The Chiropractic Vertebral Subluxation Part 4: New Perspectives and Theorists From 1916 to 1927

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Abstract

Objective: The purpose of this paper is to review and discuss the history of chiropractic vertebral subluxation (CVS) between the years 1916 and 1927.

Discussion: Theories during this period were shaped by many chiropractic school leaders and instructors. Unique contributions to theories during this period come primarily from 4 authors, John Craven, Jim Drain, Shelby Riley, and Ralph Stephenson. This period included the first thermographic instrumentation in chiropractic, which led to one of Craven's modifications of CVS theory. He also added to the literature about spinal cord pressure and developed the restoration cycle. Drain and Stephenson also expanded on the cord pressure models of CVS. Drain wrote, in plain language, of many central B. J. Palmer theories and developed protocols for acute and chronic CVS. Stephenson made several contributions to models, including his expansion on B. J. Palmer's theory of momentum of dis-ease. Stephenson's main contribution to theory was likely his vertemere cycle, which was a precursor to proprioceptive models. Riley's combination of Gregory's theories with zone therapy had a significant impact on several reflex theories.

Conclusion: Chiropractic vertebral subluxation theory during this period grew in complexity and demonstrated several new perspectives on CVS, which may be still relevant today. (J Chiropr Humanit 2018;25C:52-66)

Key indexing terms: *Chiropractic; History*

Introduction

The concepts surrounding chiropractic vertebral subluxation (CVS) increased in complexity between 1916 and 1927. Influential books were published by established school leaders such as B. J. Palmer, Arthur Forster, and Willard Carver. New thought leaders, such as John Craven, Joe Riley, Jim Drain, and Ralph Stephenson, emerged and contributed to the literature about CVS theory (Fig 1). For this paper, the years 1916-1927 were selected because of the publications and events that led to the development of new theories and new approaches to research and the analysis of the CVS. For example, 1916 marked the beginning of B. J. Palmer's collaboration with his new full-time faculty, which started with the publication of the second edition of volume 5 in collaboration with John Craven.[1-3] The year 1927 was marked by the publication of Stephenson's *Chiropractic Textbook* and Drain's *Chiropractic Thoughts*.[4,5]

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Theory developed based on several factors including the proliferation of texts,[1-4,6-9] competition among schools,[10] expanded student clinics, increased teaching loads, attempts to integrate chiropractic with other therapeutic models, the development of instrumentation,[11,12] and a unique confluence of events such as the influx of students into chiropractic colleges after World War I and the flu pandemic of 1918.[5,8,10]

Theory during this period included new distinctions between acute and chronic CVS,[4,5,12] further development of cord pressure models,[4,12] reflex models,[13,14] early proprioceptive models,[4] and expanded models of etiology.[4-6,9,15] Some of the theories from this era made new distinctions between philosophy and CVS theory.[4-6]

The purpose of this article is to review the writings of the CVS theorists and the impact of instrumentation on these theories. This is followed by an exploration of the models from 4 authors: Craven, Riley, Drain, and Stephenson. Each made unique contributions to theory, which are summed up with a section on the new CVS perspectives that emerged during this time. This is followed by a discussion that explores the importance of a systems approach, the use of innate intelligence, and terminology.

Discussion

Chiropractic Vertebral Subluxation Theory Between 1916 and 1927

Between 1916 and 1927 chiropractic school leaders, such as B. J. Palmer, Arthur Forster, and Willard Carver,

expanded on earlier theories. New authors (Craven, Riley, Drain, and Stephenson) had an increasing influence on discourse regarding CVS theory. Many of the new theories were inspired by new measures to try to detect CVS such as using thermographic instrumentation.

B. J. Palmer issued new editions of his earlier theoretical books that were published in 1916 and 1920.[1,2] His publication of the second edition of volume 5 with Craven as his collaborator might be viewed as the start of this period. Also in 1920 B. J. Palmer published his full-spine adjusting manual as volume 13.[3] The book was compiled by his faculty, Vedder, Firth, and Burich, and influenced future manuals and techniques.[16-18] In 1924 Palmer introduced thermographic instrumentation into the profession.[19]

Other authors worked on theories related to CVS. Forster, who was head of the chiropractic program at National School of Chiropractic, published 2 more editions of his book by 1923.[20] In 1921, he published *The White Mark,*[8] which was a collection of his editorials from the *National Journal of Chiropractic*. Forster viewed subluxations as secondary to disease processes. He wrote, "It may be said without question that in 95 per cent of all diseases a subluxated vertebra has something to do with their causation."[8] Carver published several texts during this period to support his lectures at his various schools.[10,21] He expanded on his models of distortion, symptomology, adjusting methods, and his full-spine structural approach to CVS.[7] The works of Craven, Riley, Drain, and Stephenson described how CVS was developed and included instrumentation along with other models of neurophysiology and even acupuncture theory.

Instrumentation and Early Theory. I propose that the development of CVS theory after 1923 should be discussed in the context of instrumentation. After this date, CVS models and the technologies used in research and analysis became linked and developed together.

Thermography in chiropractic was a technological innovation that was used to locate areas of heat over the spine. This was a procedure that had been used since the earliest years of the profession and was central to the theory of CVS detection. D. D. Palmer described palpating for heat in relation to CVS as early as 1902.[22] He wrote, "Observe the difference in temperature of your patients along the spine, of those having fever, by placing your hand at different points; where you find the greatest heat, there you will find the sub-luxation causing the inflammation which produced the fever."[22] In 1908, B. J. Palmer wrote that one should adjust the "spinal hot box" for eruptive fevers.[23] Thus before the thermograph, heat was detected with the back of the bare hand.[24]

Thermography instrumentation was first tested in chiropractic in 1923 with B. J. Palmer's Neurocalometer, a device developed by an engineer named Dossa Evins.[11] Thermographic instrumentation was used to measure physiological changes that were thought to be associated with CVS.[19] By 1924, when B. J. Palmer officially introduced the Neurocalometer as a way to detect interference to the neurologic component of the CVS, other devices were already on the market by schools from Texas Chiropractic College (TCC) to Los Angeles Chiropractic College.[25] These included Chiro Vox,[5] the E.R.V. potentiometer, and the J. W. Healey X-Ray Company's Neurophonometer, Neurothermometer, and Neuropyrometer.[25]

In 1927 Weiant and Gravelle suggested that acute CVS caused inflammation.[26] Weiant was a 1924 Palmer School of Chiropractic (PSC) graduate and Gravelle was a physicist. Under monochromatic light, they observed the paravertebral tender spots had a purple color that matched the wavelength of hemoglobin. Microscopic analysis indicated dilated capillaries. They invented the Analyte, "a lamp for visual nerve tracing."[27] By 1952, Weiant developed the Visual Nerve Tracing Instrument with Adelman to photograph the capillaries that they theorized were associated with CVS.[28]

