SWEDENBORG AND HIS SCIENTIFIC REVIEWERS*

Under this heading we present to our readers a translation of all known contemporaneous reviews and notices of Swedenborg's publications other than the theological. With a single exception, duly noted in the text, none of these has ever before been translated; and, in the case of many of them, their very existence has hitherto been unknown to the student of Swedenborg's writings. For the sake of completeness, we have added the titles and brief descriptions of those writings which were not publicly noted or reviewed. All the works are numbered chronologically in the order in which they appeared in print.

Grateful acknowledgment is made of our indebtedness to Professor Camille Vinet, who has translated the French reviews; to the Rev. Ernst Pfeiffer of The Hague, to Alfred Sprissler of Philadelphia, and to Mr. Rudolph Roschman and Dr. Bowman of Kitchener, Ontario, for assistance in the translation of the German reviews; to Professor Hugo L. Odhner for assistance in connection with the Swedish translations; to Mr. A. Wynne Acton, B.A., of Bryn Athyn, for the translation of the Latin review of *Regelkonst;* and to Professor R.W. Brown for assistance in connection with the reviews of *Finding the Longitude.*

I

On Kolmodin's Marriage, May, 1700. 4 pp., sm. 8vo. Swedish verses written in honor of the marriage of Pastor Joh. Kolmodin to the author's cousin Beata Hesselia.

II

Congratulatory Swedish Verse to Candidate Chr. G. Notman, printed in the latter's Academic Thesis, Upsala, November, 1700, 1 p., 6mo.

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* Reprinted from *The New Philosophy* vol. XXXI (Jan.–Oct., §§ 1–4, 1929), 19–68. The "Notes" that are included in this treatise are those of the editor of the journal at the time, Rev. Alfred Acton I. These are indented in the text.

III

Congratulatory Latin Verse to Benedict Bredberg, printed in the latter's Academic Thesis, Upsala, November, 1700, 1 p., 16mo.

IV

Patriae Planctus et Lacrimae in funere . . . Doct. Erici Benzelii, Regni Sueciae Archiepiscopi . . . die S. Erici Ann. 1709. Skara. 4 pp.,sm. 4to. Funeral verses written on the occasion of the burial of Archbishop Benzelius (the father of Swedenborg's brother-in-law) on May 18, 1709.

Note. This was published anonymously, but in a copy preserved in the library of Upsala University, the name "Emanuel Swedberg" is written at the end.

V

Selectae Sententiae. Upsala, 1709. 62 pp., sm. 8vo. The author's Academic. Disputation.

Note. The full title of this little work is: "Sentences Selected from L. Annaeus Seneca and Publius Syrus; the mimeographer, and perhaps also from others; together with annotations by Erasmus and a Greek translation by Joseph Scaliger; illustrated with notes by Emanuel Swedberg."

VI

The Rule of Youth. 3 pp., sm. 8vo. Latin verses written for the Introduction to two sermons by Bishop Swedberg on "The Rule of Youth and Mirror of Old Age" (Eccles. xii). This work, which included both the Latin verses and a Swedish translation by the Bishop, was published in Skara, July, 1709.

VII

Festivus Applausus in Insignem Victariam quam . . . Comes Dn. Magnus Stenbok . . . Anno, 1710, pridie calend. Martii ad Helsingburgum reportavit (On Stenbock's Victory over the Danes). Skara [March], 1710. 4 pp., fol.

VIII

Congratulatory Latin Verse to Andreas Unge, printed in the latter's Theological Dissertation, Upsala, April, 1710. 1 p., 16mo.

IX

Ad Sophiam Elisabet Brenneriam. 2 pp., sm., 4to. Latin verses published in 1713, in a volume of compositions in laudation of the Swedish poetess. The verses were written in October,1710

X

Festivus Applausus in Caroli XII in Pomeraniam suam Adventum, 1714, 22 November. Gryphswald [1714]. 28 pp., sm. 4to. A laudation of Charles XII on the occasion of his entry into Pomerania.

XI

Ludus Helonicus sive Carmina Miscellanea (Miscellaneous poems), Gryphswald [1714 or early in 1715] . 20 pp., sm. 4to.

A second and enlarged edition was printed by the author at Skara, 1716. 32 pp., sm. 4to.

Note. None of the above works received any public notice. In fact, there were at the time no Swedish journals whose province it would have been to have noted literary publications; and outside Sweden, Swedenborg's name was as yet unknown.

XII

Camena Borea

Liber I. *Camena Borea cum Heroum et Heroidum factis ludens, sive Fabellae Ovidianis similes sub variis nominibus scriptae,* ab E.S.Sueco.

Note. This work was dedicated to Count Gustaf Cronhjelm. In a letter from Rostock, dated September 8, 1714, Swedenborg describes it as being "fables in the Ovidian style, under cover of which we have related all the happenings of Europe within the last 14 or 15 years; in this way one could freely sport with serious things, and play with the

heroes and men of our native land" (*Op. Quaed.* I, 227). In a later letter dated Griefswald, April 4, 1715, he writes: "Otherwise I relieve these mathematical studies with poetry. I have laid up one or two things, and now I have in press some fables like those of Ovid under which lie concealed the deeds and other affairs of certain kings and magnates" (*Op. Quaed.* I, 229).

Acta Literaria Sueciae[1]

The Northern Muse sporting with the deeds of Heroes and Heroines; or Fables, under various names, written in the style of Ovid. By Emanuel Swedenborg, a Swede. Gryphiswald. Dan Ben. Starck. 1715. 7 pp., 8vo. By Emanuel Swedenborg who is now an Assessor in the Royal College of Mines (*Act. Lit. Suec.*, Oct.–Dec., 1724, pp. 588–90)

XIII

Daedalus Hyperboreus

Daedalus Hyperboreus eller Några Nya Mathematiska och Physicaliska och Anmerckningar (Daedalus Hyperboreus or some new Mathematical and Physical Essays and Remarks). Parts I–VI, Stockholm, 1716–1717.

Note. This periodical which appeared irregularly was the first scientific journal to be published in Sweden. It was founded and for the most part written by Swedenborg. The first number was dedicated to Charles XII; but this was done at the instance of Eric Benzelius, as Swedberg himself thought he "would obtain little recompense" thereby (*Op. Quaed*. I, 234).

Ordinaire Stockholmiska Post Tidendes[2]

It is hereby made known that it is intended to issue by the press at Upsala every other month, two or three sheets[3] of a book called *Daedalus Hyperboreus*, or Some New Mathematical Essays and Treatises, by Assessor Polhem and others in Sweden; and for a beginning in this new year 1716, some ear-trumpets and speaking tubes, and some experiments on sound and the like, made by the Herr Assessor, together with two new hoisting machines, described and invented by Emanuel Swedberg: Copies

are for sale by the booksellers in Stockholm for the benefit of the author, and may be bought far less if one subscribes for the whole work (*Ord. Stock. Post Tid.,* Jan. 10, 1716). For the month of April there has been published the second part of *Daedalus Hyperboreus* containing a description of Assessor Polhem's machine at Blanckstöten together with the copperplate pertaining thereto; also a handy method of reckoning compound interest, including also the changing of Carotins after the rise [in exchange], into any other currency that one may need. There are also other curious experiments and essays written out by Emanuel Swedberg. And it is for sale by the bookseller M. Lang and Rüger in Stockholm, and in Upsala (ibid., April 24, 1716).

Note. In a letter to Eric Benzelius, written at Brunsbo in the beginning of April, 1716, Swedenborg writes: "I am making arrangements now also with Werner in Stockholm to insert in the paper a notice of *Daedalus Hyperboreus* as follows:" Then comes a passage almost word for word the same as that printed in the April 24 issue of the *Post-Tidender.*

Daniel Tiselius[4]

That water is compressible is confirmed by Herr Assessor Swedenborg in his *Daedalus Hyperboreus* [no. II], pages 30, 31, and his article on *Experiments to be instituted from our Swedish cold,* where he says that ice cracks and sinks deeper down, as can clearly be seen at the shores of lakes where the ice lies more and more slanting and higher than the ice out on the lake itself; from which circumstance one can gather useful facts which will inform us as to the compression of sweet water and also as to its quantity and depth (*Ytterl. Försök,* p. 50; see also a similar reference to *Daed. Hyper.,* on p. 89).

Ordinaire Stockholmiskii Post Tidentes

It is hereby announced that the third Part of the so-called *Daedalus Hyperboreus* containing (1) Assessor Polhamar's division of the steelyard; (2) Emanuel Swedberg's essay on an air pump, together with a calculation and measurement of the amount and height of the water in air pumps of

this kind, and the copperplate pertaining thereto; is now issued from the press, and will be found for sale with the booksellers on Nygatan[5] (*Ord. Stock. Post Tid.*, Sept. 4, 1716).

Stockholmiska Kundgiorelser[6]

It is hereby announced that the fifth Part[7] of the so-called *Daedalus Hyperboreus* came out a little time ago, containing Herr Councillor of Commerce Polheimer's Notes on the Resistance of Media and the properties of falling weights. Also, by N. N., a sketch of a machine to use sail and wings and to attempt flight.[8] Some experiments with bullets and their resistances in snow and water, and a new discovery for finding the longitude of places, by Emanuel Swedberg. The work for the whole year [i.e., n. I–IV] is sold for 32 styvers by the bookseller in Nygatan, and in Upsala (*Stock. Kundg.* 2 April, 1717, pp. 1–2).

Christopher Polhelm

As to the places of the longitude; with regard to the finding of these, I must confess that I do not indeed comprehend the matter quite so clearly as it deserves; yet it seems to be very plausible. In this connection, I myself have thought as to what method would show itself to be the best, and I find three possible ways of finding the longitude of places by means of the moon, though they all have their objections; such as, 1. From eclipses—which is not feasible at all times. 2. By the difference of latitude between the moon and the equator in any given meridian; but since this is at times slight, and sometimes as good as nothing, it has its difficulties. 3. By the parallaxes, which make a still smaller difference. Thus, a method which claims a perfection in this matter has something to say; though these matters may well be further developed, if not for the sake of profit, at least for that of curiosity (Letter to Swedenborg, September 5, 1716; in *Op. Quaed.* I, 258–59)

Acta Literaria Sueciae

Among the new books are: . . . Emanuel Swedenborg, *Daedalus Hyperboreus* or New Mathematical and Physical Experiments, in six Parts. The fifth Part came out in Latin and Swedish together, but the other Parts

are in Swedish only. Upsala, 1716, 1717, 1718,[9] 4to. (*Acta Lit. Suec.*, 1720, Jan.–Mar., p. 26).

XIV

Cantus Sapphicus in charissimi parentis . . . diem natalem d.XXIX Augusti, Ann. 1716. Skara, 4. pp. sm 4to. Latin verses composed in honor of Bishop Swedberg's sixty-third birthday.

XV

Tinware

Underrättelse, om thet Fortenta Stiernesunds arbete (Instruction as to the tinware of Stiernesund), Stockholm, 1717, 4 pp. sm. 4to.

Note. This work was published anonymously, but on Swedenborg's own copy which is preserved in the Royal Academy of Sciences, Stockholm, the words "of Swedenborg" are written on the title page.

Stockholmiska Kundgiorelser

Since it is already known to all, what general usefulness is served by the iron implements[10] which are manufactured at Stiernsund and drawn through the cunning machine there in use, therefore, it is likewise for the service of the gentle reader that one has drawn up a short Instruction as to the tinware of Stiernsund, the care of it, and the tinning. This follows herewith on half a sheet[11] (*Stock. Kundg.*, April 9, 1717, pp. 2–3).

XVI

Algebra

Regel-konsten författad i tijo Böcker (The art of reckoning comprised in ten books} of Eman. Swedberg, Upsala [1718], 136 pp., sm. 8vo.

Note. In a letter to Eric Benzelius, dated Brunsbo, January; 1718, Swedenborg refers to the writing of this work as follows: "As I had some leisure hours here in Brunsbo, I have composed a Regel-konst or Algebra in Swedish, and although I had not a single book or other help at hand, I have tried to present it with all possible simplicity and conciseness. It will probably not exceed 6 sheets in print. I was in-

duced to write it chiefly because so many in Lund and Stockholm are beginning to use algebra. I was also asked to do it by sundry persons" (*Op. Quaed*. I, p. 276).

