema*). V. It is in this chapter that references to the *Principia* are found. Preceding this number (264) by half a page is that "admonition of the night" to refer to the *Principia*, so that he could "fly wherever he wished."

115. It seems impossible that Swedenborg could have had anything else but the *Principia's* first or universal aura in mind, because of the doctrine of forms and substances, and also because of his teachings regarding the simple fibre and the soul. A number of these references have already been given and many more will follow.

116. In later works, Swedenborg continues to use this doctrine of forms, as will be seen later.

XII. DESCRIPTION OF FORMS:

117. Swedenborg describes these forms so carefully that models can be made which, at least in part, may carry out his ideas. An interpretation which did not arise with myself is as follows:

118. The perpetual and infinite in the circular form is the circumference of the circle. If we consider this a continued motion or flux, as Swedenborg says we must, this motion is perpetual and infinite, i.e., so long as it is a motion. It is obvious from mechanics that there is less friction, because less motion, at the point which is the center. Swedenborg considers a radius in such a revolving circle: This radius has most motion at the circumference of the circle, less and less as it approaches the center, and finally no motion at the center. In the present century we would say that zero motion is the limit to which this decreasing motion is approaching. Swedenborg says that the radii in motion ter-

minate in the center; and with the termination of the radii, there is a termination of the motion.

119. The center of the CIRCULAR FORM is the only part which is not perpetual. This center is then caused to rotate or move in a circle, and the next higher form is generated, the PERPETUO-CIRCULAR form or the SPIRAL FORM. Thus something more finite is removed and something perpetual and infinite is added. Thus we arrive at a knowledge of the SPIRAL FORM. But in this form, the circular center itself has a point in its own center which is finite. By turning this point into a circular, i.e., a circular fluxion, the next higher form is obtained—THE VORTICAL. In the same way are to be understood the CELESTIAL and the SPIRITUAL. It will thus be seen that in each step up from a lower to a higher degree, a single point at the center has been converted into an infinite number of points. So that in the higher forms, the centers have become the infinite multiplied by the infinite many times.

120. In his later works, Swedenborg often referred to his doctrine of forms. Sometimes this is seen because he uses the same series of names, i.e., angular, circular, spiral, etc. At other times it is recognized by his idea of removing the point of least motion by making it perpetual. Those works which preceded *The Fibre*, like the *Economy of the Animal Kingdom*, Parts I and II, do not seem to have this doctrine, but those which were written after *The Fibre* (E.A.K., Part III, written in 1741-42) all appear to have it.

121. In the *Rational Psychology* (written in 1742), the forms from the angular to the spiritual are mentioned a number of times (no. 178), together with their functions (nos. 34, 486). Their "perpetual" nature is mentioned in no. 499; reference to *The Fibre* to understand these forms better is made in no. 486; and the Divine origin of the spiritual form as to its essence in no. 500.

122. The *Animal Kingdom* (Parts I and II, published 1744-45) cites these forms as occurring in the human body. The "perpetual" additions of each of the higher forms is given from the angular to the spiritual: "A highest, the *perpetual-celestial*, which is *spiritual*, and has in it nothing but what is everlasting and infinite" (no. 97 f.). Part II, no. 450c adds the ideas of "terminations" and centers, "mere centers."

123. The *Five Senses* (A.K. III, finished in 1744) lists the forms from the angular to the spiritual (no. 268); mentions the "perpetual centers" (no. 299); and states that "we ascend to

superior things, just as do forms—of which in the doctrine of forms—always by the addition of something of infinity or perpetuity” (no. 598).

124. The *Worship and Love of God* (published in 1745) has a good outline of the doctrine of forms, from the angular to the spiritual. In the ascent of forms, in each degree, “something infinite or perpetual has insinuated itself, which does not exist in [the lower form]” (no. 6). “There are two principles, most distinct from each other, the one natural, the other spiritual. . . . The natural principle derives its birth immediately from the sun of the world, but the spiritual from the fountain of life itself or the Supreme Deity. . . . Above this supreme form of nature, or the celestial form, there is a form perpetually celestial or SPIRITUAL, containing in it nothing but what is infinite, flowing from the irradiation of the sun of life itself, as the other forms flow from the irradiation of the sun of the world” (no. 24). In this work, Swedenborg introduces two new terms, supra-celestial, which seems to be the same as spiritual, and “the infra-celestial or the supreme natural” (nos. 71, 93, 107).

