The Tao that can be completely explained is not the Tao itself.

Dao Dejing

INTRODUCTION

The aim of this chapter is to describe the biodynamic model of osteopathy in the cranial field (BOCF). To do this, we employ a dialectic, a weave of BOCF principles with BOCF science, presented within an historical context. Some of this material appears in Chapter 3 but within a different perspective. Note that certain words have an initial capital letter, indicating the use of a defined BOCF meaning, not a standard dictionary sense.

BOCF’s legacy extends back to Hippocrates, as reflected in the Hippocratic Oath’s axiom ‘do no harm’ and its concern for our triune (body-mind-spirit) integrity. Threads of Paracelsus-style empiricism and Avicennian experimentalism color the BOCF tapestry. The foundation of BOCF, however, is firmly grounded in the philosophy and practice of three osteopathic teacher-physicians, evolving from three lifetimes spent in general medical practice, working alongside the self-balancing, self-healing principles present in their patients.

The first of these teacher-physicians is Andrew Taylor Still (1828–1917), who ‘unfurled the flag of osteopathy’ in 1874. Dr Still sought ‘the Health’ in his patients, which was always present no matter
how sick his patients presented. This concept was fundamental to Still’s hands-on approach to care. ‘I love my patients’, he declared, ‘I see God in their faces and their form’ (Still 1908). The physician’s task, Still always reminded his students, was to remove with gentleness all perceived mechanical obstructions to the free-flowing rivers of life (blood, lymph and cerebrospinal fluid). Nature would then do the rest. Still formulated innovative concepts regarding the cranium and the cranial nerves and he famously proclaimed, ‘the cerebrospinal fluid [CSF] is the highest known element that is contained in the human body’ (Still 1899). His treatment techniques included gentle pressure on cranial bones, for example in the treatment of pterygium (Still 1910).

The second of these teacher-physicians is William Garner Sutherland (1873–1954), who developed osteopathy in the cranial field (OCF). Dr Sutherland was a student of Still and became imbued with Still’s thinking, methods and practice. Sutherland formulated his first cranial hypothesis as a student in 1899 while examining a temporal bone from a disarticulated skull. The thought struck him that its edges were bevelled like the gills of a fish, as if part of a respiratory system. Sutherland’s 1899 revelation initiated a life-long evolution of thought, described in subsequent sections of this chapter.

The third teacher-physician is James S Jealous (1943–) whose biodynamic model of OCF (BOCF) has attracted great interest and controversy within the profession. For over 30 years Dr Jealous has compiled oral histories from Sutherland’s students and he continues to research Sutherland’s writings (both published and unpublished). This ‘work with the elders’ enabled Jealous to compile an authoritative chronology of Sutherland’s journey. Thus BOCF dedicates itself to the perceptual odyssey where Sutherland left off at the end of his life.

**METAPHOR AND ARCHETYPE: THE KEEPERS OF THE KEYS**

Still (1902) wrote ‘... that life and matter can be united and that the union cannot continue with any hindrance to free and absolute motion’. Still’s concepts, from the beginning, were already beyond the capabilities of double-blind trials. What Still saw and understood, and Sutherland came to refine in his later writings, was the universal principle that the natural world is constantly changing and what is fixed (or without motion) becomes out of balance with its environment. Still considered osteopathy a science but when Still’s osteopathy extended beyond known science and rational explanation, he imparted his lessons by using metaphorical language. A metaphor uses familiar information to describe an unfamiliar idea. Metaphor provides a verbal bridge over the space between the speaker’s intention and the listener’s interpretation (Artaud 1938). This transformational space, metaphorically speaking, characterizes the learning space between teacher and student, the theatre space between actor and audience and the healing space between the practitioner and patient, where at a certain moment during an exchange something greater than the sum of the parts emerges.

Metaphors, despite being inherently non-rational, have long provided heuristic tools for approaching scientific problems (Chew & Laubichler 2003). Western culture, however, has difficulty grasping non-rational thought. The non-rational aspects of osteopathy (and other alternative medical systems) are the most difficult lessons to impart and the most difficult traditions to maintain. The man-as-triune truths that lay behind Still’s osteopathy became the victims of medical reductionism, casualties of our Western way of emphasizing the intellectual and eschewing the intuitive and instinctual. Reductionism limits our view of reality and our faculty of awareness (sense of consciousness). Alternative forms of consciousness, as expressed through dreams, poetry, music, painting, or as found in cultures outside the West, such as meditation or trance states, have remained undeveloped in our society. Limiting our knowledge to what can be proven in a reductionist experiment has consistently succeeded in excluding the human spirit from the Western medical model.

This lack of spirit has been a concern of BOCF practitioners, who gained insight and inspiration from Laurens van der Post (1962).
Man’s awareness since the Reformation has been so narrowed that it has become almost entirely a rational process, an intellectual process associated with the outside, the so-called physical, objective world. The invisible realities are no longer real. This narrowed awareness rejects all sorts of things that make up the totality of the human spirit: intuition, instincts and feelings, all the things to which natural man had access.

van der Post’s anthropological concepts have played an important role in our understanding of health and disease in society. BOCF practitioners have reclaimed the human spirit in their work, in part by use of poetic metaphor, e.g. ‘From Hensen’s node emerges the Primitive Streak, the landing strip of the Soul’ (Turner 1994).

Still no doubt acquired the skill of communicating symbolically rich language from his father, a Methodist minister. Sutherland, like Still, was a practiced wordsmith, having worked as a newspaper editor before training as an osteopath (Sutherland 1962). Still’s and Sutherland’s language reflected the intimacy of their connection with the natural world. Still was part of a pioneer family, where nature was ever present and its impression was deeply embedded upon his psyche. He matured among the Shawnee and other Native American peoples – primal cultures, in anthropological terms. ‘In indigenous, oral cultures, nature itself is articulate; it speaks. … There is no element of the landscape that is definitively void of expressive resonance and power …’ (Abram 1996). Abram quotes a Native American healer, whose words resonate with the writing of Dr Still:

In the act of perception, I enter into a sympathetic relation with the perceived, which is possible only because neither my body nor the sensible exists outside the flux of time and so each has its own dynamism, its own pulsation and style. Perception, in this sense, is an attunement or synchronization between my own rhythms and the rhythms of the things themselves, their own tones and textures.