Acta Literaria Sueciae

Among the new books are: Emanuel Swedenborg, *Algebra,* written in Swedish, Upsala, 1718, 8vo (*Act. Lit. Sues.*, 1720 Jan.–Mar., p. 26).

Repel-konsten författad i tijo Bökker, etc., Algebra, comprised in ten books, by Emanuel Swedberg, Assessor of the Royal College of Mines, Upsala, 1718, in Swedish, 8vo, pp. 135.

This work, weighty in matter rather than in bulk, was at once received with great acclaim by those who were interested in the subject. Indeed, for us, the noble author was born under a lucky star for the advancement of learning, especially in mathematics, he being the first of all our countrymen who has taken on himself not only to lay down the fundamentals of an analytic science in a remarkable way, extremely easy and clear to all students even the more uncultivated, but also to demonstrate, by examples selected from many sources, the signal use of this most excellent art, especially in mechanics. Finally, he has done all this in the common vernacular, contributing words, even such as are of a technical nature, in a way which constitutes a most happy omen for our country.

The work consists of seven books (the last three books, on factoring and differential and integral calculus, are as yet unpublished), and each book of three parts. In the first part the author gives requisite definitions together with most useful theorems drawn both from the whole of mathematics and geometry but more especially from those studies which are called mixed, and from his own practical experience; in a word, the principles of all that follows. In the second part, he treats most ably of algebraic formulas, and this in entire agreement with the views of modern authors—to whose industry as is well known to all, our analysis owes its present great eminence. And then the third part applies this art of arts in the most happy way to the solution of illustrating problems of every kind, and shows how the application is to be made. But let us now briefly survey the several heads of his treatment.

Book I. Part 1. The author brings forward and explains all the mathematical terms, translated into Swedish, which are used in the work; each

of which comes later, to stand, as it were, for so many first and most general definitions.

Part 2 explains the elements of the doctrine of the unknown quantity; its signs and types, or its characters and figures, together with the fundamentals of analytic calculation, both with numbers and letters, and also the principles of the algebraic equation.

Part 3 shows by a number of examples, how rightly to reduce and solve the more simple arithmetical problems analytically, that is, by equations both numerical and universal.

Book II. Part 1 sets forth the more important theorems of mechanics, as applied, for example, to the balance, the lever, the steelyard, the screw, the pulley; the axis in a spinning wheel, the winch, the windlass, the cog-wheel, the continuous screw, the inclined plane, etc.; also some theorems drawn from hydrostatics and other branches; and those which are most necessary for the understanding of the doctrine of proportions, both the universal doctrine and the doctrine used in the triangle and circle.

Part 2. The author treats further of specious calculation[12] or of the four kinds of universal symbolic arithmetic in rational quantities both simple or single-lettered and compound or many-lettered; he also fully shows, by many examples, how to solve all simple equations by adding, subtracting, multiplying, and dividing on both sides.

Part 3 points out the method of solving and constructing problems, especially geometric, by the aid of what has already been told; and this in the following examples and many others of the same kind. Thus: In a triangle, given (1) the two angles with one side, to find the second side; (2) the angles and the sum of the two sides, to find either of the sides separately; (3) the sum of all three sides and their relations to each ether, to find each one separately. (4) Given 9 ells of cloth having a width of 2 1/4 ells, to find the length of its corresponding lining whose width is 3/4 of an ell. (5) Given (for the purpose of making a garment) 9 ells of cloth, and 28 ells of lining, which together weigh 30 pounds; while the weight of the garment when made is 24 pounds, to find how many ells of each material are lacking. (6) Given 600 Carotins, some single and some double, and their value as equalling 600 silver Thalers, to find the number of each kind of coin separately, etc., etc.

Books III. Part 1 contains the more important rules as to the proportions in respect to the times in the distances and celerities of falling, rising, or otherwise projected bodies (e.g., bullets), and of pendulums and their oscillations. Moreover, searching further into the nature of proportions, it treats of reciprocal proportionality, geometric and arithmetic progressions, logarithms, the analogy of the higher power: as, for instance, of the duplicate ratio, the ratio, namely, in which are the sides and the surfaces, the diameters and the circles, the times and the distances in falling and pendulous bodies, the times and the celerities in flowing water, and the axis and the ordinates in the parabola; of the triplicate ratio or the ratio of cubes as seen in stereometry; and then of that ratio which consists of squares and cubes as follows: *aa* : *bb* : : *ccc* : *ddd*, as the times of the planets are to their distances from the sun; also of the harmonic ratio which obtains both in the divisions of musical instruments and in the hyperbola.

Part 2, on fractions, the algorism of which is accurately given both in numbers and in universal symbols according to the four kinds mentioned above, demonstrates the method of solving fractional equations.

Part 3 consists of problems of various kinds; for example, to find: (1) the middle proportional, (2) the two middle terms, (3) the middle harmonic, (4) the third harmonic, (5) the first harmonic, given the middle term and the differences. (6) Given the sum of the weights on a scale or balance with the distances of each from the fulcrum, to find each weight separately. (7) Given the sum and difference of the weights with the length of the bar, to find each weight and arm separately.[13] Problems (8) and (9) are of the same kind as the above. In connection with these problems, the author describes a new balance whereby a thing can be weighed equally well in air as in water, and in this way one can determine (e.g.) how much copper is contained in a given mass of gold; not to mention other examples which fully demonstrate the use of this balance. (10) Given a quantity with the relation of its parts to each other, to find the separate parts. (11) In coins of two different kinds (but for the sake of example let both be silver), given the weights and the differences of the metals, to find their respective value. (12) If, in order to coin money 11/16 pure, it is necessary to mix two masses of silver differing in purity as 7/16 and 15/16, to find out how much must be taken from each mass. And there are many other problems of the same kind.

Book IV. Part 1 treats of the chief geometric theorems concerning plane figures and their proportions in lines, angles, and areas; also of the. method of resolving any equation whatever; e.g., $(aabb + aabc)/cdd = x$ into the analogous equation $cdd : aa :: bb + bc : x$, or $dd : b :: aab + aac : cx$, or $cd : aa :: bb + bc : dx$, or $c : a :: abb + abc : ddx$, or into any other; namely, by taking as the first term either the divisor of the whole, or the single parts, or both of these; these equations, like all the others, being illustrated with common numbers.

Part 2 explains the analytic signs by which the determined powers or several degrees of digits are usually denoted; likewise, the roots, whether rational or surd.

Part 3 solves the following stereometric problems, and shows, by many examples, as is the case throughout this work, how (1) to make measures equal in length and breadth. From this it is seen that a tun with a capacity of 64 cans,[14] will contain 20.15 inches in breadth or diameter, and the same in height; a half tun of 32 cans, 15.98 inches; a quarter tun of 16 cans, 12.69 inches; a can of 100 cubic inches, 5.03 inches. The author points out the twofold use of using jars, flagons, measures, etc., of this kind; for in them the overmeasures would always be well proportioned, and the wines or other liquors, having the greatest space with the least periphery, would be better preserved. (2) To make smaller measures exactly corresponding to a given tun[15] holding an overmeasure or **ἐπίμετρον** of 3 5/9 cans. (3) To compute the gain obtained from the overmeasures, when grain received in either small or capacious measures is dealt out in other measures whether larger or more confined. (4) To find out, by measuring and weighing grain, before and after, how much has been lost from drying up, or how much has been gained from moisture. (5) In a mixture of different kinds of grain, given the weight of the whole and the specific weights of each kind, to find the quantity of each.

Then follow some observations on the variation in the weight of bodies in air and in water. These observations are about as follows: (a) All bodies weigh less in water than in air. (b) According to the weight of the water in respect to the immersed body, such is the decrease in the weight of the body. (c) The weight of a body 10 cubic inches in size, is 110 cubic ounces less in water than in air; therefore (d), if ten cubic inches of water or

of ice are added to the other side of the scale, the body would weigh just as much as otherwise it weighs in the air. (e) A loaded ship is in equilibrium with the seawater displaced by the ship. (f) The difference between the weights, e.g., of a metal weighed in air and in water, shows the relative weights of the water and of the metal, namely: for gold 1 to 19, for lead 1 to 13.4, for mercury 1 to 14, for silver 1 to 10.5, for copper 1 to 8.75, for forged iron 1 to 7.5 for cast iron 1 to 7.1 and for flint 1 to 2.4. (g) A tun of 64 cans equals the greatest measure of weight (1 *skeppund*). (h) One cubic inch weighs 1 ounce; 1,000 cubic inches or a cubic foot [*sic*], 1,000 ounces. (i) There are as many cans or cubic feet as there are thousands of ounces.[16] (j) 65,700 ounces are 657 cans or 65 cubic feet and 7 cans.

(6) In a mass of gold mixed with copper, to find the proportion of each metal. (7) In a mixture of two different kinds of water or any other liquid, to find, by measuring and also by weighing, how much there is of each. And there are many other problems of the same kind, which are well worth knowing.

Book V. Part 1. Touching briefly but vigorously on the properties of the parabola and hyperbola, the author shows that the former is described by the motion of any body through the air, such as a bullet or bomb, etc.; likewise by a string or rope suspended at each extremity and forming a curve (and that this, indeed, is the true method of forming a parabola); also by water flowing from its outlet in the same way that the parabolic cube is seen in a linen sail when duly fastened or tied at all four corners and filled by the wind. He shows that by far the greatest use of this figure is seen in furnaces, bridges, water-dams, ships, the lenses of the microscope, and other things of the same kind; yea, it is seen in every analogue such as, $a : b : : b : c$, or $a : b : : aa : bb$, where the first term is a constant. Finally, he shows how to find the base-line.

The latter (the hyperbola) is seen in all bodies, such as twigs, boards, etc., when curved or bent by an external force (and from this likewise comes the method of describing this figure); while the hyperbolic cube can be seen from above in the concave surface of running sand passing through an opening. The use of this figure is seen in loud-sounding trumpets, curved horns and other wind instruments; in water-channels having an equal depth of flowing water; in burning glasses; in a word, in every

analogue, such as $a : b : : b : c$, where b is constant; also in harmonic proportion.

Furthermore he shows how to make equations equivalent to zero or to unity; also how to bring two equations into one; and by a variety of illustrating examples taken from the bosom of mechanics, he shows the use of this.

Part 2 presents the rules for multiplying and dividing powers and roots of all degrees, even when they are indeterminants and surds, by the help of the indices or exponents; showing that in addition and subtraction, as also in the equation itself, there is no special peculiarity in these quantities.

Part 3 contains static and hydrostatic problems, and by the most apt examples, it fully explains their use even in the common balance. (1) Given the center of equilibrium, and taking a certain weight, to ascertain its proper place on the steelyard. (2) Given the arms and the suspended weight, to ascertain the weight of the steelyard itself. (3) If, of two balls, shot from the same place at the same time, one descends perpendicularly and the other pursues a different path, to find how much space each covers in the same time. (4) Knowing the declivity of a channel, to find, by a piece of wood floating on the water, the depth of the latter and also its speed. (5) Given, in a dam, the height of the water on the outside, the quantity in cubic feet flowing in, and also the time, to find the size of the hole or opening. (6) Knowing the fall of the water and the circumgyrations of the wheel, to find the diameter of the latter. (7) To divide a line in a middle or extreme proportion. (8 and 9) Given certain dimensions in a cylinder, to find the others. (10) In a water or hydraulic pump, given the length, capacity, and opening, to find the height of the water.

