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Commentary

Swedenborg's influence on Sutherland's 'Primary Respiratory Mechanism' model in cranial osteopathy

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ABSTRACT

The 'Primary Respiratory Mechanism' (PRM) model in cranial osteopathy, as defined by William G. Sutherland in the early twentieth century, repeats a number of Emanuel Swedenborg's mid-eighteenth century theories regarding brain physiology. An overwhelming similarity between an 1882 English translation of Swedenborg's writings on brain physiology, and components of Sutherland's PRM model suggest strongly that Sutherland borrowed ideas directly from the 1882 text. Three of the five components of the PRM model are found in Swedenborg's writings: the inherent motility of the brain and spinal cord; the reciprocal role of the dural membranes; and the articular mobility of the cranial bones. The development of the PRM model was, therefore, a reemergence of an abandoned eighteenth century physiological hypothesis in twentieth century manual medicine practice. A call is made to reassess the PRM model and open a critical dialogue regarding cranial osteopathy in order to develop a cranial model more closely adherent to current concepts of physiology.

1. Introduction

As the development of manual medicine flourished in the United States of America in the early twentieth century, especially within the osteopathic and chiropractic professions, several practitioners began applying manual techniques to the cranial structures. Charlotte Weaver, DO,[1] and Nephi Cottam, DC[2] developed early models for cranial diagnosis and treatment. Contemporaneously, William G. Sutherland, DO, developed a model he called the 'Primary Respiratory Mechanism' (PRM). Largely through the efforts of the Cranial Academy,[3] established in 1947, and the Sutherland Cranial Teaching Foundation,[4] founded in 1953, Sutherland's model has been disseminated throughout most osteopathic teaching institutions.

The conclusions of this review suggest that William Sutherland based his model on the proposed physiology as defined in Emanuel Swedenborg's eighteenth century anatomical studies. Although Sutherland never acknowledged openly the use of any source for his ideas, careful examination reveals striking similarities between Swedenborg's and Sutherland's writings. This revelation helps to explain some of the more unique and vague aspects of Sutherland's PRM model. It also urges the reexamination of the PRM model in order to update and revise a cranial model to concur with contemporary understanding of physiology.

The first section of this paper will introduce the important persons relative to establishing the connection between Swedenborg and Sutherland: these include osteopath William G. Sutherland who developed the Primary Respiratory Mechanism model, scientist Emanuel Swedenborg, who described the brain's 'respiratory motion' in a written treatise from around 1744, Rudolf Tafel who, in 1882, translated and published that treatise in a book that promoted Swedenborg's theory, and Ida Rolf, who was personal secretary to Dr Sutherland, and who specifically stated that Sutherland utilized Tafel's translation to formulate his PRM model. The next section will investigate the similarities between Swedenborg's writings and the PRM model as described by Sutherland in regards to three of the five components of the PRM model. The conclusion is that Sutherland most probably based much of his PRM model on Swedenborg's eighteenth century physiological theories Fig. 1.

2. William Garner Sutherland, DO (1873–1954)

W.G. Sutherland graduated from the American School of Osteopathy in Kirksville, Missouri, in 1901. This was the era during