Still’s landscape was peopled by individuals who saw things from a totally different cultural perspective. Highwater (1981) wrote: ‘Though the dominant societies usually presume that their vision represents the sole truth about the world, each society (and often individuals within the same society) sees reality uniquely’. Still’s and Sutherland’s unique cultural perspectives have been revived by BOCF practitioners. BOCF initially evolved in New England, a land imbued with the spirit of Ralph Emerson and Henry Thoreau. These 19th-century New England philosophers believed that the study of Nature, or being out of doors in the natural world, offered a cleansing of the mind and spirit (‘defacilitation’ in BOCF terminology) and enhanced the journey of self-discovery.

When Sutherland first published his insights (1939), osteopathy was undergoing a period of reductionism. Most practitioners focused on the mechanistic aspects of osteopathic principles and practices. Sutherland’s OCF represented a renaissance of Still’s osteopathy but by the time of Sutherland’s death in 1954, the OCF renaissance itself entered a reformational period, a reclaiming of the rational. Reformational OCF and its basic texts (Magoun 1976, Upledger & Vredevoogd 1983) have been embraced by many osteopaths as well as massage therapists, physical therapists and chiropractors. But Sutherland’s original renaissance has carried on, under the aegis of his osteopathic students including Anne Wales, Ruby Day, Rollin Becker and Robert Fulford (Cardy 2004).

As OCF has led to BOCF, the use of metaphor has led to the use of archetype. Whereas a metaphor is a figure of speech used to suggest a resemblance, an archetype is a universal symbol that evokes deep and sometimes unconscious responses in a reader or listener. Archetypes symbolically embody basic human experiences and their meaning is instinctually and intuitively understood. Jealous’s concept of ‘the embryo’ as ever present in the living organism is a key BOCF archetype. When studying the writings of the embryologist Blechschmidt (described below), Jealous was impressed by Blechschmidt’s conclusion that embryonic function (fluid motion) creates form and precedes structure. Jealous (2001) intuited from Blechschmidt’s reports that the embryologist must have witnessed the organizational forces of primary respiration at work, without the palpatory confirmation, given the reverence with which Blechschmidt & Gasser (1978) wrote:
The originality of embryonic human beings is discernible in many ways; for example, the early human conceptus is master of the whole geometry that it applies to itself. It is never mistaken about any angular sum and it is never deceived in any surface to volume ratio. It never sets an intersecting point on the wrong site and is master of every physical as well as chemical reaction.

The embryo, as an archetype of perfect form, serves as a blueprint for our body’s ability to heal itself. The formative, resorptive and regenerative fluid forces that organize embryological development are present throughout our lifespan, ready for our co-operation in harnessing their therapeutic potency. In other words, the forces of embryogenesis become the forces of healing after birth. It is to this state of originality and omnipotentiality that our Fluid Body is constantly returning, a process of ‘morphic resonance’ (Sheldrake 1981).

Among BOCF practitioners, every event within the therapeutic arena has a name. Nothing is referred to vaguely in terms of ‘energy’. The importance of naming is shared by primal cultures worldwide, notably the Bushmen of the Kalahari (van der Post 1961). According to the Bushman, an individual’s separation from that part of themselves that is connected to ‘everything else’ leads to fear and a sense of aloneness and this facilitates the disease process. Because treatment using the BOCF connects the patient to nature, the patient receives an immediate experience of ‘not-aloneness’ or ‘belonging’ in a deep way. Patients gain a physical sense of ‘community’, possibly for the first time in their life. As Wendell Berry (1996) emphasized, ‘The community is the smallest unit of health’.

In the next three sections of this chapter, we review OCF’s and BOCF’s evolution of thought, evolution of perceptual skills and evolution of treatment approaches – from the Bones to the Dura to the CSF to the Fluid Body. See Box 4.1 for a summary.

**EVOLUTION OF THOUGHT**

**Bones**

From his student days until the late 1920s, Sutherland concentrated on cranial bones, their sutures and foramina. Sutherland proposed that cranial sutures remain mobile throughout a person’s life. His hands-on insights predicted what is now known through histological studies – that most cranial sutures never completely ossify (Retzlaff & Mitchell 1987). Living sutures contain connective tissue, blood vessels and nerves. They maintain articular function and serve as crossroads of metabolic motion and somatic information. Sutherland’s deductive observations were confirmed by research completed by his osteopathic contemporary, Charlotte Weaver. She conducted experiments that led her to regard the bones of the cranium as modified vertebrae (Weaver 1936a). Fetal dissections supported her theory that the spinal column and the cranium are embryologically homologous (Weaver 1936b). Weaver characterized the sphenobasilar symphysis as a modified disk between occiput and sphenoid – plastic and capable of motion (Weaver 1938).

**Box 4.1 A chronology of OCF and BOCF evolution**

| 1910s–1920s | Sutherland studies the cranial bones and their sutures and foramina |
| 1930s, early | Sutherland begins experimenting with the dura and its infoldings (falx, tentorium) |
| 1930s, late | Sutherland shifts his focus to the fluctuation of cerebrospinal fluid and elucidates the Primary Respiratory Mechanism |
| 1943 | Sutherland describes the Breath of Life |
| 1948 | Sutherland begins working with Tidal Potency |
| 1951 | Sutherland stops motion testing, all fulcra occur in still points |
| 1960s | Sutherland’s writings are published, after editing by Ada Sutherland and Anne Wales |
| 1970s | Sutherland’s students Rollin Becker and Robert Fulford expand his post-1943 work |
| 1980s | Bar Harbor: at a meeting of osteopaths from England and New England, James Jealous links Sutherland’s insights to the works of Blechschmidt and van der Post |
Dura

In the early 1930s Sutherland shifted his emphasis to the dura and its bilaminar infoldings that form the falx and the tentorium, collectively known as the reciprocal tension membrane, which balances motion within the skull. Sutherland accessed the dura by gently gripping the cranium. The external periosteum is contiguous with the internal dura. Sutherland visualized one continuous web of connective tissue, from the cranium down to the sacrum – which he characterized as the tadpole-shaped ‘core-link’.

