REVISED EDITION

"A well-written, practical overview of craniosacral therapy, one of the safest and most effective techniques for improving health that I have found. I wish that more practitioners like Michael Kern were available."
—**Andrew Weil**, author of *Natural Health, Natural Healing*

WISDOM IN THE BODY

THE CRANIOSACRAL APPROACH TO ESSENTIAL HEALTH

Michael Kern
D.O., R.C.S.T., M.I.C.e.A., N.D.

WISDOM IN THE BODY

The Craniosacral Approach to Essential Health

MICHAEL KERN

D.O., R.C.S.T., M.I.Cr.A., N.D.

Pacific Distributing
Murrieta, California

North Atlantic Books
Berkeley, California

Published by:
North Atlantic Books
P.O. Box 12327
Berkeley, California 94712

Pacific Distributing
39582 Via Temprano
Murrieta, California 92563

Printed in the United States of America

Wisdom in the Body: The Craniosacral Approach to Essential Health is sponsored by the Society for the Study of Native Arts and Sciences, a nonprofit educational corporation whose goals are to develop an educational and cross-cultural perspective linking various scientific, social, and artistic fields; to nurture a holistic view of arts, sciences, humanities, and healing; and to publish and distribute literature on the relationship of mind, body, and nature.

North Atlantic Books' publications are available through most bookstores. For further information, visit our website at www.northatlanticbooks.com or call 800-733-3000.

ISBN-13: 978-1-55643-559-1

Library of Congress Cataloging-in-Publication Data

Kern, Michael, 1956–
Wisdom in the body: the craniosacral approach to essential health / by Michael Kern; foreword by Franklyn Sills.—Rev. ed.
p.; cm.
Originally published: London : Thorsons, 2001.
Includes bibliographical references and index.
Summary: "Presents a comprehensive introduction to the biodynamic approach to craniosacral therapy, a healing practice that aims to resolve the trapped forces that underlie and drive trauma-based patterns of disease and suffering in the body"—Provided by publisher.
ISBN 1-55643-559-2 (pbk)
1. Craniosacral therapy. 2. Holistic medicine.
[DNLM: 1. Manipulation, Osteopathic–methods. 2. Cranial Sutures—physiology. 3. Holistic Health. 4. Sacrum—physiology. WB 940 K39w 2001a] I. Title.
RZ399.C73K47 2005
615.8'2—dc22

2005015097

5 6 7 8 9 10 SHERIDAN 15 14 13 12 11

CONTENTS

Acknowledgments x
Permissions xi
List of Illustrations xiii
Foreword by Franklyn Sills M.A., R.C.S.T. xv
Introduction xvii

Chapter 1 *The History and Development of Craniosacral Work 1*

Beginnings 2
The Breath of Life 5
Spread of the Work 9

Chapter 2 *The Craniosacral Concept 12*

The Three Tides 13
Groundswell of the Breath of Life 23
The Holographic Principle 27
Original Matrix 32

Chapter 3 *The Primary Respiratory Mechanism 36*

Primary Respiratory Motion 37
Five Core Aspects 41
The Whole Body 78

Chapter 4 *The Intelligent Body 90*

Key Principles 91
Relationship between Structure and Function 92
Unity of the Body 94
Inner Source of Healing 97

Chapter 5 *Patterns of Experience 105*

Fulcra in Health and Disease 106
Inertial Patterns 112
Effects of Inertia 115

Chapter 6 *The Art of Diagnosis 123*

Aspects of Diagnosis 124
Preparing the Ground 125
The Art of Palpation 136
"Conversation" Skills 142
Perception 145

Chapter 7 *Essentials of Treatment 155*

Aims of Treatment 156
Heart of the Healing Process 157
Inherent Treatment Plan 164
Therapeutic Skills 170
Particular "Conversations" 175
Fluid Skills 182
Stillpoints 184
Treatment Practicalities 189
Return to Wholeness 195

Chapter 8 *A Holistic View 198*

Origins of Disorders 199
The Mind-Body Continuum 206
Body and Energy 216

Chapter 9 *Stress and Trauma 224*

The Nature of Stress and Trauma 225
Physiology of Stress and Trauma 227
Shutdown and Dissociation 232
Resources 235
Shock and Trauma Skills 239

Chapter 10 *Pregnancy, Birth and Children 248*

Start of Life 249
Pre-birth 250
Entering the World 260
Causes of Complications 267
Working with Babies and Children 276

Appendix: So You Want To Be a Craniosacral Therapist?
by Candice Marro R.C.S.T. 283
Glossary 288
References 303
Further Reading 322
Resource Guide 325
Index 327

ACKNOWLEDGMENTS

Sincere thanks and acknowledgments to Franklyn Sills, who has helped to synthesize many of the ideas in this book, and with appreciation for the depth and breadth of his vision, his profound contribution to craniosacral work and his friendship over many years.

Deep gratitude to H.H. Gyalwang Drukpa for his tremendous gift of presence, boundless compassion and faultless guidance.

Thanks to all my colleagues at the Craniosacral Therapy Educational Trust in London, in particular to Katherine Ukleja, Steve Haines, Sally Nealon and Colin Perrow for their contributions and editorial feedback.

Thanks to Christopher Muller, Richard Grossinger, Julie Brand and all at North Atlantic Books for their support of this work.

In memory of Ethel Blake, my grandmother, for her wisdom, encouragement and cheesecake.

For Doreen, my mother, for her love and support.

For Candice, my partner, whose love, patience and insight touch my heart.

For Alena, our daughter, whose laughter and big open eyes remind me of what's really important.

PERMISSIONS

Quotes have been reproduced with kind permission from the following:

American Academy of Osteopathy, *Diagnostic Touch: Its Principles and Application* (Dr. Rollin Becker D.O.; 1963 Yearbook)

—, *Diagnostic Touch: Its Principles and Application, Part 2* (Dr. Rollin Becker D.O.; 1964 Yearbook)

—, *Diagnostic Touch: Its Principles and Application, Part 3* (Dr. Rollin Becker D.O.; 1964 Yearbook)

—, *Diagnostic Touch: Its Principles and Application, Part 4* (Dr. Rollin Becker D.O.; 1965 Yearbook)

—, *The Collected Papers of Viola Frymann* (Viola Frymann D.O., 1998)

—, *The Biological Basis for the Osteopathic Concept* (Dr. I.M. Korr; 1960 Yearbook)

—, *Growth and Nutrition of the Body with Special Reference to the Head* (Dr. A.G. Cathie; 1962 Yearbook)

Dr. James Jealous D.O., *Around the Edges* (1996)

—, Healing and the Natural World; interview with Dr. Jealous, 1997

Dr. Harold Magoun Jr. D.O., F.A.A.O., F.C.A., *Osteopathy in the Cranial Field* (Harold Magoun D.O.; 1st ed.; Sutherland Cranial Teaching Foundation, 1951)

—, *Osteopathy in the Cranial Field* (Harold Magoun D.O.; 3rd ed.; Sutherland Cranial Teaching Foundation, 1976)

Dr. Michael Shea Ph.D., R.C.S.T., *Somatic Cranial Work* (Shea Educational Group Inc., 1997)

Franklyn Sills M.A., R.C.S.T., *Craniosacral Biodynamics Vols One & Two* - draft version (North Atlantic Books, 2001)

Dr. John Upledger D.O., O.M.M., in *Craniosacral Therapy* (John Upledger and Jon Vredevoogd; Eastland Press, 1983)

—, *Craniosacral Therapy 2, Beyond the Dura* (Eastland Press, 1987)

—, *Your Inner Physician and You* (North Atlantic Books, 1991)

—, *The Brain Is Born* (North Atlantic Books, 1996)

Cartoons have been reproduced with kind permission from:

Gerry Mooney, Dobbs Ferry, NY: *The Nervous System* (Figure 5.3) and *Animal Magnetism* (Figure 8.3).
Biff, London: *Craniosacral Therapists in Love* (Figure 7.1); text revised by Michael Kern.

Disclaimer

The following information is intended for general informational purposes only. Individuals should always consult their health care provider before administering any suggestions made in this book. Any application of the material set forth in the following pages is at the reader's discretion and is his or her sole responsibility.

LIST OF ILLUSTRATIONS

1.1 Bevel-shaped suture between temporal and parietal bones
1.2 The primary respiratory mechanism
2.1 Primary inhalation and exhalation
2.2 The primary respiratory system
2.3 Self-palpation
2.4 The three tides emerging out of stillness
2.5 The groundswell of the Breath of Life
2.6 The formation of a hologram
2.7 Implicate and explicate realms
3.1 External and internal rotation of the parietal bones
3.2 Circulation of cerebrospinal fluid
3.3 Formation of the neural tube
3.4 Embryological development of the central nervous system
3.5 "Ram's horn" motion of the brain
3.6 Inhalation and exhalation phases of the ventricles
3.7 Mature brain: the basic parts
3.8 Circulation of cerebrospinal fluid around the third ventricle
3.9 Cranial meninges and the formation of a venous sinus
3.10 Cranial reciprocal tension membranes
3.11 Inhalation/flexion phase of the reciprocal tension membranes
3.12 The core-link; pulley-motion as the sacrum is rocked into flexion
3.13 Bones of the skull—side view
3.14 Bones of the face—anterior view
3.15 Axes of rotation
3.16 Inhalation/flexion of midline bones
3.17 Exhalation/extension of the sphenoid and occiput
3.18 Connective tissues (fascia) hanging from the cranial floor
3.19 Formation of spinal nerves with connective tissue coverings
3.20 Major transverse diaphragms

3.21 Spinal curves in flexion and extension
3.22 Whole body primary respiratory motion
3.23 Primary respiratory motion
5.1 The three tides generated as radiances around the primal midline
5.2 Patterns of experience
5.3 The nervous system (cartoon)
5.4 Facilitated segment
5.5 The effects of spinal nerve facilitation
6.1 Practitioner fulcra
6.2 Craniosacral contact
6.3 Sensory homunculus—indicating the proportion of the brain used to process sensory information
7.1 Craniosacral therapists in love (cartoon)
7.2 Indirect approach
7.3 Direct approach
7.4 Hand contacts for working with the frontal bone
7.5 V-spread process for the squamosal suture (between temporal and parietal bone)
7.6 Hand position for CV4
7.7 Harmonic relationship between the cranium and pelvis
8.1 Formation of entrapped force vector
8.2 Rings of experience
8.3 Animal magnetism (cartoon)
8.4 Major chakras and their related organs
10.1 A baby's skull
10.2 i) The four parts of the occiput at birth; ii) Distortion of the occiput
10.3 Anterior presentation—the baby's face moves past the mother's sacrum

FOREWORD

Health is universal. It is an expression of universal creativity. We live in a constantly creative universe. Each moment is a moment of creation. Our human system is an expression of this constant, moment-to-moment creation. Creation unfolds its intentions via the *Breath of Life*, a term used by Dr. William Garner Sutherland to denote the intentions and actions of a universal Creative Intelligence at work. This mysterious Intelligence, which we might call God or the divine, manifests its creative principle from the moment of conception until the day we die. This is expressed within the embryo as cellular motion and development.

Dr. Sutherland maintained that the Breath of Life generates a *biodynamic potency* within the fluids of the body. This is an ordering force which orchestrates the form and function of the human body-mind. It is this biodynamic potency that maintains the original intention of a human being as an inherent blueprint of health, one which has an active physiological function. The potency of the Breath of Life maintains the health of every cell and tissue, and allows them to function in specific ways. It is within this process that organization is sustained and the experiences of life are centered and compensated for. The unfolding of the human system is thus a living biodynamic process in which the Breath of Life is constantly manifesting its creative intentions.

In this book Michael Kern D.O. introduces a craniosacral approach that outlines a biodynamic perspective within a clinical context. This is not an easy task, yet such an introductory text is sorely needed. This viewpoint represents a paradigm shift from the concept of a *primary respiratory mechanism*, which expresses a mechanistic rhythmic impulse, to a dynamic system of tidal unfoldments that express the ordering imperatives of the Breath of Life. A biodynamic perspective is one in which the primacy of the Breath of Life is perceived and understood. It is one in which the action of the Breath of Life and the forces it generates are the focus for therapeutic work.

In the original cranial concept, the primary respiratory mechanism is outlined as a grouping of anatomical and physiological functions and parts, which express a primary and subtle

respiratory motion. It is composed of:

1. the inherent fluctuation of cerebrospinal fluid
2. the inherent motility of the brain and spinal cord
3. the mobility of reciprocal tension membranes
4. the articular mobility of the cranial bones and
5. the involuntary mobility of the sacrum between the iliac bones of the pelvis.

The perceptual shift to the primacy of the Breath of Life as our motivating and organizing factor is the foundation of a biodynamic understanding of the human system. Within this viewpoint, the human system is seen to organize as a unified field around the imperative of the Breath of Life. Thus the concept of a primary respiratory mechanism, composed of tissue and fluid elements, shifts in emphasis to a wider system that expresses the primary respiratory function of the Breath of Life. Hence, the *primary respiratory mechanism* (P.R.M.) becomes the *primary respiratory system* (P.R.S.). This includes:

- the Dynamic Stillness at the heart of all motion;
- the potency of the Breath of Life per se, which is called the Long Tide. This is a bioelectrical matrix organized around the primal midline of the body;
- the organizing and integrating function of the potency of the Breath of Life within the fluids of the body;
- the organization of the fluid and tissue systems to the imperative of the Breath of Life and its blueprint;
- the expression of primary respiration, in cycles of inhalation and exhalation, involving tissues, fluids and potency as a unit of function.

I have known Michael for many years now and know him to be a consummate clinician and experienced teacher. He is well placed to attempt to introduce concepts which are not easy to describe to a wider public. In the chapters that follow, Michael unfolds these concepts in a clear way from his own understanding and clinical practice. Again, this is not an easy task, as the observations we make are always filtered through our personal perceptual processes and current use of words and terminology. I feel that Michael has done an admirable job here. In the end, the journey is to experience and explore these phenomena for ourselves, both inwardly and in relationship. This book is an important contribution to the field, and I hope it will be widely read.

Franklyn Sills, Devon, England, January 2001

INTRODUCTION

My own story with craniosacral work began over twenty years ago when as a disaffected college drop-out I first went for treatment. I was at a crossroads that seemed so big that I froze with fear. What was I going to do with my life? A tiredness had come over me that carried on for months. I felt a constant tightness in my head and struggled to drag myself out of bed each day. My family doctor told me I had probably picked up a bug, but I left his office feeling that he really didn't know what was happening. Around the same time some close friends were enthusiastically singing the praises of a nearby craniosacral practitioner, so in despair I called for an appointment. I turned up for treatment with no idea of what to expect.

The thing that I most remember about those first appointments was how I felt heard. This was not because of any verbal reassurance or a sympathetic ear—although I'm sure that helped—but because I had never been touched in that way before. My therapist put his hands on my head, hardly making contact, and waited there in silence. I had never experienced such a light and yet penetrating touch, or been in such close and yet spacious contact with another person. Within that contact it was as if the whole of me was being held—mind, body and heart.

Furthermore, this was not just a passive or static process, as I could sense a powerful reorganization taking place inside me. There was a clear and dynamic communication going on between the practitioner's hands and my body. His hand contacts had a precision and appropriateness, as if some primal part of me was being acknowledged. Slowly, I began to notice that there was something else, apart from my own confusion and the tightness my body had been carrying. I began to be aware of a depth of presence and healing and started to let go.

With the help of craniosacral treatments, the pressure in my head lifted, my energy returned and step by step I began to find my feet. I wanted to understand what had happened and how it worked, so I started to take various holistic medicine courses and seminars—and got hooked! After apprenticing with some wonderful and supportive teachers, I set up in practice. However, I soon reached another point when I didn't know my next step. Should I enroll on

in a lengthy osteopathic training and make a full commitment to this work? I decided to take some thinking time and travel along the West Coast of the United States. One evening, with my money running out and the heaviness of indecision looming, I went to a Chinese restaurant just south of San Francisco. At the end of the meal the waiter brought some tea and a fortune cookie. When I opened the cookie, the enclosed words leaped out at me: "*You will best succeed in a profession dedicated to the service of humanity!*" Prophetic intervention or not, it seemed enough to confirm my wish to study osteopathy, so I returned to England to start the process of enrollment.

To my relief and surprise, and despite the reams of academic study and rote learning necessary to get through exams, I actually enjoyed going back to college. I became more intrigued by the healing power of nature and the inexorable wisdom of the body. It was in osteopathy school that my explorations into craniosacral work as a practitioner began, and I started to dig deeper. A few years later, as I began teaching craniosacral skills to osteopathic students and other health-care professionals, I found that attempting to communicate this work to others is a great excuse to further my own understanding.

This book has formed out of these years of treatment, learning, practice and teaching. My intention here is to present an outline of the craniosacral approach that is accessible for the layman who wants to dig a little deeper into "how things work." I hope it will also be a valuable resource for craniosacral therapy students and other practitioners.

I hope to acquaint the reader with the fundamental principles of craniosacral work by looking at its developments, from the initial insights of its founder, Dr. William Garner Sutherland, to the present day. In the process I will consider the layers of physiological functioning that essentially affect our health, in order to appreciate how we can work with ailments at the level of their origins. This book is intended not as an instruction manual but as a guide to natural laws of healing and how they are applied in craniosacral work. Through these pages I hope the reader will grasp the immense potential of this approach to reconnect us to our source of health.

Over recent years craniosacral work has become one of the fastest-growing natural therapies. Increasingly, people have been coming for treatment because of their experiences at a grass-roots level. Patients of all ages and with a wide variety of conditions have been finding improvements in their health. Yet why these results occur has remained very much a point of debate. This is perhaps because, on the surface at least, nothing much seems to happen during the treatment process. Unfortunately, many of the propositions that have been put forward take only a partial view of how we function. Any view that fragments us into our constituent parts, and in the process loses sight of the wider picture, tends to lead to confusion.

This book presents a *biodynamic* approach to craniosacral work[1]—that is, one that acknowledges the inherent life-force in the body and our intrinsic wholeness. In our materialistic, mechanistic age, because we often lose sight of the fact that we are more than just a collection of tissues, bones and fluids, we may attempt to seek explanations in physical terms only. Yet the acknowledgment of a vital force is at the heart of the craniosacral concept and was deeply appreciated by Dr. Sutherland. He called it the *Breath of Life* and considered it to be the fundamental principle that maintains order and balance in the body.

The biodynamic approach has been further developed by practitioners such as Rollin Becker, James Jealous and Franklyn Sills. This book also includes insights from practitioners in related fields such as conventional allopathic medicine, physics, the spiritual traditions, psychotherapy and other therapy forms. These can all add to our understanding and perspective about how we function.

I'm aware that a lot of jargon can creep into explanations of craniosacral work and some of the concepts can be difficult to describe in words, as they are largely experiential and subjective. Consequently, I apologize if any ambiguity remains but hope that you, the reader, will feel encouraged to investigate with your own experience what is being described. As the old saying goes, "an ounce of practice is worth a ton of theory."

While the use of some jargon is unavoidable, I've tried to stay with the language used by the founders of this approach, with the intention of encouraging consistency. In many cultures it is said that if we call something by its true name, then we can understand its nature.[2] Furthermore, craniosacral therapy is an approach that touches many levels of our experience and at the same time is firmly grounded in the anatomy of the body. This is where much of the power and efficacy of the work comes from. Consequently, many anatomical terms are used, but these have been kept to a minimum in order to make this book as accessible to the lay reader as possible.

In this second edition, the text has been revised and updated, with certain sections added and others reorganized. I trust these revisions will help to clarify the biodynamic approach of craniosacral work and that the book may serve as a bridge between this way of working and other approaches.

I hope that nobody is put off by my use of the male pronoun when referring to a practitioner. This does not imply any sexism, nor that highly skilled female craniosacral practitioners are not in abundance. In fact, women are often more able to develop the palpatory and perceptual skills required for craniosacral work. As the English language doesn't have any neutral pronouns, it seems more natural to stick to describing things from my own experience.

Where the experiences of patients are described, although names have been changed, their true gender has been kept.

For me, this whole arena of work has been a journey of discovery. Each new patient who comes into the clinic is a teacher when I listen to the unique story intelligently manifesting in his or her body. If this innate intelligence is appreciated, living skills rather than theories or techniques can be employed to support it. Biodynamic craniosacral work is basically simple in its application. It is about how we can listen to the wisdom that is at our core, and help it to restore balanced motion and health in our lives.

By contacting the core levels of health, the craniosacral approach is a gentle and powerful tool for the relief of suffering. It is an exploration into the essence of healing, one that has the potential to lead us to the deepest roots of our being.