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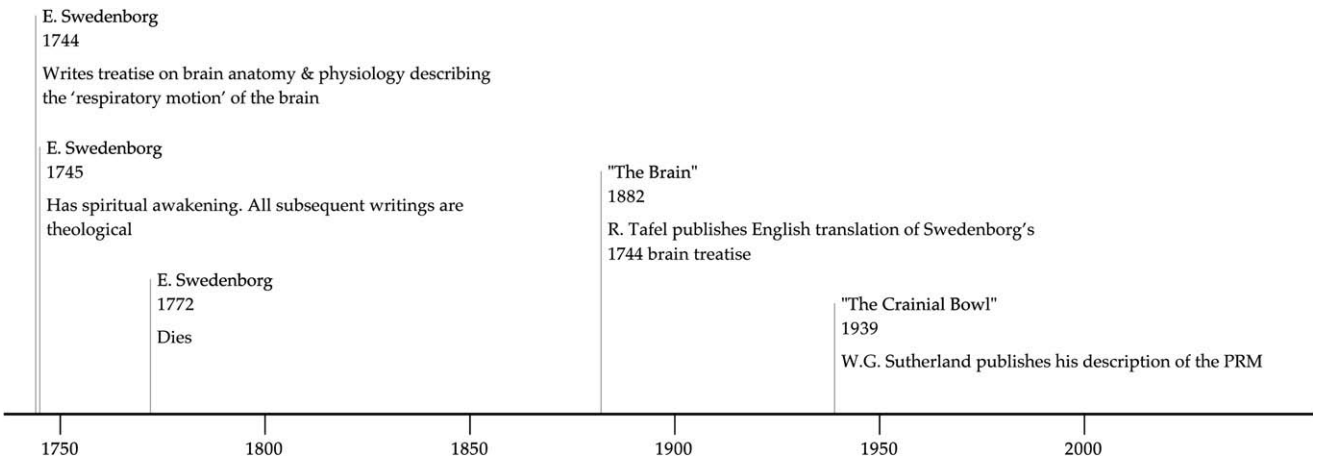

Fig. 1. Timeline of development of Sutherland's Primary Respiratory Mechanism (PRM) model. This timeline illustrates nearly 200 years between the writings of Emanuel Swedenborg, who described the 'respiratory motion' of the brain, and William G. Sutherland's publication of his description of the PRM in *The Cranial Bowl*. It is concluded that Sutherland probably referenced Rudolf Tafel's 1882 translation of Swedenborg's writings to create the PRM model.

which the school's founder, Dr Andrew Taylor Still, was instructing routinely. Sutherland first entertained the possibility of cranial bone motion as a student after looking at a disarticulated skull. Dr Sutherland is credited with extensive anatomic study of the bones and meninges of the cranium and was also known for his careful palpation. As he palpated the heads of patients, he felt motion. He interpreted this motion as the subtle movement of the cranial bones, but needed to explain the source of this presumed mechanical motion.

After studying carefully the structural morphology of the cranial bones he developed a model that described how the cranial bones move to accommodate brain motion. Because of the similarity of Sutherland's model, and the earlier writings of Emmanuel Swedenborg, it is the conclusion of this study that Sutherland directly drew from Swedenborg's writings to create the new PRM model.

By 1939, Sutherland had formalized and published this model of the 'Primary Respiratory Mechanism.' The PRM model was formalized into five components[5]:

- The inherent motility of the brain and spinal cord.
- Fluctuation of the cerebrospinal fluid (CSF).
- Motility of the intracranial and intraspinal membranes.
- Articular mobility of the bones of the cranium.
- Involuntary mobility of the sacrum between the ilia.

In this model, Sutherland assumed that the rhythmic, forceful contraction of the brain is the driving force behind cranial motion. This model also describes the dura as the mechanical link that transmits the force of the brain's contraction and rebounds in a reciprocal manner, and the cranial bones move in response to these forces. These three components of Sutherland's PRM model are found in Emanuel Swedenborg's writings.

3. Emanuel Swedenborg (1688–1772)

Emanuel Swedenborg was a famous Swedish scientist, scholar, writer and inventor, who became a theologian and mystic late in life. His early life was dedicated to the physical sciences, in which he excelled. His writings on biology are credited today for advancing the understanding of nervous system physiology and the function of ductless glands.

Swedenborg's interest in religious and spiritual topics was ongoing throughout his life. In 1743, he traveled to Italy to study specifically the anatomy and function of the brain, with a stated intent to locate the 'seat of the soul.'[6] Although he concluded that he could not locate an anatomic location for the soul, the voluminous anatomic and physiologic studies he generated were handwritten initially in several treatises from the mid-1740s. These were the treatises that were eventually translated into English and then probably used as a basis for Sutherland's model regarding cranial physiology and the PRM.