CSF

In the middle 1930s Sutherland shifted his focus to the fluctuation of CSF, driven by what he termed the Primary Respiratory Mechanism (PRM). He postulated that the PRM consists of five phenomena (Magoun 1976).

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

Sutherland described CSF circulating down and around the spinal cord in a rhythmically pulsatile and spiral fashion. Science has again caught up with his hands-on insights, thanks to advances in radionuclide magnetic resonance imaging (Greitz et al 1997). Magoun (1976) named this CSF pulsation the Sutherland Wave, after its discoverer. Many practitioners refer to the pulsation as the cranial rhythmic impulse (CRI), a term coined by Rachel and John Woods (1961). Clinical studies report a palpable CRI rate of 6–12 cycles/min, independent of cardiac or diaphragmatic rhythms (Magoun 1976).

The CRI phenomenon is poorly understood and its origin remains unknown (acupuncturists face a similar situation when asked to describe qi). Sutherland (1939) proposed that pulsations arise from rhythmical motions of the brain, causing dilatation and contraction of cerebral ventricles, generating a pulse wave of CSF. Magoun (1976) elaborated on this proposal and also posed an alternative hypothesis – that the choroid plexus produces CSF in rhythmic cycles and this oscillation generates brain motility. Upledger & Vredevoogd (1983) refined the choroid plexus hypothesis, calling it the ‘pressurestat model’. McPartland & Mein (1997) called the CRI a palpable harmonic frequency, a summation of several pulsations such as CSF oscillations, the cardiac pulse, diaphragmatic respiration, Traube-Hering modulations, rhythmically contractile lymphatic vessels, pulsating glial cells and other polyrhythms. This ‘entrainment hypothesis’ has been put forward independently (e.g. Milne 1998) and recently supported by experimental data (Nelson et al 2001). Many of these biological oscillators are lesioned by imbalanced autonomic tone (Schleip 2002), making the CRI variable and ephemeral. Indeed, in the face of severe dysfunction, the body’s rhythms may not co-ordinate into harmonics, resulting in an undetectable CRI. Thus from a BOCF perspective the CRI is a lesion phenomenon.

Fluid Body

Many osteopaths today work within the CRI models proposed by Magoun or Upledger but Sutherland moved on. In the final 10 years of his life, Sutherland described the PRM being generated by external forces. He sensed his patients being moved by an external ubiquitous force, which he called the Breath of Life (BoL). Sutherland perceived the BoL to be an incarnate process, passing through the patient’s body and the practitioner’s hands, undiminished. With the BoL concept Sutherland’s reverence for a self-correcting system had fully flowered.

The Breath of Life

Sutherland arrived at a conceptual transition, leaving those who followed with a bridge to the depth of osteopathic research and practice that places us upon a new and deeply challenging renewal of the ultimate truths of our profession. (Jealous 1997)

Sutherland’s bridge linked his students to Still’s earlier insights, such as ‘Life is the highest known force in the universe’ and ‘We are the children of a greater mind’ (Still 1902).
In the final years of his life, Sutherland’s perceptual language drew upon the natural world around his home in Pacific Grove, California. He spoke of his patients as if they were part of a sea, with waves that rhythmically move through the water and a tide that moves deeper, through both water and waves (Sutherland et al 1967). Sutherland was describing a polyrhythmic system (see Table 4.1). As the BoL transubstantiates into the PRM, it generates various harmonic rhythms in the body, such as the ‘Long Tide,’ the ‘2 to 3 cycle’ and the CRI. Becker (1965) described the Long Tide as the basal rhythm, its rate directly correlating with that of the BoL, oscillating at a frequency of six cycles every 10 minutes. Around 1988 Jealous described the ‘2 to 3’ (aka the 2 ½ CPM cycle) with a mean frequency of 2.5 cycles/min (Jealous 1997). The 2 ½ CPM is a harmonic of the Long Tide. It is not modulated by the central or autonomic nervous systems, making it a stable rhythm. Polyrhythms may explain the poor agreement seen in some OCF interexaminer reliability studies. For example, the interexaminer study by Norton (1996) reported low reliability between OCF practitioners. This study was flawed because one practitioner recorded the CRI rate while the other practitioner recorded the 2 ½ CPM cycle (Jealous, personal communication, 1997).

Sutherland (Sutherland & Wales 1990) compared the BoL to the cyclic, sweeping beam of light emitted from a lighthouse, ‘lighting up the ocean but not touching it’. The BoL sweeps through the patient, enlightening the healing forces already present in the patient. This allows the ‘Fluid Body’ to emerge, where the whole body behaves as if it were a single unit of living substance. The Fluid Body represents the BOCF equivalent of a Bose-Einstein condensate, where individual molecules lose their identity and form a cloud that behaves as a single entity (Cornell & Wieman 2002).

## EVOLUTION OF PERCEPTUAL SKILLS

### Bones

Sutherland’s initial osseous approach to OCF requires a sound palpatory comprehension of all surface landmarks of the cranium, at all stages of human development. This includes the contours of the 22 cranial bones, their interlocking articulations and many fissures and foramina. Normal and abnormal levels of tonus in extracranial muscles must also be appreciated, as well as tissue texture changes in cutaneous tissues.