Michael Kern, January 2005

1

THE HISTORY AND DEVELOPMENT OF CRANIOSACRAL WORK

Worms will not eat living wood where the vital sap is flowing; rust will not hinder the opening of a gate when the hinges are used each day. Movement gives health and life. Stagnation brings disease and death.

PROVERB IN TRADITIONAL CHINESE MEDICINE

BEGINNINGS

My belief is in the blood and flesh as being wiser than the intellect. The body-unconscious is where life bubbles up in us. It is how we know that we are alive, alive to the depths of our souls and in touch somewhere with the vivid reaches of the cosmos.
D.H. LAWRENCE

Around the start of the twentieth century a final-year student of osteopathy named William Garner Sutherland was examining a set of disarticulated human skull bones in his college laboratory. As with other students of his time, Sutherland had been taught that adult cranial bones do not move because their sutures (joints) become fused. However, he realized that he was holding in his hands adult bones that had become easily separated from each other.

Like the gills of a fish

While examining some of the bevel-shaped sutures of the cranium, including those at the temporal and parietal bones (see Figure 1.1), Sutherland had an insight that changed the course of his life. He described how a remarkable thought struck him like a blinding flash of light.[1] He hit upon the idea that the sutures of the bones he was holding were like the gills of a fish and designed for some kind of respiratory motion. He didn't understand where this thought came from, nor its true significance, but it echoed through his mind.[2]

William Sutherland set out to try prove to himself that, as he had been taught, cranial bones do not move. As a true experimental scientist, he reasoned that if cranial bones did move and that if this movement could be prevented, it should be possible to experience the effect. So he designed a kind of helmet made of linen bandages and leather straps that could be tightened in various positions, thus preventing any potential cranial motion from occurring.

Cranial movement

Experimenting on his own head, he tightened the straps, first in one direction and then in another. Within a short period of time he started to experience headaches and digestive upsets. This response was not what he was expecting, so he decided to continue his research to find out more. Some of his experiments with the helmet led to quite severe symptoms of cranial tightness, headaches, sickness and disorientation. Of particular interest was that when

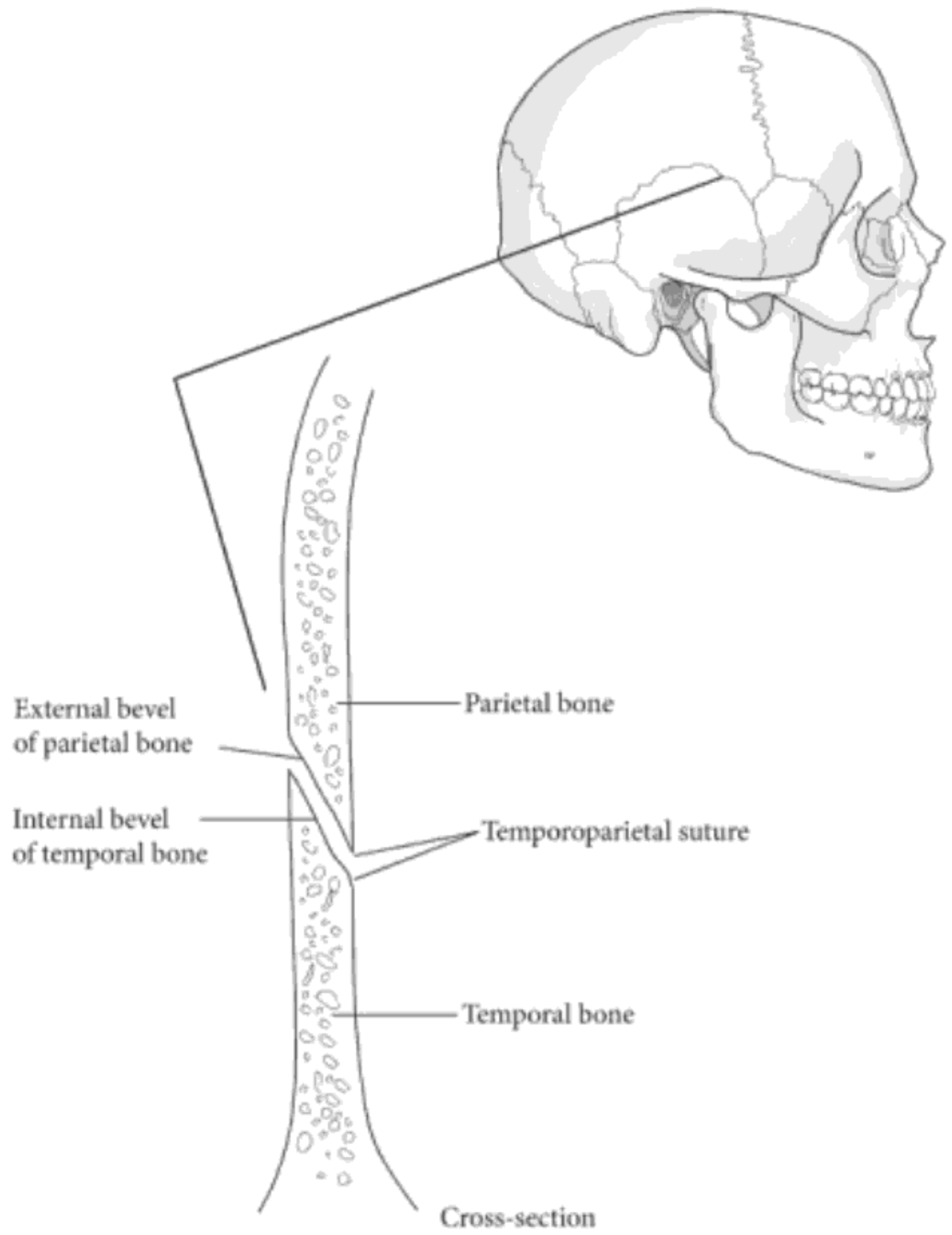

Figure 1.1: Bevel-shaped suture between temporal and parietal bones

the helmet straps were tightened in certain other positions, it produced a sense of great relief and an improvement in cranial circulation.[3]

After many months of pulling and restricting his cranial bones in different positions with these varying results, Dr. Sutherland eventually stopped this research, having convinced himself that adult cranial bones do, in fact, move. Furthermore, the surprising responses that he felt in his own body had shown him that cranial movement must have some important physiological function. Sutherland spent the remaining fifty years of his life exploring the significance of this motion.

Historical acceptance

Although most Western countries did not recognize cranial motion, this possibility was not new to other cultures. There are various Asian systems of medicine such as acupuncture and Ayurveda that have long appreciated the subtle movements which occur throughout the body caused by the flow of vital force or life-energy. This has also been traditionally taught in Russian physiology. Interestingly, anatomists in Italy in the early 1900s were already teaching that adult cranial sutures do not fully fuse, but continue to permit small degrees of motion throughout life.[4]

Cranial manipulation has been practiced in India for centuries, and was also developed by the ancient Egyptians and members of the Paracus culture in Peru (2000 B.C. to 200 A.D.).[5] Furthermore, in the eighteenth century, the philosopher and scientist Emmanuel Swedenborg described a rhythmic motion of the brain, stating that it moves with regular cycles of expansion and contraction.[6]

Tissue breathing

From an early stage of his investigations, Dr. Sutherland realized that he was exploring an involuntary system of "breathing" in tissues, important for the maintenance of health. At a fundamental level, it is this property to express motion that distinguishes living tissues from those that are dead. Dr. Sutherland perceived that all cells of the body need to express a rhythmic "breathing" in order for them to function to their optimal ability. Much of his research was carried out by combining a profound knowledge of anatomy along with finely tuned tactile and perceptual senses. He discovered that these subtle respiratory movements can be palpated by sensitive hands. He also started to realize that this motion provided a wealth of clinical information.

An interdependent system

Dr. Sutherland recognized that the motion of cranial bones is connected to other tissues with which they are closely associated. The membrane system, which is continuous with cranial bones along their inner surfaces, is an integral part of this phenomenon. Significantly, Dr. Sutherland also found that the central nervous system, and the cerebrospinal fluid that bathes it, have a rhythmic motion. The sacrum, through its dural connections to the cranium, also forms part of this interconnected system. Thus, there is an important infrastructure of fluids and tissues at the core of the body that expresses an interdependent subtle rhythmic motion.

As Dr. Sutherland dug deeper into the origins of these rhythms, he realized that there are no external muscular agencies that could be responsible. He concluded that this motion is produced by the body's inherent life-force, which he referred to as the *Breath of Life*—taking this name from the Book of Genesis in the Bible.[7]

THE BREATH OF LIFE

Think of yourself as an electric battery. Electricity seems to have the power to explode or distribute oxygen, from which we receive the vitalizing benefits. When it plays freely all through your system, you feel well. Shut it off in one place and congestion results.[8]
DR. A.T. STILL

The inherent life-force of the body, the Breath of Life, was seen by Dr. Sutherland to be the animator or spark behind the rhythms he discovered.[9] Alluding to the source of this phenomenon, other practitioners have referred to it as the soul's breath in the body. The Breath of Life is considered to carry a subtle yet powerful potency or force that generates subtle rhythms as it is transmitted into the body.[10] Dr. Sutherland realized the particularly significant role played by cerebrospinal fluid in expressing and distributing the potency of the Breath of Life. As potency is taken up by the cerebrospinal fluid, it produces a tide-like motion that is described as its *longitudinal fluctuation*. This motion has great importance in carrying the Breath of Life throughout the body and, as long as it is expressed, health will follow.

Expressions of health

Dr. Sutherland believed that the potency of the Breath of Life carries a basic Intelligence (which he spelled with a capital "I"), and he realized that this intrinsic force could be effectively employed by the practitioner for promoting health.[11] An essential blueprint for health is carried in this potency, which acts as a basic and powerful ordering principle at a cellular level. This integrates the physiological functioning of all the body systems. A similar concept is found in many traditional systems of medicine, where the main focus for healing is also placed on encouraging a balanced distribution of the body's vital force.[12]

The presence of full and balanced rhythms produced by the Breath of Life signifies a healthy system. As long as these rhythms are expressed naturally, the body's essential ordering principle is harmoniously distributed. Therefore, these rhythmic motions are primarily an expression

of health. Their existence ensures the distribution of the ordering principle of the Breath of Life, and their restriction can have far-reaching consequences.

This brings us to two basic tenets of craniosacral work:

1. Life expresses itself as motion.
2. There is a clear relationship between motion and health.

Dr. Harold Magoun D.O., a student and colleague of Dr. Sutherland, described the intelligent action of the Breath of Life in the following way:

> *All life is manifested in energy or motion. Without motion, in some degree, there can only be death. Furthermore, motion is essential to function. But that motion must be intelligent and purposeful for the living organism to successfully compete with its environment. Hence that motion must be guided and directed by a Supreme Being. There must be a channelling of the Universal Intelligence down to the individual cell or organism. Otherwise all would be chaos. What is the Supreme Intelligence? How does the channelling take place? No one knows for sure. The fact remains that the existence of such is a positive and irrefutable fact which is emphasized by the world's greatest scientists.*[13]

Primary respiratory motion

Dr. Sutherland named the interdependent system of tissues and fluids at the core of the body the *primary respiratory mechanism* (see Figure 1.2). As the subtle rhythmic motion of these tissues is not under voluntary muscular control, they are also sometimes referred to as *the involuntary mechanism* (or I.V.M.). Sutherland used the term "primary" because this motion underlies all others. It is the manifestation of the life-stream itself. Each cell expresses *primary respiration* throughout its life. Significantly, many different symptoms and pathologies that involve both body and mind can be traced back to disturbances of primary respiration.

There are, of course, other vital rhythms in the body such as the heartbeat and lung breathing. Although necessary for the maintenance of life, these are considered secondary motions because they are not the root cause of the body's expression of life. Without the Breath of Life these other rhythms could not be present. Lung respiration—the breath of air—is therefore sometimes called *secondary respiration.*[14]

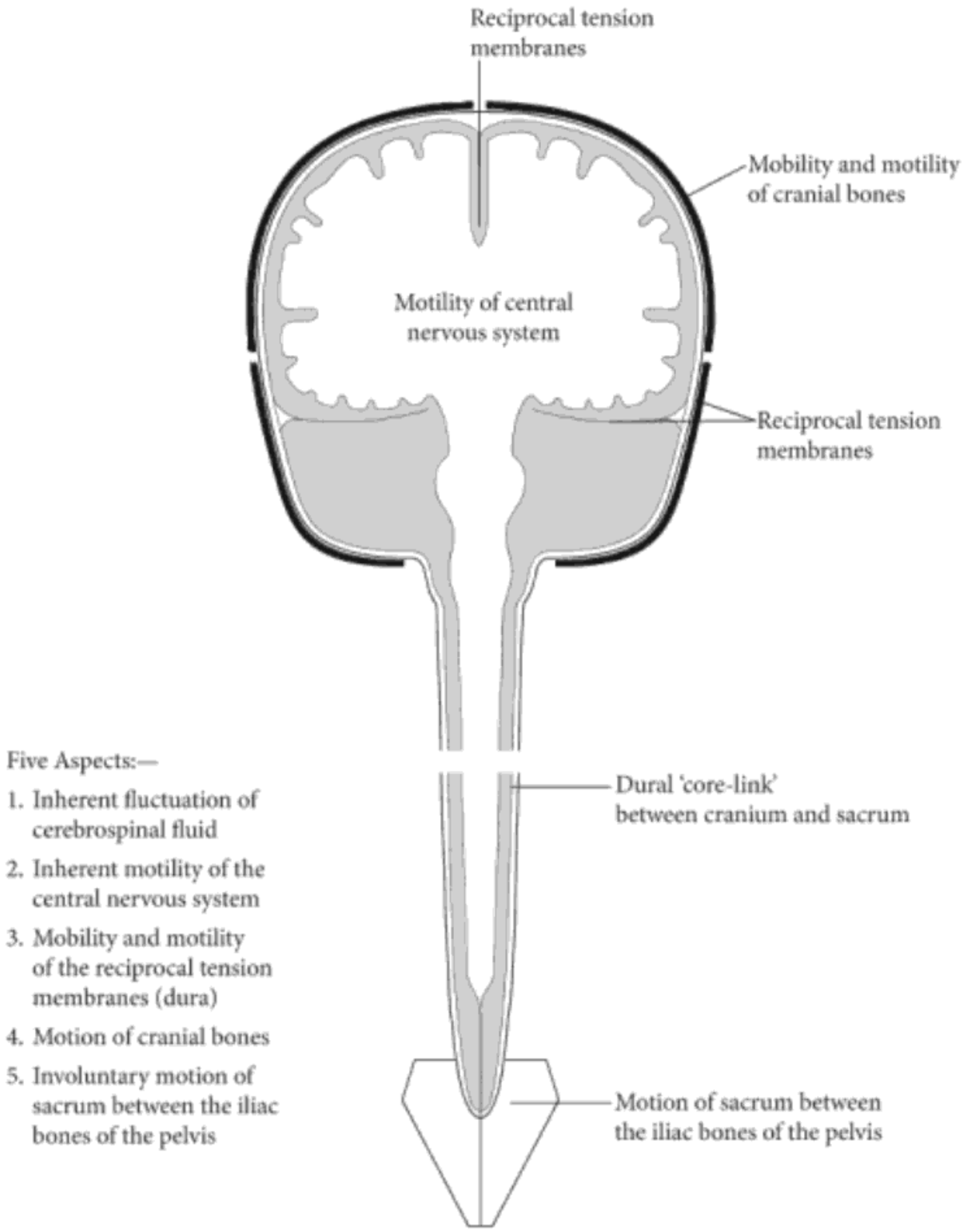

Figure 1.2: The primary respiratory mechanism

This fact was proved to Dr. Sutherland early in his development of this work. During the days of prohibition in the United States during the 1920s, he was staying at a cottage on the shores of Lake Erie. One day he heard a commotion outside. A drowning man who had been drinking too much illegal liquor was being dragged out from the water. By the time Dr. Sutherland reached the shore, the man was lying on the ground. His normal life signs—

lung function and cardiovascular pulse—had ceased, and all attempts to resuscitate him had failed.

With some quick thinking, Dr. Sutherland held the sides of the man's head and encouraged a rocking motion of his temporal bones, in an attempt to stimulate primary respiration.[15] This worked; within a few seconds the man's breathing and heartbeat started again, he regained consciousness and made a full recovery. This experience helped to affirm to Dr. Sutherland the tremendous power of working directly with the Breath of Life.

Sustained by the Breath of Life

The importance of an underlying vital force for the maintenance of health has been demonstrated by many reliable accounts of seemingly magical feats performed by advanced yogis. Some of these feats include being buried alive for up to seven days with no access to air, water, food or light. Amazingly, it seems that these yogis are able to sustain their bodies by going deep into meditation and being conscious of the fact that their lung breathing is not the main thing keeping them alive. It seems they are able to suspend many of the secondary physiological functions of the body, but still preserve the primary expression of the Breath of Life. Their survival depends on their ability to stay in relationship with this fundamental, life-giving principle.

The expression of the Breath of Life at a cellular level is a fundamental pre-requisite for good health. If the rhythmic expressions of the Breath of Life become congested or restricted, then the body's basic ordering principle is impeded and health is compromised. The main intention of craniosacral work is to encourage these rhythmic expressions of health. This is done by gently facilitating a restoration of primary respiration in places where inertia has developed.

SPREAD OF THE WORK

Nature heals, the doctor nurses.
PARACELSUS

Dr. Sutherland developed various therapeutic approaches to harness the intrinsic power of the Breath of Life and help resolve any restrictions to primary respiration. He began to teach this work to other osteopaths in the 1930s and continued to do so tirelessly until his death in 1954. Because it challenged some of the closely held beliefs among practitioners of the time, his work was at first largely rejected by the mainstream osteopathic profession. However, his clinical results in a wide range of cases were impressive, and he began to attract a small band of osteopathic colleagues who wished to study with him.

In the 1940s the first osteopathic school in the United States started a post-graduate course called "Osteopathy in the Cranial Field" under the tutelage of Dr. Sutherland. Soon after, others followed. This new branch of practice became known as *cranial osteopathy*. As the reputation of cranial osteopathy began to spread, Sutherland trained more teachers to meet the demand. The most notable of these early teachers were Drs. Viola Frymann, Edna Lay, Howard Lippincott, Anne Wales, Chester Handy and Rollin Becker.

However, even today many osteopathic colleges do not teach this work in their basic courses, and so it is often studied as an option at post-graduate level. Consequently many practicing osteopaths do not use this approach. Nevertheless, in the last few years, post-graduate training courses for practicing osteopaths have become widely available.

Dr. John Upledger

In the mid-1970s Dr. John Upledger was the first practitioner to teach some of these therapeutic skills to people who were not osteopathically trained. Dr. Upledger had become drawn to exploring primary respiration after an incident that occurred while he was assisting during a spinal surgical operation. He was asked to hold aside a part of the dural membrane system that enfolds the spine while the surgeon attempted to remove a calcium growth. To his embarrassment, Upledger was unable to keep a firm hold on the membrane, as it kept rhythmically moving under his fingers.[16]

Dr. Upledger took a post-graduate course in cranial osteopathy and then set out on his own path of clinical research. Over the years, he has developed some clear and practical perspec-

tives about the impact of trauma on the primary respiratory mechanism, as well as a combined mind-body approach for working with traumatic experience called *somato-emotional release*. Furthermore, he has done a great deal to popularize craniosacral work around the world.

When Dr. Upledger began to teach non-osteopaths, he encountered great opposition from many in the profession who believed that the foundation of a full osteopathic training is necessary to practice the craniosacral approach. Many osteopaths are still of this opinion, and it continues to be a cause of debate and argument. However, many also believe that this work can provide an integrated approach to healthcare in its own right and need not remain within the sole domain of osteopathic practice. Nevertheless, one thing is for sure, a good foundation in anatomy, physiology and medical diagnosis is necessary in order to apply craniosacral work with safety and competency. It also takes time and proper training to develop the necessary skills. It is an unfortunate fact that in recent years many people have set up in practice with only minimal training.

Cranial osteopathy and craniosacral therapy

It was Dr. Upledger who coined the term "craniosacral therapy" when he started to teach to a wider group of students. Dr. Upledger wanted to differentiate the therapeutic approaches he had developed; furthermore, the title "cranial osteopath" could not be used by those practitioners who were not osteopathically trained.

One question I'm frequently asked is, "What is the difference between cranial osteopathy and craniosacral therapy?" Although Dr. Upledger states that these two modalities are different,[17] the differences are not always so obvious. They have both emerged from the same roots and have much common ground, yet different branches have developed. A variety of therapeutic skills are now commonly used by both osteopaths and non-osteopathic practitioners of this work, so neither cranial osteopathy nor craniosacral therapy can be accurately defined by just one approach. However, in practice, craniosacral therapists often work more directly with the emotional and psychological aspects of disease. Aware that I'm running the gauntlet of professional politics, in this book I use the term "craniosacral" to include the whole body of work from the early pioneering cranial osteopaths to more recent developments in the field.