In the mid-1740s, shortly after completing these anatomic studies, Emanuel Swedenborg's spiritual search took a more direct turn: he began experiencing mystical visions in which he claimed that he communicated directly with angelic beings. Swedenborg wrote that these angels instructed him concerning many topics, including for example, the nature of Heaven and Hell, sin and redemption, and the true meaning of certain biblical passages. Swedenborg continued to have visions and wrote of these metaphysical revelations for the remainder of his life. These metaphysical experiences are described in dozens of books, some published only after his death in 1772. By 1787, a church was founded based on Swedenborg's spiritual writings, named the 'Church of the New Jerusalem.' Because his religious followers thought that Emanuel Swedenborg was inspired by the divine, all of his writings, both scientific and spiritual, were considered important.

Until the late nineteenth century, most of Swedenborg's writings were available only in the German language. The anatomic and physiologic treatises regarding the brain were translated into English by German linguist Rudolf Tafel.

4. Rudolf Leonhard Tafel, PhD (1831–1893)

In 1853, the Tafel family, with the Boericke family, opened a bookstore in Philadelphia, PA, that specialized in Swedenborgian literature. The suggestion of noted homeopath Constance Hering, influenced them to begin selling homeopathic remedies also. Rudolf later left the family business to pursue his PhD in linguistics while his brother Adolf, along with Francis E. Boericke, opened the Boericke & Tafel Homeopathic Pharmacy in 1869.[7]

Rudolf Tafel's first major publication was the massive *Documents Concerning the Life and Character of Emanuel Swedenborg*.[8] Tafel moved eventually to London, England where he translated several unpublished manuscripts of Emanuel Swedenborg's anatomical writings, dated ca. 1744. These were then published in a two volume work entitled *The Brain: Considered Anatomically, Physiologically and Philosophically*.[9,10] As will be illustrated below, the first

volume of *The Brain* is most likely the source of Sutherland's cranial PRM model.

The Tafel family was therefore a unique historical link that spread, directly and indirectly, the influence of Swedenborg's philosophies into the practice of homeopathy and osteopathy.

5. Publication of *The Brain*

In his 1882 publication of *The Brain*, Tafel was not only a translator, but was an author of extensive chapters at the end of each volume that supported Swedenborg's theories. For this reason, each volume of *The Brain* contains two large sections; the first part providing a translation of Swedenborg's ca. 1744 writings, and the second part being Tafel's detailed discussion and defense of Swedenborg's ideas. Tafel took great effort to assert that Swedenborg's physiologic concepts were correct and even included some contemporary physiologists' writings and physiologic graphs that supported Swedenborg's theories.

6. Sutherland's connection to Swedenborg's writings

The connection between William Sutherland, DO and Swedenborg's book, *The Brain*, is described by a person with close ties to osteopathy: Ida Rolf, PhD (1896–1979). Dr Rolf is best known as the creator of 'structural integration,' known commonly as 'Rolfing.' Structural integration is a unique form of deep bodywork that focuses on the remolding of the connective tissue of the body with the goal of restoring body symmetry and alignment.

While Ida Rolf was developing her approach to structural integration, she was known to have had an excellent rapport with a number of osteopathic physicians with whom she shared, discussed and demonstrated her ideas. For example, David Patriquin, DO, in a personal communication, described how she presented her ideas at an osteopathic conference in New York in 1955.

Ida Rolf stated in several lectures that she knew Dr William Sutherland and in a transcribed lecture, she told the audience how she learned about Sutherland's methods after being hired as his secretary.[11] Rolfing instructor Jim Asher reported she often showed off a signed copy of Sutherland's book, *The Cranial Bowl*, that was dedicated warmly to her.

It was probably through her contacts with various osteopaths that Ida Rolf heard rumors that Dr Sutherland's ideas were inspired by the writings of Emanuel Swedenborg. Ida Rolf even went so far as to identify that the book used was Rudolf Tafel's translation of Swedenborg's *The Brain*. In a taped lecture to one of her advanced structural integration classes, Ida Rolf described this connection to the students:

> [Tafel] made a translation which is pretty hard to get. And there are books [by Swedenborg], the titles of which are the *Animal Kingdom*, and the *Economy of the Animal Kingdom*, and those are not the same books …. And then there are these books, *The Brain*. Now *The Brain* is an impossible thing to get a hold of. Originally there were 6 copies, (or was it 4?) printed, and that's all. Old … Sutherland had one of those. And when somebody accused him, or suggested to him, 'Oh I see where you got some of your ideas,' that book disappeared. And it hasn't reappeared. Even after his death it hasn't reappeared ….[12]

Ida Rolf may have exaggerated the scarcity of this book (there were obviously many more than six copies published), but she is correct that Sutherland's model seems to borrow heavily from the proposed physiology as described in *The Brain*.