### Dura

The dural model of OCF, like the osseous approach, requires a comprehensive grasp of anatomy. Perceptually, sensing the dura and the reciprocal tension mechanism requires the practitioner to palpate tissues beyond his or her fingertips. This seemingly esoteric skill is familiar to anyone who has driven an automobile on wet roads – feeling a slippery road surface through the steering wheel, sensing the road surface indirectly, through a series of linkages from the road through the tires through the wheel axles to the steering wheel.

### CSF

For practitioners working with the CSF and fluid fluctuations, anatomical knowledge is not sufficient. Rollin Becker admonished, ‘Studying the cadaver is like studying a telephone pole to find out how a tree works’ (Speece et al 2001). The requisite education comes from a study of living tissues in one’s patients. The practitioner visualizes ‘a state of rapport in the fluid continuity between the physician and the patient’ (Magoun 1976) by ‘melding the hands with the head’ (Upledger & Vredevoogd 1983). With training and practice the practitioner feels a subtle motion, much like the respiratory excursion of the chest, sensed as a

<table>
<thead>
<tr>
<th>Cycle name</th>
<th>Cycle rate</th>
<th>Cycle source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cranial rhythmic</td>
<td>6–12 cycles/min</td>
<td>Unknown. Possibly autonomic or pre-Neutral CNS activity</td>
</tr>
<tr>
<td>impulse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 ½ CPM cycle</td>
<td>2.5 cycles/min</td>
<td>Primary Respiration</td>
</tr>
<tr>
<td>Long Tide</td>
<td>0.6 cycles/minute</td>
<td>Breath of Life</td>
</tr>
</tbody>
</table>
broadening and narrowing of the head between the hands. This type of palpation represents a harmonic signal of several senses, including temperature receptors, mechanoreceptors and proprioceptors (McPartland & Mein 1997). Other yet unelucidated sensors may detect piezoelectricity or electrical fields as described by yogic practitioners (Green 1983). Milne (1998) achieved ‘visionary craniosacral perception’ by entraining his diaphragmatic breath, empathy and intent with those of his patient.

**Fluid Body**

Detecting polyrhythms and the Fluid Body requires practitioners to augment their ‘afferent’ activity and reduce their ‘efferent’ activity. In other words, practitioners must emphasize reception rather than transmission – the difference between listening to a radio and conversing on a cell phone. Even ‘melding the hands with the head’ may be too efferent. Conveying efferent forces into a patient creates a jumbled sense of ‘I–thou’. To detect the Long Tide and the 2 CPM cycle requires defacilitation of the practitioner’s central nervous system (Jealous 2001). Our consciousness, like our spinal cord, can become facilitated and noisy. According to Jealous, a quiet mind requires the cranial, thoracic and pelvic diaphragms to function without inhibition. This is accomplished by allowing the breath to become slow and regular and by softening the muscles above the pubic bone. These actions reportedly serve to ‘synchronize the practitioner’s attention’. As attention synchronizes and has room to breathe, the practitioner senses deeper rhythms and the signal shifts from the CRI rate to the 2 ½ CPM cycle. With deeper defacilitation, perception of the 2 ½ CPM cycle disappears into the Long Tide (Jealous 2001).

With enhanced perceptual skills, the practitioner eventually perceives a sense of Neutral, which is experienced as a homogenization of tissue, fluid and potency – the Fluid Body, where nothing under the fingertips can be discerned as a separate entity. This lysergic entity lies at the perceptual center of BOCF. The Neutral cannot be conceptualized, it can only be experienced. It is here that ‘holism’ becomes more than a philosophical concept; it can be appreciated as an actual sensory perception.

References to the Long Tide and the BoL appear in the first edition of Magoun (1951), possibly due to the influence of Paul Kimberly (Jealous, personal communication, 2001). But references to the BoL were expunged from later editions. ‘Osteopathy has shamefully hidden its greatest mystery and resources’ (Jealous 2001). A summary of some of the differences between OCF and BOCF is presented in Table 4.2.

**EVOLUTION OF TREATMENT APPROACHES**

**Bones**

Directly adjusting sutures and foramina affects the function of cranial nerves and vessels that traverse these apertures, as well as the function of muscles that originate or insert upon cranial bones. Some of Sutherland’s students continue to focus on bones and sutures, such as the American chiropractor DeJarnette, who founded sacral-occipital technique (Hesse 1991). Treatment of suboccipital muscles directly impacts the dura and may be helpful in patients with dural headaches and chronic pain syndromes (McPartland et al 1997).

**Dura**

Treating the reciprocal tension membrane with balanced membranous tension (BMT) is an indirect technique, performed by gently exaggerating the membrane’s strain patterns, balancing the tension in strained fibers with the tension present in normal fibers, effecting a release of the strain (Sutherland & Wales 1990). Many osteopaths work with this dural model and get good results. Lawrence Jones used his counterstrain technique to mold the falx and the tentorium. Beryl Arbuckle was an extraordinarily gifted practitioner of BMT.

**CSF**

Sutherland initially used direct hydraulic force, such as the CV-4 technique for compressing CSF in the fourth ventricle (Magoun 1976, Upledger & Vredevoogd 1983). The CV-4 induces therapeutic
changes around the body, possibly via peri-
aqueductal gray (PAG) tissue, which surrounds
the fourth ventricle. The PAG is lined with neuro-
receptors (opioid and cannabinoid receptors) and
it responds to stimuli (such as hydraulic pressure)
by activating these neuroreceptors, by releasing
endorphins and endocannabinoids and by
propagating pain-inhibitory signals to the dorsal
horn. The PAG is homuncular, like the somato-
sensory cortex, so the topography of the PAG
corresponds to different parts of the body
(J Giodarno, personal communication, 2002).

Most practitioners who work with the rhythmic
fluctuation of CSF focus upon the CRI rate, as
exampled by Magoun’s and Upledger’s models.
The CRI rate is also the focus of the Sutherland
Cranial Teaching Foundation (SCTF), although
the SCTF now incorporates the 2.5 CPM cycle and
the Long Tide into its curriculum (A Norrie,
personal communication, 2002).