Biodynamics and biomechanics

In the branch of practice referred to as "biodynamic" craniosacral therapy, there is an emphasis on working with the underlying forces that govern how we function. The focus

of a biodynamic approach, predominantly referred to in this book, is to cooperatively and respectfully employ these organizing forces for both diagnosis and treatment. This has practical ramifications for the way in which diagnosis and treatment are carried out, as will be explored a little later.

In contrast, "biomechanic" approaches focus on the results or effects of these organizing forces (i.e., the manifestation of tissue tensions in the body) rather than directly relating to the underlying forces themselves. They rely on the application of relatively active techniques of treatment. We could say that biomechanic treatment works more from the outside-in, whereas biodynamic treatment works more from the inside-out.

Craniosacral biodynamics

In biodynamic craniosacral work, the healthy functioning of the body is considered to be determined by the ability of the potency of the Breath of Life to play freely throughout the body.[18] This understanding has a direct connection to the pioneering insights of Dr. Sutherland. It is interesting to note that during the latter years of his life, Dr. Sutherland focused his attention more and more on working directly with the potency of the Breath of Life as a therapeutic medium.[19] He saw that if the expression of this vital force can be facilitated, then health is consequently restored. Dr. Rollin Becker, Dr. James Jealous and Franklyn Sills have each added valuable insights into the operation of these natural laws that govern our health.

In recent years there has been a huge increase of interest in craniosacral work. It is now taught and practiced in many countries around the world. As this work is largely unregulated by law, professional associations that uphold standards of practice and appropriate codes of ethics have been set up in many of these countries. The Resource Guide at the end of this book includes contacts of professional organizations with registers of practitioners who are qualified as such in biodynamic craniosacral work.

2

THE CRANIOSACRAL CONCEPT

The same stream of life that runs through my veins
night and day
runs through the world and dances in rhythmic measures.
It is the same life that shoots in joy through the dust
of the earth in numberless blades of grass and breaks
into tumultuous waves of leaves and flowers.
It is the same life that is rocked in the ocean-cradle
of life and death, in ebb and flow.[1]

RABINDRANATH TAGORE

THE THREE TIDES

Life manifests itself like a development of fluctuations; up and down, hunger, sleep, waking up, feeling like working, feeling like resting, etc. When we start feeling that behind these fluctuations there is something immutable, we stop being perturbed.[2]
ITSUO TSUDA

The craniosacral concept focuses on how we function in mind, body and spirit, on subtle levels of physiology. At the basis of this concept is an understanding about the workings of the Breath of Life and the critical role played by its rhythmic motion in distributing our essential forces of health.

In this chapter we will explore some of the different aspects of the integrated physiological system of the Breath of Life, referred to as the *primary respiratory system*. We will also draw comparisons from the world of modern physics and biology.

Life as motion

As we noted, life is expressed as motion. All living cells demonstrate this basic truth. They breathe with the Breath of Life which vitalizes them and maintains the numerous physiological functions necessary for survival.

As the Breath of Life is expressed in the body, a series of tide-like rhythms are generated, producing subtle involuntary movements of the fluids and tissues. This motion initially arises at the core of the body and significantly involves the central nervous system, the cerebrospinal fluid and surrounding membranes and bones. The manifestation of these rhythms in the body denotes the effective distribution of the Breath of Life and is indicative of healthy function.

The cyclical rhythms of the Breath of Life have two phases of motion. These can thought of as a "breathing in" and a "breathing out." These phases are called *primary inhalation* and *primary exhalation*. Generally speaking, during the inhalation phase a subtle motion occurs in fluids and tissues, which rise upwards and at the same time expand from side to side (while shortening from front to back), oriented around the midline of the body (see Figure 2.1). During the exhalation phase, the opposite occurs: a motion that generally recedes down towards the lower part of the body and narrows from side to side.

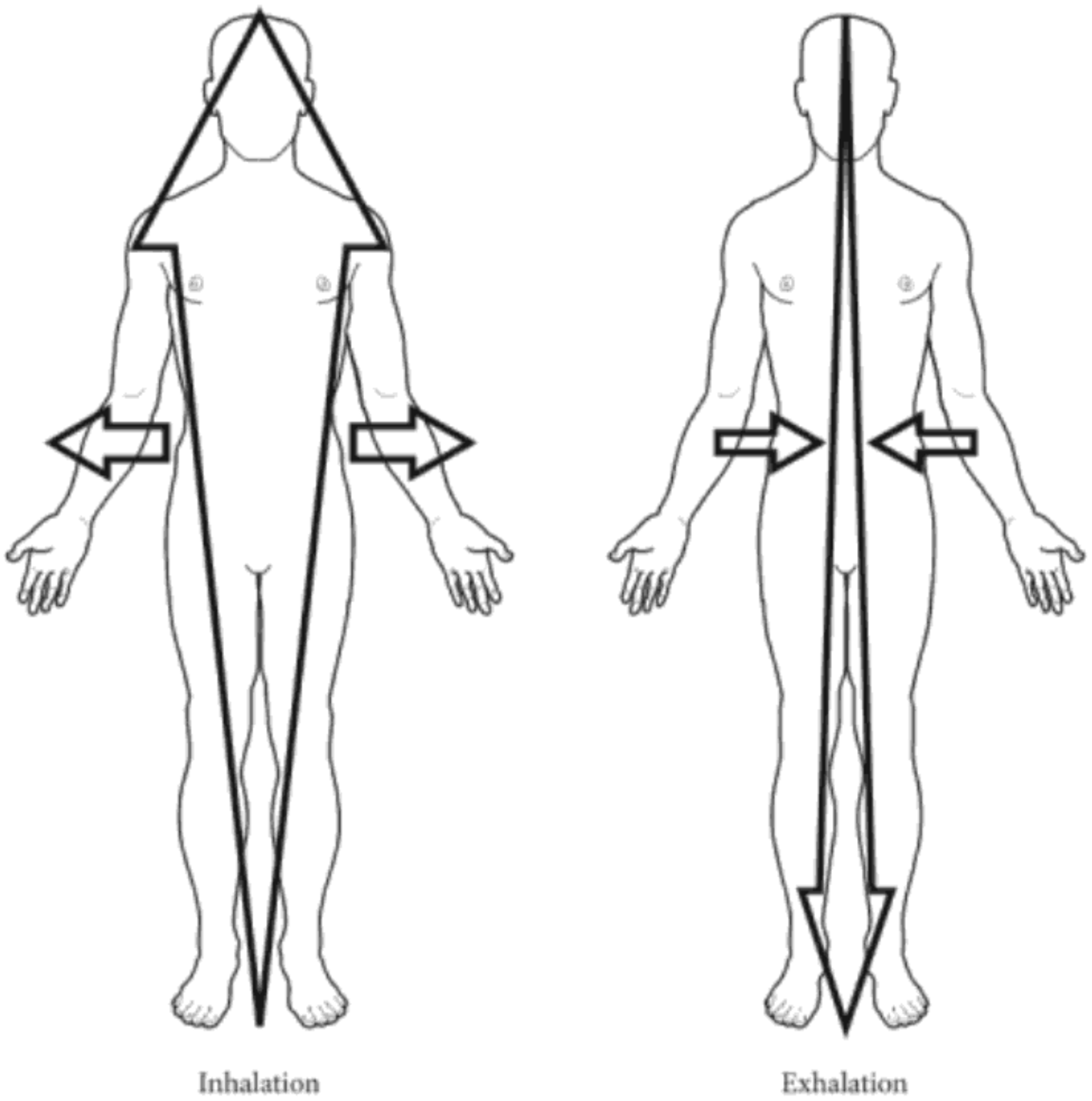

Figure 2.1: Primary inhalation and exhalation

These movements manifest in all parts of the body, producing rhythms that have been scientifically measured and can be palpated by sensitive hands. The combination of an inhalation and an exhalation phase constitutes one rhythmic *cycle*.

From the core of our being a succession of rhythms emerges, creating a whole system of primary respiratory motion. Three main rhythms have been identified. These all express phases of inhalation and exhalation at a different rate and are sometimes referred to as the "three tides" (see Figure 2.2).

Each of the three tides is a manifestation of a different level of functioning of the Breath of Life. Each one is enfolded in the others, producing rhythms within rhythms, known as:

- the cranial rhythmic impulse
- the mid-tide
- the long tide.

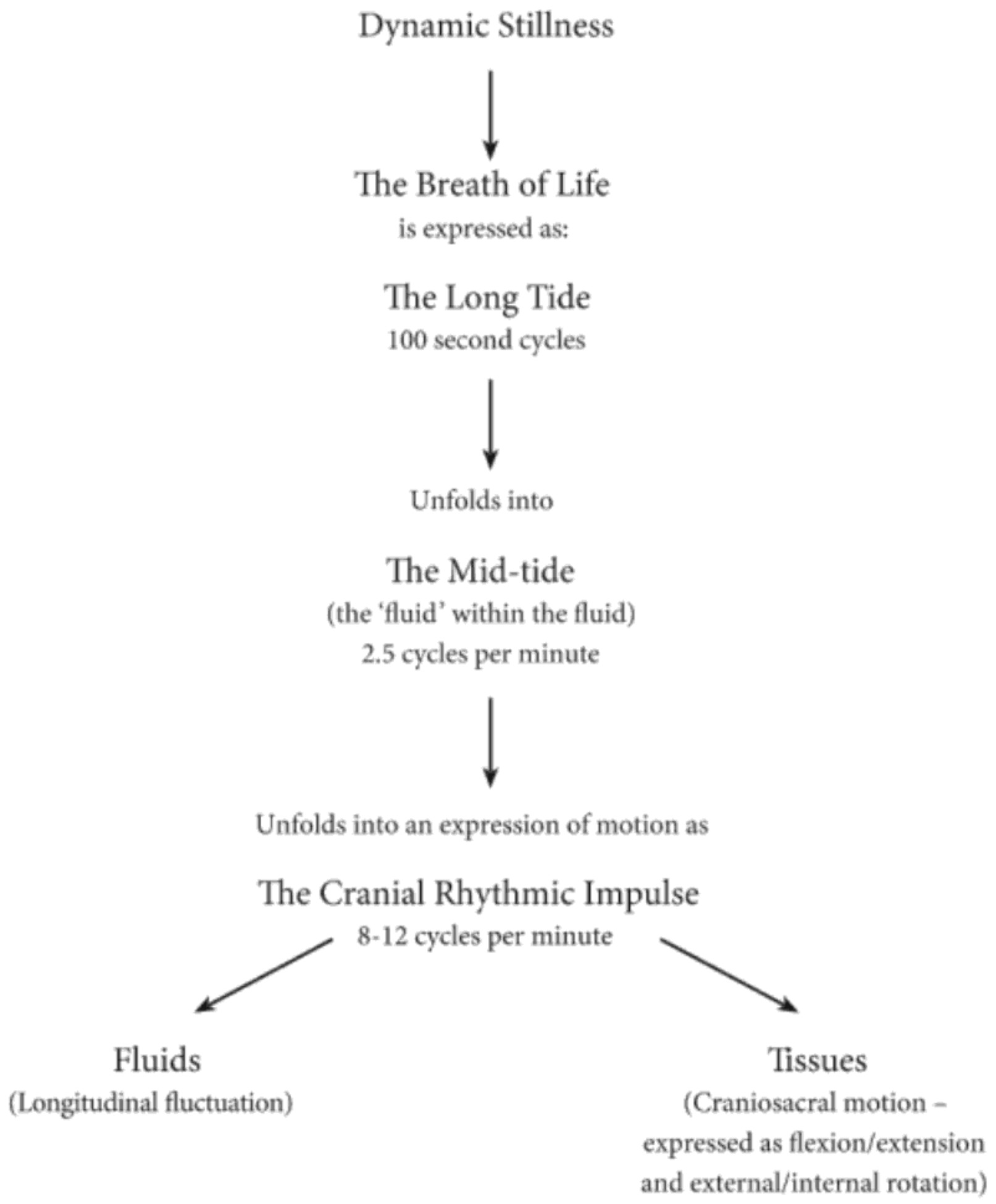

Figure 2.2: The primary respiratory system

Cranial Rhythmic Impulse

As the Breath of Life is conveyed into the body, it sets up a very slight rocking motion of all fluids, bones, membranes and organs. Individual tissue structures behave like boats gently rocked on the surface of the ocean. This motion occurs at an average rate of between eight and twelve cycles each minute and is called the *cranial rhythmic impulse* (C.R.I.). The C.R.I. is primarily an expression of how individual parts of the body move in their relationship to each other.

During each phase of the C.R.I., each tissue structure expresses a specific pattern of motion, often called *craniosacral motion*. The midline structures of the body rock backwards and forwards in motions referred to as *flexion* and *extension*, and the paired structures rock outwards and inwards in motions referred to as *external rotation* and *internal rotation*. The movements of flexion and external rotation both occur in the inhalation phase of the C.R.I. Extension and internal rotation both occur in the exhalation phase. The fluids of the body (i.e., cerebrospinal fluid) express this motion as a longitudinal fluctuation, rising up the body in inhalation and receding in exhalation. These movements can also be thought of as individual waves that ride on deeper tides. All these patterns of motion will be described in further detail in Chapter 3.

The cranial rhythmic impulse is considered to be the outermost (i.e., most superficial) unfoldment of the Breath of Life. It is produced as a result of how our deeper forces of health interface with any conditioning or experience held within the body.

Research experiments

The cranial rhythmic impulse has been measured in numerous research experiments. In 1963 American osteopath Dr. Viola Frymann clearly recorded these minute contractile and expansile movements at the cranium.[3] These experiments were the first in which a rhythmic motion not directly connected to either heartbeat or lung breathing was scientifically identified. Since that time, a growing number of investigators have been able to measure this phenomenon. In a later experiment (1978), recordings of pulse rate and lung breathing were taken, along with measurements of subtle rhythmic motion from different regions of the head.[4] These recordings again clearly showed that the cranial rhythmic impulse is a distinct motion not directly related to heartbeat or lung respiration.

It must be emphasized that the movements produced by the cranial rhythmic impulse are minuscule. They are measured on a scale of *microns* (each micron is one-millionth of a

meter). The greatest motion measured at the cranial sutures is forty microns, about half the thickness of a piece of paper.[5]

Drs. John Upledger and Zvi Karni conducted experiments recording subtle movements at both the cranium and the sacrum. They used sensitive strain gauges and measured changes in the electrical potential of the skin.[6] Their instrumentation picked up changes in motion, which were also simultaneously detected by manual palpation. These experiments helped to affirm the ability of the human hand to be sensitive to these small movements.

In another experiment, Dr. Upledger and colleagues measured the cranial rhythmic impulse of patients in a coma or with chronic neurological disorders. Again, measurements were taken with strain gauges and checked by palpation. They found that these patients all exhibited a slowing down of the cranial rhythmic impulse to about a half of the normal level.[7] Upledger and Karni were also able to establish that these rhythmic movements are detectable all over the body.

Self-palpation

You may be able to feel these movements in your own head. To do this, find a comfortable and quiet place to sit. With a lightness of attention, place your hands on your head. Gently cup the sides of your head with your palms barely touching (see Figure 2.3). You may be more comfortable doing this leaning slightly forwards, with your elbows resting on your knees.

Figure 2.3: Self-palpation

First, become aware of your heartbeat. Then, notice your lung breathing. Then just see if you notice anything else. Place your attention on the tissues under your hands. See if you can perceive a subtle motion slower than both your heartbeat and lung breathing. See if you can feel this by sensing what may be happening underneath these other two movements. Let your hands just float on your cranial bones, as if they are gently resting on corks floating on the tide. If you press too hard you will prevent the "corks" from expressing their motion. Create some space inside yourself to allow any impressions to come into your awareness.

Do you notice a subtle welling up and receding of fluid in your hands, like the movement of a tide? This may be the longitudinal fluctuation of cerebrospinal fluid. Do you notice a widening and narrowing from side to side of the "corks"? This may be the external and internal rotation of bones at the sides of the head. You may also get a sense of the tissues' inner breathing, or motility.

Variable rates

The rate of the cranial rhythmic impulse (C.R.I.) is relatively stable if compared to the heartbeat or lung breathing, which more easily fluctuate according to our circumstances. For example, the heart and lungs show dramatic changes in rate depending on whether we are in a state of rest or activity. They also vary in response to changes in our environment, or as a result of strong emotion. Nevertheless, although the heart and lungs adjust more obviously, the rate of the C.R.I. does also vary with changes in life circumstances. These variations indicate changes in physiological function that occur at a deeper level.

The C.R.I. will often, for example, speed up in cases of acute illness and fever. In this way the ordering principle of the Breath of Life carried in these rhythms is made more available. The C.R.I. may also quicken in hyperactive or anxiety states. It tends to slow down in more chronic states of fatigue or depression and also congestive conditions such as persistent headache or catarrh. Resistances held in the tissues of the body will also greatly influence the expression of the C.R.I. If compared to the deeper tides of the Breath of Life, the rate of the C.R.I. is relatively unstable.

What is significant is that the C.R.I. records how our essential health interfaces with the effect of any conditioning. This makes it a useful barometer of mental, emotional and physiological patterns. Consequently its palpation may be used as an indicator of health and disease, involving both mind and body.

Origin of motion

There has been much debate in the profession about what exactly causes these rhythmic impulses. Some practitioners believe they are generated in response to a cyclical production and reabsorption of cerebrospinal fluid (as is detailed in Chapter 3). Others place an emphasis on the motion of the central nervous system. There is also a suggestion that the cranial rhythmic impulse (C.R.I.) is produced by involuntary muscle contraction, causing the delivery of a rhythmic movement to cranial bones and the central nervous system.[8] Still others believe the C.R.I. is produced by a combination of many different factors, including lung breathing and arterial pulsations. In the *entrainment theory* it is suggested that there is a pooling of various motions and pulsations produced by both patient and practitioner.[9] A coherent rhythm may be created as these pulsations harmonize together.

Clearly this is a subject where further research is still needed. Nonetheless, there can be no doubt that this rhythmic motion is a real and palpable phenomenon. Whatever the particular mechanisms that produce or disseminate the C.R.I., there still remains the question of what moves these mechanisms.

If we wish to investigate the actual origins of this motion, there is good reason to suggest the crucial presence of an underlying vital force, the potency of the Breath of Life. I emphasize this perspective because it is frequently not included by those who take a more mechanistic approach.

To summarize, the outermost rhythmic expression of the Breath of Life is called the *cranial rhythmic impulse* (C.R.I.) or *craniosacral motion*. It is here, with the C.R.I., that most people have their first experience of primary respiration. It is also here that many therapists focus their work. However . . . there are deeper and slower rhythmic movements that underlie the C.R.I.

The Mid-tide

In the course of clinical practice, many practitioners have become aware of tidal rhythms operating beneath the cranial rhythmic impulse.[10,11,12] These slower tides also express a rhythmic motion in phases of inhalation and exhalation, and they are considered to be the driving power that produces the C.R.I. Although these rhythms are somewhat more subtle, they can also be detected by palpation. In the biodynamic approach of craniosacral therapy, relating to these deeper tides and the ground from which they emerge, becomes the main

focus of treatment. The particular rhythm that directly underlies the C.R.I. is expressed at the rate of approximately two-and-a-half cycles per minute. It is referred to as the *mid-tide.*[13]

The mid-tide is considered to carry the available bio-energy, or biodynamic potency, that vitalizes the body. As such, it is a fundamental expression of our health. In the inhalation phase the mid-tide rises up the body and widens from side to side, a motion that simultaneously involves the potency, fluids and tissues that all breathe together as "one thing." In the exhalation phase the mid-tide recedes down the body and narrows from side to side. Individual tissue structures generally follow the same patterns of motion found with the cranial rhythmic impulse, but as parts of this whole unified field of motion instead of individual movements. This motion is naturally orientated around the midline of the body.

The rate of the mid-tide is far less affected by our immediate conditions than the C.R.I. Its rate is consequently less variable.

Biodynamic potency

In essence, the mid-tide is an expression of the embodied forces of the Breath of Life. The biodynamic potency expressed within the mid-tide is of great significance because it carries into the body the essential ordering forces of the Breath of Life. Therefore it has a profound ability to maintain physiological integration and balance at a core level. The potency of the mid-tide promotes health and healing in all tissues where it is able to manifest.