Although William Sutherland never credited openly Swedenborg's writings, he indicated that he knew of Swedenborg's ideas at least once when he stated in a lecture: 'Swedenborg, 200 years ago, said there is movement in the brain. Have we anything new? No.'[13]

7. Swedenborg and Sutherland comparison

In order to examine the similarities between the writings of Emanuel Swedenborg and the PRM model of William Sutherland, three areas of greatest similarity will be examined:

(1) The inherent motility of the brain and spinal cord.
(2) Reciprocal role of the dural membranes.
(3) Articular mobility of the bones of the cranium.

With each of these topics, excerpts from Tafel's 1882 translation of Swedenborg's *The Brain* will be quoted. It is important to remember that Emanuel Swedenborg's writings date from ca. 1744, whereas Rudolf Tafel's commentaries date from his 1882 English translation. Quotes from Sutherland's teachings will then be compared. The similarities imply strongly that Sutherland used Swedenborg's writings as a primary source for these components of the PRM model.

7.1. The inherent motility of the brain and spinal cord

Because both the brain and the heart have ventricles, both are filled with fluid and both are composed of fibrous tissues, many ancient observers assumed erroneously that the brain was a pump and actively pumped clear fluid, analogous to the heart pumping blood. This concept dates back to at least the ancient Greeks, and it was still being debated scientifically in the eighteenth century. This ancient belief formed the basis of Swedenborg's concept of the brain as a contracting organ. Swedenborg, writing in the 1740s, quoted multiple medical authors who wrote about the brain's presumed contractions. The influence of these authors is evident in Swedenborg's claim that, '… the cerebrum is expanded and constricted like the heart and lungs, and that it performs a systaltic and diastaltic motion ….'[14] Swedenborg believed that the brain was not just a fluid pump, but also pumped the vital life force of the organism:

> The cerebrum besides by its alternate movements of expansion and constriction, and by the assistance of the lungs, excites the body and all its viscera into a similar perennial motion; and by this means it transmits, in each alternate time, the soul and its animal spirit through all the fibres into every province of the body; thus animating and vivifying each part in the universal body, and the universal body with all its parts, so that they live by acting, and act by living. On this account the cerebrum must be styled *the general organ of animation.*[15]

Interestingly, this view of the brain also seems to be the source of Sutherland's concept of the PRM carrying the 'Breath of Life.'[16] Tafel, in his epilogue to *The Brain*, reiterates the idea that the brain distributes the 'spirit' throughout the body:

> From this universal theory of Swedenborg concerning the relations which exist between the motion of the brain and the respiration of the lungs, it follows that when the brain expresses the spirit or nervous fluid from its grey substance into the nerves of the body when therefore the brain has its expiratory motion, the lungs go through the process of inspiration, and *vice versa*.[17]

Swedenborg based these conclusions on the writings of other authors' dissections, vivisections, and direct observations of the brains of living persons with open head wounds. He quotes authors such as Ridley, Vieussens, Baglivi, Fantoni, Bellini, Pacchioni,[18] who agreed that in an exposed living brain, two motions were detected.