CRI-oriented practitioners may bring about
therapeutic changes by inducing entrainment
(McPartland & Mein 1997). Entrainment was
first described in 1665 by Christiaan Huygens
(Strogatz & Stewart 1993). He noted that collections
of pendulum clocks began swinging in synchrony
with each other. This coupling phenomenon also
arises within organisms (e.g. cardiac pacemaker
cells) and between organisms (e.g. simultaneously
flashing fireflies, harmoniously chirping crickets
and women whose menstrual phases cycle
together). Huygens noted that the ‘strongest’ clocks
(those with the heaviest pendulums) established
the eventual, overall rhythm. McPartland & Mein
(1997) proposed that practitioners transferred
their ‘strong clock’ rhythms onto their patients
and enhanced this transfer by assuming a medita-
tive state before treating patients. Meditative,
centered states are known to produce strong
entrainment (Tiller et al 1996). Centering to harness
entrainment may be a widespread therapeutic
technique, albeit unrecognized by practitioners of
Feldenkrais, network chiropractic, polarity therapy,
reiki, therapeutic touch and Tragering. Chinese
practitioners center on tan tien, the ‘one point’,
about 5 cm above the pubic bone, whereas Tibetan
practitioners meditate on an image of the
Medicine Buddha centered at sahar chakrã.

### Table 4.2 A brief comparison of biomechanical and biodynamic models of OCF

<table>
<thead>
<tr>
<th>Biomechanical</th>
<th>Biodynamic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Techniques led by practitioner’s forces, directly or indirectly</td>
<td>Techniques follow movement within the system. Transmutative ability of the Tide is acknowledged. Tidal forces directly interface with pattern of disease. Practitioner follows closely</td>
</tr>
<tr>
<td>Axial motion in bones</td>
<td>Transmutational, translational motion</td>
</tr>
<tr>
<td>‘Mechanism’ used as a non-distinct collective term</td>
<td>‘Mechanism’ defined through specific elements (i.e. Breath of Life, Fluid Drive, Tidal Forces, different rates, etc.). Words have sensory foundations that are clearly stated</td>
</tr>
<tr>
<td>CRI is a primary expression of the BoL</td>
<td>CRI is not an expression of the BoL, nor is it a therapeutic force.</td>
</tr>
<tr>
<td>CRI 8–14 cycles per minute. Slower rates not identified</td>
<td>Basic rate is 2–3 cycles per minute; slower rates are specifically identified as primary to the system</td>
</tr>
<tr>
<td>Perception is automatic. Skills not delineated</td>
<td>Perception is a conscious, skillful act, requiring training and moment-to-moment adjustment, not automatic</td>
</tr>
<tr>
<td>Lesions are somatic and articular in nature</td>
<td>Lesions may occur at any level in the system. A lesion is seen as a unit of dysfunction in the Whole person</td>
</tr>
<tr>
<td>SBS is a primary site of orientation for lesion activity. Lesions are diagnosed and reduced by conceptual sequences beginning at SBS</td>
<td>Primary site is variable. Lesions are not automatically corrected; sequences are not conceptual. Priorities are established by the Tide</td>
</tr>
</tbody>
</table>
crown of the head (McPartland 1989). The new ‘Freeze-Frame’ technique focuses on the heart to achieve entrainment (Tiller et al 1996). All these techniques center attention on parts of the body rich in biological oscillators (intestines, brain and heart).

Tiller et al (1996) stated that feelings of empathy and love lead to strong entrainment. Jahn (1996) described the resonant bond between practitioner and patient as a form of love, transmitting ‘beneficial information’. Wirkus (1992) emphasized that the healer ‘... must feel and be the heart chakra. ... It is not thinking the word “love”, it is the real sensation of pure love which brings warmth, delicate vibrations in your heart area’. Fulford (1988) was precise: ‘You the [practitioner] stand neutral, acting as a conduit for the flow of divine love. As you learn to use love properly in healing work, your body vibrations increase and it becomes easier to handle the potency of the love energy’.

Entrainment has its limitations. It can only be employed by practitioners who work with the CRI. Practitioners working with slower rhythms avoid efferent activity, so no entrainment may be possible or desired. We limit our therapeutic potential when we focus solely on the CNS – whether we work with the CSF or the cellular vibrations of entrainment. We may also cause side effects and iatrogenesis (Greenman & McPartland 1995, McPartland 1996).

**Fluid Body**

According to a précis by Jealous (personal communication, 2004), ‘Cranial osteopathy is not about the cranium. It is about Primary Respiration’. Sutherland’s move from the CSF to the Fluid Body began with a technique he called ‘automatic shifting’. Paulsen (1953) described Sutherland’s sensation of a ‘motor’ starting in the CSF and then carrying on of its own accord, generating a healing force that treated several lesions around the body. ‘The core of this work is perceptual’, wrote Jealous (2001). ‘We learn to sense the Whole. When one meets a patient, one sees the Whole – a very rare event in our modern world.’ When a patient achieves a Neutral as described previously, the CNS becomes quiet (the person often falls asleep). With the CNS ‘out of the way’, the whole person – the CNS, CSF, all other fluids and all other tissues – merges into the Fluid Body. Within the protoplasmic Fluid Body, motion is purely metabolic, responding freely to the outside presence of the natural world and the BoL.

To harness the potency present in the BoL as expressed in the Tide requires ever more subtle techniques. In the final years of his career, Sutherland stopped all motion testing of the head and applied no forces to osteopathic lesions. He worked with fulcums in still points and stated, ‘treat not with techniques but gentle contact’ (Sutherland & Wales 1990). Working with the Health is a BOCF imperative, echoing Still (1899): ‘To find health should be the object of the doctor. Anyone can find disease’. Jealous (1997) described therapeutic changes requiring an ‘aboriginal and instinctual consciousness’ on the part of the practitioner, not intellectual or even intuitive: ‘The moment is filled with the effort to be present with the Health in the patient and the story as it unfolds into its own answer’.