Book VI. Part 1 treats more fully concerning the parabola, carefully showing its properties; also concerning the author's new method of readily ascertaining and demonstrating the proportion of two geometric quantities. (See his *Daedalus Hyperboreus,* Part V, where you will find these matters more fully argued.) The substance of this method amounts to the following—according to the author's own words in the above mentioned *Daedalus* (which appeared in Latin, and at the same time in Swedish, in the year 1717), p. 127: *Given two lines, areas, or spaces between which a proportion-*

ate ratio is desired, it is first necessary to find the equations of each. These you must join together with the proportional sign (: :)*; working afterwards solely by division and multiplication in the usual manner employed in equations, until you have reduced this parity or ratio of the equation into its least terms,* etc. All these points are here illustrated by the following examples: (a) Let the diameter of a sphere equal *d*, and the circumference *c*; its volume will be *cdd*/6, and the circumscribed cube will equal *ddd*; hence the ratio of these is *cdd* / 6 : : *ddd*, i.e., *c* : : 6*d* or as 11 to 21. (b) A sphere is to its inscribed cube as *cdd* / 6 : : *ddd* / 2√2, i.e., *c*√2 : : 3*d*; (c) to its surface as *cdd* / 6 : : *dc*, i.e., *d* : : 6; (d) to its area as *cdd* / 6 : : *cd* / 4, i.e., 4*d* : : 6; (e) to a cylinder of the same altitude and base, as *cdd* / 6 : : *cdd* / 4, i.e., 2 : : 3; (f) to a cone equal in height and breadth, as *cdd* / 6 : : *cdd* / 12, i.e., 2 : : 1.

Part 2 explains the extraction of roots, namely, how this is done in all powers, both in surds and rational quantities, and also in compound equations and their sequences.

Part 3 has the following problems: (1) To divide a line into a middle extreme proportion. (2) To divide a straight line into three proportional parts. (3) With certain data, to find the sides of an obtuse triangle. (4) Given in a triangle the area and the sum of the perpendicular and the base, to find the sides.

Book VII. Part 1 presents the most excellent theorems explaining artillery, the art of shooting or gunnery, including a great deal that is undoubtedly most worthy of note in respect to the paths of bullets and bombs in the air, and their directions; and also in respect to the science of the military machines themselves, to the powers of gunpowder and to other like subjects.

Part 2 clearly presents the raising of all kinds of roots to any power required.

Part 3 gives the solutions of fourteen problems in artillery, problems of no ordinary sort and which because of their use are of the utmost importance. The solutions are founded on the propositions laid down in Part I and are guarded on every side by the powerful aid of examples.

As a crown to the work, the author shows that common numbers also can be applied to algebra; that is, that all the arts of analysis have their place in these numbers equally well as in universal symbols (*Act. Lit. Suec.*, Jan.–Mar., 1721, pp. 126–34).

Neue Zeittungen Von Gelehrten Sachen[17]

The first Trimestre of the *Acta Literaria Sueciae* contains the following: . . .

(2) *Regel-konsten författad i tijo Bökker,* etc., i.e., Algebra in ten books; by Emanuel Swedberg, Assessor of the Royal College of Mines. Upsala, 1718, 8vo, pp. 135.

This work has been very well received by book lovers; indeed, it contains more good things than one would expect in so small a number of sheets. The author seems to have been born for the promotion of mathematics, he being the first man in Sweden to propound the elements of algebra; and not only has he done this in a distinctive method which is extremely easy and is suitable for all beginners, but, by examples sought out from all possible subjects, he has also shown the great use of this excellent art, especially in mechanics; and all this in good intelligible Swedish, including very happy translations even of the technical terms.

The work consists of seven books—the last three books, on factoring and differential and integral calculus are not yet printed. Each book consists of three Parts. In the first Part are contained principles, namely, definitions and theorems which the author has taken from the whole of mathematics, geometry and more especially from the mixed branches of learning and his own experience; in the second, the rules of algebra are handled in an excellent way, according to the method of modern scholars; and in the third, this science is applied to the solution of well-known problems of divers sorts.

The editors review all the Books and give the contents of each Part. Among other things, mention is made of a new kind of balance invented by the author, whereby all things can be weighed in water as well as in air, and whereby, for example, one can find how much copper is contained in a mass of gold. There is also a new method, thought out by the author, whereby one can easily find and demonstrate the proportion of two geometrical quantities. In his *Daedalus,* which came out in Latin and Swedish in the year 1717, the author describes this method in the following words: Datis duabus lineis, areis vel spatiis, inter quae ratio analogica desideratur, necessum est utriusque aequationes primum concilientur, quas cum signo analogiro (: :) compones, operando dein per solas divisiones

et multiplicationes, non aliter quam solitum est circa aequationes; et hoc eousque dum reduxeris par illud aequatiotrum, sive rationum, in terminos[18] minimos (*Neue Zeit.* May 14, 1722, pp. 378–80)

Johan Mört[19]

What else are the writings of the well-born Herr Assessor Swedenborg published in our mother tongue than proofs of the diligence and care which he bestows on the means whereby our young men may have the pursuit of the science of mathematics earnestly at heart? (*Avled. til Geom.* Preface).

Luarence Julius Killin

Let us go merely to the authors who opened the way for students of the art of Algebra, and in the works of these authors, namely, in Isaac Newton's *Resol. Quaest. Arith.* pp. 65, 66, in the so-called *Regel-koest* by the noble Assessor Emanuel Swedenborg, pp. 61 seq., and in Richard Sault's *Treatise of Algebra,* pp. 20 *seq:,* etc., we will find that, by a method as admirable as it is pleasant, problems are solved and unknotted which are no less intricate than they are of the greatest value in civil life. (Academical Dissertation *De Usu Algebrae,* Pt: II, Upsala, 1743, p. 6.)

XVII
Finding the Longitude

Emanuel Swedbergs *Försök att finna Oestra och Westra Lengden* igen igenom Månen som til Lärdas ompröfwande framstelles (Emanuel Swedberg's attempt to find the East and West Longitude by means of the moon. Put forward for the examination of the learned). Upsala, 1718; sm. 8vo., pp. 4 + 38.

Note. This work is a rewriting and very considerable amplification of an article which appeared in the fourth issue of *Daedalus Hyperboreus* under the title (in Swedish), *A New and Sure Method of Finding the East and .West Longitude, put forward by Emanuel Swedberg.* The article fills thirteen pages,whereas the printed book consists of thirty-eight pages. On the other hand, the article is accompanied by two figures;while, though ten figures are referred to in the book, no

copy with figures has yet been found. The book opens with a preface, signed "E. S.," addressed to Edmund Halley, Savillian Professor of Astronomy in Oxford and subsequently Astronomer Royal of England. In a letter to Eric Benzelius, dated Starbo, February, 1718, Swedenborg refers to the manuscript of this work, when he writes: "I have a more extended explanation of the method of finding the longitude of places, in which I have gained more and more facility." He adds that he thinks of translating the work into English and of sending it to Halley, whereby he hopes "to win someone's approval" (*Op. Quaedam* I, 284).

For Swedenborg's third writing on the Longitude, see n. XXV; and for his fourth, see n. XLIV.

Acta Literaria Sueciae

Emanuelis Swedenborgii[20] Reg. Colleg. Metall. Assess. *Forsoek* at finna *Oestra* och *Westra Laendten* igen, igenom Månan.

That is,

Attempts to find the *Longitude* of places by means of the *Moon.* In Swedish 8vo. Upsala, 1718, pp. 38.

In this work, the noble author submits to the judgment of the learned, his entirely new solution of the much talked of problem which for so long a time and in so remarkable a way has baffled the greatest mathematicians of every age; and it seems evident that this solution, with the great brevity of its process and the clearness of its demonstrations, is, on its own merits, to be preferred to all others that have hitherto appeared.

I. After explaining the *terms of the art,* terms which the author himself has translated into the vernacular with no little propriety; and after

II. Premising for the benefit of the more unlearned, a *definition of Geographical Longitude,* and explaining its true nature and character;

III. The author demonstrates the great *use of the problem,* or rather its imperative necessity both on land and at sea.

IV. He recounts the *principal modes hitherto known,* of investigating the differences of meridians. These are: (1) By the aid of eclipses of the sun and moon. (2) By the obscuration of the satellites of Jupiter. (3) By chrono-

metric instruments, automatic clocks, etc. (4) By the right ascension and declination of the sun compared with the line of the meridian. (5) By examining the course of a ship, during a frequently repeated casting of the lead. (6) By the moon—but by very different methods and in divers ways, such as the observation (a) of the moon in the meridian; (b) of the moon when it is at the 90th degree; (c) of the distance of the moon from a given star in the neighborhood of the ecliptic; (d) of the relative altitudes and longitudes, etc., of the moon with respect to fixed stars; (e) of some star when it is eclipsed by the moon; also (f) by the movement of the longitude of the planets. The author concisely shows that each of these methods is beset with difficulties, thorns, ambiguities, and errors.

V. He argues the *possibility* of a solution from the fact that it is evident that some persons have approached the goal more nearly than others; nay, the matter would be attended with no difficulties provided (a) the moons of Jupiter were larger and were more plainly visible to us; or (b) our earth had a number of moons; or (c) we had more frequent eclipses while the moon was passing through the ecliptic; or (d) there were alternations of day and night in a moon revolving about its own axis; or (e) the magnetic needle were free from declination; or (f) there were clocks, clepsydras[21] and other time-measurers, arranged also for greater intervals of time, each being without error; or, finally (g) as regards the moon (which our author, in common with Kircher, Riccioli and others, judges to be the best means in this business) provided one could entirely remove the inconveniences of the parallaxes and of the place where the moon is best observed. It was when the author was occupied in this business that he discovered that method of finding the apparent and true position of the moon which he here sets forth.

VI. He recites the following *advantages of this method,* to wit, that by it (1) one can find the apparent position of the moon by the naked eye; (2) then its true position, merely by observing the altitude; (3) one can find the parallax with very little trouble by the solution of a right angled triangle; (4) can also learn it approximately, as to both its quantity and nature by simple sight;[22] (5) can observe the entrance of the lunar edge or centre into a given degree, etc., of the zodiac—just as in the case of an eclipse; (6) when the moon is shining, one can make the observation ten and even twenty times a night; (7) one has no moon's latitude—a thing which is not

without its own difficulties; (8) whenever this shall be necessary, one can obtain his calculation from the tables with the least amount of trouble; and finally (9) he will need no other instrument than that in common use among sailors.

VII. The author tells *what parallaxes properly are,* and also what labor and trouble are required to find them in the ordinary way.

VIII. He sets forth *his own method,* of which the following will give some idea. Select two fixed stars in precisely the same longitude (as to any difference in latitude, this does not matter, if only both stars are visible), and observe merely with the naked eye, the approach of the moon to a straight line passing through these stars (☽ = ✶✶ or ✶☽✶ or ✶✶☽), judging this by some guide such as a cord, a twisted hair, or a thread properly stretched. At the same time, consult a watch, set, either then or later, for the latitude and meridian, of the place, and make note of the apparent situation of the moon at the given time when it coincides with the position of the stars (that is, of the stars that lie in one and the same circle of longitude).

IX. Further, to obtain *the true position of the moon together with the parallax,* take the moon's altitude, by means of a quadrant or other nautical instrument, and then, from the table of parallaxes corresponding to this altitude, obtain the parallax of the altitude. After this (in a way to be shown presently), the inferior angle of the parallactic triangle must be measured; that is, the angle which is formed by the circle of longitude (or, the above mentioned straight line: ✶ ☽ ✶) with the quadrant of the moon's altitude (or the perpendicular line) passing through the centre of the moon. The other parts of the triangle referred to will then readily be found merely by the sines; and in these, the parallax of longitude; which, when added to, or subtracted from, the previously observed position of the moon, will give the true position of the moon.

X. After explaining *the working of this method,* the author shows that in this way the true parallax of longitude will be correctly ascertained.

XI. He shows that the nature of the parallax is also obvious to the naked eye, to wit: When the moon and the two stars are observed to be in a straight line, perpendicular to the horizon, all three bodies being at the nonagesimal; the circle of the altitude will then cut the ecliptic at a right angle, so that there will be not the least difference between the true

position of the moon and its observed position. If, however, the straight line which joins the three bodies has more or less of obliquity, the magnitude and nature of the parallax can be judged from this obliquity. Thus, if the inclination be toward the right, the difference or parallax, which is found by trigonometry, must be added; if to the left, it must be subtracted.