Firstly, a pulsatile motion synchronous with the cardiac pulse was observed. The second motion was synchronous with pulmonary respiration: when an unfortunate person with an open head wound inhaled deeply, the brain was observed to withdraw within the cranium. Conversely, when the person exhaled or coughed, the brain expanded outward, sometimes even protruding slightly through the cranial opening. This was interpreted to be the inherent contraction and expansion of brain tissue. These early investigators even went so far as to thrust their fingers into living brains to feel directly these forceful 'respiratory' movements of the brain.[19]

The most striking relation between Swedenborg's and Sutherland's writings concerns the very concept that the brain contracts rhythmically, and the force of contraction originates entirely from within the brain tissue. In *The Brain*, Swedenborg explained that:

> It [the brain] performs this motion in the same way as the large muscle of the heart, which also undergoes its systaltic and diastaltic motion by simple expansion and constriction; for its fibres near the core are also curved in spiral flexions …. It is only the spiral fluxion [sic] and form which furnishes an easy power of expansion, and which causes one part not to be in the way of another.[20]

Swedenborg also theorized, in detail, the manner in which the brain changed its shape during this contraction:

> Each lateral ventricle during the time of constriction, that is, during its systole, is lengthened out, and contracted in width, and *vice versa*; for the corpora striata, the beginning of the medulla oblongata, whose backs bulge out in the cavity, then swell throughout their whole length, and spread out laterally: wherefore the medulla which encloses these bodies, runs through them, and is inserted between them, is lengthened out, and therefore diminished in respect to its other dimensions. It hence follows that the posterior and descending cornua, which are called the ammonites and the ram's horns, then subside and close up completely, and the upper or broader parts of the ventricles become very narrow and are contracted.[21]

Rudolf Tafel, in his epilogue to *The Brain*, restated this concept:

> According to the dynamic or autocratic theory of the motion of the brain, as stated by Swedenborg, the origin of the motion of that organ is contained in its own bosom, and therefore is independent of the arterial and venous circulation of the body, and of the circulation of the cerebral–spinal liquid.[22]

Moreover, because the brain was known to give commands to other parts of the body, and because of the synchrony between the brain's apparent contraction and respiratory function, it was assumed that the brain's powerful contraction *caused* pulmonary inspiration directly; hence, this contraction of the brain was the body's *primary respiration*. Tafel, in his epilogue to *The Brain*, emphasized the order of causality between the action of the brain and the lungs:

> … the motion of the brain is not derived from that of the lungs, but is anterior to it in time. After that it was shown that the motion of the brain extends throughout the whole encephalon, including the spinal cord.[23]

The theory that the brain's contraction *precedes and causes* pulmonary respiration is also to be found in Sutherland's teachings.

In a training manual of Sutherland's model and methods written by Drs Rebecca and Howard Lippincott, the explanation of Sutherland's PRM model echoes closely Swedenborg's theories by emphasizing that the respiratory action of the brain precedes pulmonary respiration:

> The primary respiratory mechanism, to which the diaphragmatic respiratory mechanism is secondary, includes the brain, the intracranial membranes, the cerebrospinal fluid and the articular mobility of the cranial bones ….[24]

Sutherland, while palpating patients' heads, felt 'contractile and expansile accommodation'.[25] Although this was interpreted by Sutherland as being the force of the brain's motion as felt through the resultant motion of the cranial bones, a problem arose: notably that the perceived motion of the cranium was not always synchronous with pulmonary respiration. This observation was certainly not in agreement with Swedenborg's model. Sutherland and his students, therefore, had to address this discrepancy:

> The primary respiratory mechanism is superior to costal respiration, the latter being secondary to it and controlled through normal nerve channels and the carbon dioxide reflex. Active articular motion of the skull, as part of the mechanism, does not necessarily coincide with costal respiration. It can, however, be made to coincide.[26]

Swedenborg's physiological writings that describe a rhythmically expanding and contracting brain provided an elegant explanation as to why one can palpate an apparent rhythmic expansion and contraction of the cranium, and it is concluded in this study that Sutherland based his PRM model on Swedenborg's writings. However, even if Sutherland utilized this physiological theory of Swedenborg, the palpated rhythm of the cranium was found not to coincide with pulmonary respiration. Sutherland may have retained Swedenborg's model of brain motion, but, in doing so, had to alter the model to accommodate this observation. In his book, *The Cranial Bowl*, Sutherland — in small print — even describes several 'esoteric experiments' that 'prove' that the brain's motion is the primary respiratory mechanism.[27] It appears, therefore, that Sutherland made an effort to adhere to a proposed physiological theory that did not fit with his own clinical findings. It is outside of the scope of this paper to conjecture as to why Sutherland would continue to use a model that did not completely explain his palpatory observations. It is to be noted, however, that even though Sutherland deviated from Swedenborg's proposed physiology in regard to the synchrony of 'brain respiration' and pulmonary respiration, Sutherland maintained that brain motion constituted the "Primary Respiratory Mechanism."