Palpation of the mid-tide gives the practitioner a clear relationship to the way in which intrinsic health is being expressed in the body. When the mid-tide is tuned in to, it is often experienced as a sense of unity and well-being permeating the body, bringing a feeling of wholeness. It may be felt by settling into a state of greater stillness and taking a wider view of ourselves (for more details, see Chapter 6). One patient described an experience of the mid-tide in his own body "like slipping down a boat ramp and sliding *into* the water."[14] In fact, accessing the mid-tide is like dropping beneath the waves on the surface of the ocean. It can be compared to being in a submarine rather than a boat.

Inner breathing

As the potency of the mid-tide is expressed in tissues and fluids, it causes them to "breathe" simultaneously at this slower rate. This inner breathing of tissues is called *motility.* All living structures express motility, including even seemingly hard and rigid ones like bones. Our

usual perception of bone as a hard and lifeless substance is derived from the fact that only dead and dried specimens are usually examined. However, when teaching this work, Dr. Sutherland often implored his students to focus on what occurs in *living* tissues.[15] Living bone is full of life and motion. It contains a high percentage of fluid and a blood and nerve supply, and it possesses a remarkable degree of flexibility.

As a result of the mid-tide, tissues become gently rocked like seaweed within the ocean. As Dr. Becker observed, "The tissue elements, the muscles, ligaments, bony structures, the organ systems within their connective tissue envelopes, and their fluid contents, automatically go along for the ride as the bioenergy patterns unfold in their functioning."[16]

Role of fluid

Fluid can be seen everywhere in nature as the carrier of life; without water, there is no life. All living organisms contain a large proportion of fluid. In fact, each cell of the body can be likened to a tiny sac of fluid, in which its microscopic internal structures "float." However, when life departs and organisms die, they dry up. It is interesting to note that whenever scientists look for signs of life on other planets, they first look for signs of water.

Consequently, it is the fluid systems of the body that distribute the essential potency of the Breath of Life. This biodynamic potency is rhythmically expressed within the fluids at an average rate of two-and-a-half cycles per minute. Potency becomes infused in the fluids which irrigate the whole body and convey this vital force to all regions. Therefore an unrestricted motion of fluid within the body is critical for the dissemination of biodynamic potency and the maintenance of health.

The biodynamic potency of the Breath of Life has been described as the "energy free to act within the fluids."[17] This potency may be experienced as a kind of "fluid within the fluid."[18] A similar concept is found in Chinese medicine, where the fluids of the body are also considered to carry vital forces and a basic ordering principle. It is important to remember that living tissues are primarily composed of fluid that serves these functions.

Spark in the motor

Since the early days of this work, craniosacral practitioners have particularly recognized the significant role of cerebrospinal fluid (C.S.F.) in carrying the potency of the Breath of Life.

C.S.F. is the "juice" that bathes the central nervous system. It is also the vehicle into which biodynamic potency is initially expressed in the body. C.S.F. can thus be seen as the principal link between the potency of the Breath of Life and its expression in the body.

The potency expressed within cerebrospinal fluid acts as the "spark in the motor,"[19] motivating its longitudinal fluctuation. Dr. Sutherland had a deep appreciation of this vital force carried in C.S.F., and considered it to be central to the workings of primary respiration.[20] He described the potency of the Breath of Life as an "invisible element" found within C.S.F. and the force that makes it move.[21] The remarkable properties of C.S.F. will be considered in more detail in Chapter 3.

The Long Tide

Emerging from the ground of our being, the first stirring of the Breath of Life sets up a very deep and slow rhythmic impulse. This can also be palpated through the body as it rises and expands, and recedes and narrows. This slower rhythm is often referred to as the *long tide* and is a subtle radiance of the most essential qualities of the Breath of Life. The long tide is in fact the subtlest manifestation of our life-force. It underlies and supports all other activities in the body.[22]

The long tide is a wider field phenomenon that may be perceived both within, as well as around the body. It is a universal force that becomes individuated; it operates as a vast field of action that manifests locally as the organizing "wind" of the human system. This can be perceived as rhythmic spiral motions within a large field of action that become oriented around the midline of the body. The long tide essentially creates and maintains our form and function.

A similar kind of motion has been identified in nature by Viktor Schauberger, an Austrian scientist and forester. Schauberger focused much of his work on the critical role played by water in carrying the life principle around the living planet. He used to go into the forest, find a quiet place to sit and just listen. When doing this he started to sense rhythmic forces in the environment that he perceived as a subtle creative impulse imbuing the whole of nature. He called this rhythmic movement, "original motion." There are many correspondences between Schauberger's findings and the perception of the long tide in and around the body.[23]

Perceiving the long tide is like dropping down near to the ocean floor. The long tide directly underlies the mid-tide, serving as the force behind it. The other, faster rhythms are generated from the long tide, as the Breath of Life becomes embodied through the fluids and unfolds into its outer manifestations. Each rhythmic cycle of the long tide is expressed at a rate of about once every 100 seconds. It has a light, airy quality as it permeates the body as our most essential life breath. This is sometimes experienced as a shimmering, a subtle radiance or electrical wind.

Protoplasmic streaming

Similar rhythmic movements have also been identified in primitive life forms called protoplasm. A phenomenon called *protoplasmic streaming* is well-known to biologists. This motion is a fundamental expression of the life principle in protoplasm and also has a regular rhythmic rate of one cycle every 100 seconds. No matter what the conditions, the rhythmic forces behind protoplasmic streaming continue as long as the organism is alive.[24] In fact, our bodies are just more complex forms of protoplasm. It seems likely that all living organisms are essentially maintained by the rhythmical action of the long tide—the most formative and generative force in the universe.

Deepest resource

In comparison to the faster tides, the long tide is not affected by the vagaries of day-to-day experiences and conditioning. It is the expression of our fundamental health that is never lost, and which continues whatever else is going on. It is very stable in its nature and rate, as it gently resonates and rhythmically permeates the body from the core of our being. At a profound level, the long tide contains the knowledge to create healing. It is at the foundation of all regulatory functions of the body and clinically, its emergence indicates a reconnection to our deepest resource of health.

GROUNDSWELL OF THE BREATH OF LIFE

And Lord God formed man of the dust of the ground, and breathed into his nostrils the Breath of Life, and man became a living soul.[25]
GENESIS 2:7

Dynamic stillness

From our deepest source, the Breath of Life is conveyed in a series of unfoldments described above as the three tides. However, at our very core there is a state of pure, unfabricated being and stillness. This is the place of our deepest nature. This essential ground state is underneath all our individual traits, our personality and all our doing. It is our being. It is like the ocean floor.

If we deeply quieten ourselves, dropping our awareness into the source from which all our activities emerge, we may catch glimpses of this ground of dynamic stillness. At this level there is no duality, no subject and no object. Many spiritual traditions refer to this realm as our fundamental and primordial state. It is not a vacuum, for all of life's potential is contained within it. In Buddhist texts it is described as having qualities of emptiness and luminosity. A state of stillness is contained at the basis of all forms, and the full potential of all forms is to be found within it. It is perhaps to this reality that the Buddha was referring when he taught, "Form is emptiness, emptiness is form, form does not differ from emptiness, emptiness does not differ from form."[26]

Life emerges

All expressions of life emerge out of stillness. As our being manifests into becoming, the Breath of Life starts to express itself as a succession of motions. This sets up the different tidal rhythms of the primary respiratory system. From the formless, life starts to take form. This process can be compared to how a wheel turns. At the hub of the wheel there is stillness. However, as you move towards the periphery, motion takes place at a faster rate (see Figure 2.4).

Essentially what is being described here is a coming about of our individuation, our emergence into form. This process of creation is happening each moment of our lives, and is organized around the creative intention of the Breath of Life. It was described by Dr. Sutherland as a "groundswell."[27] The groundswell of the Breath of Life refers to the stirring of life as it manifests from the ground of our being.

This groundswell motion arises with a centrifugal force (a movement outwards), followed by a centripedal return to the source (a movement inwards). These centrifugal and centripedal motions rhythmically arise from and return to the source as the most basic expression of life (see Figure 2.5). This may be perceived as spiral movements of energy, like the coiling and uncoiling of a spring in constant motion.[28]

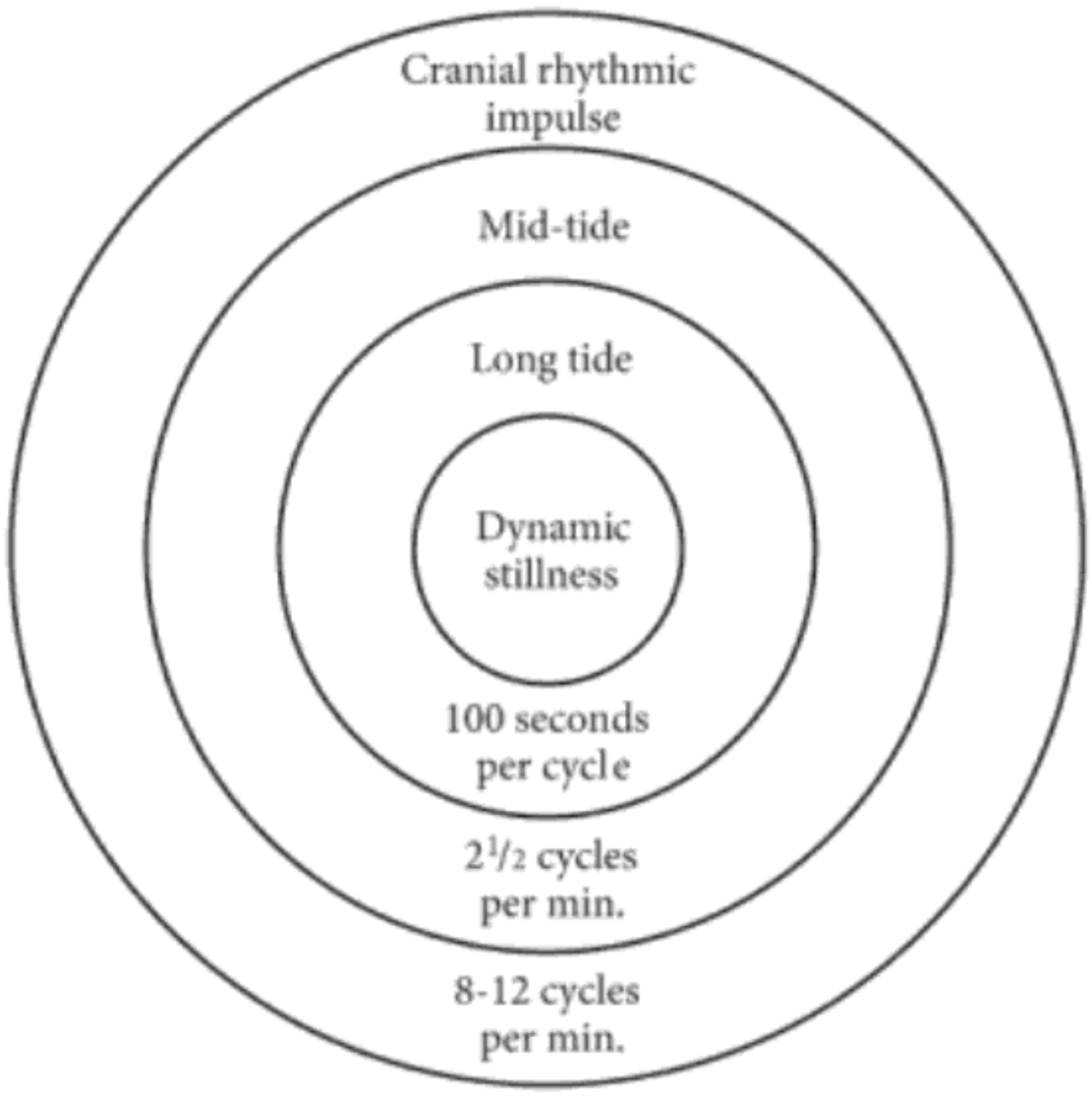

Figure 2.4: The three tides emerging out of stillness

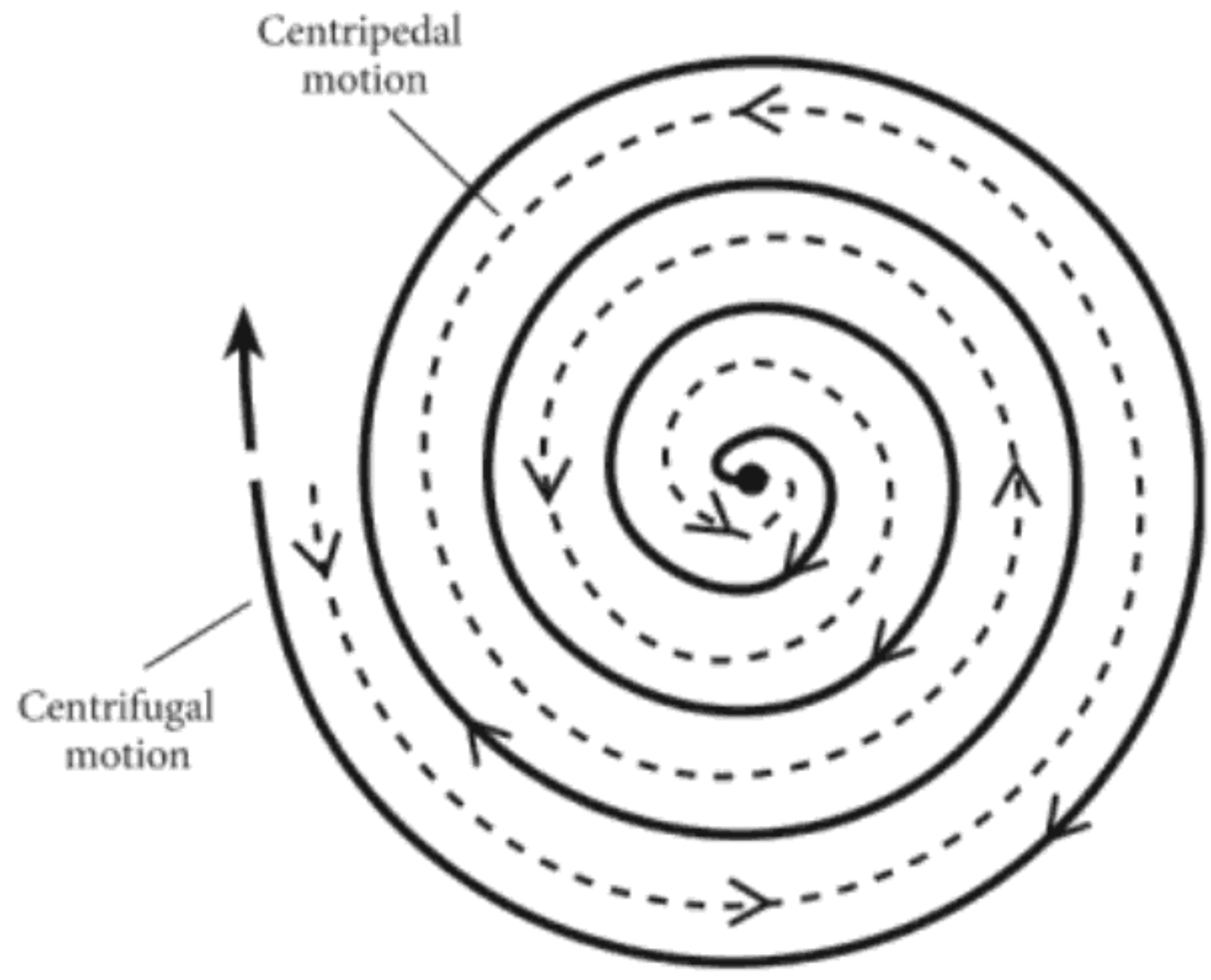

Figure 2.5: The groundswell of the Breath of Life

Genesis

The body is in a constant state of repair, regulation and regeneration. At each moment, the vitalizing forces of the Breath of Life hold the whole process together, bringing order and integration. As Dr. James Jealous describes,

> *The Breath of Life comes into the body. We can sense various rhythms that are created from it, and we can perceive that process taking place. . . We can actually perceive the Breath of Life come into the body, come into the midline, and from the midline, generate different forms of rhythms in the bioelectrical field, fluids and tissue. Essentially what's happening is genesis. It never stops. Moment to moment we are building new form and function.*[29]

Dr. Jealous is describing an extraordinary thing: the direct perception of the Breath of Life coming into the body, oriented around the midline. In this continuous process of creation, our form and all our physiological activities are being generated and maintained by the expression of life's creative impulse.

Transmutation

The primary respiratory system can be regarded as a kind of transformer that steps down the powerful energies of the basic life-breath into the physical body. From a source of stillness, the emergence of each rhythm signifies a further condensation into form. This can be compared to how electrical power is brought into a city on 44,000-volt power lines, and then stepped down to 110 volts so that it can be used.[30] Dr. Sutherland called this process a *transmutation.*[31]

Change of state

Transmutation refers to a change of state. Just as ice can turn to water and then to steam, a transmutation is a becoming of something new, a kind of "shape-shifting."[32]

Each emerging unfoldment of the Breath of Life is a change of state as our creative intention unfolds into form. In this process each new state is formed out of the one that underlies it. From the ground of dynamic stillness, motion arises. This is a transmutation that is expressed as the long tide. Then the mid-tide is generated, as the essential potencies of the long tide

become transmuted into the fluids of the body. This motion unfolds into the faster longitudinal fluctuations of fluid and the craniosacral motion of tissues.

THE HOLOGRAPHIC PRINCIPLE

Relativity and, even more important, quantum mechanics have strongly suggested (though not yet proved) that the world cannot be analysed into separate and independently existing parts. Moreover, each part somehow involves all the others: contains them or enfolds them.[33]
DR. DAVID BOHM

The human organism can be seen as a unified system of function in which the whole is contained in every part. This same idea is found in a variety of health care systems such as Chinese and Ayurvedic medicine, polarity therapy, reflexology and iridology. In these therapies, individual parts of the body such as the pulse on the wrist, the texture of the tongue, zones on the feet or regions of the eye are used to reveal information about the whole system.

This principle is also illustrated by the genetic building blocks called DNA contained in every cell. Each cell contains coiled strands of DNA that hold the inherited information of the entire body. Each cell contains information of the whole, enabling the creation of compatible new cells with the same genetic imprint.

Holographic model

The different tidal rhythms produced by the Breath of Life make up a whole system of interrelated motion, the primary respiratory system. Each aspect of the primary respiratory system is contained within the other, creating a unified field of activity. Therefore, each part is interconnected and has access to the whole.

In the holographic view of the universe, each and every physical form is considered to be interconnected in this way. This concept was pioneered by researchers such as Stanford neurosurgeon Dr. Karl Pribram and the renowned quantum physicist Dr. David Bohm.

What is a hologram?

The behavior of light illustrates how the holographic principle works. A hologram is a special type of three-dimensional projected image, produced by a beam of pure laser light. A laser

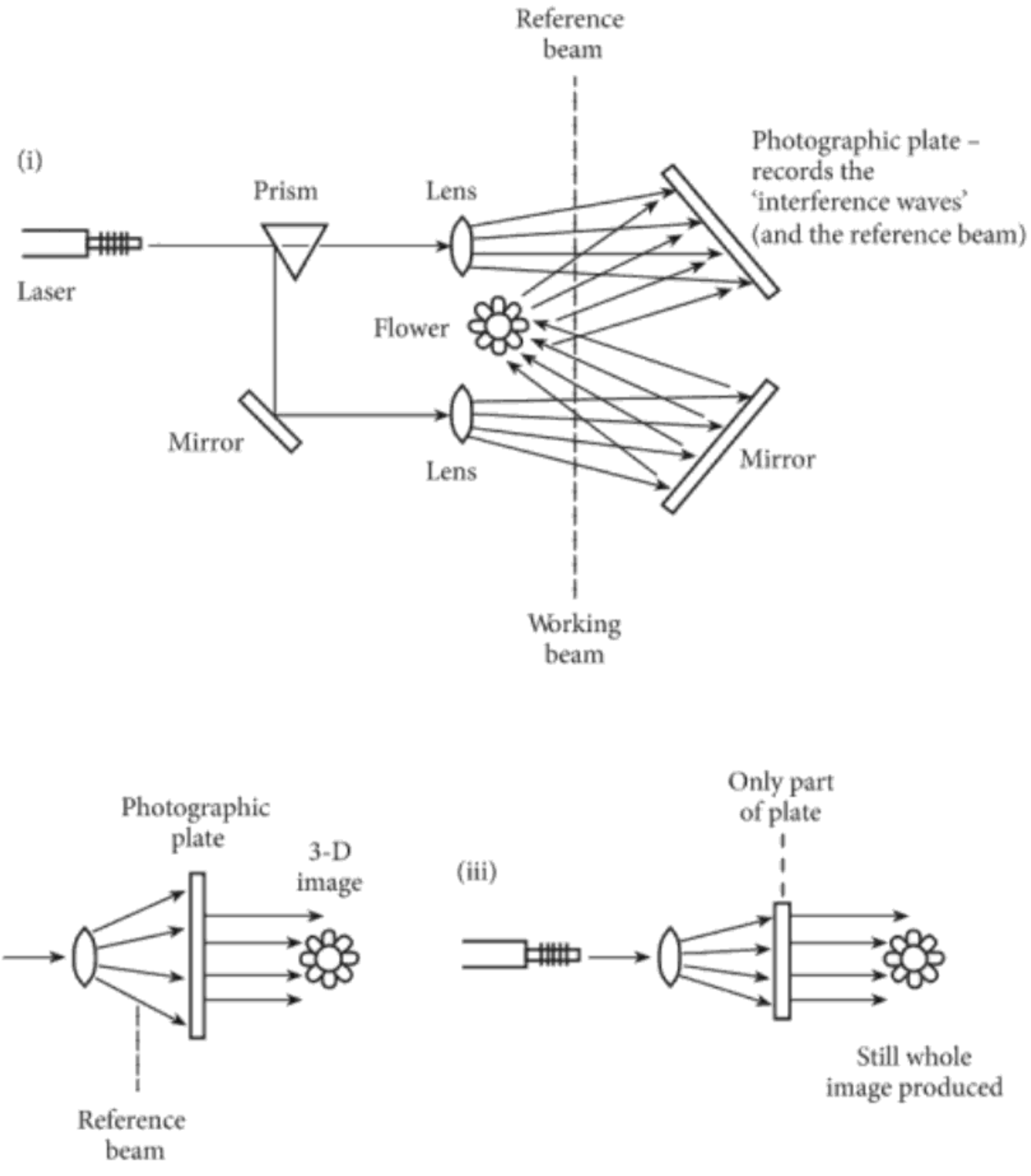

Figure 2.6: The formation of a hologram

beam is passed through a prism, which then splits it into two separate branches[34] (see Figure 2.6[i]). One branch of the laser beam is aimed at an object being photographed and as a result the object is reflected back onto a photographic plate or film. The other branch of the split laser beam is aimed directly at the photographic plate.