XII. The author explains more fully the *new and characteristic features* of this method, and also what, as he trusts, he has accomplished by it, namely, the finding of the parallax of longitude by means of that lower angle, which he calls the subparallactic,[23] as well as the other advantages mentioned in § 6. Moreover, he here states that if by any chance one should commit an error in the second or third observation, provided it be not a very gross error, he will be turned from his goal only slightly if at all; for a variation in the altitude even up to two whole degrees makes only a slight variation in the parallax; and the subparallactic angle does not sensibly change its figure in half an hour.

XIII and the eight following paragraphs. He advances a number of points to meet the main *objections* that might be formulated against this method. In the first place, he says that we must not despair of obtaining in the future, Tables of the utmost accuracy, though it is clear that those hitherto in use have not been at fault.

XIV. Many *pairs of stars suitable for this business* are to be found at first inspection; as, for instance, a star in the head of Cassiopeia and Lucida Cathedrae 29 degrees 35 minutes Aries; a star in Andromeda and Gyrus Umbilicus of Cassiopeia 37° 52″; two stars in the Triangle, 38° 58 1/2″; two in Pisces, 112° 29″; a star in Ursa Major and one in Argonavis, 119°; a star in Ursa Major and one in Cancer, 122° 57″; two stars in the Gemini, 109° 6″; two stars in Orion and also a star in Hydra 119° 44″.

XV. *Nothing is to be feared from refraction*, unless the moon is too near the horizon; moreover, there is a ready remedy for this disadvantage.

XVI. *The angle formed by the moon's orbit* and the circle of the common longitude of the three heavenly bodies can be held to be a right angle, as is usually the case in every astronomical calculation; but whoever wishes to do so, can investigate the discrepancy by trigonometry.

XVII. *The centre of the moon* can best be observed in opposition; but about the time of conjunction, especially in a clear sky, the whole hemisphere of the moon can often be seen by means of its secondary light

reflected from the earth. Otherwise, the edge of the disk must be seen in line with the two stars; for then (given the semidiameter of the moon and its hourly motion), the immersion of its centre can easily be obtained; or, note can also be made of the place in the disk through which the diameter passes. Nay, and finally, its centre can be judged from the alinement of the horns of the crescent-shaped moon with the two stars, and the judgment will not be far wrong. Practical experience will teach us other methods.

XVIII. The setting of the watch with the clepsydras to the meridian of the place, is a thing well known to navigators, and requires almost no trouble. Otherwise, the altitude of some fixed star must be taken (from this, will also be seen the difference of meridians). As to how longitudes may be found merely by altitude, without inquiry into the time, this the author will show in another place.

XIX. *Nor is there any need laboriously to calculate from the Tables*, the exact time for the true entrance of the moon into a given point of the ecliptic (which can be obtained by rightly comparing with the Tables, the time of the observation, that is, the time when the conjunction was seen); for in this method, we have nothing to do with the latitude of the moon, or with the angle of the sun and moon, or with any fixed meridian. All that is needed is to correct the time of the periodic movement, and this is obtained by a triple anomaly.Therefore, there would be no lack of ephemerides to aid the work, and no over laborious calculation.

XX. As regards the measuring of the subparallactic angle, of which measuring (as being the shortest and clearest way of all to the parallax) the author spoke in § IX, this is most conveniently worked out by the goniometer[24] used and described by Riccioli and Hevelius, or by some other goniometer (easy of invention) so made that when the sight is directed to the moon, through the hole of the instrument, the latter being freely suspended in a perpendicular position, and the index is pointed to the two fixed stars, the angle between the ecliptic and the circle of longitude will be obtained at once. The author, however, in order to show the superiority of this method of obtaining the angle, also points out five other methods.

XXI. Finally, that nothing may be lacking to facilitate this business, the author shows that one can equally well choose *any two stars* of high magnitude and brilliancy, stars namely, with different longitudes, and can make the above-described observation with these; that from this, given the

complements of the latitudes of these stars together with the angle of the difference of the longitudes, one can find the distance of the two stars from each other, and also the two remaining angles (none of these however, ever vary in respect to the same stars, so that, for any given pair of stars of this kind, the calculations may be ready to hand); then, for the moon's apparent position, he can measure the distance of the moon when in conjunction with the two stars, from either of these stars, by the astronomic radius, or sextant, in use among sailors; furthermore, by trigonometry he can measure the angle of the difference between the moon's longitude and that of the stars; and lastly, having observed the altitude and the angle as stated above, can find the subparalactic angle together with the parallax of longitude; which, being added to or subtracted from the observed position of the moon, according to the arrangement of the sky, will show the true position.

XXII. Instituting a *comparison between this latter method and the other*, and this in all the several steps, so that the advantages of each readily come to view, the author makes the following statements: (1) The apparent position of the moon is obtained solely by measuring the distance of the moon from the star; (2) and then the true position, by a solution, merely by sines, of the parallactic triangle, that is to say, given the subparallactic angle and the parallax of altitude, as frequently stated above. (3) This can also be accomplished by the subparallactic angle. (4) As soon as certain places in the sky have been found where the moon can be observed, namely,wherever it can be found in a straight line with two stars, it is then possible to determine in the moon the immersion of its centre, and the conjunction itself, also the steps of the moon in its passage through, and likewise the time of the incidence, together with the whole progression. But the more the stars differ from each other in longitude, or the greater the obliquity they have in respect to the ecliptic, the longer will be the interval between the first incidence and the total immersion of the lunar body; and the reverse; this interval being the shortest of all when the stars are of the same longitude. (5) During full moon and also when the moon's disk is seen by reflected light, one can take any well-known, nearby, and brilliant pair of stars; but if the centre of the moon is not apparent, note must be made of the first moment of the entrance or departure of the moon's edge. (6) If by any chance the parallax be obtained from inaccurate

observation of the altitude, or the subparallactic angle from inaccurate observation of its magnitude, the resulting variation will not be so great but that, in the first case, an error of two or three degrees, and in the second; of ten or twelve minutes or even of half an hour, would be almost negligible.

XXIII. Finally, in order that all may judge rightly concerning this way of searching out the angle of which such frequent mention has been made, the author here tells of other ways, and these not a few, to wit: by the observation of the altitude of a single star; or of the moon alone; or of all three bodies, the complements of the altitudes etc., being then called into aid.

XXIV. A brief recapitulation **ἀνακεφαλαιωσις** of what has been said follows; and then, at the end,

XXV. The reason for the hope cherished by the author with respect to this philosophers' stone, or rather, rock, which, to astronomers, has hitherto been truly Sisyphean; and this the more, because with this method, especially the second method, ten, or even twenty observations can conveniently be made in a single night (*Act. Lit. Suec.,* Apr.–June, 1720, pp. 27–33).

> Note. It was in anticipation of the above review that Swedenborg wrote to Eric Benzelius on March 3, 1724: "It is well that it pleases my brother to have the *Longitude reviewed*, but I desire that it be done with some care in order that it may find favor abroad, especially since it may be of such great use to the public. I am somewhat assured that, among the methods which have been discovered, this is the easiest." Then, referring to a Latin version of the work which was being made by Professor Vallerius, he continues: "In the version, and in the review, in order to preserve the continuing of the subject, chapters 21, 22, 23 come immediately after the 12th chapter, namely, in the following order: 12, 21, 22, 23, 13, 14, 15, 16, 17, 18, 19, 20, 24" (*Op. Quaed.* I, 301) .

Neue Zeitungen Von Gelehrten Sachen

The second Trimestre of the *Acta Literaria Sueceae* for last year contains the following:

(1) Emanuelis Swedenborgii, Reg. Colleg. Metall. Assess. *Foersoek att finna Oestra och Westra Laengden igen, igenom Månen:* that is, Emanuel Swedenborg's attempt to find the East and West Longitude of Places by means of the Moon. Upsal., 1718, 8vo, pp. 38.

In this work, the author presents to the learned, his new solution of the famous problem, over which the greatest mathematicians of all times have spent so much labor, a solution which is rightly to be preferred to all that have hitherto been known. The author has presented a process which is very brief, and a demonstration which is clear. He mentions different methods of finding longitudes; and shows wherein each is at fault. The author's own discovery, whose many advantages and conveniences he describes, consists in the following: One must choose two stars having the same longitude, and, with the naked eye, must watch for the moment when the moon approaches them in such way as to make a straight line with the two; this can be measured very easily by a stretched cord or string or other instrument. Then one must consult a watch which has been set to the latitude and meridian of the place. From this the apparent position of the moon when it has come into accord with the position of the two stars, may be found very easily. In order to discover the true position of the moon with the parallax, one must find the moon's altitude by means of a quadrant or other nautical instrument, and, from the table of parallaxes, must set down the parallax of altitude belonging thereto. One must then measure the inferior angle of the parallactic triangle, namely, the angle formed by the circle of longitude which passes through the two stars and the moon, and the quadrant of the altitude which passes through the centre of the moon; and from this, must find the parallax of longitude. This, if added to the apparent position of the moon or subtracted from it, will give the moon's true position.

The author also answers the objections which might be advanced against him in this matter, and points out a number of profitable suggestions as to how one might perform the operation in the most convenient way. In order to facilitate it, here minds us that one might also choose two other bright stars even if they have not the same longitude; and he points out the way in which one should proceed in such case. He hopes that this discovery will be of great use, since, with it, one can very conveniently

make from ten to twenty such observations in a single night (*Neue Zeit.* June 2, 1721, pp. 345–47).

XVIII

Motion and Position of the Earth

Om Jordens och Planeternas Gång och Stånd (On the motion and position of the earth and planets). Skara [January, 1719]; small 8vo., 46p. The Dedication is signed "E. S."

Note. This work was dedicated to the Prince Consort. It was published without the figures to which it refers. The author's autograph copy of these figures has, however, been found; see *The New philosophy*, 1927, pp. 170–174.

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Among the new books are: . . . Emanuel Swedenborg,Concerning the Motion and Position of the Earth and Planets. In Swedish, Skara, 1719, published in 8vo by the Widow Kjellberg (*Act. Lit. Suec.*, Jan.–Mar., 1720, p. 26).

XIX

The Height of Water

Om Wattnens Högd och Förra Werldens starcka Ebb och Flod Bewisutur Swerige framsteld af Eman. Swedberg (Proofs from Sweden concerning the height of water and the strong ebb and flow in the primeval world, put forward by Em. Swedberg). Upsala, 1719; sm. 8vo [116p.].

Note. This work was dedicated to Queen Ulrica Eleonora.There were two editions. The first, published in Upsala, March, 1719, contained ten "proofs" of the primeval height of water; by "Eman. Swedberg." The second, published in Stockholm, November of the same year, was entirely rewritten, and contained 17 proofs, by"Em.Swedenborg,"—Swedberg had been ennobled the previous May. Of this second edition, which is the edition reviewed in what follows, Swedenborg, in a letter to Eric Benzelius, writes on November 3, 1719: "I have improved the work published in Upsala, on the

primeval world's high water; and have added a number of clear proofs, together with an undeniable demonstration as to how stones have moved in a deep ocean; and also, clear demonstrations of the change in the northern horizon; and that it is a reasonable conclusion that in former days Sweden was an island (*Op. Quaed.* I, 292).

Jacob À Melle

Following Joh. Woodward, Joh. Jacob Scheuchzer, Joh. William Baier, David Sigism, Bultner, and others, Emanuel Swedenborg, Assessor of the Royal College of Mines in the Swedish nation, in a book written in the vernacular and published in octavo, Stockholm, 1719, under the title *Om Wattnens Hoegd, och foerra Werldens starka Ebb och Flod; Bewis utur Swerige* (Arguments taken from Sweden, to show that the height of the waters and of the sea in the primitive globe was due to a strong flood) has recently shown in clear fashion and with weighty arguments drawn from the internal and external appearance of the land of Sweden, and from the various things that have been found therein, how widespread over our globe as the extension of this destructive flood, that is to say, the Deluge, in former times, and the nature of the signs and indications of its pristine fury which it has everywhere left behind it (*De Lapidibus figuratis,* Lubec, 1720, p. 4 note c).