John Craven's Writings. John Craven joined the PSC faculty on graduation in 1912 (Fig 2). He started publishing articles in *The Chiropractor* in 1914.[29] Some of his articles summarized B. J. Palmer's theories on cycles and eventually became core chapters of the second edition of *Philosophy of Chiropractic,* volume 5, published in 1916.[1] Craven also collaborated with B. J. Palmer on the third edition of volume 2 in 1920 and authored his own books, *Chiropractic Orthopedy* in 1921, and *Chiropractic Hygiene* in 1924.[2,6,30] *Chiropractic Orthopedy* expanded on B. J. Palmer's theories of spinal cord pressures.[6] In 1925 Craven published an article on CVS theory based on research with the first thermography instrumentation.[12]

Craven's main writings in the 1916 edition of volume 5 were part of his chapter on the restoration cycle, which

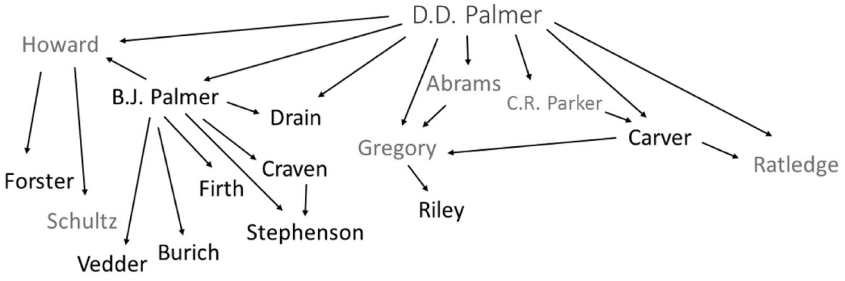

Fig 1. *Subluxation theorists between 1916 and 1927.*

Fig 2. *John Craven. (Courtesy Special Services, Palmer College of Chiropractic.)*

included the concept that after the CVS is adjusted, normal transmission is restored.[1] Restoration was a concept developed by both D. D. and B. J. Palmer.[31,32] Craven was the first to refer to this as the *restoration cycle*,[1] which he connected to B. J.'s theory of cycles.[32]

The natural restorative process was central to his theory. Most of Craven's writings on CVS came after 1920. He wrote that after the correction of CVS, "the current of impulses may become normal, and when we have done that, then we should leave our patient to the life within the body for all the processes of reparation and restoration, and when we have done that we have done our patient a real service and the patient will recover."[33] Rather than philosophizing about "life," Craven was interested in the processes and the practicality of patient care. The key was "to restore incoordination to coordination."[33]

Craven's chapter on spinal cord pressures was published in 1921.[6] He updated B. J. Palmer's writing on the topic from 1911.[34] B. J. Palmer based his original model on Primrose's cord pressure hypothesis.[35] Craven proposed that cord pressures existed within the spinal canal and may refer pressure to a few fibers depending on the degree of CVS.[6] The most common places of pressure, he thought, were areas where the cord was enlarged, especially the middle cervical area (Fig 3).[6] Cord pressure was proposed to be caused by trauma, pathologic conditions within the cord, or pulling on the cord from sacrum or coccyx. He proposed that pulling on the cord from the coccyx could cause pressure anywhere along the spine and that tenderness could be found below the point of spinal cord pressure. Craven suggested that coccyx and sacrum cord pulling was rare.[6]

In December 1925 Craven introduced the first theoretical modifications to CVS theory, which were based on instrumentation.[12] He reported that chronic and acute CVS produced different thermographic readings and concluded that chronic CVS may have pressure but no interference. Craven hypothesized that the full carrying capacity of the nerve is not normally active. He differentiated carrying capacity of the nerve from interference with transmission.[12] According to Craven, this new distinction between interference and lowered capacity explained why some acute conditions appeared from an unchanged chronic CVS. He felt that it also accounted for the ability to increase activity and function when required by the environment. He wrote, "In many cases it is an old, chronic CVS that may have existed for years. It is not necessary to assume that there is interference with transmission at all times on that nerve, and as a matter of fact the Neurocalometer has shown there is not."[12]

In those cases when the body required more "current" over the nerve for function rather than for basic metabolism, thermographic readings changed. Craven hypothesized that when increased need demanded greater current, the pressure from this type of CVS interfered with the greater current. This, he felt, occurred even though it was not interfering with basic metabolism. He also proposed that chronic CVS may produce interference with the transmission to the tissues, which caused tissue weakness and depletion. In those types of chronic CVS, the tissues no longer have the capacity to effectively adapt.[12] This was the introduction of a new chronic CVS theory: Chronic CVS may not always have interference to transmission because transmission could be intermittent and related to functional need.

Joe Shelby Riley's Theory (1921). Joe Shelby Riley graduated from the Palmer-Gregory School in 1911 under his mentor Alva Gregory (Fig 4).[10] Riley and Gregory spearheaded a multistate agenda to combine medical practices into chiropractic.[10] Riley claimed degrees from many fields including medicine, osteopathy, and naturopathy. The author page in his 1921 book reads, "Joe Shelby Riley, M.D., M.S., Ph.D., LL.D., N.D., F.A.S., D.M.T., D.P., D.O., B.D., D.C., Ph.C."[13] He opened a school in New England in 1912. Wardwell suggested that chiropractors drove him out of Massachusetts and so he moved to the District of Columbia and opened the Washington School of Chiropractic in 1914. That school closed in 1926.[36] Riley apparently was not highly regarded by some in the profession.[10,36]

Riley published books in 1917, 1919, and 1921, including his *Science and Practice of Chiropractic with Allied Sciences*.[9,13,15] Riley developed many of his ideas from