Let's say that the object being photographed is a flower. The beam of light projected onto the flower is called the *working beam*. When the working beam meets the flower, it splits up into various wave forms like the scattered ripples produced in flowing water when it encounters a rock. In this way the working beam becomes diverted or conditioned by encountering the

flower. Some of the ripples of light bouncing off the flower are reflected onto the photographic plate.

However, the other branch of laser light from the prism maintains its coherence. It remains as pure unadulterated laser light, unconditioned by meeting any object.[35] This beam is called the *reference beam*. It is also reflected onto the photographic plate.

Where the light waves from both the working beam and the reference beam meet, *interference patterns* are produced. Where these interference patterns reach the photographic plate, they are recorded on film that stores a three-dimensional image of the hologram. If you then shine another beam of pure laser light through the photographic plate, a complete three-dimensional image of the flower is produced in the space behind it (see Figure 2.6[ii]).

Whole in the part

Let's imagine that, after recording the image of the flower, the photographic plate is accidentally dropped and shatters into many small pieces. One would probably think that at least a part of the image would be lost. However, each broken piece is still able to produce an image of the whole flower (see Figure 2.6[iii]). This is because each individual part of the plate contains the whole picture in an encoded form. One of the key features of a hologram is that information of the whole is contained within each part. In other words, each part has access to the whole.[36]

Reference beam

Let's imagine that the reference beam becomes blocked while the image is being made, and only the "ripples" created when the working beam encounters the flower reach the photographic plate. When you then attempt to produce a holographic image, no clear or coherent picture will be generated, only chaotic patterns.[37] However, if some of the ripples from the working beam become blocked, an image will still be produced. So, in the production of a hologram the reference beam is fundamentally necessary to maintain the order and integrity of the encoded image. Without the reference beam, only chaotic images are produced.

An organism can be viewed as a kind of holographic system in which everything is intrinsically connected. Furthermore, the reference beam of a hologram is akin to the essential ordering principle of the Breath of Life, which maintains the integrity and coherence of the body. If the Breath of Life becomes blocked or restricted, then disorder or chaos results and

coherence is lost. One of the main intentions of craniosacral work is to reconnect chaotic parts of ourselves to the reference beam of the Breath of Life.[38]

Holographic memory

One of the great mysteries that has puzzled neuro-scientists is how the brain stores memory. Even though various parts of the brain may be damaged or even removed by surgery, memory can still remain intact. This shows that there is not any one particular physical location in the brain that carries out the function of memory. It seems that memory is enfolded throughout the whole brain.

Dr. Karl Pribram proposes that the brain operates in many ways like a hologram.[39] He suggests that memory is stored in a similar way to how holographic images are stored on a photographic plate. This would explain how a specific memory does not have a location but is distributed throughout the brain.[40] In the holographic model, each part of the brain contains information relating to the whole and therefore has access to every other part.

Light-based

Holograms require a source of coherent light. Recent research indicates that the brain also has the ability to communicate and process information through pathways of light. This is in addition to the linear communication that takes place through nerve pathways. While we usually consider nerve impulse conduction as super-fast, physicist Dr. Mae Wan Ho suggests that it is actually quite cumbersome in comparison to this light-based communication system and is probably designed to slow things down![41] Evidence has been found that brain cells may emit coherent light in organized waves.[42] These light waves provide the ideal medium in which memory could be holographically distributed. Some researchers suggest that cerebrospinal fluid is the vehicle that carries this light.[43] In fact, tiny particles of energy, biophotons, with the capability of emitting light have been found in the life fluids of all living organisms (see also Chapter 3, "Conductor of Potency").[44]

Implicate and explicate order

Dr. David Bohm proposed that a unifying principle holographically links the whole of creation. He surmised that although all forms in creation appear to be separate on the outside, they are in fact, connected by an underlying implicit order. Dr. Bohm referred to a

"holographic universe" that has two aspects: an inner *implicate realm* and an outer *explicate realm* (see Figure 2.7).[45]

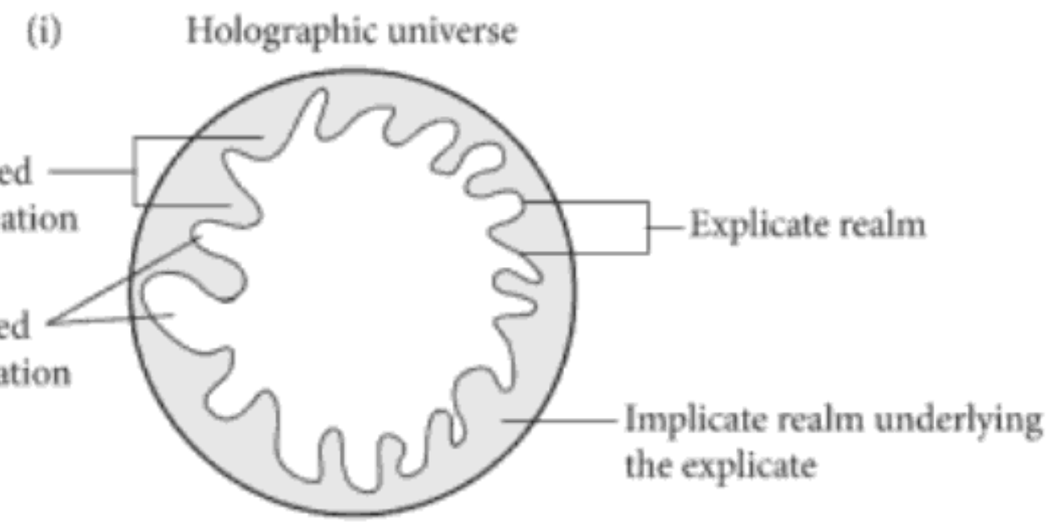

Figure 2.7: Implicate and explicate realms

The implicate realm is a domain of undivided wholeness, which is at the basis of all forms. The explicate realm is the domain where things appear, at least on the surface, to be separate. This is what we can see with our eyes. However, the implicate realm of wholeness is always contained within each explicate part. Franklyn Sills observed, "What may at first appear to be unrelated random occurrences, may actually be completely interrelated at an implicate level."[46]

All these proposals are in accord with Dr. Sutherland's view of the primary respiratory system. In the craniosacral concept, the tidal rhythms of the Breath of Life emerge from an implicate realm of dynamic stillness. Within each emerging state, all others are enfolded—rather like

a set of Russian dolls. In the primary respiratory system, there are interpenetrating rhythms within rhythms, emerging from a unified field. Each rhythmic unfoldment is a particular expression of an enfolded universal principle.

Realm of unity

According to the holographic view, everything in life is connected to everything else, and everything is contained in everything else. It is even thought that the whole universe is holographically contained within every single atom.[47] Each atom can be seen as an individual little universe. Just as the sun and planets in the outer universe revolve around one another, so do electrons.[48]

The presence of an intrinsic realm of unity is acknowledged in many spiritual traditions, as well as in modern quantum physics. For example, both Christianity and Judaism refer to God or the "divine" as an indivisible universal principle. The whole Eastern spiritual philosophy is founded on the principle that there is an essential unification of matter and experience. Buddhists refer to this underlying state as *shunyata*—our true enfolded, unmanifested nature. The quintessential religious experience of oneness and unity described by mystics may be a clear experience of this implicate and universal ground.[49]

This view suggests that the essential wholeness at the ground of our being can be intrinsically found within any single part. It is by reconnecting to the implicate realm that our greatest potential can be accessed and most fundamental healing take place. Going back to this source of wholeness, in each moment it may be possible to wipe the slate clean and start over again.

ORIGINAL MATRIX

Health can be defined as the emergence of Originality. The Originality expresses a complete balance of both structure and function as intentionalised in the creation of a human being.[50]
DR. JAMES JEALOUS

Embryological imperative

From the moment of conception, the body forms around a precise and primary design. As the first cells of the body start to divide, they somehow know how to create a human being—

as opposed to something else! An extraordinary degree of order and intelligence is apparent in this process. However, at this early stage no genetic mechanisms have been found that are capable of promoting such organized development. According to leading embryologist Dr. Erich Blechschmidt, the ordering and organization of our early development does not occur as a result of genetics operating through our DNA. As he states, "Hereditary factors are an important but not the only condition for the process of differentiation . . . The genes themselves do not perform the differentiation process."[51]

Apparently genetic influences do not begin to fully operate until about six weeks after conception.[52] Even then they are only considered to modify the process of cellular development rather than being primarily responsible for it.[53] In other words genetic mechanisms will determine whether you have blue or brown eyes, but not whether you have eyes at all. Therefore, an important question arises. What provides the coherence of our early growth? Dr. Blechschmidt proposes that an ordering principle brings about this organization, operating through the fluids of the body. Significantly, this is the same conclusion that Dr. Sutherland came to when considering the role that fluid plays in carrying the intrinsic ordering principle of the Breath of Life.

Essential blueprint

The Breath of Life carries an essential blueprint for health, which Dr. James Jealous called the "Original Matrix." This blueprint is a deep and unwavering ordering principle intrinsically distributed around the body in the tidal rhythms of primary respiration. The original matrix has also been described as an *original intention*, because it is present at the very beginning of life as the cells of the embryo begin to form and differentiate.[54] However, this same embryological imperative continues throughout life, in each moment of creation. The rhythms of the Breath of Life continuously deliver an intrinsic order into the fluids, and thus into each cell of the body. The various tissue and fluid systems of the body form around this essential blueprint and are maintained by it, until the time of death. As long as there is life, this ordering principle is never lost.[55] Franklyn Sills states,

> *In healing work this is a critical point to understand. No matter how desperate the situation, the information of the whole, its inherent ordering principle, or blueprint, is still available in each part. The blueprint of health is thus present in each part and is still available if it can be accessed.*[56]

Facilitating order and health

Because the original matrix is distributed in the rhythmic cycles of primary respiration, the ability of cells to express the Breath of Life has critical consequences for their health. At a fundamental level, primary respiration maintains each cell's order and integrity. The aim of craniosacral treatment is to facilitate the expression of the original matrix in tissues that have become disordered and affected by pathology. By encouraging the manifestation of the Breath of Life at a cellular level, the craniosacral therapist acts as a facilitator of this essential blueprint for health. According to Dr. Jealous,

> *It is the permeation of the Breath of Life into disorientated tissues that re-establishes the Original Matrix. The Original Matrix is a form that is carried through the potency of the Breath of Life around which the molecular and cellular world will organise itself into the Original pattern set forth by the Master Mechanic.*[57]

Sarah's story

Sarah's case illustrates how the re-emergence of the original matrix may be experienced. Sarah had come for craniosacral treatment because of a serious and persistent lower back problem. Her doctor had recommended surgery to remove one of her spinal discs, but Sarah was reluctant to go ahead with this and was looking for alternative treatment. When tuning in to her primary respiratory system from the feet, the intrinsic wisdom in her body began to take over. What follows is her own personal description.

Sarah started to feel a slow wave move through her body. This wave began at her feet, moved through her legs, up into her lower back and then into the disc that was causing trouble. As this wave permeated the area of her lower back, she literally felt a rearranging of the tissues around the disc. The wave continued up her spine, but then got stuck at the occipital bone at the base of her skull. She started to feel an intense pain there. A strong image then came into her mind. "Oh, my god! I remember coming off a motorbike and 'biting' the back of a bus!" she exclaimed. A few years back, Sarah had been in an accident. She had landed face-down in an open-backed bus, knocking out a few teeth. She then remembered that after this accident she needed to undergo lots of dental work. Flashbacks of this time started to come back to her during her treatment. She next felt the wave move from the back of her head to her face, and then back down through her body. At this point the pain and the images associated with her accident all disappeared. Sarah then exclaimed, "My body now feels how it was intended to!"[58]

Inviolable wisdom

The subtle rhythms produced by the Breath of Life are the primary self-regulating and self-healing forces in the body. Dr. Sutherland described that the potency of the Breath of Life carries an inviolable and unadulterated wisdom, beyond the relatively meagre intelligence of our own human ideas and concepts.[59] This potency carries our original matrix of health. Therefore the balanced expression of primary respiration ensures a constant distribution of inherent health to all cells of the body. In the words of Dr. Rollin Becker,

> *It provides the physiological evidence of health within the whole body physiology as well as evidence of less than health for any area of dysfunction. It can be used as a diagnostic tool as well as being a tool for treatment, and it is a manifestation of life within the patient that the physician can use in his service to restore health to the patient.*[60]

3

THE PRIMARY RESPIRATORY MECHANISM

Know your anatomy and your physiology, but when you get your hands on a patient's body, never forget that a living soul dwells therein.

DR. A.T. STILL

PRIMARY RESPIRATORY MOTION

The rhythmic, involuntary mobility of the tissues and fluids and the various tides are all totally integrated with each other and with the body as a unit.[1]
DR. ROLLIN BECKER

One thing that becomes clear when considering the physiological functioning of the body is the remarkable order that underlies its complexity. The systems of the body are guided by a wisdom that is actually a manifestation of our own basic nature. This inherent, intelligent force of integration and wholeness makes itself available through the rhythms of the Breath of Life.

In this chapter we will take a look at the key tissue and fluid systems located at the core of the body that express primary respiration. We will also look at the significance of these tissues and fluids for the totality of our health and the particular ways that they rhythmically move.

In order to get a sense of how the structures at the core of the body function, it is necessary to have an understanding of their anatomy. Therefore, a review of major anatomical features is also included here.

Tensile motion

All the bones, membranes, fluids and organs of the body express primary respiration as specific patterns of movement. At the level of the cranial rhythmic impulse (C.R.I.), individual tissues move like wave-forms that ride on deeper tidal forces.[2] By comparison, the slower mid-tide is expressed in the fluids, and consequently in *all* living tissues, of the body as a dynamic and unified field of motion.[3]

The cyclical rhythms of primary respiration have the characteristic of *reciprocal tension*, a kind of tensile pushing and pulling produced in the body. This is expressed first as a movement one way, and then as a movement back. At the level of the C.R.I. these tissue and fluid rhythms function at the average rate of between eight to twelve cycles per minute. This may be palpated as a slight rocking of individual structures. It is also sometimes called the *craniosacral rhythm*, or abbreviated to the *cranial rhythm*. At the level of the mid-tide, an underlying reciprocal tension motion is expressed as a push and pull within the unified field of tissues, fluids and potency at the rate of about two-and-a-half cycles per minute.

Mobility and motility

All parts of the body expresses primary respiration as both *mobility* and *motility*. Mobility refers to the movement of one structure in relationship to another, for example at a joint or suture, or between different organs. Each structure in the body expresses a particular natural pattern of craniosacral mobility. This kind of motion occurs solely as a function of the C.R.I.

Motility refers to the inner breathing of tissues, a motion that arises from within a particular structure. Motility occurs as the direct expression of the potency of the Breath of Life, which motivates and enlivens tissues from the inside. Motility is normally expressed in tissues as a welling up and expansion from side to side, followed by a receding and narrowing. It is essentially a factor of the mid-tide.

It is thought that the natural craniosacral mobility occurring between structures is primarily generated by their intrinsic motility.

Primary respiratory mechanism

After Dr. Sutherland discovered the existence of motion involving the cranial bones, he embarked on a path of enquiry which led him to dig deeper for further understanding.[4] He realized that there is a system of inter-related tissues and fluids at the core of the body, all of which play an important role in expressing primary respiration. These are the tissues and fluids in and around the dural membrane system, a continuous tissue infrastructure that surrounds the brain and spinal cord.

This inter-connecting system is referred to as the *primary respiratory mechanism* (see Figure 1.2, page 7). It comprises the cerebrospinal fluid, the central nervous system, the membranes that surround the central nervous system, the cranial bones and the sacrum. These five core components are also sometimes called the *craniosacral system*. The physiological motion of these tissues and fluids has important consequences for the whole body; many pathologies can be traced back to some disturbance in their function.

In health, all aspects of the primary respiratory mechanism operate in a harmonic relationship. Each component expresses primary respiration in a specific way, but they function together as part of an integrated system.

The different aspects of the primary respiratory mechanism can be compared to the different instruments in an orchestra, which all play the same music but contribute in different ways

to the overall sound. In this analogy, the Breath of Life can be seen as the conductor of the symphony and our embryological blueprint as the composer.

Two phases

Primary respiration is rhythmically expressed in two phases. However, these two phases are described in different ways, according to which parts of the body are being referred. The terms *inhalation* and *exhalation* are usually used to describe the motion of the cerebrospinal fluid (C.S.F.) and the central nervous system. These rise and widen from side to side during the inhalation phase, and descend and narrow from side to side during the exhalation phase.

Other parts of the body express primary respiration in phases that are traditionally described as:

- *flexion* and *extension*
- *external* and *internal rotation.*

Flexion and extension refer to the motion of single midline structures. One example of such a midline structure is the occipital bone, centrally placed at the back of the head (see Figure 3.13, page 67).

External and internal rotation refer to the motion of all paired structures of the body. The two parietal bones capping the top of the head, one on the left and one on the right, are examples of paired structures (see Figure 3.1).

Flexion of the midline structures and external rotation of the paired structures occur simultaneously during the inhalation phase of primary respiration. For example, while the central nervous system and C.S.F. are expressing inhalation, the occipital bone moves into flexion and the parietal bones move into external rotation. Extension and internal rotation occur simultaneously during the exhalation phase.