7.2. Reciprocal role of the dural membranes

Swedenborg reasoned that the dura was a passive tissue that, like a tendon, absorbed the forces applied by the contractions of the cerebrum. He also reasoned that the design of the dura assisted the motion of the cranium through its reciprocal rebounding action:

> When the brain expands it folds up its clefts and interstices, and prevents the passage of the blood by the vessels into the sinuses; it likewise draws down and contracts the sinuses themselves. The effect, which is necessarily extended there by upon the whole circumference and the two laminae of the dura mater, is plain. It follows hence that the dura mater in respect to this motion is passive; yet that by virtue of its elasticity, and its capacity as a muscular tendon, it contributes in a general way to the reciprocal expansive motion of the brain.[28]

Swedenborg continued his explanation of how the dura assists the cranium in rebounding from the brain's expansion:

> Reaction and elasticity are required in order that it may concur in a general manner with the motion of the brain. For when the latter has reached the extreme bounds of its expansion, then the

> dura mater urges it to enter upon the reciprocal period of its contraction …. It therefore ministers to the brain capacity of a tendon.[29]

It is made clear, in Swedenborg's text, that the dural membranes absorb the significant force of the brain's contraction:

> By (the dura's) attachment to the cranium, and also by its elasticity, it causes the cranium to yield a little, though insensibly, to a strong motion of the cerebrum; the bones of the cranium derive this property from infancy ….[30]

Swedenborg also described how the dural membranes transmit and distribute forces applied to the cranium in order to protect the brain:

> The action of the brain, therefore, has respect to those places where the cranium is strongest; and shocks received by the cranium are directed to the most tranquil places, and thence they are communicated to all points of the whole brain; and on this account both are perfectly protected and remain without any fear of danger or injury.[31]

Scientific studies have established that the dural membranes mediate traumatic forces applied to the skull, just as Swedenborg described over 250 years ago.[32]

Sutherland's concept of the 'reciprocal tension membrane' also appears to spring directly from Swedenborg's writings. As seen above, Tafel's 1882 translation uses the word 'reciprocal' frequently in describing the mechanical action of the dural membranes. This word reappears prominently in Sutherland's description of the PRM. Sutherland's account of studying and naming this mechanism may hint at Swedenborg's writings:

> I remember one especial difficulty very well. It concerned the falx cerebri and the tentorium cerebeli functioning as cooperative balance agencies in the delicate and intricate mechanism of cranial membranous articular mobility. We found considerable *information*, even in that early day, descriptive of the intracranial membranes as functioning in the act of shock absorbers, stress bands and partitions to prevent the cerebral hemispheres from bumping together ….
> After considerable discussion in correspondence, we finally agreed upon the terminology of: *the reciprocal tension membrane*.[33]

The next two quotes from Sutherland echo the mechanical function of the dural membranes as described by Swedenborg, but Sutherland adds his own analogy by comparing the mechanism to that of a balance wheel of a watch:

> The falx cerebri and the tentorium cerebelli, especially, function as intermedial, propellant tension bands between the convolutions and the articulations as well as balance—reciprocants in the equalization of articular mobility.[34]
> The cranial articulations are involuntary in their mobility, and have no intermediate muscular agency for operation. However, they possess a special intracranial membranous tissue that acts not only as an intermediate agency, but functions also as a reciprocal tension agent that limits the normal range of their articular mobility. This agency functions by way of the falx cerebri and tentorium cerebelli, causing movement of the articulations and at the same time regulating or limiting the normal range of articular mobility. This tension tissue agent functions somewhat like that of a tension spring to the balance wheel of a watch; the tension spring regulating or limiting the to-and-fro movement of the balance wheel. Hence, the term *reciprocal tension membrane* is chosen in relation to the intracranial membranous tissue functioning with the cranial articulations.[35]

Sutherland again emphasizes the dura's mechanical role, not just in mediating the force of the brain's motions but also in transmitting these forces to drive the resultant motion of the cranial bones.