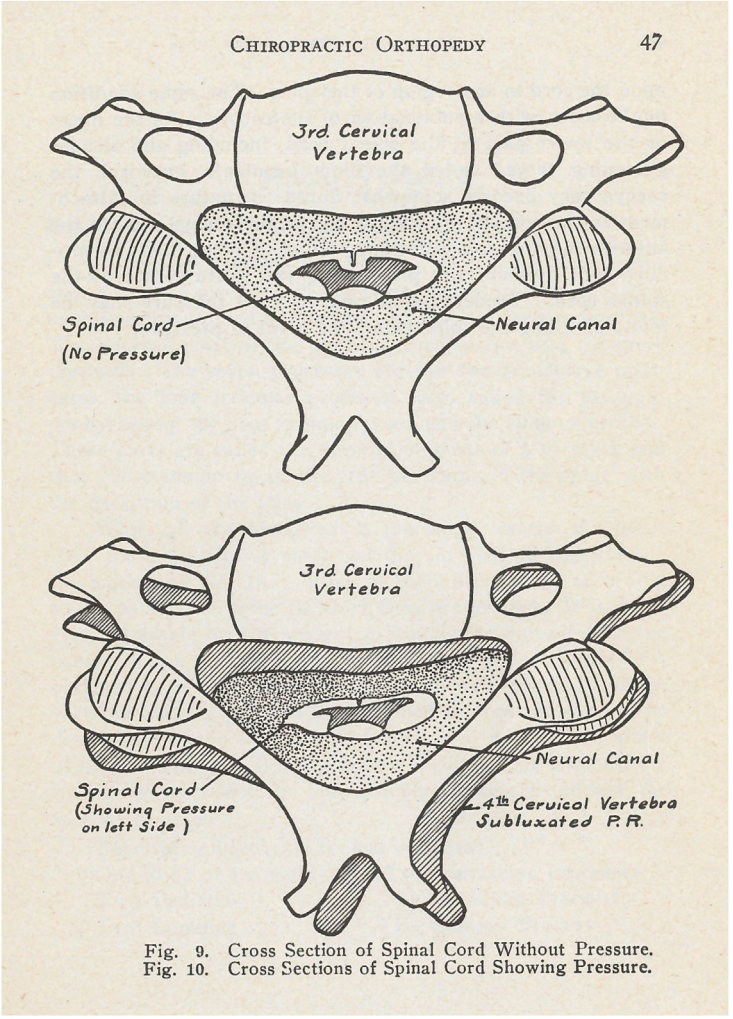

Fig 3. *Figures from Craven's* A Textbook on Chiropractic Orthopedy[6] *(drawn by R. W. Stephenson). (Courtesy Special Services, Palmer College of Chiropractic.)*

Gregory, although he also gave credit to D. D. Palmer and B. J. Palmer. Riley taught many alternative healing methods under the title of chiropractic including osteopathic manipulation, spondylotherapy, instrument adjusting, rectal dilation, lamps, vibrators, and naturopathy. Keating, Callender, and Cleveland referred to Riley as "the maximum mixer of his era."[10] By 1921 he had developed his Plus Ultra triad (Fig 5), which included medicine and surgery (chemistry, bacteriology, obstetrics, and gynecology), physiotherapy (electrotherapy, thermotherapy, pneumotherapy, and zone therapy), and spinal therapy (chiropractic, concussion, sinusoidalization, and mechanotherapy).[13]

In 1921 Riley proposed that adjustment of CVS removed the pressure on the nerves. The adjustment replaced the vertebra causing the impingement, which then released the interference.[9,13] His theory was a mix of both D. D. and B. J. Palmer's CVS models with Gregory's approach to stimulate or inhibit the nervous system, which was based on Abrams' spondylotherapy. Riley suggested best results started with a chiropractic adjustment followed by concussive therapy. He proposed that slow concussive strokes inhibited the nervous system and rapid strokes excited the nervous system.[13] This theory is credited to Davis, Gregory, and Abrams.[37-39]

Riley's main innovation during this period was his inclusion of zone therapy, which was first introduced by 2 medical doctors in January 1917 as an adaptation of acupuncture meridian theory to pain management.[40,41] Riley published his first edition of *Zone Therapy Simplified* later that year.[15] Zone therapy integrated elements of acupuncture theory with regular medicine. It was a precursor to reflexology, which was started by Riley's student Eunice Ingham.[42] By 1921 Riley had integrated zone therapy with his wider system, which included chiropractic.[13]

Drain's Theory (1927). James Drain was a 1911 graduate of the PSC (Fig 6). He studied under B. J. Palmer and also took 11 lessons from D. D. Palmer in 1913.[43] Drain attended at least 12 Palmer homecoming events before buying TCC in

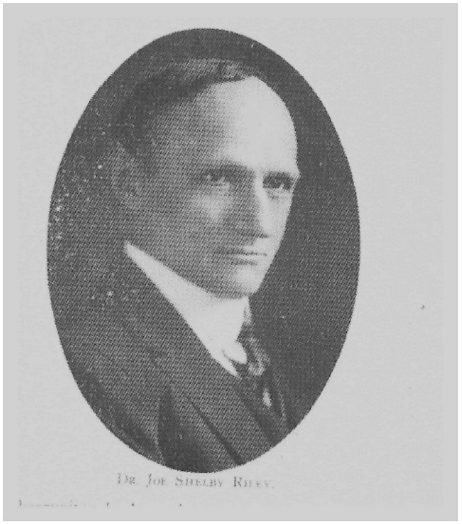

Fig 4. *Joe Shelby Riley. (Courtesy Special Services, Palmer College of Chiropractic.)*

1921.[5] Drain published his *Chiropractic Thoughts* in 1927.[5] Drain wrote that CVS puts pressure on nerve coverings and the coverings of the spinal cord. His writings on retracing, pediatric care, multiple cord pressures, and momentum of disease processes are informed by years of clinical experience and teaching and by his study of the first B. J. Palmer texts.[5] Drain recommended adjusting CVS in only 1 or 2 areas. He felt this concentrated the force that could be used by innate intelligence. He hypothesized that adjusting more than 3 vertebrae scattered the force from the adjustment.[5,44] One of Drain's practices was, throughout the night, to adjust acute patients who were considered to have a high risk of imminent death. He rechecked the patients every 6 hours. He felt that if the innate contraction of forces, which was a concept of B. J. Palmer's from 1908,[45] did not last for 6 hours, then clinical judgment should rule on how frequents adjustments should be delivered.[5]

Drain noted that cord pressure concepts were first developed between 1908 and 1911,[5] which concurs with B. J. Palmer's first incorporation of cord pressures into CVS theory from the second edition of volume 3.[34] Drain suggested that the most common location for spinal cord pressure was at the level of the atlas and axis, although it may be found at any level of the spinal canal. He noted that signs and symptoms of cord pressure could include shooting pains in the body, paralysis of half of the body, tender nerves below