To summarize, the primary respiration of different parts of the body is described as:

- Inhalation—central nervous system and fluids
- Flexion—midline structures
- External rotation—paired structures

} all occurring at the same time

- Exhalation—central nervous system and fluids
- Extension—midline structures
- Internal rotation—paired structures

} all occurring at the same time

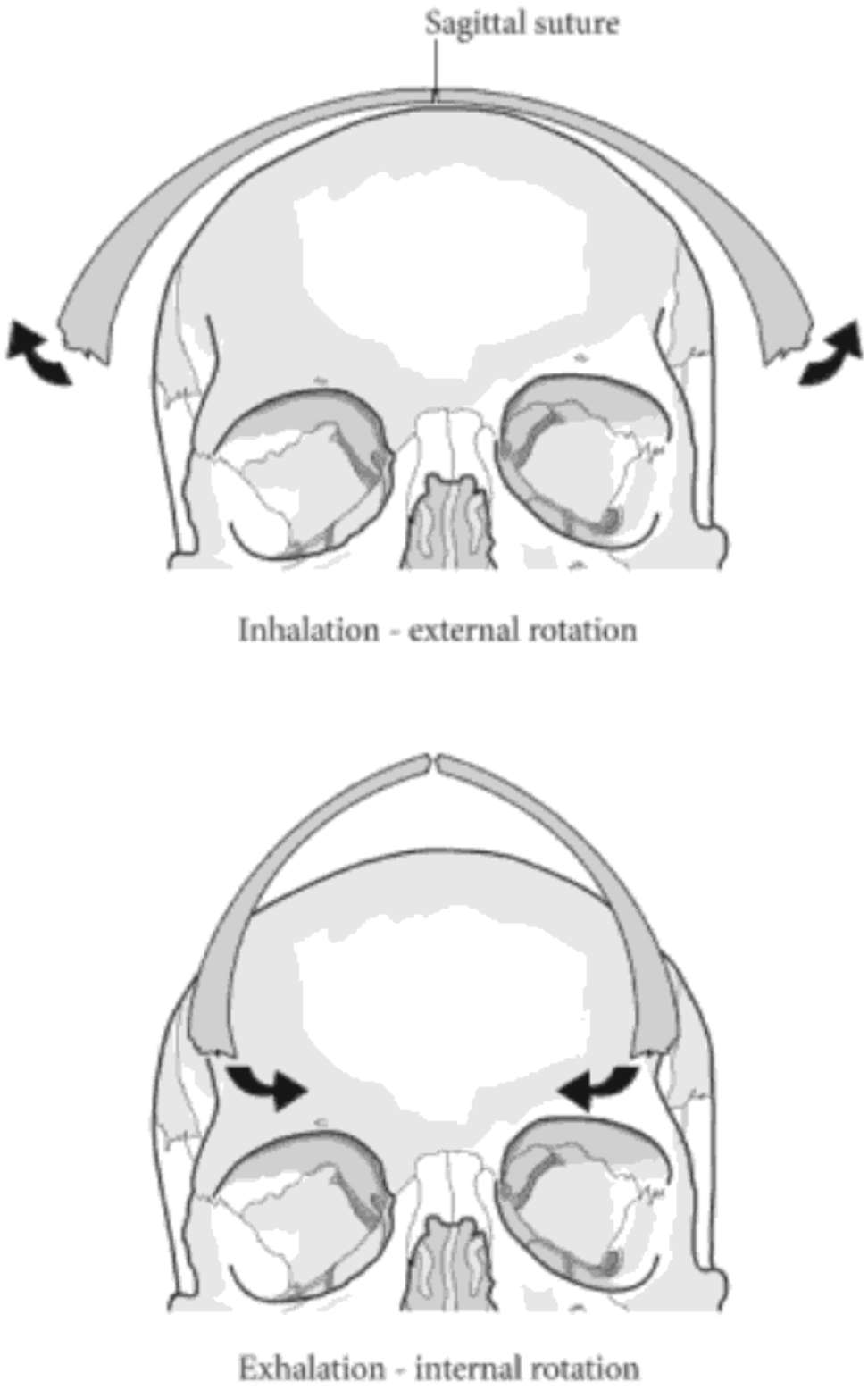

Figure 3.1: External and internal rotation of the parietal bones

At the level of the mid-tide and long tide (i.e., deeper organizing forces), the same patterns of motion may be perceived, but as subtle field phenomena rather than as movements of individual structures. Therefore, in biodynamic craniosacral practice, where an emphasis is placed on working with these deeper tides, all the above terms are often simplified to just *inhalation* and *exhalation*. These terms describe the essential movements of tissues and fluids as they discreetly breathe in and breathe out during the two phases of primary respiration.

FIVE CORE ASPECTS

The primary respiratory mechanism has been broken down into five components for teaching purposes, but it remains one unit of function.[5]
DR. ROLLIN BECKER

In this section we will explore the tissue and fluid systems that constitute the core elements of the primary respiratory mechanism. These pages contain quite a lot of information about some specific ways that the Breath of Life is expressed in the body. Remember that the organization of our anatomy reflects the functioning of the whole of ourselves—mind, body and spirit. To help bring this information alive, see if you can relate these descriptions to the movements and sensations in your own body. The corresponding diagrams may help you picture clearly what I am writing about. If you are unfamiliar with some of the anatomical terms that are used, the glossary at the back of the book may help.

The five principal aspects that constitute the primary respiratory mechanism play an important role in expressing the Breath of Life and regulating the balance of health. Although these tissues have great significance, primary respiration is actually a feature of the whole body. Therefore, we will also consider how the body as a whole acts as an integrated unit of function, as well as the way that rhythmic motion is expressed by all fluids, connective tissues, bones, organs and muscles.

The five components at the core of the primary respiratory mechanism are:

1. The inherent fluctuation of cerebrospinal fluid (C.S.F.)
2. The inherent motility of the central nervous system
3. The mobility of the reciprocal tension membranes
4. The motion of cranial bones
5. The involuntary motion of the sacrum between the iliac bones of the pelvis.

1) The Inherent Fluctuation of Cerebrospinal Fluid

The inherent fluctuation of cerebrospinal fluid (C.S.F.) refers to its tide-like motion along the body, contained within the membranes that surround the central nervous system.

C.S.F. is a transparent, slightly yellowish fluid, produced by a process of filtration and secretion. This occurs within specialized tissues called *choroid plexi* (see Figure 3.2, page 42). These are cauliflower-shaped growths of blood vessels located in the fluid-filled cavities of the brain, the *ventricles*. The choroid plexi filter blood entering the brain, adding certain

substances such as magnesium and chloride, while potassium and calcium are removed.[6] The choroid plexi also filter any harmful materials that may be carried in the blood. Therefore, C.S.F. has a different chemical composition from blood, distinctly suited to maintain the delicate balance of the central nervous system, which it bathes. Approximately 150 ml of C.S.F. is contained in the cavities of the brain and spinal canal at any one time, and its total volume is replaced (i.e., produced and reabsorbed) every three to four hours.

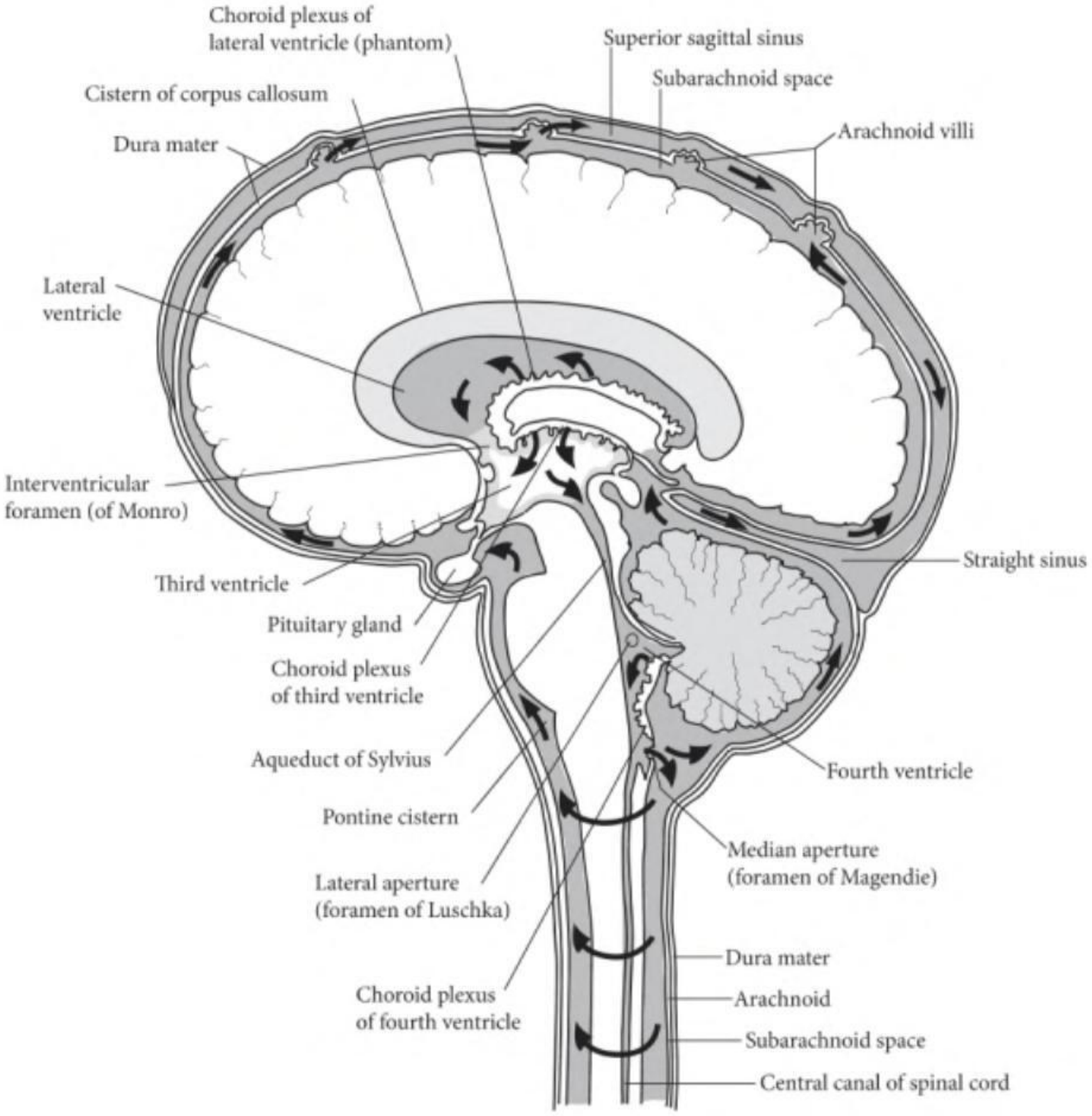

Figure 3.2: Circulation of cerebrospinal fluid

Circulation of C.S.F.

C.S.F. circulates around the central nervous system, before being reabsorbed back into the bloodstream. This reabsorption occurs through small projections—the *arachnoid villi*—which are located in the head's drainage channels called *venous sinuses* (see Figures 3.2, page 42, and 3.10, page 60). The system of venous sinuses in the head connects with veins, which then transport the reabsorbed C.S.F. back to the heart along with de-oxygenated blood. However, radioactive tagging has also indicated that small amounts of C.S.F. escape from the spinal column through sheaths of connective tissue that surround the spinal nerves (see Figure 3.19, page 80).[7] The hollow collagen fibres within these connective tissues provide the medium through which C.S.F. can pass into the rest of the body.

Physiology of C.S.F.

C.S.F. provides essential nourishment for the central nervous system, helping it to maintain a consistent chemical balance, even when other conditions of the body are changing. All the critical functions that are mediated by the central nervous system are dependent upon the supply of this fluid. If the physiology of C.S.F. is disturbed, the functioning of the central nervous system can be affected, with vast ramifications for the health of the whole body.

Over 100 years ago, Dr. A.T. Still, the visionary founder of osteopathy, paid particular attention to the properties of C.S.F. He wrote,

> *Cerebrospinal fluid is the highest known element that is contained in the human body and unless the brain furnishes this fluid in abundance a disabled condition of the body will remain. He who is able to reason will see that this great river of life must be tapped and the withering fields irrigated at once or the harvest of health be forever lost.*[8]

It is known that the nervous system degenerates if the choroid plexi (which produce C.S.F.) are removed.[9] Furthermore, there is also evidence that the choroid plexi may deteriorate in the elderly. This suggests that certain types of brain disorders, such as Alzheimer's disease, may be caused by an inadequate C.S.F. production.[10] Any deficiency in the production of C.S.F. will lead to malnutrition of the brain.

C.S.F. has a number of other crucial roles to play. Waste products are rinsed from the central nervous system by the steady flow and reabsorption of C.S.F. It provides "water beds" for the

protection of the brain, acting as a shock absorber and helping to maintain the shape of the brain.[11] C.S.F. also dampens the physical effects that the pulsation of arteries can have on the sensitive structures of the central nervous system.

If all the vital physiological functions of C.S.F. are considered, the importance of encouraging its proper flow can be appreciated. There is much truth in the statement made by Dr. Harold Magoun when he called C.S.F. "a regulatory complex which transcends any and all other agencies throughout the body."[12]

Inherent fluctuation

In addition to its circulation around the central nervous system, C.S.F. also has a tidal motion—described as an *inherent fluctuation*. The fluctuation is called "inherent" because it moves due to a power found within itself, not because of any external agency. The tidal fluctuation of C.S.F. is a motion that ebbs and flows along the body in rhythmic cycles. Like the ocean tides this is a movement of the whole volume of fluid at the same time, rather than a current, a circulation, or a wave.

In many ways, the body displays similar properties to the planet on which we live. Dr. Sutherland not only compared the rhythmic fluctuation of C.S.F. to the tide of the ocean, but also concluded that it is governed by the same great intelligence which governs the ocean tide, the rotation of the earth and the motion of all the planets.[13] In Chinese medicine our connection to the natural world is well recognized. According to the Chinese system, C.S.F. is controlled by "kidney energy" and the kidneys are governed by the moon. Therefore the moon, which governs the tides of the oceans, also governs the functioning of C.S.F. within the body.

The tidal motion of C.S.F. is also described as a *longitudinal fluctuation* because it moves up and down along the length of the body. As we noted there are two phases to this motion, described as inhalation and exhalation. C.S.F. rises up the body in inhalation and recedes down the body in exhalation. In inhalation there is also a welling up of fluid from side to side and a narrowing from front to back. In exhalation there is a side-to-side narrowing of the fluid.

Whereas the ocean tide rolls onto the seashore twice a day, the fluctuating motion of C.S.F. in the body occurs at faster rates, on average about ten times each minute with the cranial rhythmic impulse and about two-and-a-half times a minute at the level of the mid-tide.[14] If it seems hard to picture these simultaneous tidal rates, remember that the rhythms generated by the Breath of Life coexist as motions enfolded within each other. We are *polyrhythmic systems*.

Pressurestat mechanism

Over the years a number of theories have attempted to explain how the longitudinal fluctuation of C.S.F. is initiated. This section contains an outline of some of these theories, although none have been proven.

Some practitioners have suggested that this motion is generated by movements in the central nervous system.[15] Dr. John Upledger proposes that it occurs because of the way C.S.F. is produced and reabsorbed. He describes a rhythmic build-up of C.S.F. controlled by a *pressurestat mechanism*. In this model, the membrane sac within which C.S.F. circulates is seen as a semi-enclosed hydraulic system. Pressure is maintained in this system because it contains only partial openings through which C.S.F. is produced and reabsorbed.

Dr. Upledger proposes that C.S.F. production at the choroid plexi is pulsatile.[16] He suggests that normally production goes on for about three seconds, then stops for about three seconds, and then repeats. He also suggests that reabsorption through the arachnoid villi is constant. In this way, an expansive rhythm is produced about every six seconds, or ten cycles per minute. Dr. Upledger surmises that there are sensitive nerve reflexes that are located in the sagittal suture between the two parietal bones at the top of the skull. As the hydraulic system fills with C.S.F., these nerve reflexes get stretched and send messages to the choroid plexi to stop producing C.S.F.

Ball valve mechanism

It has also been proposed that a *ball valve mechanism* may control the drainage of C.S.F.[17] The *straight sinus* is one of the main channels in the venous sinus system, helping to drain reabsorbed C.S.F. away from the head (see Figure 3.2). A bundle of tissue composed of arachnoid villi has been identified at the entrance to this channel. It is thought that this tissue can become engorged with blood in rhythmic cycles, thus intermittently blocking the passage of fluid through the straight sinus. This mechanism may help to control the outflow of fluid from the head and rhythmically increase the pressure of C.S.F. within the system. This pressure increase may then affect the production of C.S.F. at the choroid plexi, which temporarily shuts off as a result. When the ball valve mechanism unblocks the straight sinus, pressure is reduced and C.S.F. production resumes.

However, I saw a spinal operation recently that casts doubt that either of these mechanisms can properly explain how longitudinal fluctuation occurs. In this operation the surgeon was demonstrating a revolutionary technique of grafting nerve tissue into a patient's spinal

cord, which had been severed during an accident. When the membranes surrounding the spinal cord were opened, there was still a marked surge of C.S.F. about every six to eight seconds, clearly visible as it rose up into the opening. If the pressurestat model or the ball-valve mechanism was correct, then it would not have been possible for C.S.F. to continue its fluctuating motion once the spinal membranes were open, as this would have altered the pressure dynamics upon which these models are based. Therefore, it seems there is still no better explanation for this phenomenon than that originally proposed by Dr. Sutherland. The motion of C.S.F. is an inherent fluctuation arising from a potency found within itself. No doubt this is a topic for further research.

Fluid drive

The potency behind C.S.F. motion produces what is sometimes described as the system's *fluid drive*. A strong fluid drive indicates a plentiful expression of potency of the Breath of Life being taken up in C.S.F. This generates a more powerful surge and settling of its longitudinal fluctuation, and is indicative of a good availability of healing resources for the whole body. However, fluid drive may become diminished in states of chronic illness or exhaustion. Therefore, the quality of fluid drive is a useful baseline for the practitioner to establish in the assessment of a patient's condition. It can provide a wealth of clinical information about the body's state of constitutional health.

Highest known element

The pioneering cranial practitioners had a deep appreciation of the subtle yet powerful properties of C.S.F. Dr. Sutherland realized the significant function of this fluid early in his investigations of primary respiration. In addition to its physical properties, he perceived that C.S.F. provides an important connection between the potency of the Breath of Life and its expression in the body. C.S.F. is considered to be the initial recipient of the Breath of Life, playing an essential role in taking up and distributing its potency. This concurs with Dr. Still's view that C.S.F. is the "highest known element in the body."[18] The basic ordering principle of the Breath of Life is primarily carried around the body within this fluid medium.

Carrier of potency

Dr. Sutherland saw the biodynamic potency of the Breath of Life as a kind of fluid that is carried within the C.S.F.[19] He described the potency in the fluid as "liquid light."[20] Dr. Magoun

referred to this phenomenon as "an electrical potential."[21] Consequently, C.S.F. has been compared to a kind of battery fluid in the body. This battery fluid can be recharged with potency that provides it with remarkable healing properties.[22] Dr. Sutherland had no doubt that the fluctuation of C.S.F. is the key element in the craniosacral concept.[23] The free and unrestricted movement of C.S.F. is a major factor in promoting health.

Other practitioners have also recognized the exceptional functions carried out by C.S.F. Dr. Randolph Stone, an osteopath who developed the practice of Polarity Therapy, described C.S.F. as, "A storage field and conveyor of ultrasonic and light energies. It bathes the spinal cord and is a reservoir for these finer essences . . . Through this neuter essence, mind functions in and through matter as the light of intelligence."[24] C.S.F. is regarded as the primary meeting point between the Breath of Life and the body. It is a junction between the physical and the spiritual; an essence that conducts the life-principle through the body, like the life-giving sap in a tree.[25] According to nuclear physicist, Dr. R.T. Lustig,

> *Through nuclear physics we are just catching a glimpse of what cerebrospinal fluid really is . . . a vital mechanism which affords powerful influences upon human physiology . . . A cold analysis of research in kindred fields . . . points unmistakably to the buried potential in the cerebrospinal fluid . . . With the opening of the atomic age we are getting a better perspective of energy, its sources and conversions . . . Sutherland's work . . . puts him on record as having recognized at an early date the interchangeability of energy and matter as it relates to biology.*[26]

This view of C.S.F. is not only compatible with much modern research, but is also alluded to in many historical sources. A respected eighteenth-century anatomist, named Burton, referred to the C.S.F.-filled brain ventricles as "the receptacles of the spirits."[27] C.S.F. has been called the "brain dew" and referred to as "the nectar of life," "the divine fluid," and "tears of the sky of God." Can C.S.F. also be the allegorical ambrosia of ancient Greece, the all-sustaining beverage of the gods who resided on the symbolic brain of Mount Olympus? Or perhaps it is the divine nectar called *soma* referred to in the ancient Vedas of India?[28] Dr. Magoun asserts, "As long as life exists, this highest known element is the abiding place of that mysterious spark that cannot be explained but is none the less present."[29]

Peter's case

Peter was a film producer who was experiencing sharp headaches that often started after any kind of exertion. He was also exhausted, probably because of work stress and having recently

moved into a new house. He was starting to become very concerned because his symptoms were not improving and extensive medical tests had not been able to reveal any cause for his condition. When he lay down on the treatment table, I tuned in to how primary respiration was being expressed in his body.

I put my hands on Peter's head and my first impression was that the strength of potency in his system was very low. This was revealed by the weak and flat quality of his fluid drive. Furthermore, there was an area of tension at the base of his skull, where it appeared that the longitudinal fluctuation of C.S.F. was getting congested.