Note. The above constitutes the first mention of Swedenborg's name in the learned world outside Sweden.

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Om Wattnens Hoegd och foerra Werldens starka Ebb och Flod, Bewósutur Swerige.

That is:

Arguments taken from Sweden to show that the height of the waters and of the sea in the primitive globe was due to a strong flood. By Emanuel Swedenborg, Assessor in the Royal College of Mines; Stockholm, Joh. H. Werner, 1719; 8vo, 40p.

The purpose of the author, illustrious by his learning and travels and by his experience and writings on natural subjects and on mathematics

and mechanics, is to add to the Divine Word and to the truth, some strength or some testimonies drawn from the phenomena of nature as observed in his fatherland, and which are the clearest monuments, as it were, of a general flood. These testimonies, seventeen in number, are set forth in the order in which they are here reviewed:

I. *The large, fertile and charming hill on West Gothland, called* KmneKulle.[25] This hill, two Swedish miles[26] from Skara toward the quarter midway between the north and the west, lies on the shore of Lake Wehner, between the two mountains Hunebergand Billingen. It is of such a height as to afford a view of vessels sailing in the lake below at a distance of many Swedish miles. The hill itself consists of many distinct strata of stone of divers species; the lowest, consisting of common greystone (granite), the middle of various kinds of limestone and talc, and the upper of brown, cerulean and black colored slate. The illustrious author would show from this, both the height of the waters in our northern land and the violence with which of old they were moved.For he thinks it likely that, through the orifices or openings which lay between these mountains, the ocean, beating lengthwise against the latter, poured from both sides into the central calm an abundance of water together with many heterogeneous bodies, such as sand, ballast, stones, various kinds of clayey earths, and such like things; and these burdens, being finally deposited here in the very confluence or centre of the waves, as in a tranquil haven, seem to him to have furnished to this remarkable hill both its matter and its origin; and this the more especially, because from the foot or base which is circular and has a diameter of one Swedish mile, the several strata are horizontal and lie perfectly parallel with each other all the way to the top which has a figure not unlike a moderately truncated cone. [This description suggests that the hill in question is a drumlin, a landform associated with glaciated landscapes. Editor]

II. *Other hills of the same kind.* Some of these are round and sloping and some long. Some, moreover, are high on the one side while on the other they sink into a kind of valley and then again mount up; in these one can also observe the ridges of the mountains running parallel to each other on either side.

III. *The lay of the mountain ridges in a southerly and northerly direction;* that is to say, their close agreement, frequently observed, with the merid-

ian of the heavens. The author opines that there is a twofold cause for this, the one being the tides of that ocean which of old covered the larger part of Europe, these following the motion of the moon from east to west; and the other, the direction of the waves of the sea as determined by the winds, which latter are observed to be carried on the ocean to one and the same quarter for half the year. To the author, it seems credible that formerly the winds on the ocean—which is supposed to have then been larger and more open—likewise followed for the most part the course of the sun from east to west.

IV. *The shape, form and constitution of the mountain ridges*. For the most part they have a broad base below, a crest above, and a declivity at the sides; this declivity, moreover, is greater in mountains consisting of stones, and less where the material consists of sand or other lighter and less solid substances, in which case also the ridges themselves extend to a length of from ten to twelve Swedish miles. [Swedenborg is here noting that the "angle of repose" of deposited material varies inversely as the particle size, that is, the coarser it is the steeper the slope. Editor.] Add to this, that in these ridges, especially those composed of limestones, are found petrified fishes, also insects, and other marine creatures. Indeed, in the Norwegian mountains are found innumerable fragments of stones and of the mountains themselves, broken off by force, and lying one over the other like walls guarding the land. In explanation of these various phenomena, the author states that when these ridges were being formed, the surface of the waters stood on one and the same plane with the crests of the ridges, and this to a depth of some hundreds of ells. [An alternate explanation can be found by means of a glacial hypothesis. However, in the history of geology a glacial hypothesis to explain the occurrence of heterogeneous deposits, both in high and low places, did not emerge until the nineteenth century. Editor.]

V. *The roundness of the stones in the above mentioned ridges.* All the stones, both large and small, and whatsoever the depth at which they are found, seem to have been smoothed and polished by water. Add, to this that in heaps of stones of this kind one is found to be white, another red, a third the ordinary stone, a fourth a stone of another variety and color.

VI. *Stones scattered about throughout the whole globe.* In plains and valleys immense stones are found lying in "various positions sometimes

singly, sometimes piled one upon the other; there are also entire fields paved with stones like streets; nay, some of these stones are in the summits of mountains, some are buried in the earth, in the depth of the sea, in marshes, at the bottoms of lakes. In other places, where there are no nearby mountains, lie stones and rocks which are nothing but pieces and fragments of mountains; and at a distance of many miles you will invariably find mountains which have been mutilated of these their members, as it were. The author here taken occasion to explain how these mountains might have been broken by the ebb and flow of the waters, that is to say, by the tides of the primeval ocean; and how after this, by the aid of the waves, the pieces might have been divided and dissolved into stones, pebbles, and even into fragments and also sand, as shown by the smoothness of all these stones. He also shows in many ways, that in the deeper seas especially, and most of all in the primeval ocean, the power of the waves would be sufficient to tear away rocks and other heavy matters and to carry them off whithersoever fate directs. [Again, all these things find explanation by the glacial hypothesis.]

VII. *The water lines in Huneberg and Billingen*, the above mentioned mountains in West Gothland, which testify in the plainest way to the height of the waves in former times. These mountains are two Swedish miles in length, half a mile in breadth, and over two ells in height. At 20 or 30 ells, counting from the top, is seen a kind of dividing line encircling the whole mountain; this line is very even and is parallel with the horizon. The author considers this belt as indicating in the plainest possible way the point reached by the surface of the sea, which of old covered all these regions.

VIII. *The strata of earth and stones*—which are so manifold and well distinguished. It is observed that the lowest stratum usually consists of nothing but rock, the second of stones, the next of sand, and the highest of clay and black soil. Moreover, whole plains have been observed covered with clay and mud which extend everywhere to an even depth. Many domestic examples and testifications of such strata are here brought forward; especially of strata of common granite lying over limestone.

IX. *The round cavities*, vulgarly called jettegrytor or "pots of the giants" *bored out in the mountains themselves.* These are found to have a diameter of from 2 to 3 feet and a depth of as many ells. The author has observed a

steep rock projecting above hollows of this kind, and he judges that the water, running down from this rock and, making a vortex or gyre, with the assistance of stones that have fallen in by chance, has formed these hollows as though with a turning lathe. The author has seen such hollows containing round and polished stones near Mount Gullmar, the town of Strömstad, and the river Trollhettar; moreover, many have been seen in Lapland by the celebrated Doctor, Professor Rudbeck.

X. *Mussels, cockles, testacea and other shell-bearing creatures.*These can be seen in the mountains of Bohus and in other places, e.g. near Uddewalle, Strömstad, Sundsborg, sometimes 50 fathoms above the level of the sea. Moreover, they constitute whole plains, 200 paces long and 5 or 6 deep, so that the natives make lime by burning them. The noble author judges that all these have been gathered together and scattered about solely by the waves of the sea. Mention is also made of petrified sea creatures, of which Dr. Magnus Bromell, Professor of Anatomy in Stockholm has made a large and elegant collection gathered from the bosom of his fatherland, which he intends to bring to public light. From these the author concludes that in ancient times, as for instance in the time of the great and universal flood, the stones and schist were nothing but slime, clay and mud.

XI. *Pieces and wrecks of ships*, such as keels, masts, sterns, and the like. These have been found far from the sea, and are frequently come across in mountains; from which the author thinks it can be sufficiently evident that these high places were formerly covered by the sea and were navigable.

XII. Likewise, *whales, fishes, and other creatures o f a like kind.* In particular, however, mention is here made of that great skeleton of a whale which was found some years ago in West Gothland, twelve Swedish miles from the ocean and two from the city of Skara, and which is now preserved by Professor and Doctor of Medicine, Laurence Roberg, in the Upsala Hospital.

XIII. *Pools and lakes containing fishes*; as, for instance, in those high mountains Runeberg and Billingen. These, the author believes, most certainly owe their origin to inundations of the oceans.

XIV. *The lowering of rivers, and their empty strands;* or deep rivers which have become dry beds. That is to say, beds, in which within the memory of our fathers, the waters flowed in full flood, have been found in some

places to have so dried up that one can cross them dry-shod; and even whole tracts, which formerly, when the rivers ran deep, were like lakes, are now wholly empty and dried up. The author has also observed rivers flowing from closed or dammed up lakes, which daily impelled their waters more and more precipitantly,[27] and also made for themselves new channels.

XV. *The Black Soil* from which the late Professor 0l. Rudbeck, the elder, wished to fix the age of the earth. For the author deems that this soil was formed in process of time above the sand, clay, mud, and other refuse of the sea, from trees and plants. It is frequently found quite deep, even in places which sixty years ago were submerged by the waves of the sea. Moreover, in mountains and sandy places none at all is found.

XVI. *The uneven shape of the earth*, namely, its mountains, ridges, and valleys. These, especially in Lapland and Norway, seem to the author to present no other appearance than the bottom of an abyss such as we imagine exists in the depth of the restless ocean.

XVII. *The annual fall of the Baltic Sea*, by reason of which, in our own memory, many fields and meadows have begun to emerge from the waves. Cities in West Bothnia have been obliged to change their location and draw nearer to the sea; where now, is hardly place for a boat, in former times were ports and navigation.

The author also discourses on the change of the horizon in the northern regions. If we are to believe, as is reported, that toward the south, on the other hand, the seas rise, it follows that the earth is gradually losing its shape and is becoming more spherical at the equator and flatter at the poles. Thus the earth's horizon from being a kind of oval is coming more and more to the round shape of a globe; and not only this, but the meridian line is also contracting, so that where formerly a degree contained ten Swedish miles there is now a progression of only nine. The author thinks this would be easy to observe, as well as being worth while, especially in the ice of Lake Wenner.

He seeks the cause of this phenomenon in the motion of the earth around the sun, which, according to his hypothesis, as given in a special tract communicated to the learned world not very long ago,[28] is now slower than it was formerly; granting this, then the moon with its vortex

likewise ran through the zodiac more swiftly than now, and indeed so much so that in the space of two or three hours it exercised pressures on the ocean which now take place every [six [29]] hours.

By these proofs the author then wishes to confirm the opinion entertained by the late Dr. Rudbeck, to the effect that our land of Sweden was formerly an island. At the same time, from a more accurate survey of our waters and lands, he demonstrates what places might at that time have stood high above the water. He sets the region of Orebro at 60 ells above sea level, this figure being based on the observed altitudes of the following rivers, namely Trollhettan 30 ells, Ronnom 10, Gullspång 10, and finally, Lake Hielmar 10. The author likewise judges it is worth to observe the difference in respect to the horizon, between Baltic Sea and the ocean at Norway, from which some inference could be made concerning the shape of the earth.

Lastly, the proofs above mentioned are repeated in relation to greater tempestuousness of the sea, which obtained of old in northern regions; at the same time, the author concludes that a flood lay for some time on the highest peaks of the mountains, as the sea rose highest over our northern land[30] (*Act. Lit. Suec.*, Jan.–Mar., 1720, pp. 5–11).

> Note. The above is the first review of Swedenborg's works ever printed. In a letter to Eric Benzelius, dated February 29, 1720, Swedenborg refers to this review which Benzelius had sent him on the 26th. He writes: "The review is a pleasure, even its Latinity is to be praised, but it would have done no harm if a little more had been mentioned about the proof which was advanced as to stones moving in a deep abyss; still this is made up for by the treatise itself. I offer you my grateful thanks for it. On page 10 at the bottom of the page, *Singulis horis* should be *singulis sex horis*. This can be corrected in the copies that are sent abroad " (*Opera Quaedam* I, 299). From the review that now follows, it would appear that the suggested correction was not made.