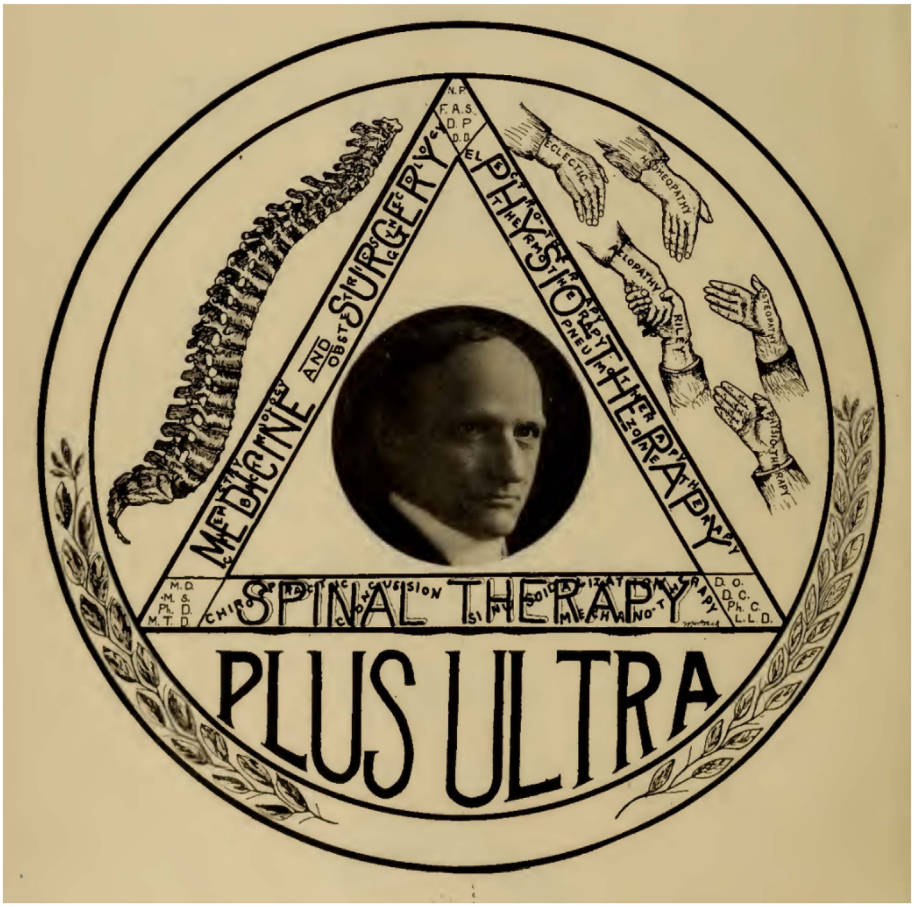

Fig 5. *Plus Ultra Triad from Riley's* Conquering Units: Or the Mastery of Disease.[13]

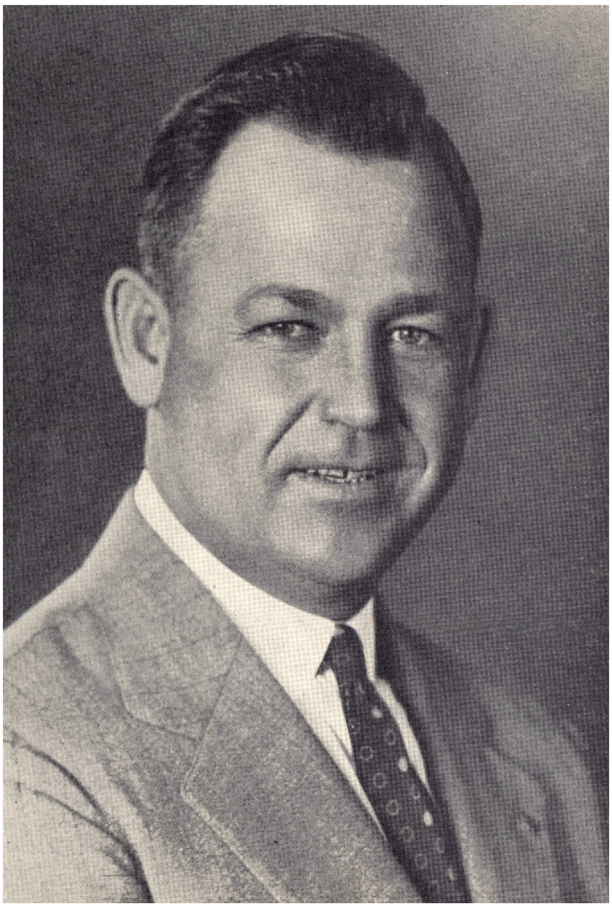

Fig 6. *James R. Drain. (With permission from the Drain family.)*

the point of pressure, and even hysteria and nervous breakdown. Any pathophysiologic condition, he postulated, could be related to cord pressure, mainly caused by anterior, posterior, and lateral CVS. Each type of cord pressure CVS could lead to different clinical findings. He wrote that even a slight cervical CVS could put pressure on the cord.[5] Clinically, adjusting the highest point of cord pressure was the rule. An assessment of primary and compensatory curves was crucial to determining whether the cord pressure was causative.[5]

Drain expanded on B. J. Palmer's theory of major and minor CVS, distinguishing between the two.[5] A major CVS was characterized by a hot spot, a cold spot, or a tender nerve and could include any combination of these. He also relied on x-ray analysis whenever possible to determine laterality of the vertebrae in relation to the articulations above and below. Other methodologies included Kiro Vox (a thermography instrument developed at TCC), symptomology, history, palpation, and nerve tracing.[5]

R. W. Stephenson's Theory (1927). Stephenson graduated from PSC in 1921 and joined the faculty (Fig 7). He taught in the philosophy, orthopedy, and technique departments.[24] Stephenson first started writing about the fundamental principles of chiropractic in 1924, including information on neurocalometer research.[46] By 1927 he had written his own text, *Chiropractic Textbook*.[4] In the preface to his 1927 text, Stephenson thanked his teachers B. J. Palmer and John Craven.[4] He developed the classic 33 principles to sum up B. J. Palmer's chiropractic philosophy and theory.[4] The CVS was described as principle 31 in relation to the body's inability to adapt to ill-timed or unbalanced forces from the environment. A second edition of his book was published in 1940. The book became a core text at the PSC for decades and influenced tens of thousands of chiropractors. Stephenson also created the drawings for Craven's orthopedy text.[6]

Stephenson defined CVS according to B. J. Palmer's classic 4 criteria: misalignment, occlusion, pressure, and interference. Stephenson wrote, "A subluxation is the condition of a vertebra that has lost its proper juxtaposition with the one above or the one below, or both; to an extent less than a luxation; which impinges nerves and interferes with the transmission of mental impulses."[4] That definition guided theory for many in the profession.[10]