The first aim of treatment was to try to build Peter's constitutional resources. This was done by encouraging what are called "stillpoints" in his body. These are periods of settling and stillness of the cranial rhythmic impulse that allow for deep physiological rest. This enables the C.S.F. battery fluid of the body to recharge with potency (see also Chapter 7, "Stillpoints"). I then started to work with the area of tension at the base of Peter's head, by subtly inviting a decompression through my hands. This region can have an important effect on the drainage of fluid from the head and, if restricted, may cause the congestion of C.S.F. During Peter's third treatment this tension completely resolved, leading to an immediate improvement in the longitudinal fluctuation of his C.S.F. and the strength of its fluid drive. Peter remarked it was, "like someone switched a light on inside my head!" After this his energy increased and headaches disappeared.

2) The Inherent Motility of the Central Nervous System

The soft and gelatinous tissues of the brain, together with the spinal cord, express primary respiration principally in the form of a motility. A number of researchers have confirmed the presence of a rhythmic movement of nerve tissue occurring at the rate of about eight to twelve cycles each minute.[30] In 1987 medical researchers, Feinberg and Mark, also demonstrated the motion of the human brain using magnetic resonance imaging, although they linked this motion to the pulse of the circulatory system.[31] As another researcher commented, the brain is "vibrantly alive . . . incessantly active . . . dynamic . . . highly mobile . . . able to move forwards, backwards, sideways, to circumduct and to rotate."[32]

Embryological development

Generally speaking, the growth patterns that tissues follow when they are being formed during their embryological development determine the pattern of their primary respiration

throughout life. This is because an organizing blueprint is laid down by the Breath of Life at the time of our early development and remains present as an ordering force continually expressed within the rhythms of primary respiration. Consequently, the motility of the central nervous system is expressed along the axis of its embryological development.

At about the third week after conception, a bundle of rapidly developing cells called the embryonic disc starts to fold in on itself at the midline, forming the neural groove (see Figure 3.3[33]). As the sides of the embryonic disc heap up and join in the middle, a hollow

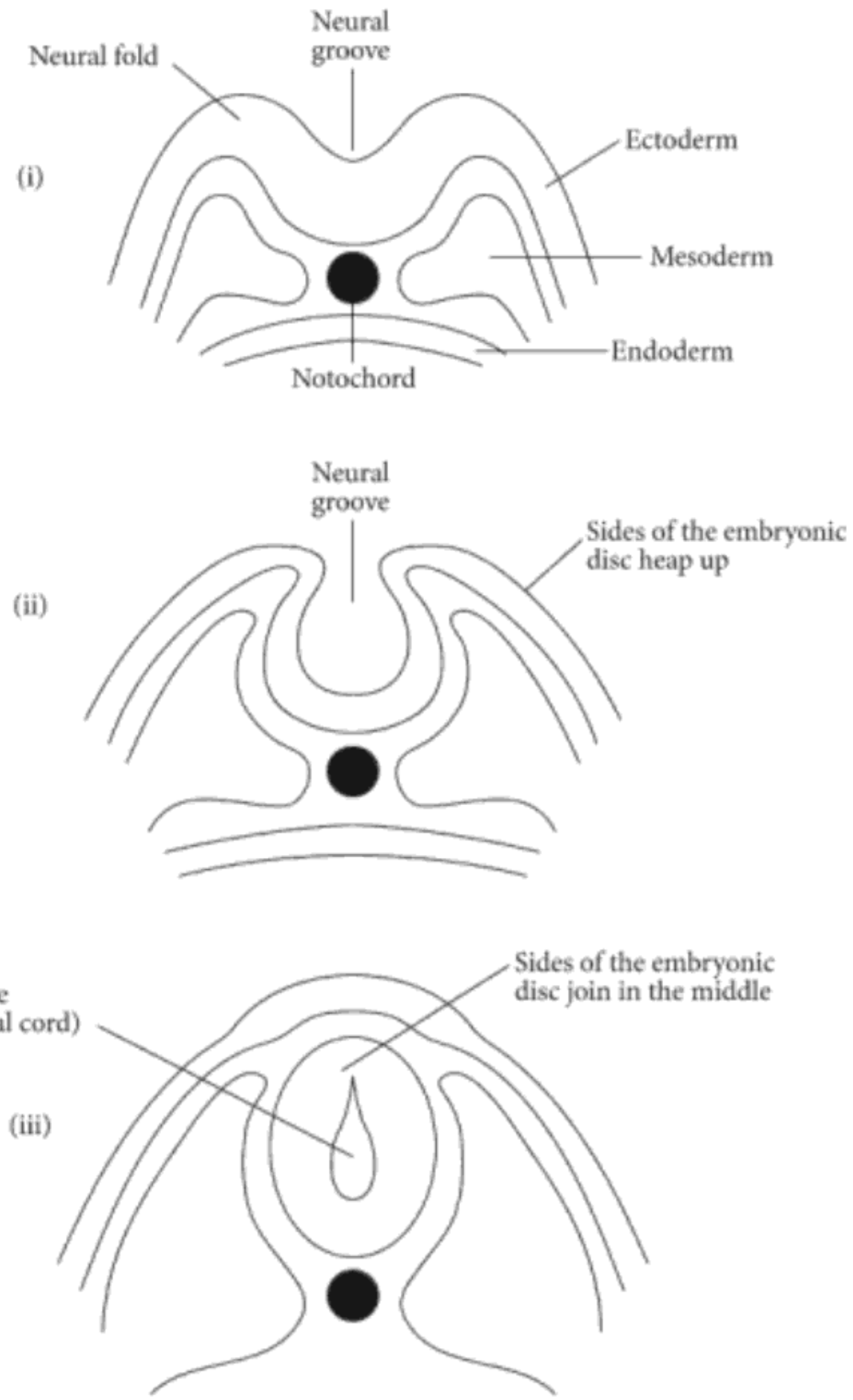

Figure 3.3: Formation of the neural tube

structure called the *neural tube* is formed. This is an early manifestation of the central nervous system, one of the first body systems to form. The brain and spinal cord develop as outgrowths from this primordial tube (see Figure 3.4). The neural tube elongates, bulges outwards, and by the fifth week starts to fold in on itself at the top. By the end of the fifth week the formation of the specific structures of the brain has begun (see Figure 3.4[ii]). The brain is formed as the tissues around these folds mushroom out in a curling pattern. (see Figures 4.4[iii and iv] and 3.5).

The expanding and curling pattern of growth at the top of the neural tube is organized around the *lamina terminalis*. The lamina terminalis forms the front wall of the third ventricle

Figure 3.4: Embryological development of the central nervous system

(see Figure 3.2, page 42). This place acts as the natural fulcrum for the growth and development of the central nervous system. It remains as the place around which primary respiration of the central nervous system is expressed throughout life, as long as there are no stressful influences that modify this motion.

Inhalation and exhalation

The motility of the central nervous system is expressed as part of an integrated pattern of motion, associated with its surrounding membranes, bones and fluid. In health, all these tissues move in synchrony with each other.

As the central nervous system expresses the inhalation phase of primary respiration, the brain rotates forwards towards the lamina terminalis, in a motion like the curling of a ram's horn (see Figure 3.5).[34] In inhalation, the front part of the cortex of the brain rotates anteriorly (towards the front) and inferiorly (footwards), and its back part rotates superiorly (towards the top of the head). At the same time, the brain widens from side to side as it "breathes in," while shortening from front to back and from top to bottom. Simultaneously the spinal cord rises while it widens from side to side and shortens from top to bottom. Dr. Sutherland likened this motion of the central nervous system to a tadpole pulling up its tail.[35]

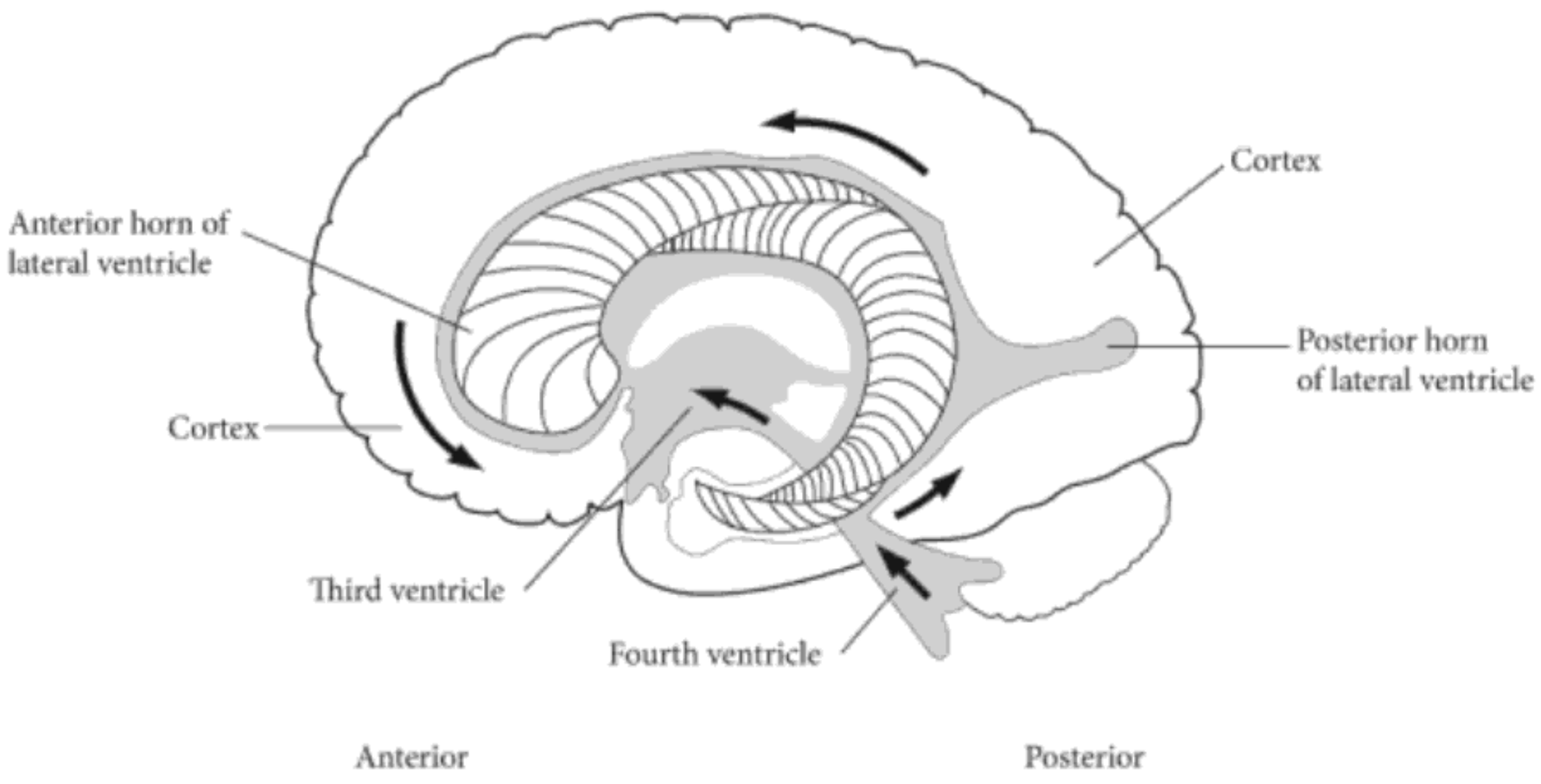

Figure 3.5: "Ram's horn" motion of the brain

The opposite motion occurs during the exhalation phase, when there is an uncurling of the brain towards the back, a narrowing from side to side and a lengthening from front to back as it "breathes out." The spinal cord lowers in exhalation, narrows, uncurls and elongates. In the inhalation phase, the ventricles of the brain widen from side to side and narrow from front to back (see Figure 3.6). This motion occurs in synchrony with the welling-up and rising of C.S.F. in the inhalation phase of its longitudinal fluctuation.

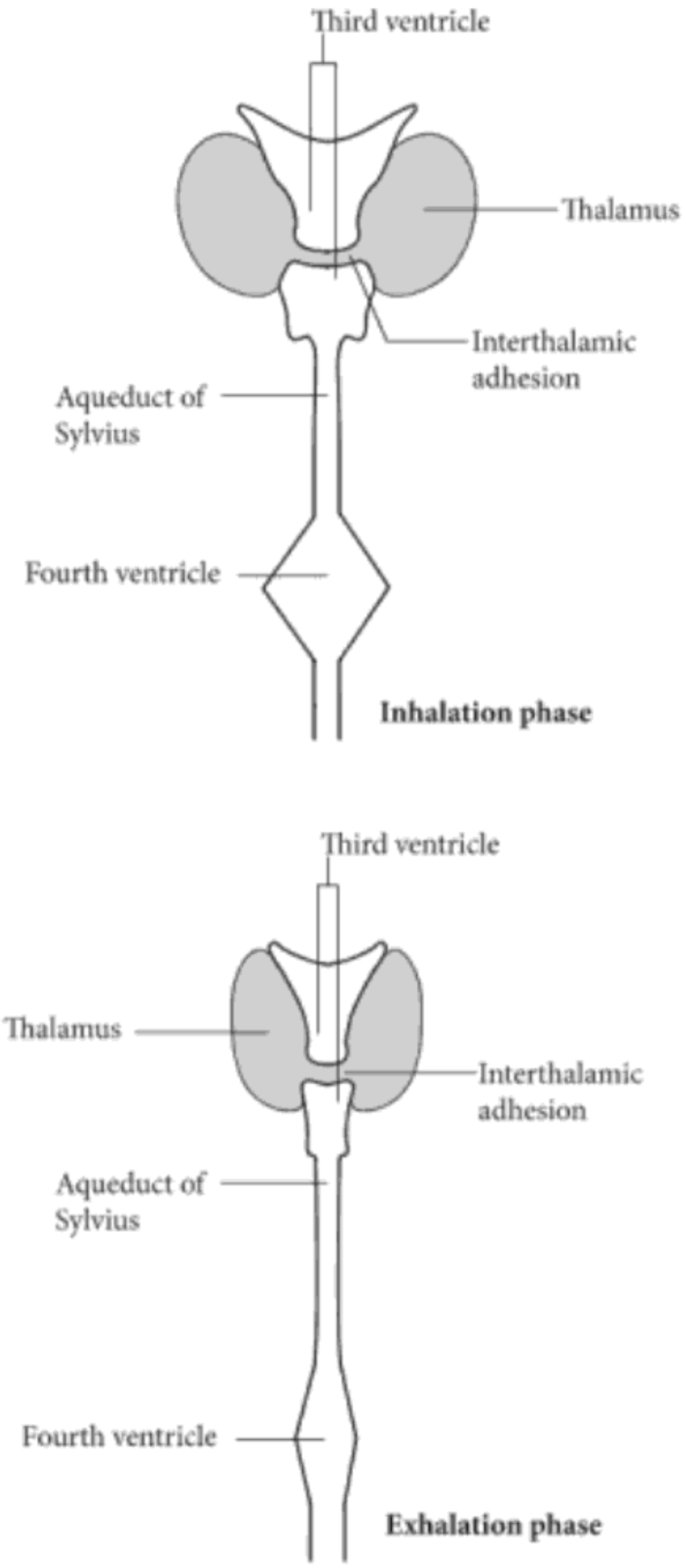

Figure 3.6: Inhalation and exhalation phases of the ventricles

God's drug store

The brain is one of the largest organs in the body. While it is widely recognized as the organ through which our thinking processes operate, this is now considered to be just a small part of its function. According to the psychologist Robert Ornstein and physician David Sobel, the main purpose of the brain is for the maintenance of health.[36] It has an extraordinary capacity to receive information, process it and act accordingly. It is the largest organ of secretion in the body, producing hundreds of chemicals according to our needs, including neuro-transmitters used by individual nerve cells to communicate with each other. In this way, the brain maintains a balance between our internal physiology and our social worlds, environment, thoughts and feelings.

The brain makes countless adjustments, secretions and commands that it sends to the rest of the body. Long before the chemicals of the brain had been scientifically analyzed, Dr. Still observed with great perception that, "The brain is God's drug store having within all drugs, lubricating oils, opiates, acids, and every quality of drug that the wisdom of God thought necessary for human happiness and health."[37] The motility expressed by the brain, is thought to have an important influence on the way these chemicals are produced and distributed.

Maintenance of balance

The brain can be thought of as a collection of brains (see Figure 3.7). It is comprised of different parts, each with different functions, but all working together to maintain the balance of the body. Each part of the brain specializes in receiving or sending particular messages and commands. However, if the different parts of the brain lose their ability to function in an integrated way we may end up experiencing mixed messages. The expression of primary respiration is essential for maintaining the fluidity, integration and co-ordination of these functions.

Mind and body

Our psychological states have a critical influence on the physiology of the central nervous system. Some centers in the brain interpret thoughts and feelings, and translate these psychological states into physiological actions. These centers are collectively known as the *limbic system*, and are located around the middle of the brain. An emotion like fear, for example, can trigger the limbic system to initiate the release of certain neuro-transmitters and hormones. These chemicals then produce a physiological response in the body.

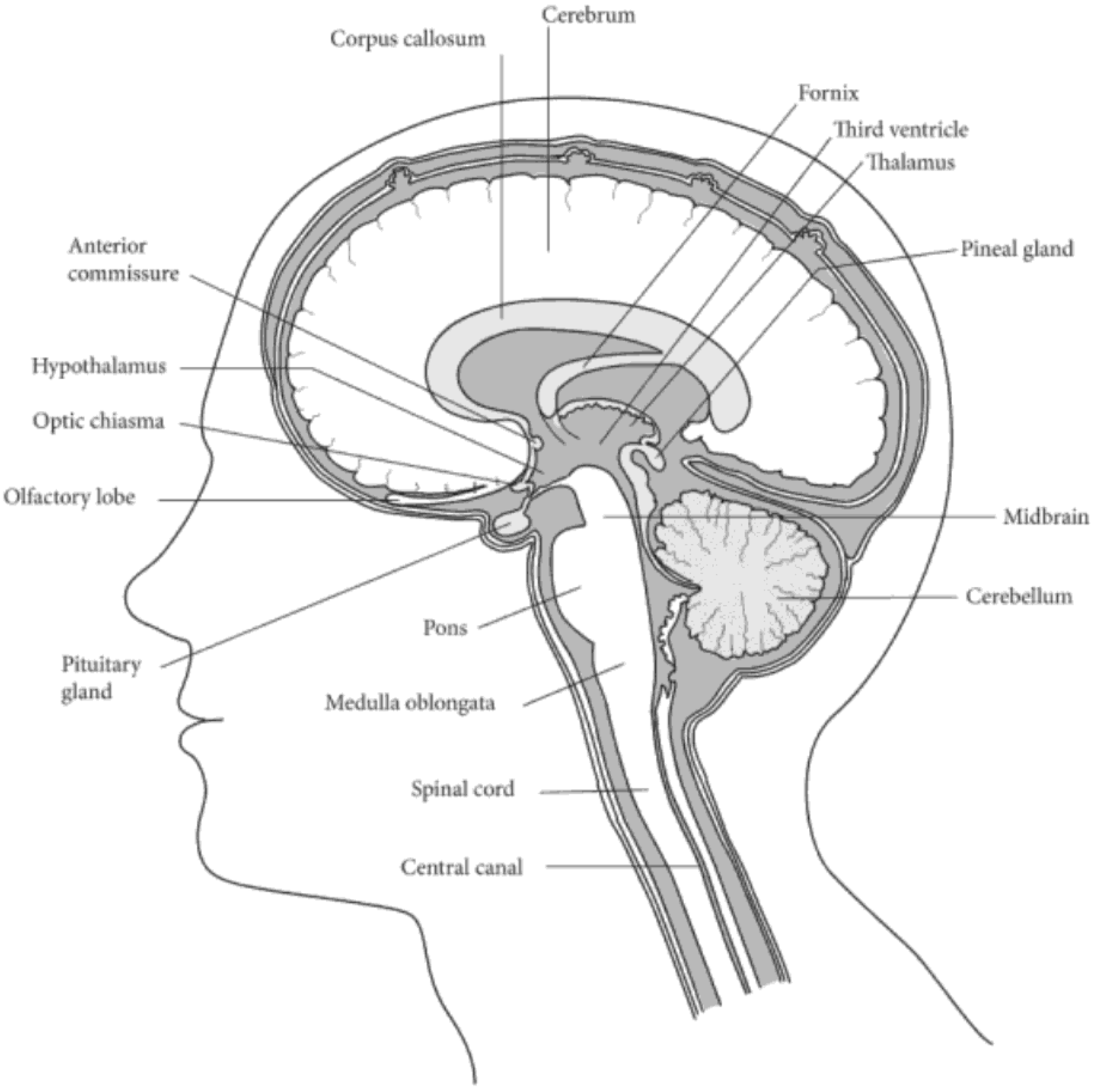

Figure 3.7: Mature brain: the basic parts

If our psychological states become habitualized, the tissues of the central nervous system may become structurally patterned accordingly. As a result, certain architectural changes may take place. It is thought that particular psychological states can produce particular effects. For example, Stanley Keleman suggests that fear inhibits the brain, rage makes it over-active, sadness shrinks the brain, and defiance hardens it.[38] In this way, mental-emotional patterns directly translate into body patterning. As this principle holds true throughout the whole body, we will look at this subject in more depth in Chapter 8.