125. The *Spiritual Diary* contains a passage remarkably like that quoted above from *The Fibre* (no. 266a). The chapter is about those who “INQUIRED WHAT THE LORD DID BEFORE CREATION.” Swedenborg says: “I was afterward led by the Lord Himself into a certain perception of forms, the idea of which exceeded immensely all the ideas received by geometers, for even the lowest human forms, as those of the intestines, so vastly surpass the forms apprehended by geometrical ideas that they can by no means be perceived by them” . . . [they] “cannot possibly be conceived from geometry and its calculus of infinites, since they infinitely transcend all such calculus. What then could be conceived from geometry of the forms of the still more subtle organs, and what of the vital forms, or those adopted to the reception of life, which immensely transcend the organic forms and the forms of sight” (no. 3482).

126. “Wherefore, lest I be held in those ultimates and most finited things, there was given me by the Lord a notion of forms which transcend the forms of geometers; for geometry is terminated in a circle, and curves which refer themselves to the circle, which are only terrestrial and not even of the lowest atmosphere. From those lowest or terrestrial forms, by the removal of

imperfections such as cause gravity, quiet, cold, etc., there is given a most general perception of forms which do not suffer from such things. And because there are still other forms which suffer less, (from these imperfections) and in the same way others, suffering still less, there are at length given forms in which nothing can be conceived except a center in every point, so that it consists of mere centers" (no. 3484).

127. As mentioned in the first part of this section, models can be made which illustrate the nature of these forms. This is not the place to consider such models, but a very informative, if less perfect, model can be obtained from a modern ring of ball bearings. Consider a point on one ball in this ring, then cause the whole ring to move as it does in a machine. The point will then generate a silhouette of the SPIRAL FORM, or at least an approximation thereto.

128. We must hasten to supplement this view, however. No whirling mass of motion can equal even the lower forms of Swedenborg's series. We have not the facilities of the angels to "present these incomprehensible minima visually and intellectually" (*A.C.* no. 3347^e). But our models do give us something to visualize, even though the higher are very difficult, and a knowledge of the Supreme finite is at best incomplete, as will be seen from Swedenborg's further description of them, discussed in the next two sections of this paper.

XIII. DESCRIPTION OF THE SPIRITUAL FORM :

129. Although some idea of the higher forms can be obtained from the doctrine of forms, a complete description is impossible. "Wherefore, if they [i.e., their qualities] are expressed, they appear as paradoxes, to wit: That this form or substance is simple, and relatively to all natural forms and substances, a unit void of figure, extension, magnitude, gravity, and levity, and therefore not material" (*Fibre* no. 266a). This is said especially of the celestial form.

130. Swedenborg says much the same thing of the determinations of the First Aura, the soul, the simple cortex, and the simple fiber. Since the first aura is labeled the celestial form (*Fibre* nos. 266, 266b), its interior parts would be the spiritual form (*Fibre* no. 274). It is therefore possible that Swedenborg had the spiritual form in mind when he penned the passage quoted just above.

131. The spiritual form is described at length in the *Fibre* no. 267. Summarized, the number states: The spiritual form, i.e., the *Perpetuo-celestial*, is most far removed from the ultimate or earthly form. Philosophers and theologians speak of spiritual forms which inhabit the heavens—angels—and the souls of men. But these are properly called more perfect celestial forms. Therefore the Divine Form of these eminent men, I call the spiritual form. Here Form and Substance coincide. Angels and our souls are celestial forms created for the reception of influx from the spiritual form. The spiritual form is above all nature, incomprehensible, form in the abstract. It is incompatible with the material, the extended, the fluid, and all that is terminated in nature. An abstract or angelic speech must be used to express the powers and essences of this form. It is because of this form that all lower forms exist, and have life, understanding and wisdom.

132. In the *Spiritual Diary* no. 3484, part of which was quoted above, Swedenborg continues with a description of the higher “forms within nature” which are “spiritual forms,” a description very much like the descriptions in *The Fibre*. He continues: “At length I saw myself carried forward to forms which are almost without termini, and so without time and space. But all these forms are still finite. . . . They are within nature and devoid of life. . . . Even though they be devoid of life, still the forms within or above them are vivified by the Lord. But yet they are organic because they have nothing of life in themselves. Such are the forms within nature. Since no one can have any conception of forms which are within nature, by any kind of removals, I now perceive that when I was writing about forms in folio, I at length confessed that within the most subtle forms of nature, there are given spiritual forms never perceptible” (*S.D.* no. 3484).