Stephenson viewed the CVS in the context of the organism's intelligent attempt to adapt to the environment.[4]

Fig 7. *R. W. Stephenson. (Courtesy Special Services, Palmer College of Chiropractic.)*

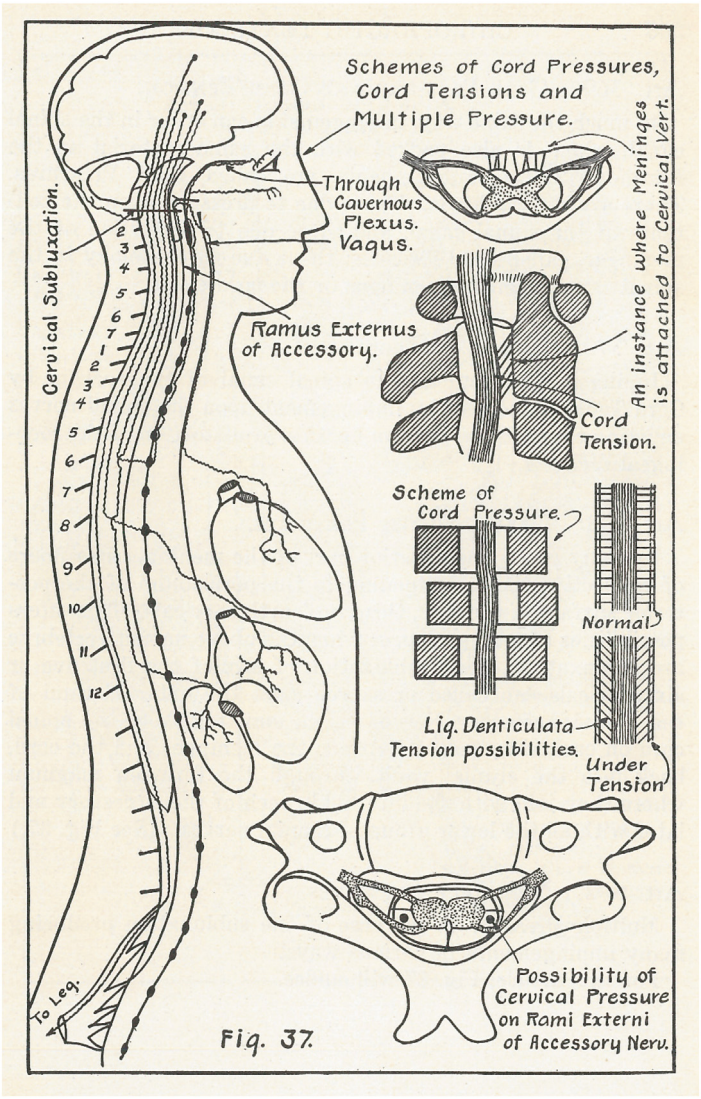

Fig 8. *From R. W. Stephenson's Chiropractic Textbook.*[4] *(Courtesy Special Services, Palmer College of Chiropractic.)*

This was an early systems approach to the body's organizing processes based on complex cycles, a detailed exploration of momentum in health and disease, and an energetic perspective on the nervous system.[47,48]

Stephenson distinguished several kinds of impingements and cord pressures.[4] He built on Craven's and B. J. Palmer's cord pressure models.[6,34] He hypothesized that cord pressures arose from pathologic conditions, like a tumor in the cord, canal, or meninges, and that, "those due to pressure upon the contents of the spinal canal, and those due to distortion of the meninges, [were] called Cord Tension."[4] He also referred to sacral impingements within the spinal canal as cord tensions. He proposed that cervical CVS, especially of the second, third, and fourth cervical vertebrae, caused cord pressures because of the attachments of connective tissue to the meninges; he felt that the first 6 cervical vertebra could cause pressure on the external rami of the spinal accessory nerve.[4] Stephenson's illustrations of multiple cord pressures are similar to depictions of adverse mechanical cord tension by neurosurgeon Alf Breig, published 50 years later (Figs 8 and 9).[4,49] More recent research demonstrates that suboccipital muscles have direct attachments to the meninges.[50] Stephenson hypothesized that the CVS impinged not only nerves going to other tissues and organs in the body but also to the tissues that hold vertebrae in place. The vertemere region affected by the CVS included the vertebra, discs, muscles, and ligaments. The interference to the transmission of mental impulses in this region kept the body's innate intelligence from self-correcting. He called this the *vertemere cycle* and suggested it is the reason why chronic CVSs were perpetuated. Stephenson considered this the only practical

cycle for chiropractic application in relation to the other cycles developed by B. J. Palmer and Craven.[1,4]

Different CVS Perspectives

At least 5 perspectives on CVS theory emerged during this time period; more sophisticated cord pressure models, expanded etiologic and adaptive premises, inhibition and excitation methods associated with reflex zones, the use of technology to study and analyze physiological changes associated with CVS, and new theories about chronic and acute CVS care (Fig 10). This last perspective integrated some of the others but truly emerged in the crucible of the flu pandemic of 1918. The emerging instrumentation perspective was discussed earlier. The other perspectives will be explored next.

Acute Perspective. The impact that chiropractic had on the flu pandemic in the United States is difficult to gauge and important to frame for the modern reader. Forster and his team tried to capture it. He wrote[8]:

> During the influenza epidemic last year thousands of people suffering from this disease, as well as pneumonia, were cared for by Chiropractors. Many of the patients who received adjustments had been given up to die by their attending physician. They were not, therefore, what could be called favorable cases upon which to test out the merits or demerits of Chiropractic… But the fact remains that the majority owed their recovery to Chiropractic…Reports covering about thirty thousand cases were collected and statistics compiled thereupon showed that the mortality rate under spinal adjustment was almost insignificant, being less than one-eighth per cent.

He continued[8]:

> The published report of these remarkable results gave Chiropractic an impetus that could not have been equaled by fifty years of ordinary progress. It has shed an undying lustre on the profession. It has raised Chiropractic in the popular esteem to a degree impossible to estimate…

Forster cited one-eighth of a percent for fatality rates. The global mortality rate for this pandemic was 2.5%.[51] If Forster's statistics were correct, then chiropractors would have had greater success than orthodox medical approaches. A more detailed study is warranted to explore this further.