Zeitungen Von Gelehrten Sachen

UPSALA. During the past year a new journal has appeared in this city, under the title *Acta Literaria Sueciae* for the year 1720, published in Upsala.

First Trimestre. Upsala; Werner, 1720, 4to. Each trimestre consists of four sheets, and the editors promise to give news concerning all the books appearing during the year in Sweden with brief reviews of them, and also concerning works expected in the future; to insert such physical, anatomical, chemical, botanical, mathematical, historical, critical, and other observations as may be offered to them; and to describe the lives of learned men recently deceased. This first trimestre contains the following: . . .

(2) *OM Wattnens Hoegd och foerra Werldens starka Ebb och Flod. Bezeis utur Swerige*. That is, Proofs taken from Sweden, of the height of water and the strong ebb and flow of the primitive world. By Emanuel Swedenborg, Assessor of the Royal College of Mines, Stockholm, U19, 8v0. 40 sheets.[31]

In this work, the author, who is famous by reason of his learning, travels, experience, and writings, both on physics and on mathematics and mechanics, has brought together for the defence of truth and of God's Word, some phenomena, observed in his fatherland, as so many clear indications of a universal flood.

These indications are seventeen in number. The first is taken from a mountain in West Gothland, two miles from Skara, on Lake Wenner between the two mountains Huneberg and Billingen.

This mountain consists of different layers lying one over the other, the lowest being common greystone, the middle limestone of different sorts, and the upper, brown, blue and black slate. The author thinks that the sea must have emerged in the place between those mountains, and at the same time have washed with it, stones, sand, earth, clay and such like materials, from which was finally formed this mountain which is entirely round and, on the average, is one Swedish mile in breadth; especially in view of the fact that its layers from the bottom to the top lie perfectly horizontal. From which fact one could judge both as to the former height of the water in these places and also as to its powerful flow.

The second indication is taken from other hills of the same kind.

The third, from the lay of the mountains and mountain ridges in a southerly and northerly direction, which accurately coincides with the meridian of the heavens.

4. From the figure, form and constitution of the mountain ridges which are sometimes extended to a length of from ten to twelve miles, and on which are frequently found petrified fishes and other sea creatures,

many stones, and torn off parts of mountains; all of which came about from the fact that the waters stood then as high as these mountain ridges, namely, some hundreds of ells.

5. Because the stones on the mountain ridges are round, and all of them, large and small, and at whatsoever depth, are polished and smoothed by water; and also are of different colors.

6. Because stones lie scattered about over the whole earth; and, in plains and valleys, very large stones are found in various positions; whole fields can be seen paved with stones like streets; many such stones can be found on mountain ridges, in the earth, at the bottom of the sea and of lakes, and in other places where there are no mountains. These stones are nothing but torn off fragments of a mountain, which sometimes have been deposited many miles distant therefrom. In this connection, the author points out the way in which the water could rend mountains and carry off large stones and other heavy bodies.

7. From the water lines on the West Gothland mountains, Huneberg and Billingen. These mountains are two miles long, half a mile broad, and more than 100 ells high; and 20 or 30 ells below their peak they have all around them a line or streak which is parallel to the horizon and which plainly shows how high the water stood.

8. From the layers of earth and stones everywhere to be found at like heights; where, underneath is solid rock, after this stones, then sand, and over this clay and black soil; of which the author brings forward many examples.

9. From the round holes found in mountains, and which are two or three feet broad and as many ells deep; over these, project sloping rocks, and the water falling from these by its vortex and with the aid of stones that have fallen in, has made these holes.

10. From the mussels, snails and other shell-bearing creatures which are found on mountains, sometimes 50 rods above the level of the sea; or which constitute whole fields 200 feet long and 5 or 6 feet deep; all of which could never have been brought there except by the flow of the sea. The author mentions also objects that have been petrified, of which Herr Dr. Magnus Bromell, Professor of Anatomy in Stockholm, has made a large collection in Sweden, and of which he will publish a description.

From the above, the author concludes that at the time of the flood stones and schist were nothing but mud, slime, and sand.

11. From the parts of ships, such as keels, masts, sterns, etc., which from time to time are found far from the sea and even on mountains; from which it may be gathered that formerly the sea covered these high places also.

12. From the ribs of whales, from fishes and the like; thus Herr Professor Laur. Roberg preserves in the Upsala hospital a large skeleton of a whale which was found some years ago in West Gothland twelve miles from the sea and two miles from the city of Skara.

13. From lakes and their fishes, as, for instance, on the high mountains Huneberg and Billingen. According to the author's opinion, these had their origin in the floods of the sea.

14. From those rivers which receive a stronger flow of water, or which, on the other hand, become dried up.

15. From black soil; from which the old Professor, Ol. Rudbeck the elder, wished to determine the age of the globe. The author's opinion, however, is that this soil came over the sand which had been brought thither by the sea in process of time, and from trees and plants. Usually it is quite deep even in places which only sixty years ago were covered by the sea; but on mountains and in sandy plains, there is none at all.

16. From the uneven shape of the earth. Thus the mountains and valleys in Lapland and Norway seem to the author to present the appearance of an abyss such as might be seen at the bottom of the sea.

17. From the annual retreat of the Baltic Sea, as a result of which, many fields and meadows have come into existence in our time, and the coastal cities in West Bothnia have been obliged to draw nearer to the sea; for where formerly had been a harbor and navigation, now there is hardly place for a boat. If then the sea is drawing farther back toward the south, as is reported, it would follow that the earth is gradually changing its shape, becoming higher at the equator and flatter at the poles, and, from being an oval body, is becoming a spherical ball; likewise, that the meridian line is becoming ever shorter, and, where formerly a degree amounted to ten miles, it now comes to scarcely nine—as could easily be observed on the ice of Lake Wenner. The author seeks the causes of this in the motion of the earth around the sun, which, as he has recently demonstrated in a special

treatise, is now much slower than formerly; from which it follows that the moon also, together with its vortex, formerly ran through the zodiac more rapidly, so that its pressures on the sea occurred in two or three hours while now they are repeated every hour.[32]

Finally, from the above the author wishes also to confirm Rudeck's opinion that Sweden was formerly an island; and, by accurate sea levels, he shows which places stood above the water in former times (*Neue Zeit*., March 31, 1721, pp. 202–6).

Note. The above review constitutes Swedenborg's first introduction to the learned periodicals of Germany.

Daniel Tiselius[33]

The high situation of the waters [of Lake Vetter] as compared with the Baltic and the North Sea, can be seen from the descent of the streams which flow east and west from this place. As regards the western streams, Herr Assessor Swedenborg, who, both in his own country and in foreign lands, is so highly renowned for his learned speculations, in his fine treatise *On the Strong Ebb and Flow in the Primitive World*, page 38, gives attention to the stream fall [in the region] from Gothenborg to Lake Venner and beyond; from which it is seen that the region in Nerike has the highest situation, namely, as high as 60 ells, as compared with the North Sea; while the stream fall as observed at Trolhettan is 30 ells; at Ronnom Elf 10; at Gullspang 10; also10 at Lake Hjälmar, from which the waters fall down to the North Sea (*Uthförlig Beskrif*, p. 13).

Julius Bernard Von Rohr[34]

In 1719, Herr Emanuel Swedenborg, Assessor of the Royal Swedish College of Mines wrote in the Swedish language *Proofs drawn from Sweden, of the height of waters and the strong ebb and flow in the primeval world.* The author of this work, as a clever natural scientist and mathematician, has here, in defence of the truth of the Sacred Writings, brought forward various descriptions of the mountains and subterranean things in Sweden as indications of the Flood; and throughout he gives evidence of a wide knowledge of natural science and mathematics. He here tries to show on the basis of a law of hydrostatics, that the great Flood could have driven

large rocks, such as are found here and there in fields, especially in northern lands; and he also shows that, when it is high, water by its flow could drive great stones, its force being according to its altitude. He appeals to the testimony of experience, as seen in stone dams and in ore-crushing works [35] (*Phys. Bibl*. 9, On Water, pp. 229–30).

XX

Concerning Money and Measures

Förslag til wårt Mynts och Måls Indelning, så at Räkningen kanlättas och alt brëk alskaffas (Proposal for the division of our coinage and measures so that calculation can be made easy and all fractions be eliminated) Stockholm, Royal Print shop, 1719; sm. 4to, pp. 8.

Note: this work is published anonymously. It was reprinted 1795 with Swedenborg's name on the title page.

Acta Literaria Sueciae

The plan of the noble Assessor Emanuel Swedenborg with respect to the Decimal Ordering of Moneys and Measures for the facilitating of numeration, and the elimination of fractions, was printed not long ago by Werner (*Act. Lit. Suec*., Jan.–March, 1720, p. 222).

Neue Zeitungen Von Gelehrten Sachen

STOCKHOLM. Herr Emanuel Swedenborg has published a plan with respect to the Decimal Ordering of Moneys and Measures, for the facilitating of calculation and the avoidance of fractions (*Neue Zeit*., June 2, 1721, p. 352).

XXI

The Rise and Fall of Lake Venner

De Incrementis et Decrementis Wenneri Lacus, una cum ichnographica cataractarurn Goth-Elbae delineatione accurata.

Note. This work seems not to have been printed, but the MS was sent to the Upsala Society of Sciences. In the Minutes of that Society, for July 29, 1720, we read that "Doctor Martin took home" this MS "to

read it over and write out his notes on it." But on October 14, of the same year, the Minutes state that "Dr. Roberg read his review" of this work.

Acta Literaria Sueciae

Sundry Observations transmitted in letters by learned men concerning the two celebrated lakes, Venner and Vetter.[36]

From a manuscript dissertation by the noble Emanuel Swedenborg *Om Vennerns fallande och stigande.*

That is:

Concerning the increase and decrease of Lake Wenner, together with an accurate ground plan delineation[37] of the cataracts of the Gotha-Elv River. That the size of Lake Venner, that immense body of water which is deservedly to be numbered among the best lakes of the world, may be rightly reckoned, the noble author gives its length as 20 Swedish miles, and its breadth as 16; and from this he infers that the whole area of the Lake is 320 square miles. Moreover, since there are twenty-four streams flowing into Venner, while the only outlet is by the Gotha-Elv, he shows that under the Romars bridge the latter has a width of 14 fathoms. He makes the average depth between the banks to be 6 ells; and states that such is the rapidity of the flow that it accomplishes 3 eIls every second. From this he then demonstrates that 100,000 cubic fathoms of water flow out of Lake Venner every year; therefore, in order everywhere to maintain the height of the waters this immense lake, the same quantity of water must flow in again by the above mentioned twenty-four streams. From observations which have recently been made, however, it is evident that this lake gradually increases and rises up to a height of 2 or 3 ells, and this in the course of five or six years. But—and this also has been observed—this elevation of the waters and also their subsidence, sometimes comes suddenly, so that the lake changes its height to the extent of 1 or 1.5 ells in the space of a few months. How this comes about has long been a subject of inquiry.

On the ground of his calculation, the noble author proves that this does not arise from an augmented inflow from the twenty-four aforementioned streams; he also asserts: Even though nothing whatever were added

to the lake by these twenty-four streams, and supposing meanwhile that the out flow were the same as now, and also remained the same for thirteen whole years, yet from this cause the surface of the lake could not sink more than 3 ells. Or, what comes to the same thing, if the inflow were to continue, and granting that outflow is prevented, yet in an entire year it would rise not more than 1/4 of an ell.

The main position which the noble author has taken on himself to demonstrate in this Dissertation is: That these sudden or gradual changes of the waters in this lake cannot be brought about by an augmented inflow of mountain water nor by certain set winds. Neither can it come subterraneously from other sources, since one and the same air is ever incumbent on the surface of the waters and presses equally on the surfaces of the intercommunicating lakes. Therefore, this matter has not yet been rightly explained.

As to other observations which he has made on the nature of water in general, these he will transmit to our Literary Society (*Act. Lit. Suec.*, Oct.–Nov., 1720, pp. 111–12).