133. These two descriptions were written six or seven years apart. One from *The Fibre* is a part of Swedenborg’s “own works” on philosophy; the other is a part of the Divine Revelation which he delivered. Yet they are so much alike that they obviously describe the same experiences: I. They both start with the angular or terrestrial forms. II. They progress upward by removing finite parts or imperfections. III. They cannot be described by geometry or the calculus of infinites. IV. The higher forms are almost all centers. V. They cannot be completely com-

prehended. VI. The higher forms are within the lower. VII. The higher forms are spiritual.

134. Although little can be learned of these higher forms from geometry even when exalted, as with Swedenborg, much can be understood from the terminants of this form which will be described in the next section.

XIV. THE DETERMINANTS OF THE SPIRITUAL FORM :

135. By the determinants of the SPIRITUAL FORM, Swedenborg means the organic structures that are built out of that form. This is a use or meaning quite different from the modern terms "determinate" and "indeterminate." It is necessary to know this to understand a number of Swedenborg's statements (*Rat. Psych.* nos. 171-72, *Senses* no. 275). The determinants of the SPIRITUAL FORM are the spirituous fluid or soul, the pure intellect or simple cortex, and the simple fiber.

136. The nature and characteristics of these organics is taught in various places in Swedenborg's early works. Cross references, however, assure us that they are part of his philosophic system. A good example is found in the *Fibre* no. 269: "Life and intelligence by means of influx from the spiritual form . . . [is] treated at length in *Transaction* II, nos. 241-72," i.e., in the second volume of the *Economy of the Animal Kingdom*.

137. The *Economy* asks the question, Is the spirituous fluid—demonstrated by anatomy and philosophy—the same as the soul of the theologians? The conclusion is that they are the same. A number of references (15 or more) teach this, e.g., *E.A.K.* II, nos. 246, 276, 303. In the works following the *Economy*, Swedenborg seems to have discontinued the term spirituous fluid and uses the term soul. Thus, there are three universal essences, the soul, the animal spirit, and the red blood (*Brain*, nos. 83, 89).

138. The spirituous fluid is the soul of the body (II *E.A.K.* no. 245). It forms the body in the beginning (*ibid.* no. 226) and controls and determines the body after it is formed (*ibid.* no. 229, *Rat. Psych.* no. 13). But it is also the soul of the mind (*W.L.G.* no. 64, p. 136, *Rat. P.* nos. 137-38, II *E. A. K.* no. 269). It is above the mind (*mens*) which in turn is above the animus (II *E.A.K.* nos. 270, 277, *Rat. P.* no. 127). It is the cause of consciousness (II *E.A.K.* nos. 274, 276). It alone has intelligence

and wisdom (*ibid.* no. 269, *Rat. P.* no. 137). These do not exist in the soul *in se*, but are derived from the Infinite (II *E.A.K.* nos. 245, 260, *Rat. P.* no. 127).

139. The soul or spirituous fluid is made of the substance of the first aura (II *E.A.K.* nos. 166–67, 228, 290). Swedenborg often uses the term “determined” meaning that it “is formed into” (*Rat. Psych.* nos. 175–76; *Senses*, no. 475). The first aura is the CELESTIAL FORM, but within it is the SPIRITUAL FORM. From consciousness, i.e., love, intelligence, and wisdom, which flows from the Infinite, we can form some further ideas of the SPIRITUAL FORM.

140. The Pure Intellect is above the rational mind (*Rat. Psy.* no. 123) and below the soul (*ibid.* no. 127). Its function is to recognize truth, to give rationality (*ibid.* no. 129), and to organize the conscious mind (*ibid.* no. 126). It is the activity of the simple cortex (*ibid.* no. 125).

141. The simple cortex lies inmostly concealed in the cortical glands (*Rat. Psy.* nos. 1, 124). It is built from the substance of the soul (*ibid.* no. 128); it is a CELESTIAL FORM (*ibid.* nos. 125–27), and hence within is the SPIRITUAL FORM as described in *The Fibre* no. 266 (*Rat. Psy.* no. 125).

142. The simple fiber arises from the units of the simple cortex (*Rat. Psy.* no. 126). All living parts of the body are alive because they contain this fiber (*ibid.* no. 264, *Fibre* nos. 275, 314). The simple fiber is celestial and spiritual (*Fibre*, no. 316). It is built from the first aura (*ibid.* no. 279), and therefore is from substances which within are of a spiritual nature and a partaker of life (*Fibre* nos. 280, 283). Living tissues are different from dead—the differences give us a further idea of the nature of the spiritual form.

(*To be Continued*)