Forster reasoned that if 1 million case studies per year could be documented, this would provide statistically irrefutable evidence for the efficacy of chiropractic adjustments of CVS. To accomplish this, he suggested that the 10 000 chiropractors in the field produce case studies on 100 patients per year.[8]

Another aspect of the flu pandemic was captured in the writings of Drain while he was practicing in the countryside of Texas with a horse and buggy. Drain built his practice on house calls.[5] He wrote[5]:

> In the acute cases, I do not know of anything more acute than influenza or pneumonia. I kept a record of my cases up until I got sick myself and I submitted that

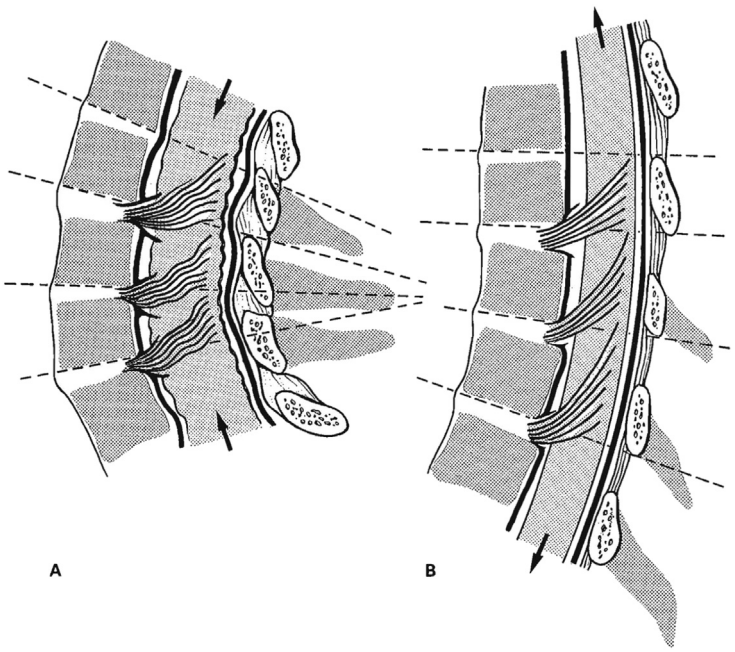

Fig 9. *The biomechanical effects of postural changes on the soft tissues in the cervical canal. (A) Extension. Slacked nerve roots and protruding ligamenta flava. (B) On flexion, elongation of the cord and nerve roots is permitted by the slackening of the cord tissue and elasticity of the fibers. (From Breig's adverse mechanical cord tension.[49] With permission from Michael Shacklock and Neurodynamic Solutions.)*

Subluxation Perspectives	Some New Hypotheses
Expanded Cord Pressure Perspective	• Cord pressures may develop from the cervical and sacral spine with referred pressure depending on degree of subluxation. Cord pressures may be located primarily at the upper cervical spine with various signs and symptoms as well as different clinical findings. This could arise from internal pathologies.
Excitation/ Inhibition Perspective	• Slow concussive forces may inhibit the nervous system and quick forces may excite. This approach may engage reflex systems associated with acupuncture meridians.
Adaptation Perspective	• Ability to adapt is central to the chiropractic paradigm. It may be diminished with chronic subluxations, the body's inability to adapt to ill-timed or unbalanced forces relates to subluxation etiology, may be related to a reserve capacity of nerves.
Chronic Perspective	• Distinct thermographic heat patterns, may have pressure but no interference, tissue adaptability is reduced, may be related to proprioceptive cycles or vertemere cycles.
Acute Perspective	• Causes inflammation, distinct thermographic heat readings, required more frequent adjustments based on innate contraction of forces.

Fig 10. *New hypotheses related to each of these perspectives.*

> record to the authorities down there, of attending 473 cases diagnosed by the health physician as Spanish influenza, or three-day fever. In the 473 cases not a single case developed pneumonia, and only three died.

This personal account gives the modern reader an appreciation for the intensity through which the acute CVS perspective was developed. Although it is unknown if any cause and effect relationships existed because no definitive information is available, chiropractors would spend the next several decades theorizing how their observations of positive health outcomes could be related to global changes in the central nervous system.[52-57]

Chronic Perspective. According to Drain, distinctions between acute and chronic CVS were developed in response to severe cases.[5] Stephenson and Craven also came up with chronic and acute models. Stephenson's vertemere cycle was a precursor to proprioceptive models of CVS.[4] Both Drain and Stephenson wrote extensively on momentum in health, disease, and "dis-ease." Craven hypothesized that chronic CVS may have periodic interference to nerve transmission.[12] Craven, Drain, and Stephenson, along with Firth, agreed with B. J. Palmer's dictum that CVS was the physical representative of the cause of "dis-ease."[4,5,16,58] Aspects of their work were incorporated by B. J. Palmer into the development of his later theories.[59,60] For example, Craven's line of reasoning about interference, based on his observations of thermography patterns in the early 1920s,[12] was later used by B. J. Palmer, who studied similar phenomenon for the next 10 years.[19,59,61]

Adaptation Perspective. Craven suggested that adaptation to the constant changes from the environment dictated the need for an increase of nerve current.[12] This theory refuted Forster's claim that the Palmer theory included a constant flow of nerve energy as an all or nothing principle of CVS.[20] Craven argued, instead, that adaptation required that nerves have a reserve capacity.[12]

For years, adaptation had been central to the philosophy of chiropractic and its relationship to the CVS.[4,31,54,62] Stephenson and Drain both included adaptation models as central to their theories.[4,5] Future research could test their hypotheses with current adaptation models such as modern theories like allostasis and salutogenesis.[63,64]

Excitation/Inhibition Perspective. Future theorists built not only on the works of the Palmers, Firth, Loban, Carver, Forster, Craven, Drain, and Stephenson but also those of Gregory and Riley. Riley incorporated Gregory's theories of excitation and inhibition along with the zone therapy meridian system. This affected reflex techniques, which were developed in the 1930s by theorists including Hurley, Logan, and DeJarnette.[13,39,65-67] B. J. Palmer and many of his students disagreed that inhibition and stimulation should be included in chiropractic because the approach was derived from therapeutic models.[59] In their paradigm, based on D. D. Palmer's theories, the chiropractic adjustment was enough to normalize the nervous system.

Years later, Carl S. Cleveland, a 1917 PSC graduate and founder of Cleveland Chiropractic School in Kansas City, refuted the concept of adjustment to stimulate or inhibit the nervous system. In the preface to his book, Cleveland wrote, "The purpose of an adjustment is not to depress or not to stimulate! But, to remove interferences with transmission, or pressures, from the affected nerve thus restoring normal nerve supply."[68] Cleveland then described how innate intelligence potentially decreased or increased the function of the organ systems. This principle is congruent with the teachings of the Palmers.

Critical Review and Discussion of Previous Works

There is little peer-reviewed literature exploring the CVS theories of this period, especially the works of Craven, Riley, Drain, and Stephenson. Even though Stephenson's text is well known, it is not well cited in the literature.