Neue Zeitungen Von Gelehrten Sachen

The fourth Trimestre of last Year's *Acta Literaria Sueciae* contains the following: . .

(6) From a manuscript dissertation by the noble EmanuelSwedenborg, *Om Vennerns fallande och stigende*, i.e., Concerning the increase and decrease of Lake Venner, together with an accurate ground plan delineation of the cataracts of the Gotha-Elv River.

The great Lake Venner is 20 Swedish miles long and 16 broad.Thus its surface covers 320 square miles. Twenty-four rivers flow into it, but its water has only one outlet through the river Gotha-Elv. The author has calculated that 100,000 cubic rods of water flow out from it every hour, and therefore an equal quantity must flow in from the twenty-four rivers. It has been observed that this lake gradually increases in height, and this to the extent of 3 or 4 ells in 5 or 6 years; but sometimes it rises or falls 1 or 1.5 ells within a few months. The author shows from his calculation that this rising cannot be ascribed either to an inflow from the twenty-four rivers—which in thirteen years would give not more than 3 ells in height—or to the water running down from the mountains, or to certain winds or

subterranean supplies; thus the problem has not yet been solved. He will make known his ideas concerning the nature of waters in general at another time (*Neue Zeit*., Aug. 7, 1721, pp. 502–3).

Daniel Tiselius[38]

Sweet waters (especially those that have some width) are subject to many variations, since in their pores they are more open and, being lighter and more prone to adhesiveness, are less constant in their level than salt waters; which latter have a heavier flow, form a more level surface, and fall more smoothly according to their level—according to the learned discussion entered into by the well-born Herr Assessor Emanuel Swedenborg, in his Disputation on the Rise and Fall of Lake Venner.[39] Therefore, one looks forward with especial anticipation and great desire, to obtaining information from the well-born Herr Assessor's treatise On the Inner Nature and Property of Water, being under the belief that this work will soon be made public[40] (*Uthförlig Beskrif*, pp. 6–7).

The variation of the water in Lake Vetter is of another sort, and it is said that the depth as well as the width of the Lake contributes much to it; this also was suggested by the well-born Herr Assessor Swedenborg in his dissertation on Lake Venner (ibid., p. 95).

Herr Assessor Swedenborg in his dissertation on Lake Venner seems to give closer attention to the transparency of water when, to a certain degree, it is mingled with salt. Naturally, he is speaking of sea water which is of this nature (ibid., p. 105).

In his dissertation on Lake Venner also, § 9, he has written cleverly concerning the expansion of water by heat and cold, as the reader can see in that work[41] (*Ytterl. Försök*, p. 50).

One also sees how the water particles insinuate themselves into phosphorescent wood which shines in the dark, so that while the wood is wet, it shines in this way, but when it is dried, it ceases to shine (Descartes, *de Meteoris*, chap. I). On the other hand, sweetwater always inclines to adhesiveness so that it can very easily shine and can contain air in its pores, as pointed out by Herr Assessor Swedenborg in his *Lake Venner* § 9; for it contains the property of expanding, as can be seen from soapy water which one can blow into large bubbles (ibid., p. 55).

XXII
Letter to à Melle

Epistola Nobiliss. Emanuelis Swedenborgii *ad Vir. Celeberr*. Jacobum à Melle.

Note. This open letter to Jacob à Melle, the learned editor of the *Nova Literaria Maris Balthici et Septentrionis* dated Stockholm, May 21, 1721, was published in the *Acta LiterariaSueciae* for July–September, 1721, p. 192–196. It was occasioned by a footnote in à Melle's work (Lubec, 1720) *De Lapidibus Figuratis* (On Figured Stones), in which he refers to Swedenborg's treatise on the *Height of Water* as clearly showing by weighty arguments that the earth had once been covered by a flood. See n. XIX under Jacob à Melle.

The letter was translated into English and published in *Acta Germanica or the Literary Memoirs of Germany*,[42] etc., volume I [London], 1742. No volume II was ever published, but in 1743 Volume I was reissued, apparently because the publisher had changed his address, the new address on the title page being the only variation between the two editions. In 1759 the work was again reissued but under the new title, *Literary Memoirs of Germany and the North*.

Swedenborg's letter to à Melle is printed on pages 66–68, under the heading "Some Indications of the Deluge in Sweden. By M. Emanuel Swedenborg. From the *Acta LiterariaSueciae*, Trimestre tertium, An. 17221, p. 192. Translated from the Latin." Being presented as an article, the English translation omits all reference to à Melle, but otherwise it is complete. The same volume of the *Acta Germanica* contained also (on pp. 122–24) Swedenborg's article on Conserving Heat (see n. XXX). The publication of this volume marks the first appearance of Swedenborg's name in English literature.

In 1750, selections from the *Acta Germanica*, translated into French, were published in Paris under the title *Memoires Litteraires sur differens sujets* traduits de I'Anglois per M.Eidons. These selections include Swedenborg's first article (*Quelques Indications du Deluge Universal en Suede*) but not the second.

Neue Zeitungen Von Gelehrten Sachen

The third Trimestre of last year's *Acta Literaria Sueciae* contains the following: . . .

(3) A Letter from the most noble Emanuel Swedenborg to the celebrated Jacob à Melle.

Herr Swedenborg makes known the fact that in Sweden, and also in many other places, stones are found, and likewise petrified objects, marked with all kinds of figures. Collections of these are being made in West Gothland by the Provincial Physician, Herr Joh. Hesselius; in Stockholm, by Herr Dr. Magnus Bromell, Assessor of the College of Mines, who has already reproduced many of them in copper plates; and in Upsala, by Herr Dr. Laur. Roberg, Professor of Medicine. To each of these learned men thanks are due for the most important proofs of the height of the sea in former times.

That the country of Sweden, which is now inhabited, was formerly covered by the sea, can be proved by the following and other evidences: On a high mountain, not far from Uddewalla, is seen a whole tract of land full of muscles and cockles; and the like are also found near Stromstad on a mountain which is 79 ells above the sea; and likewise on several islands, where they exist in such abundance that the inhabitants, by burning them, obtain the finest lime. Moreover, in Sweden, many layers thereof, one on top of the other, are found in the ground, especially in mines, as, for instance, in Schonen not far from Landskrona, etc. That the sea stood high above the earth can be seen more clearly in northern lands than in southern. For in the former are found whole regions covered by exceedingly large stones, being, as it were, sown with stones; and the higher the region in respect to the sea, the more numerous and the larger are the stones.

In a Swedish treatise[43] Herr Swedenborg has endeavored to show that the heaviest rocks could have been carried around by the deep and stormy sea and dragged here and there throughout the world. He enumerates in their order the proofs by which he attempted to demonstrate this, and from these he concludes that the present unevenness of the surface of our globe is due to the sea; and that all the mud, shells, sand and stones found there are the result of the violent motion of the water at its bottom. From this it is that there are so many different sorts and shapes of mountains; so

many strata in them; so many mountains connected together, consisting partly of sand, partly of stone, partly of great rocks, and stretching out to a distance of from eight to ten miles; and the roundness of the small stones, which, by their continual movements and their rubbing against each other have been rounded as though turned on a lathe. This opinion is much confirmed by he fact that the interconnected mountains in Sweden stretch for the most part from north to south, a fact which must be ascribed to the continual winds from east to west, which even now are still common on the ocean.

Whether all this could have come about during the universal flood, still remains a matter of doubt; for different parts of ships are found in many places situated from 40 to 50 ells above the sea; and even on mountains there are found rings, hooks, and like things of the same sort which show that the place had formerly been a harbor. Moreover, it is an ascertained fact that even now the sea toward the north is ever retreating; and it is known that in seventy years it has had a fall of from 4 to 5 ells. Therefore, in many places, ploughing and sawing is now going on where a hundred years ago men were occupied with ships and fishing, as Herr Swedenborg has been informed by old inhabitants, and he has himself visited these places. In West Bothnia, there are several cities which have been separated from the sea in this way, or that now they are from 100 to 1,000 paces distant from it. The like is said of Upsala and other cities. From this it may be been that such things could not have happened during the universal flood, but that some lands, especially the northern, were covered by a deep sea, long after the flood; and when, toward the north, the sea retreated, they gradually came to the light and so could be inhabited.

If this view could be corroborated by experiments, one might well venture to entertain the following thoughts: First, that the horizontal pressure of our earth changes, so that toward the poles the seas are retreating, and toward the equator they are rising higher; second, that the distances of latitude vary; and third, that some lands may formerly have been islands, which, when the sea retreated, were again connected together (*Neue Zeit*., Sept. 14, 1722, pp. 723–26).

XXIII, XXIV, XXV

List of Proposed Publications

Note. In a letter to Eric Benzelius, dated Stockholm, December 1, 1719, Swedenborg submits the following "plans" on which he had set his mind: "I. To translate what I have printed here, into Latin or French, and from time to time to send it to Holland and England; to which, when they are further advanced, I will add some of my discoveries on fire and furnaces and other improvements for mining regions, together with something not yet printed. Would my brother be so kind as to give me the names of those in foreign countries who write Transactions and Memoirs?

"2. As I now intend, in some measure, to understand mechanics as related to mining districts and mines, at least to such an extent as to be able to describe better than anyone else, all that is new and old in connection therewith; and also the theory concerning fire and furnaces, in connection with which I have made a heap of discoveries; therefore I think to use all my leisure time upon whatever can promote mining places and their welfare, and on the foundation which is already laid down, to make myself as skillful therein as possible.

"3. If luck so favors that I get together the means that are needed and meanwhile, by the preparations and communications above referred to, have been able to win some credit abroad, it pleases my fancy to travel abroad and seek my luck in my calling, which latter lies in everything that concerns the promotion both of mining districts and of mines, etc. A man can be reckoned as a fool if, being free and unfettered, and seeing his opportunity[44] in foreign lands, he yet remains here in darkness and cold, where the Erynides, Envies and Pluto have set their abode and have the disposal of all rewards, while labors such as I have undertaken are rewarded with misery."

To carry out these plans, Swedenborg continues, would take four or five years. "Still, it has ever been to my liking that one should know what he is doing and should form for himself a handsome Plan in respect to what it is most practicable for him to carry out in his life" (*Op. Quaedam* I, p. 296).

Swedenborg got the opportunity to go abroad in June, 1721.

Acta Literaria Sueciae

The most noble Swedenborg, during his preparation for his long journey, has sent us his letter to that most learned man Jacob à Melle, which we insert in the present Trimestre, p. 192. He has gone to the United Netherlands, and perhaps further, for the purpose of communicating to men who are learned and are celebrated for their knowledge of mathematics and physics, his brilliant thoughts which throw light on these branches of science. We here present a list of the works which he has prepared for the press and which, we suppose, he will publish this year in Belgium .[45]

1. Natural Principles. Part I. On the different positions of round particles [Part viii].

2. The Theory of Water, briefly setting forth geometrical and experimental demonstrations of water particles, that is, their interior mechanism [Pt. ix].

3. Natural Principles. Part 6, On the interstitial figures of water[particles] in the quadrate pyramidal position [Pt. x].

4. The Theory of Common Salt, containing geometrical and experimental demonstrations of the particles of common salt; that is, the mechanism of its interior texture [Pt. xi].

5. The Theory of the Acid of Salt, containing geometrical and experimental demonstrations of the particles of the Acid of salt, that is, the mechanism of their figure [Pt. xii].

6. The theory of nitre and saltpetre, containing geometrical and experimental demonstrations of the particles of nitre, that is, their mechanism [Pt. xiii].

7. The Theory of volatile urinous salt, and also of oil, containing experimental and geometrical demonstrations of the particles of oil and of volatile urinous salt [Pt. xiv].

8. Appendix, or some general rules on transparency, and on white, red, and yellow colors; extracted from our Theory of Light and Rays [follows Pt. xiv].

9. The Theory of Lead, containing geometrical and experimental demonstrations of the particles of lead, that is, the mechanism of its interior texture. The Preface treats of matter and metallic particles and of their origin. At the end there is a bare recital of experiments regarding silver and mercury [Pt. xxvi].