**BOCF SCIENCE: QUANTUM CONSCIOUSNESS**

Osteopaths base their science in physics, whereas Western medical practitioners practice chemistry – their pharmacodynamic tools treat chemical moieties known as genes and gene products. Osteopaths recognize the A-T-C-G chemistry of genes but focus on the physics of the midline within the double helix itself. To wit, osteopaths focus on the double helix’s fourth dimension: time. DNA converts time into space. Surprisingly, this transmutation can be explained within the mechanistic model of Newtonian physics (Pourquié 2003). Many new ideas proposed by New Age healers operate within a Newtonian paradigm. Pert (2000) hypothesized that energy therapists heal their patients by inducing a vibrational tone that shifts neuroreceptors into their constitutively active state or the vibrations trigger the release of endorphins that activate the neuroreceptors. Oschman (2000) described crystalline materials within biological structures (e.g. phospholipids within cell membranes,
collagen in connective tissues) that generate electric fields when compressed or stretched (piezoelectricity). These energy fields may be the source of hands-on healing, a radical proposition but safe within a mechanistic paradigm.

Newtonian physics has undergone a paradigm shift to quantum physics, thanks to relativistic studies addressing subatomic phenomena and consciousness. Still’s writings suggest he had undergone a quantum paradigm shift. He knew instinctively that the healing events in his patients happened at the subatomic level but he did not have the words or the concepts of quantum physics to draw upon, to express the transformation he was experiencing in his treatments. Instead, he ascribed the return to health to God or Divine Nature at work.

Sutherland’s BoL exhibits characteristics that can only be explained by quantum theory (e.g. the theory of implicate order by Bohm 1980). The BoL transubstantiates into Primary Respiration, a field force that generates a spatial orientation, so it shares characteristics with the ‘morphogenetic fields’ described by Sheldrake (1981). Sheldrake’s concepts are very quantum: morphogenetic fields carry information only (no energy) and are available throughout time and space without any loss of intensity after they have been created. These non-physical ‘blueprints’ guide the formation of physical forms through three-dimensional patterns of vibration he called morphic resonance. The morphic resonance that generates form in the embryo is the same process that generates healing in the adult.

The role of consciousness in quantum theory is a radical departure from classic physics. The outcome of any experiment depends upon the consciousness of the observer. Indeed, the term observer should be replaced by the term participator. We cannot observe the universe, we are participants in it. Our individual consciousness is a small hologram of the universal consciousness shared by all living things. Capra (1996) named consciousness (‘the process of knowing’) as a key feature of life, including life forms such as plants and protozoans that lack a central nervous system. The protoplasmic Fluid Body shares this consciousness, which explains its ‘sensitive’ and ‘decision-making’ attributes (Jealous 2001).

From a BOCF perspective, Jealous (2001) acknowledged that the practitioner’s consciousness has a primary role in the depth of therapeutic changes arising in the patient. Jealous discovered that his therapeutic results improved in proportion to the extent to which he could free himself from conscious rationalization. He discovered, as did Sutherland, that the practitioner’s effort ‘… is to let the Breath of Life move us, allow us vision. … One’s effort must be from a “sense of the possibilities”’ (Jealous 2001). The following sections of this chapter review new research ‘around the edges’ of BOCF science.

Blechschmidt’s embryology vis à vis the BoL

Jealous (2001) characterized traditional osteopathy as a science based on anatomy, whereas BOCF is a science based on embryology. BoL practitioners have followed the work of Erich Blechschmidt (1902–1992), an unabashedly holistic embryologist. Blechschmidt (1977) maintained that the embryo is not only alive, it is fully functional at every stage of its development. According to Blechschmidt, each part of the embryo develops in motion and each motion impacts the development of each subsequent development. Early embryological development is largely epigenetic, guided by fluid dynamics. Blechschmidt’s concepts agree with BOCF practitioners, who postulate that the BoL, the external force described by Sutherland, generates a spatial orientation in the embryo. The spatial orientation becomes expressed in the material plane by fluid forces, perhaps by electromagnetic water hydrogen bonds (a concept that resonates with the ‘water imprint’ theory of homeopathy), generating a matrix that governs the embryo’s development. This conceptual agreement between Blechschmidt and BOCF places them on one side of a great debate. For the past 50 years scientists have argued over two theories regarding embryonic development: is it passive and ‘external’, driven by fluid dynamics, or active and ‘internal’, driven by the molecular activity of genes?

Neural crest cells (NCCs) are a focus of this debate. Migratory NCCs appear in the fourth week of human embryogenesis. As the lateral edges of the neural plate fold up and fuse at the
midline to form the neural tube, NCCs surf the crest of the wave generated by this zipper-like action. They follow highly replicated, stereotypical pathways. In our age of molecular medicine, advocates of active cell migration uphold the dominant paradigm. According to this view, migrating NCCs are directed by genes that express cell membrane receptors. NCC receptors sense molecular gradients in the extracellular fluid. Thus NCC migration has been described as chemotactic, guided by molecules such as integrins, cadherins and connexins (Maschhoff & Baldwin 2000). This molecular view is challenged, however, by phylogenetic inconsistencies – NCCs only appear in vertebrate embryos. Invertebrate embryos have no NCCs yet they express genes linked with NCC migration, such as BMP2/4, Pax3/7, Msx, Dll and Snail (Holland & Holland 2001). Vice versa, genes associated with vertebrate cell migration, such as CNR1 (Song & Zhong 2000), are absent in invertebrates (McPartland & Glass 2001, McPartland et al 2001). Plants, which are devoid of a CNS, also express integrin receptors (Lynch et al 1998), which aid plant cells in the perception of gravity (a very subtle force in non-ferrous materials). Perhaps integrin receptors are not chemotactic guides but in fact respond to subtle electromagnetic forces such as the BoL.