References to Stephenson usually indicate his 33 principles, not his CVS theories.[4,36,69-72] This era had an impact on future theory and so it is important to discuss some of the issues associated with it.

Examining this period of CVS theory leads to several other interesting areas of inquiry about chiropractic theory in general. Some of the distinctions made during this era are still relevant today, such as the systems approach, the differentiation of innate intelligence in terms of biological self-organization, the implications for differentiation to CVS theory, and the importance of including these issues in any critiques of philosophy or CVS theory in the modern literature.

Systems Thinking. D. D. Palmer's chiropractic paradigm arose from an early systems approach and a holistic worldview.[73] Several authors have equated D. D. Palmer's thinking to a systems approach.[73-75] The chiropractic paradigm views the biological organization of the organism within the greater context of environmental perturbations.[76,77]

Three examples illustrate how this short period continued that systems perspective. Instrumentation evolved into a global and systemic viewpoint about how the CVS affected long-term patterns.[78] The adaptation perspective situated the organism within the context of the environment whereby the CVS came to be viewed as a failure for the system to adapt to the environment.[47] The excitation/inhibition perspective was coupled to the zone therapy models developed by Riley, which evolved into several of the reflex systems whereby light contacts to the spine led to systemic spinal and neurophysiological changes.[79]

By the 1920s, chiropractors had been testing D. D. Palmer's paradigm in teaching, model building, rudimentary research, and applied clinical application for more than 2 decades.[3,5,20,80,81] This led to a sophisticated view of the living system, one that was congruent with the way the organismic biologists of the 1920s were also describing life. Biologists were searching for answers that distinguished biology from physics and chemistry. Organismic biologists sought to define biology as the organizing relationships amongst the parts.[82-84]

Stephenson's use of the term *organization* was congruent with the way the term was used by the organismic biologists of the 1920s.[77] In 1927, R. W. Stephenson wrote, "Then what is Innate Intelligence? Scientifically, it is the Law of Organization. (This is by no means a view of the physicists but is squarely in Chiropractic.)"[85] Biologists and chiropractors of the 1920s used the term *organization* in the same way that dynamical systems theorists and complexity theorists use the term *self-organization* today.[77,86] The chiropractic paradigm developed alongside twentieth-century theoretical biology.[76] By integrating this observation from history, new avenues of empirical research may be designed to study the ways the CVS and its correction might relate to the self-organization of living systems.

Differentiation of Innate Intelligence. Stephenson's differentiation of innate intelligence as the law of organization was a new distinction within the chiropractic paradigm and in relation to CVS theory. He wrote, "Innate Intelligence, the law of organization, continually coordinates the forces and materials within the organism to keep it actively organized."[85] Stephenson emphasized the biological organizational level of the living system. Stephenson's text was required reading at PSC for many decades. The impact of his text is difficult to overestimate because, in the first 75 years of the chiropractic profession, 75% of chiropractors graduated from PSC.[87]

Stephenson's distinction may have been the first differentiation within the profession of the biological elements from the spiritual elements of the original definitions of innate intelligence. Before this, the term *innate intelligence* was used by the Palmers and their students to depict several different ontological levels or categories of being, from soul to spirit as well as from basic biological organization to healthy function.[31,88-91]

D. D. Palmer first used the term *innate intelligence* in 1902 and 1903 to describe how the biological system adapts to the environment such as bony changes to stressors like the development of osteophytes.[90,92] He first used the term *intelligence* in 1872[93] as a synonym for "spirit" leaving the body during Mesmeric trance. Thus his first use of *intelligence* was part of a description of his own subjective experiences associated with his spiritualist belief system and early magnetic healing practices. It was not until 1905 that D. D. Palmer officially linked the term *innate intelligence* to the spiritual levels of being. That is, he used the same term to define different levels of being—biological, organizational, and spiritual.[91] Neither of the Palmers ever fully differentiated these ontological levels within the terminology.[31,89,94]

More recent perspectives have developed from Stephenson's differentiation by proposing that CVS could be viewed apart from the psychospiritual levels of the original innate intelligence definition.[72,77,95] From this perspective, the role of CVS in limiting the organism's ability to adapt and further self-organize becomes the central focus of the profession. This approach allows for a focus on chiropractic's raison d'être without delving into the complex definitions the Palmers associated with innate intelligence. This shift in terminology around the meanings of innate intelligence emphasizes the biological and physiological expressions of health, which are congruent with other CVS definitions of the era and in alignment with salutogenic orientations.[96-99]

The CVS definition originating from the PSC line of theory could now be discussed apart from the spiritual connotations that D. D. Palmer attributed to innate intelligence.[73,100-102] This is important because other CVS theorists also developed models during this period, all of which were distinct from the Palmer's philosophical language.[7,9,20,103,104] When CVS theory is compared with spiritual and philosophical theories, these differentiations and alternate terminologies are rarely cited.[105-107] These distinctions are often missed in the literature for various professional and intraprofessional reasons.[108]

Cognitive Dissonance. There is a trend in the literature that uses terms like *cognitive dissonance* in attempts to understand how chiropractors might reconcile CVS theory with evidence-based practice.[109] The assumptions in that argument are that all CVS definitions must contain a nonlogical element because of the traditional definitions.

Cognitive dissonance might be one way to explain how an individual deals with undifferentiated levels of being defined by the same term.[110] However, by separating the definition of innate intelligence and emphasizing the biological definitions in relation to CVS, this conflict is resolved. It may even establish a way to reintroduce psychospiritual aspects of health and well-being into the theory,[77] which would develop chiropractic theory more in line with D. D. Palmer's wider paradigm.[111]

Many complementary and alternative medicine (CAM) theories include psychospiritual and energetic dimensions of health. Micozzi[112] suggests that cognitive dissonance shows up as a double standard when science proves the efficacy of some of these methods. Micozzi wrote[112]:

> Cognitive dissonance for biomedicine leads to a great deal of thrashing about in an attempt to fit empirical observations into places where they cannot go, such as interpreting the vast diversity of healing phenomena routinely observed clinically and increasingly demonstrated scientifically.

It seems that early chiropractors were trying to answer complicated questions about health, healing, and well-being. Diverse research methodologies are needed to explore all of their hypotheses (Fig 11).[113,114]

Theory Distinctions and Confusions. This section will discuss what I perceive to be misunderstandings in the literature about distinctions made by the theorists in this period of 1916-1927[5-8,21,85,115] and address such distinctions discussed in the literature for at least 2 decades.[72,116-118] I will attempt to clarify between the Palmer definitions and other theories. I feel that it is important to avoid associating psychospiritual definitions to all CVS theorists.