10. Some new observations, or rough experiments, in respect to Fire, Iron and its ore and scoriae; collected from the great furnaces used for iron smelting; together with the construction of such a furnace.

11. A Treatise on the elementary nature of fire; to which is added a new invention of a stove.

12. Description of a naval receptacle for repairing vessels in ports, commonly called a Dock, immune from all storms; with a new method for the construction of the same.

13. New construction of a dam or mole, by means of which rivers and torrents of water are held back in such wise that the greater, the higher, and the more violent the rush of water, the firmer stands the dam; and which at the same time can be constructed at less cost and maintained for a longer time than the ordinary dam.

14. A method of examining mechanically the powers and qualities of ships of different sorts and construction.

15. A new method of finding the longitudes of places on land and at sea by means of the moon (*Act. Lit. Suec*., July–Sept., 1721, pp. 209–11).

Neue Zeitungen Von Gelehreten Sachen

UPSALA. When Herr Swedenborg began his journey to Holland last year, he had ready for the printer the following MSS which he expected to print in Holland.

1. Pars prima principiorum naturalium de diversis sitibus particulartan rotundarum.

2. Theoria aquae, breviter exponens demonstrationes Geometricas et experimentales particularum aquae, sive mechanismum illarum interiorem.

3. Pars sexta principiorurn naturalium de figuris interstitialibus aquae in situ quadrato, pyramidali.

4. Nova Theoria salis communis, continens demonstrationes Geometricas et experimentales particularum salis communis, sive mechanismurn interioris ejus texturae.

5. Theoria salis acidi, continens demonstrationes Geometricas et experimentales particularum salis acidil sive mechanismum figurae illarum.

6. Theoria nitri et salis petrae, continens demonstrationes Geometricas et experimentales particularum nitri, sive mechanismum illarum.

7. Theoria salis urinosi volatilis, ut et olei, continens demonstrationes experimentales Geometricas particulartun olei et salis urinosi volatilis.

8. Appendix, sive regulae quaedarn generales de transparentia, coloribus albis, rubris, et flavis, ex theoria nostra luminis et radiorurn desumtae.

9. Theoria plumbi, continens demonstrationes Geometricas et experimentales particularum plumbi, sive mechanismum interioris ejus texturae. Praefatio agit de materia et particulis metallicis, earumque ortu. Sub finern nude recensentur experimentade Argento et mercurio.

10. Observata quaedarn nova, sive experimenta rudiora de igne, ferro ejusque minera et scoriis e camino ejus magno collecta, una cum camini ejus constructione.

11. Tractatio de natura ignis elementari, cui subjungitur novainventio camini.

12. Descriptio receptaculi navalis, vulgo Dock appellati, proreficiendis navigiis in portubus, ad quod nullus aestus marinus alluit, cum methodo nova constructionis ejus.

13. Nova constructio aggeris, sive moliminis aquatici, cujus opesistuntur flumina et torrentes aquae cum illo artificio, ut, quo plus et altius et vehementius insurgat aqua, eo firmior stare et simulminore sumtu construi et diutius, quarn usitati, servari possit.

14. Modus mechanice explorandi virtutes et qualitates diversigeneris et constructionis navigorum.

15. Methodus nova, inveniendi Longitudines locorum terrae marique ope Lunae (*Neue Zeit*., May 8, 1722, pp. 418–20).

(*To be continued*)

ENDNOTES

1. The *Acta Literaria Sueciae* was a Latin Journal published every three months as the official organ of the Royal Society of Sciences of Upsala. It continued from 1720 to 1742, and contained the transactions of the Society from 1720–1739. In 1744, it was continued under another name, and under still another name and no longer in Latin, it still constitutes the organ of the Royal Society of Sciences of Upsala. This Society was the first learned society to be established in Sweden, and the *Acta Literaria Sueciae* was the first Latin journal to be published in that country. As a learned journal, it was preceded only by Swedenborg's *Daedalus Hyperboreus*. The latter, however, was written in Swedish with the exception of the fifth number which, at the request of Charles XII, was written in both Swedish and Latin.The Royal Society of Sciences of Upsala has officially recognized that the *Acta Literaria Sueciae* was in effect the continuation of the *Daedalus Hyperboreus*. In the preface to the first issue of the *Acta*, the design of the journal is presented as being to make the learning of Sweden known to foreigners by reviews and notices of Swedish publications; and also, at suitable times, to give obituary eulogiums of learned Swedes; see below, n. XIX, under *Neue Zeitungen*.

2. This is among the first news sheets to be published in Sweden. Each issue was of 4 pages (occasionally more) in 16mo.

3. One "Sheet" or "ark" made 8 pp., 4to.

4. In his *Ytterligare Försök och Siö-profwer uthi Wättern* (Further Researches and Proofs from Lake Vetter). Stockholm, 1730. This work was written as a continuation of the author's *Uthförlig Beskrifning* referred to on another page.

5. Nygatan or " New Street " is the name of a street in the central part of old Stockholm.

6. Or "Stockholm Announcements." A small sheet of 4 pages, 16mo, which was one of the earliest of Sweden's news sheets.

7. This is an error, and should read "fourth Part."

8. At the end of this article, Swedberg signed himself N. N.

9. The Sixth and last number of the *Daedalus Hyperboreus* is dated June, 1717.

10. The work done at Stiernsund was the tinning of iron, e.g., of iron plates, spoons, etc.

11. The instruction as to tinware was printed at Polhem's leading, as a 4to supplement to the 16mo *Stockholmska Kundgiorelser.* It was probably intended as a means to increase the sale of the products of the Stiernsund works which had been established by Polhem in the beginning of 1700.

12. Logistica Speciosa, i.e., calculations with letters in place of numbers; algebra.

13. The text of *Regel-konst* refers to 81 figures; these were not published, nor have they ever been found. It would seem, however, that the reviewer in the *Act. Lit. Suec.*, when he wrote his review, had these figures before him. This is indicated by the fact of his omitting to mention that the book was unaccompanied by figures—and had the figures been lacking, this surely would not have escaped remark, especially since without the figures the text is sometimes obscure; and by the fact that in the present passage, when speaking of the problems in Book III, Part 3, the reviewer refers to "fulcrum" and "bar" whereas in the text these words are represented merely by letters which refer to the figures. Thus, the text of Problem 7 reads: "Knowing the sum and the difference of the weights *E* and *D*, and the length *AC* to find each weight separately:" Perhaps the reviewer had Swedenborg's MS figures before him.

14. The Swedish "kan" was equal to about 3 quarts.

15. The Swedish "tun" held 64 cans or about 48 gallons.

16. The reviewer has made a slip here. Swedenborg's words are: "There are as many cans as there are 100 ounces, and as many cubic feet as there are 1,000 ounces."

17. The *Neue Zeitungen von Gelehrten Sachen*, a German periodical of 8 pages, small 8vo, which appeared twice a week, was established by John Gottlieb Krause in 1715, and continued until 1784, and thereafter under a slightly changed name until 1797. From its different correspondents it received news concerning the plans and publications of the learned from all parts of Europe. It also gave a digest of the contents of all the learned journals published in Germany, and of the principal journals published elsewhere in Europe, besides many short reviews of new books. Its continuance for over eighty years is a sure sign of its popularity. Indeed, it was probably the most widely read of all the learned journals of Germany; and it constitutes at this day a rich source of information concerning the contemporary works of the learned.

18. The translation of this passage may be seen in the preceding review, Book VI, Part I.

19. In *En Klar och Tydelig Genstig* eller Anledning til Geometrien och Trigonometrien (A Clear and Timely Pathway; or Introduction to Geometry and Trigonometry), of Johan Mört. Stockholm, 1727.

20. The name on the title page is *Swedberg*. The book was published in 1718, Swedberg was ennobled in 1719, and the review was written in 1720.

21. *Clepsydra,* an instrument for measuring time by the flow of a liquid through a fine aperture in the container. The name came also to be used for vessels or hourglasses where sand or some mineral was used in place of a liquid.

22. This is a paraphrase of the following sentence by Swedenborg:"(4) By sight one can note approximately how great this [parallax] is, whether greater or lesser, whether to be added to or subtracted from the apparent position."

23. From this, and also from the review of no. XXV (in the explanation of Fig. 13) it appears that this term was invented by Swedenborg ad hoc.

24. An instrument for measuring angles.

25. *Kulle* is Swedish for *hill.*

26. A Swedish mile equals about six and a half English miles.

27. The work under review does not say anything about this "daily" observation, and the reviewer's words must be based either on his own deductions or perhaps on his understanding of oral statements by Swedenborg himself.

28. The reference is to *The Motion and Position of the Earth and Planets*, published in Skara in January, 1719. See n. XVIII.

29. See Note at the end of this review.

30. English translation of this review was published in the *Intellectual Repository* for 1819, pp. 455–61.

31. This is an error. It should be "40 pages."

32. See the Note at the end of the preceding review.

33. In *Uthfölig Beskrifning öfwer den stora Swea och Giötha Sion Wätter* (Accurate description of the Swedish Lake Vetter). Upsala, 1723.

34. In *Physikalische Bibliothek* worinnen die vornehmsten Schriften diezur Naturlehre gehören angezeiget werden (Library of Physics wherein are noticed the principal writings pertaining to natural philosophy). Leipzig, 1754. A copy of this work was in Swedenborg's library.

35. The latter part of this review refers to Swedenborg's *HydrostaticLaw* (n. XXXIII).

36. Only the review of Swedenborg's work is translated here.

37. This "delineation" is not contained in our copy of the *Acta Literaria*. Possibly it was not published.

38. In *Uthförlig Beskrifning öfwer den stora Swea och Giötha Sion Wätter* (Accurate description of the great Swedish Lake, Vetter). Upsala, 1723.

39. From this it would appear that Tiselius had access to Swedenborg's unpublished MS on Lake Vetter; for in the present text, and also later, he refers to statements in that MS which are not noticed in the review published in the *Acta Literaria Sueciae*. But see footnote 41 below.

40. The reference is to the last paragraph of the review in *Acta LiterariaSueciae* (and also of the MS) where this work is promised. The work was never communicated to the Upsala Society, but it is listed as numbers 2 and 3 of some proposed works which, in September, 1721, the *Acta* announced as to be printed by Swedenborg (see n. XXIII, XXIV, XXV). Apparently Tiselius had not as yet seen the *Prodromus* (n. XXIII), published in 1722, parts 8 and 9 of which constituted the promised work on the Nature of Water; or possibly he may have been looking forward to the "work itself" of which this publication was merely the Prodromus or Forerunner.

41. From this it would seem as though the MS on the *Rise and Fall of Lake Venner* (n. XXI) had been published. There is, however, no record of any such publication.

42. "*Acta Germanica or the Literary Memoirs of Germany*, etc., being a choice collection of what is most valuable and really useful not only in the several Literary Acts published in different parts of Germany and the North—such as the Miscellanea Curiosa of the Imperial Society at Vienna, the Breslaw Collection, Acta Eruditorum Lipsi, Commentarii Academiae Scientiarum Imperialis Petropolitanae, *Acta Literaria Sueciae*, Commer. Lit. Norimberg, Miscellanea Berolinensia, Acta Hafniensia, the Acts of the Royal Society at Stockholm—but likewise in the several Academical Theses or Dissertations in the several Faculties at the Universities all over Germany, etc. Done from the Latin and High Dutch by a Society of Gentlemen. Vol. I [London], 1742." The *Neue Zeitungen* for August 6, 1742, p. 563, in noting the publication of this volume, states that "the second volume is already in press and will be published very shortly." This second volume was never published, but in 1743 the first volume was reprinted as noted in our text.

43. Namely, "The Height of Water."

44. Reading "ser sitt win" for "har sit wån."

45. The first nine of the paragraphs that follow are almost verbatim the same as the headings of the chapters or rather "Parts" in the work on *Chemistry*. For the benefit of the student, we have added, in brackets, the number of the corresponding "Part" in this work. Paragraphs 10–15 describe the articles contained in *Iron and Fire*, and *Finding the Longitude*. The Latin text of what follows is printed in the review from *Neue Zeitungen.*