Blechschmidt argued that fluid dynamics permit migrating cells to overcome the inertial, thixotropic (viscous) behavior of embryonic extracellular fluid. The tensile quality of the fluid matrix provides a scaffold for the migration and movement of NCCs. BOCF practitioners correlate this concept with Sutherland’s description of the Tide acting as a fluid-within-a-fluid, expressing a tensile quality, with the ability to direct force. Blechschmidt’s theory has been verified by researchers around the world (see a dozen citations in Jesuthasan 1997) who injected latex beads into living embryos. Latex beads are inert objects incapable of molecular chemotaxis and lacking inherent motility. They nevertheless follow the migratory pathways of NCCs. The tensile fluid forces required for this kind of movement were demonstrated by Schwenk (1996), who used micropipettes to inject streams of fluids into water. Boundary surfaces arising between the moving fluid and the still water vortexed into organic forms (see Fig. 4.1). Experimental changes in fluid density or injection speed created different forms. In some experiments, the tensile quality of the fluid matrix created shapes that resembled the migratory path of neural crest cells. In other experiments the spatial orientations of fluid-in-a-fluid suggested CNS formation in the embryo, complete with dura and pia, cerebral hemispheres and a corpus callosum connecting the hemispheres (see Fig. 4.2). Schwenk’s experiments with fluid mechanics suggested that the geometric configuration of the embryo is present before the structure develops.

Genetic contributions

After the fluids lay down a matrix or blueprint, genetic expression subsequently organizes the cells and cell migration does indeed become active. For example, the initial wave of NCCs stops migrating and establishes a reticular lattice. This lattice provides a scaffold for the active chemotaxic growth of neurons, presaging the mature organization of the autonomic nervous system (Conner et al 2003).

Similar phenomena govern the growth of neurons, via a sensory and motor apparatus in their tip termed the growth cone. Growth cone pathfinding is partially guided by fluid forces, a passive process again demonstrated by the translocation of inert latex beads (Newman et al 1985). But genes also contribute to growth cone pathfinding, by expressing cell membrane receptors that are activated by extracellular ‘attractant’ or ‘repellent’ compounds. For example, UNC-40 and Eph receptors are activated by netrins and ephrins, proteins secreted into extracellular fluid. Activated UNC-40 and Eph receptors begin a molecular cascade that directs the cell’s actin cytoskeleton, thereby regulating growth cone motility (Dickson 2002). A veritable molecular soup guides neurons to their destinations. This complexity can be appreciated by the daunting task faced by commissural axons, which must grow towards the midline, cross it and then continue on their path without turning back.

Nevertheless, Blechschmidt emphasized that genes do not act; they react to external forces. The reaction of genes to hydrostatic pressure during
embryogenesis has recently been termed ‘the morphogenetic mechanism’ (van Essen 1997). van der Wal (1997) likened genes to the clay that forms a piece of pottery. Clay by itself cannot form into shape, it requires the hands of the artist. And the hands of the artist cannot act without the mind of the artist. From a BOCF perspective, clay represents the genes, the hands represent the fluid forces and the artist’s mind represents the BoL – the ‘deific plan’ or the ‘master mechanic’ often alluded to by Still. Anecdotally, we (JM and ES) attended a BOCF workshop the week that Venter et al (2001) published the human genome sequence. While scientists around the world pondered the paradox that an organism of our complexity could operate on only 30,000 genes (Claverie 2001), our workshop of BOCF practitioners confirmed the obvious necessity for epigenetic forces to make ‘decisions’ that shape embryogenesis.
Metabolic motion

Blechschmidt (1977) elaborated six different mechanisms by which fluids ‘behave internally’, creating function out of which emerges structure: contusion, distusion, dilatation, retension, detraction and densation. Later he added corrosion, loosening and suction mechanisms (Blechschmidt & Gasser 1978). These mechanisms are driven by the metabolism of cellular tissues. Cell metabolism potentiizes or depletes various fluids, which Blechschmidt termed ‘metabolic fields’. For example, the earliest bending of the embryonic disk – flexing into a ‘C’ shape – is due to a decrease in pressure from the collapse of the yolk sac (Drews 1995). Cellular metabolism depletes nutrients in extracellular fluids and causes a build-up of metabolic wastes. Sheets of cells adjacent to depleted fluids slow their growth and become the concavity of tissue curvatures. Concentration gradients of nutrients and wastes create fluid movements between sources and sinks. When these fluid movements canalize tissues they become embryonic blood vessels.

Sheets of cells, tissues and organs grow at different rates. The epithelial linings of these assemblages become restraining structures, generating form. The embryonic face, for example, arises as folds and furrows between an expanding brain and a beating heart (Blechschmidt & Gasser 1978). Growth differentials within the embryonic cranium create fluid patterns that later condense
into mechanical tension zones or mesenchymal restraining bands known as the dural girdles. They guide the position, shape and inner structure of the brain: ‘The resistances are not crude mechanical forces but delicate living developmental resistances’ (Blechschmidt 1961). The midline dural girdle between the cerebral hemispheres serves as a strong restrainer against the pull of the descending viscera and the eccentric growth of the cerebrum. This midline dural girdle is retained into adulthood as the falx cerebri. It initially cleaves the frontal bone, which is why the frontal bone, a single midline structure in most adults, functionally behaves like a paired bone. In some individuals this midline function is retained as structure, the metopic suture (Magoun 1976). Several paired dural girdles arise in the embryo and one of them is retained into adulthood as the tentorium cerebelli.