The Murphy et al[107] critique of CVS focused on a 1902 compression model linked to D. D. Palmer's biopsychospiritual definition of innate intelligence. In their arguments, they did not include the complex literature on CVS that developed afterward. Instead, they built an argument for firing faculty from chiropractic colleges if they teach the chiropractic paradigm based on D. D. Palmer's models. Murphy et al wrote[107]:

> One of the problems that we encounter frequently in our interaction with chiropractic educational institutions is the perpetuation of dogma and unfounded claims. Examples include the concept of spinal subluxation as the cause of a variety of internal diseases and the metaphysical, pseudo-religious idea of "innate intelligence" flowing through spinal nerves, with spinal subluxations impeding this flow. These concepts are lacking in a scientific foundation and should not be permitted to be taught at our chiropractic institutions as part of the standard curriculum. Much of what is passed off as "chiropractic philosophy" is simply dogma, or untested (and, in some cases, untestable) theories which have no place in an institution of higher learning, except perhaps in an historical context.

The references they cite to support that statement have not been subjected to critical analysis in the literature.[119-122] Furthermore, there are no distinctions being made between dogma, metaphysics, CVS theory, or the body's inherent self-organizing capacity.[73,101] No primary historical references were used to support their conclusions.[107]

They also stated[107]:

> Faculty members who hold to and teach these belief systems should be replaced by instructors who are knowledgeable in the evidence-based approach to spine care and have adequate critical thinking skills that they can pass on to students directly, as well as through teaching by example in the clinic.

There are several areas in their argument that I disagree with. One is that they did not demonstrate knowledge of the recent literature on the topic. Another is that they did not recognize that many different CVS theories have evolved that do not rely on the Palmer's philosophical language. Finally, their references do not represent the decades of CVS theory that arose from clinical and empirical research or the differentiations described earlier that started during 1916-1927.

There are several initiatives in the profession today focused on bringing an evidence-based approach into the classroom.[123-125] One goal of teaching students evidence-based practice is so that they might learn about the different types of scientific evidence.[126] And yet there is no indication from these initiatives that an inclusion of evidence for CVS, such as clinical studies, case studies, and other forms of research, are being used, even though these form the basis of modern theory and practice. A balanced approach would be to embrace the type of pluralism advocated by Kaptchuk and Miller regarding integrating divergent epistemological approaches in health care.[127] This type of critical stance toward evidence-based practice coupled with an inclusive pluralism is important especially with regard to Villanueva-Russell's sociological assessment. She theorizes that a few academics in the chiropractic profession are attempting to control the profession's identity by using adherence to scientific standards as a rubric, engaging in "lexicon cleansing," and using the academic publications as a tool to achieve their goals.[128]

Not many current CVS theories still conflate philosophy, spirituality, and biological systems. If some do, they should use appropriate philosophical and methodological tools to distinguish between ontological levels, epistemological perspectives, and biopsychosocial research.[77,108,129]

Methodological Families	Examples of Methodologies
Phenomenology	• Ways for individuals to systematically view subjectivity in relation to direct experience: Husserlian phenomenology, introspection, meditation, and contemplation.
Structuralism	• Ways to objectively research the individual's internal experience such as quality of life, self development, and other patterns of direct experience that are recurring.
Autopoiesis	• Ways to study the inherent self-organizing processes of the body: cognitive science, self-organizing systems, complex systems, and dynamical physiology.
Empiricism	• Ways to research observable behaviors: anatomy, physiology, pathophysiology.
Hermeneutics	• Ways to research intersubjective understanding: medical anthropology, meaning across cultures.
Ethnomethodology	• Ways to study the intersubjective domains related to these ideas in the culture at large and within the chiropractic culture: semiology, genealogy, cultural studies, poststructuralism, and semiotics.
Social Autopoiesis	• Ways to research self-regulating systems: how the social system within the society or within the profession shape practices and interactions.
Systems Theory	• Ways to research the chiropractic profession and various aspects of the profession such as private offices and colleges within social and economic forces.

Fig 11. *Eight methodological approaches that could be applied to researching the complexity associated with the many definitions of innate intelligence and subluxation.*

I feel that one of the biggest challenges to exploring the history of CVS theory is to make adequate distinctions among philosophy, scientific theory, and hypothesis. By doing so, we may be better able to assess research programs. Viable theoretical models from the past might be used as starting points for future research, but first we need to understand it. Rather than dismissing theory from the past outright,[130] which may be due to misunderstandings and misinterpretations, we should master it, study how it evolved, and contrast prior theory with current theory and research. Only then can we be sure that all of the hypotheses about CVS have been tested.

Limitations

This article reflects one person's interpretation of historical writings and theories. Future reviews of the literature should include more systematic methods. Without detailed search parameters, inclusion and exclusion criteria, synthesis methods, a standard critical appraisal of the literature reviewed, and evaluation of bias, it is acknowledged that conclusions do need to be made with caution. A strength of this work is that it includes new insights into the history of the chiropractic vertebral subluxation based on primary and secondary sources, many of which have not been included in previous works. However, this research is limited by the writings that are currently available.

Conclusions

The chiropractic literature between 1916 and 1927 proposed new theories about living systems in relation to CVS. Theorists from that period viewed the body as a dynamically organized biological system. The role of the central nervous system was to adapt to the environment, centralize the self-organizing processes, and heal from various pathophysiological processes. The central chiropractic paradigm was that CVS impinged on the nervous system, which disrupted the inherent organizing capacity of the organism, leading to "dis-ease" and disease processes.

Chiropractic subluxation theory and its many methods of detection multiplied during this period. Acute and mild CVS were described and expanded on. Different types of chronic CVS were described. The vertemere cycle was developed to explain why CVS are self-perpetuating. Reflex zones were related to CVS for the first time by linking zone therapy's meridian theories to inhibition and excitation cycles. The CVS

in relation to cord pressures took on a new complexity both anatomically and clinically. Understanding the process of correction over time as a result of momentum and retracing also took on new dimensions. The CVS was situated in a much wider context in relation to the organism's adaptation to the environment. All these new insights added to the complexity of the concept and further proposed CVS as the basis of the chiropractic profession.

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Supervision (provided oversight, responsible for organization and implementation, writing of the manuscript): S.A.S.
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Practical Applications

- This series of articles provides an interpretation of the history and development of chiropractic vertebral subluxation theories.
- This series aims to assist modern chiropractors to interpret the literature and develop new research plans.

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