7.3. Articular mobility of the bones of the cranium

Swedenborg does not discuss the actual motion characteristics of the separate cranial bones, but states clearly that the sutures interdigitate to absorb the tension from the brain's motion as transmitted by the dura:

> The sutures and articulations point out which are the termini, and of what kind are the spheres of motions or expansions …. The frontal bone shows that the front part of the cerebrum, divided into two bosses or protuberances, expands in an anterior direction; the coronal, frontal, and transverse sutures when they are present indicate which are the limits, the directions, and the areas of the expansions; the parietal bones show that the mass of the cerebrum underneath elevates itself and pours itself out towards the larger, and at the same time towards the lateral, sinuses; the saggital and lambdoidal sutures that it swells downwards, and not beyond these limits. The occipital bone indicates what kind of space was left to the cerebellum for swelling; its elevation in the middle, where the sinuses meet, shows of what nature are the determination and the concentration of the motions of both brains. The crista frontalis and the crista galli, with their little foramina and cavities, and the frontal sinuses and also the rest, show of what nature the forces are which cause a tension, and likewise of what nature in the tender brains were alternate modes of drawing or pulling, by which these parts were made to rise and gape open.[36]

In contrast, Sutherland discussed perceived skull motion from a clinician's point of view, concentrating on the outer skull and function of the cranial bones. Sutherland spent a great deal of time studying the individual cranial bones and ascertaining how they interact mechanically with one another:

> As an introductory study of the cranial membranous–articular functioning, we shall liken the sphenoid bone, with its greater and lesser wings, to an airship, the frontal end ascending during expiration and then changing to a 'nose dive' as it descends in association with inspiration. In conjunction with the basilar process of the occipital bone, the sella turcica area undergoes an undulatory downward movement as the frontal end ascends and changes to an undulatory movement upward as the frontal end descends. In relation to this undulatory basilar functioning, the vault dovetail sutures function in accommodative contractile and expansile service, the sutures being a contractile accommodation as the basilar area undulates downward in expiration, and being in expansile accommodation as the basilar area undulates upward during inspiration.[37]

As is seen, Sutherland created a detailed model known as the PRM that described the presumed motion of all the cranial bones.

8. Conclusion

Clearly, in the above listed three components of the PRM model, William G. Sutherland's teachings follow the writings of Emanuel Swedenborg closely. The contention that Sutherland used Swedenborg's writings as a basis for his PRM model is supported upon close scrutiny of both authors' writings. More extensive study of these writings may reveal even more correlations. This knowledge provides several insights and explains several vague aspects of the

PRM model; e.g., the relationship between cranial and pulmonary 'respiration,' Sutherland's insistence that the brain's 'respiration' precedes pulmonary respiration, and the origin of Sutherland's concept of 'the breath of life,' as described in the PRM model.

Some osteopaths view William G. Sutherland's contribution of the Primary Respiratory Mechanism (PRM) model as one of the most important contributions to osteopathic thought. His PRM model was unlike any other cranial model in that it went beyond simple anatomy and mechanics. By attributing the driving force of this cranial mechanism to the inherent motion of the central nervous system, Sutherland introduced a powerful, elusive mechanism; a mechanism that, by its very nature, generated philosophical discourse as well as scientific discussion. Yet, the PRM model, as originally described by Sutherland, is most probably a modified restatement of an antiquated physiological hypothesis from the mid-eighteenth century.

Critical dialogue regarding cranial osteopathy is a crucial component that can only strengthen the osteopathic profession. The PRM model has been part of osteopathic thought for over 60 years. To understand that it is based on an abandoned eighteenth century physiological hypothesis will hopefully propel the osteopathic profession to open a dialogue that will serve to advance our science.

9. Support/funding

None.

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