**Functional midline**

Another aspect of embryology that informs BOCF is the concept of a functional midline, around which our bodies and health must organize. The midline is the earliest expression of function within the embryo. A series of structures arises from the midline – first the primitive streak appears in the ectoderm, beginning at the caudal pole of the embryonic disk. Subsequently, the notocord develops within the endoderm, again growing from caudad to craniad. Days later, the neural groove forms along the midline, arising tail to head. During the fourth week of development, the neural tube closes at its two ends and the movement of fluid is no longer a circulation but a fluctuation. The amniotic fluid becomes the CSF. The lamina terminalis marks the closure of the cephalic end of the tube. This midline structure persists in the adult, at the roof of the third ventricle. It is the pivot point for all neural movement. During the inhalation phase of the PRM, the entire central nervous system spirally converges upon the lamina terminalis. During the exhalation phase, all tissues move away from the lamina terminalis.

Jealous (1997) described the midline arising from the Stillness, generated by the BoL. The functional midline remains present throughout our life and our structure and physiological motion remain oriented to the midline. The BoL comes into the body at the coccyx and ascends along the midline, radiating ‘like a fountain spray of life’ (Sills 1999). The conveyance of a midline bio-energetic force from tail to head has been described by numerous workers, perhaps first by the medical polymath Wilhelm Reich. Reich and his students independently described the PRM: ‘... confirmation of brain movement can be obtained from individuals who are free of armoring ... this movement is relatively slow and unrelated to arterial pulsations’ (Konia 1980). Interestingly, genetic mechanisms tend to work in the opposite direction, in a cephalad to caudad progression. This is best exemplified by the activation of a dozen Hox transcription factor genes (the ‘Hox clock’) that direct the formation of embryonic somites from head to tail. The sequence of Hox gene expression is co-linear with their gene order on the chromosome (Kmita & Duboule 2003).

The movement of the Tide can be palpated throughout the body, termed ‘Zone A’ by BOCF practitioners (Jealous 2001). Asian practitioners conceptualize this energy moving in channels, such as Chinese qi and Ayurvedic vata and its subdosha prana (McPartland & Foster 2002). The movement of the Tide can also be palpated outside the body, in the ‘auric field’ of various Eastern and Western energy workers, termed Zone B in the BOCF lexicon. Osteopaths such as Randolph Stone and Robert Fulford primarily worked in Zone B. Rollin Becker worked in Zone C, a field diffusing from the midline to the edges of the room (personal communication, J Jealous, 1999). Jealous (2001) emphasized that all these zones exist simultaneously, as do other domains, such as Zone D which extends from the patient’s midline to the horizon. The zones are useful diagnostic tools, augmenting the practitioner’s perceptual fields.

**Embryology learns from BOCF**

BOCF has learned from embryology but the relationship is reciprocal – BOCF has informed the science of embryology. Take the anterior dural girdle (ADG) for an example. The ADG arises
around the eighth week of pregnancy, as a condensate of strain patterns between the evaginating telencephalic vesicles (Fig. 4.3). According to most embryologists, the ADG regresses before birth. However, one of Jealous’s colleagues alerted him to a cranial strain pattern that he detected in several of his adult patients. They started calling it ‘the hoop’, describing its sensory feel. They organized perinatal dissections with Frank Willard PhD and discovered that the anterior dural girdle does not always involute before birth but sometimes remains as an anterior transverse septum (Fig. 4.4). In other cases the girdle regresses, although a strain pattern may remain in the fluids.

BOCF palpation also presaged the discovery of a dural bridge in the suboccipital region (Jealous, personal communication, 1999) and this structure is now known to persist in adults (McPartland & Brodeur 1999). The dural bridge attaches the dura to the posterior atlanto-occipital membrane (PAOM), a ligament that spans the OA joint.

Figure 4.3  The anterior dural girdle forming in an 8-week-old embryo, drawn as a thin double line between anterior and lateral telencephalic vesicles. (Illustration by McPartland, redrawn with permission from Blechschmidt & Gasser 1978.)

Figure 4.4  Neonate dissection of the anterior cranial fossa, looking from posterior to anterior, with the pons sliced and brain removed. Bilateral anterior transverse septae angle between the dissected midline falx and paired tentoria. (Photograph courtesy of the F.O.R.T. Foundation, www.BioDO.com.)
CARE AND ENHANCEMENT OF THE ATTENTION FACULTY

BOCF is taught within a clinically based program, where each step is designed as a journey to reawaken the intuitive and instinctual aspects of the practitioner’s mind. Our intuitive and instinctual faculties were called ‘primary perceptions’ by Pearce (1977), who described them as ‘part of nature’s built-in system for communication and rapport with the earth’. These abilities tend to disappear, like muscle atrophy, if they go unused. Thus intuition and instinct are present at birth but wither due to lack of use given today’s societal and educational burdens. Our intuition, instinct and perceptual vitality are also dulled by the stress of urban living and the pressures of our professional life.

Great care is taken in the choice of where practitioners receive BOCF training. The natural world is a necessary participant and instructor. Through his own experiences in the wildernesses of New England and Canada, Jealous learned how the deeper self, the human spirit, emerges upon encountering the natural world. Nature’s ‘spell of the sensuous’ quiets a person’s CNS, allowing boundaries to fall away between the individual and the whole. John Muir, a 19th-century American naturalist, spoke like an osteopath: ‘In nature, when we try to pick out anything by itself, we find it hitched to everything else in the universe’ (Muir 1911). The BOCF practitioner transports this natural-world phenomenon to the urban treatment room, incorporating an indigenous state of consciousness into everyday clinical practice.

It is important to recognize that what is observed during the course of treatment is not the result of mesmerism, colored by a vaguely vitalistic theory, but evidence of a precisely organized natural system which requires discipline and dedication in order to develop the practitioner’s perceptual faculty. Practitioners are currently in a unique position. Given our training in medical science and hands-on manipulative techniques, combined with the principles of Still and Sutherland, we can consult with the blueprint for health, namely embryological growth and development recapitulated as the forces of healing. But there is a caveat: without the proper preparation, this approach can be dangerous for the patient and an abuse of the practitioner’s commitment to the Hippocratic Oath. This model does not work with ‘energy’ but with the consciousness of the natural world.

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