The ventricles

The ventricles are an inter-connecting system of brain cavities filled with cerebrospinal fluid (C.S.F.). They are not really distinct structures but a series of spaces within the tissue. The ventricles are the remains of the hollow neural tube around which the central nervous system developed in the embryo. C.S.F. is produced in the ventricles. The majority of C.S.F. is secreted by choroid plexi located in the two large lateral ventricles contained in each hemisphere of the brain. However, some C.S.F. is also produced in the third and fourth ventricles, which are located below the lateral ventricles (see Figure 3.2, page 42). The ventricles act as reservoirs of C.S.F. and its inherent healing potency.

Third ventricle

The third ventricle is shaped like an inner tire or a hollow flattened doughnut with a solid center, formed by part of the thalamus of the brain (see Figure 3.8). It is located at the center of the brain, surrounded by the tissues of the hypothalamus, thalamus and basal ganglia. These are vitally important structures for processing information and regulating the body.

Pituitary and pineal glands

The walls of the third ventricle contain both the pituitary and pineal glands. The pituitary gland is called the "master gland" of the hormonal system because it controls many other hormonal glands. It responds to messages received from the hypothalamus, located just above it, by releasing hormones that govern growth, sexual development, reproduction, blood sugar and stress responses. The rhythmic cycles of primary respiration are thought to play an essential role in regulating the secretion of these pituitary hormones.

The obscurely functioning pineal gland is located at the back wall of the third ventricle. Much mystery still surrounds this gland, but it is known that it regulates the reproductive system and our biological clock. According to many spiritual traditions, the pineal gland is considered to be the seat of the soul. Interestingly, in adulthood crystals, sometimes referred to as "brain sand," form in the pineal gland. Although no clear purpose for these crystals has been proven, they have been found to contain *biogenic magnetite*, the same substance that gives migrating birds their sense of direction. They may also function as amplifiers of energy as with many other types of crystal. In this way, these crystals may assist in the uptake of potency of the Breath of Life as it enters the C.S.F.

Primary energy center

The importance and significance of this region has been recognized in many spiritual and traditional health care systems. In the Indian and Tibetan systems of medicine, the third ventricle is considered to be the site of the primary energy center of the body. This is known as the *ajana chakra* in Sanskrit. A chakra is a gateway through which energy passes. In these systems of healing, the ajana chakra is seen to distribute our most essential quality of energy. As Franklyn Sills points out, "The Chinese call this center the 'true field of elixir' or the 'true Niwan,' or enlightened center."[39] In his book about chakras Harish Johari, refers to the region around the third ventricle as the "cave of Brahmin,"[40] a place that yogis go to during meditation.

The existence of a primary energy center is also recognized in biodynamic craniosacral therapy. The area of the third ventricle is considered the site of the *original fulcrum* that is formed at conception and through which the organizing potencies of the Breath of Life first become expressed. In this process the blueprint for the formation of the whole human being becomes laid down and starts to organize the cellular differentiation and development of the body.

Dynamo motion

It is considered that C.S.F. becomes potentized with the Breath of Life mainly in the third ventricle.[41] It is here that the biodynamic potencies of the Breath of Life become transmuted into the fluid. It is no coincidence that the walls of the third ventricle contain some of the most crucial nerve centers and glands for the physiological balance of the body, as these vital structures are able to benefit from the immediate contact of this freshly potentized C.S.F.

Much newly formed C.S.F. enters the third ventricle through openings in the front part of its roof, coming from its main sites of production in the lateral ventricles above. It then circulates around the solid hub of the third ventricle, in a motion that has been likened to that of a dynamo (see Figure 3.8). It is within the activity of this dynamo motion that the spark of life is thought to enter the C.S.F.

Ignition

The third ventricle is considered a critical junction between the vital potencies of the Breath of Life and its manifestation in the body. A process of ignition occurs within the fluids as the creative intention of the Breath of Life enters the body through this primary fulcrum.

This ignition produces the "spark in the motor" referred to by Dr. Sutherland that drives the longitudinal fluctuation of C.S.F. and brings the organizing potencies of the Breath of Life into the body. This process is vitally important for the proper incarnation and embodiment of the organizing forces of the Breath of Life. Many chronic health conditions, often involving a variety of seemingly unrelated symptoms, can be traced to a problem with the ignition process. Ignition quite frequently operates with sluggishness due to the presence of strain or trauma.

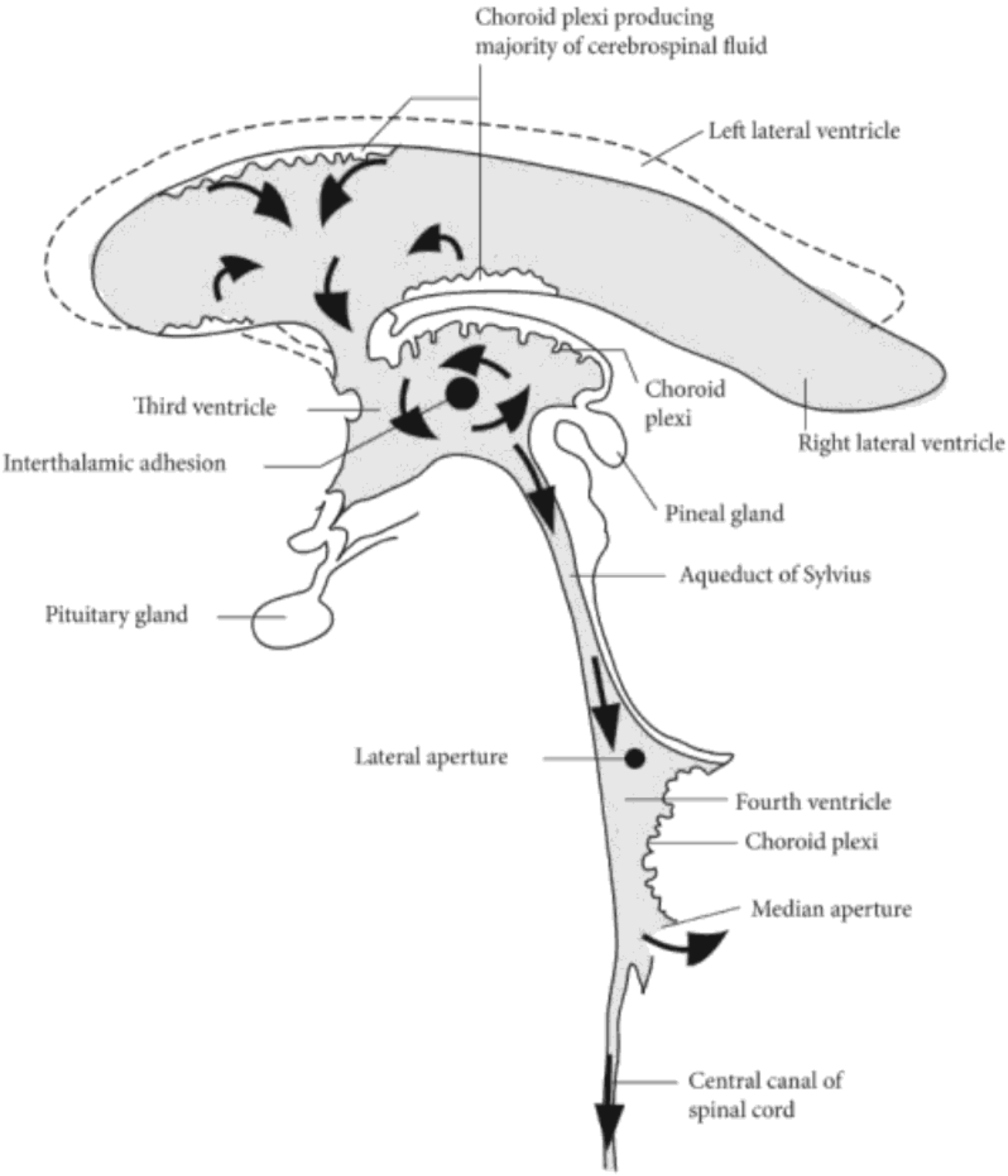

Figure 3.8: Circulation of cerebrospinal fluid around the third ventricle

Fourth ventricle

The fourth ventricle is located below the third ventricle, and is connected to it by a long narrow channel called the *Aqueduct of Sylvius*. The fourth ventricle is a rhomboid-shaped cavity filled with C.S.F. It is also of great importance for the maintenance and regulation of health because its walls contain many of the major nerve centers of the body, including those that control lung breathing (secondary respiration), blood circulation, digestion, elimination, homeostasis and ten of the twelve cranial nerves. These tissues, vital for physiological functioning, likewise become bathed with freshly formed and potentized C.S.F., carrying the ordering principle of the Breath of Life.

3) The Mobility of the Reciprocal Tension Membrane System

The central nervous system is contained within a system of connective tissues called *meninges*. There are three layers of meninges and they are an integral part of the primary respiratory mechanism (see Figure 3.9).

The inner layer of meninges is similar to plastic wrap (or cling film) as it closely follows all the contours and convolutions of the brain and spinal cord. This layer is called the *pia mater* and is very thin and delicate.

The middle layer of meninges is called the *arachnoid* because it resembles a spider's web and is also thin and delicate. The arachnoid and pia mater are connected by thin strands of tissue with a space between called the subarachnoid space. It is within the subarachnoid space that C.S.F. circulates around the central nervous system.

The dural system

The outer layer of meninges is called the *dura mater*. *Dura* means strong and *mater* means mother, so this tissue is considered a strong mother! This tough and fibrous membrane is actually formed of two layers that are largely fused together. However, at certain points in the skull the two layers of dura separate from each other. The inner *meningeal* layer splits away, while the outer *periosteal* layer adheres to the internal surfaces of cranial bones. At the places where the meningeal layer splits away, folds of tissue are created, forming

membranous partitions for the brain. These folds of dural membrane create strong vertical and horizontal sheets of tissue that help regulate the motion of the primary respiratory mechanism. Furthermore, venous sinuses are formed where the layers of dura separate (see Figure 3.9). These important channels drain both blood and reabsorbed cerebrospinal fluid from the head.

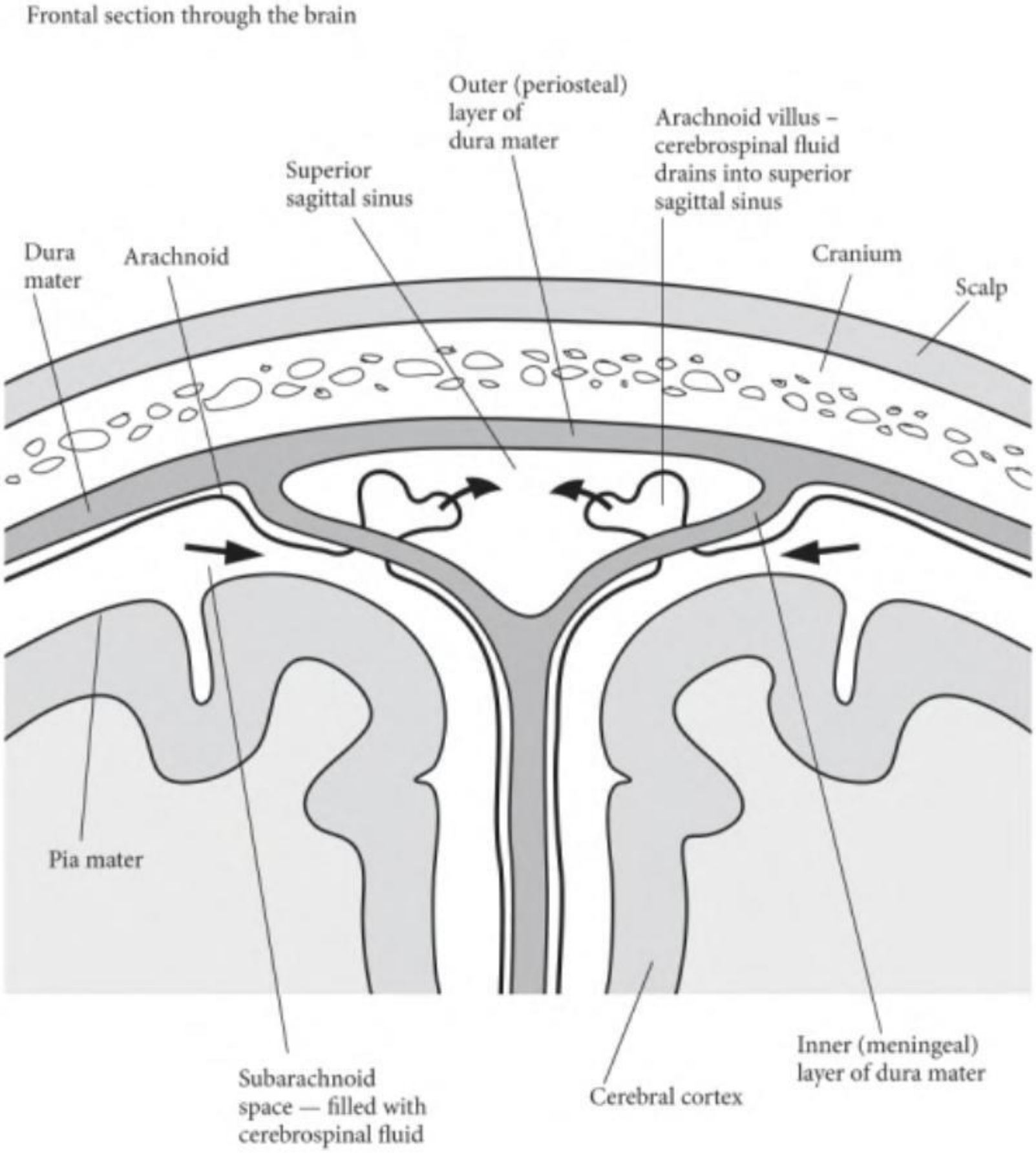

Figure 3.9: Cranial meninges and the formation of a venous sinus

The continuous system of connective tissue formed from dural membranes is called the *reciprocal tension membrane system* (see Figure 3.10).

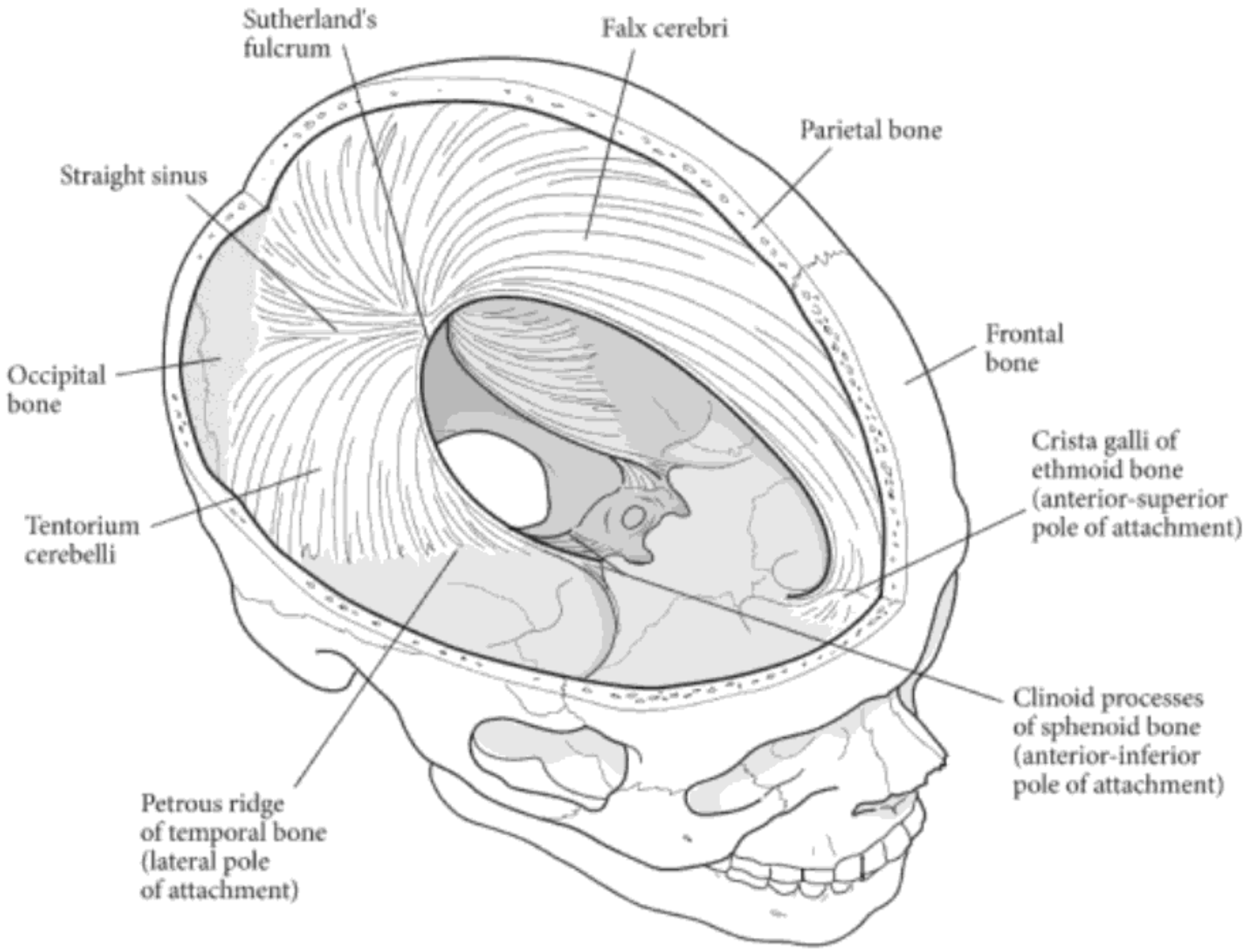

Figure 3.10: Cranial reciprocal tension membranes

Vertical partitions

There are two vertical partitions, made of dura, for the brain. The large upper vertical sheet of tissue, called the *falx cerebri*, separates the right and left cerebral hemispheres. It is a sickle-shaped membrane that traverses the underside of the top of the skull from front to back. At the front, the falx cerebri is attached to the ethmoid bone (see Figure 3.10). It then passes beneath the frontal bone, runs under the suture between the two parietal bones and attaches at the back to the occipital bone. At the back it meets the horizontal partitions of dural membrane at an important junction in which the *straight sinus* is formed.

The *falx cerebelli* is a smaller vertical partition beneath the straight sinus, separating the right and left hemispheres of the cerebellum. It is attached by a dense ring of connective tissue to the *foramen magnum*, a large opening in the floor of the occipital bone through which the lower part of the brainstem and top of the spinal cord exit the skull. The ring of tissue around the foramen magnum is then continuous with the *spinal dura*—the long tube of membrane that surrounds the spinal cord.

Horizontal partitions

Horizontal folds of dural membrane separate the upper and lower portions of the brain, forming a partition between the cerebrum and the cerebellum. This tissue has two leaves that form a tent-like structure across the back part of the skull. It is called the *tentorium cerebelli*. At its front end, the tentorium attaches to projections on the sphenoid bone called *clinoid processes* (see Figure 3.10). At the sides it is attached to the inner ridges of the temporal bones and to a small part of the parietal bones. At the back it attaches to the internal surface of the occipital bone. The two leaves of the horizontal tentorium meet with the vertical falx cerebri at the straight sinus in the midline.

Reciprocal tension motion

Dr. Sutherland named these tissues the "reciprocal tension membrane system" because they are maintained in a state of constant tension during all of their movements. Because the dura is both continuous and relatively inelastic, any motion that takes place in one part of the system is easily transferred to another. In this way, the reciprocal tension membranes function as a unified system. Primary respiration is expressed through this system as a tensile pushing and pulling motion, first in one direction and then in another.

These membranes form an integral part of cranial rhythmic motion. During each phase of inhalation, the falx cerebri shifts anteriorly towards its attachment at the front and curls in on itself, narrowing from front to back (see Figure 3.11). The smaller falx cerebelli also narrows from front to back. Meanwhile, the tentorium flattens out and widens from side to side. It also moves forwards and rises where it attaches to the sphenoid bone at the front. The motion of these membranes coincides with a general narrowing from front to back and widening from side to side of the cranium during inhalation.

In the exhalation phase the opposite motion occurs. The falx cerebri uncurls, moves posteriorly and lengthens from front to back. Meanwhile, the tentorium narrows from side to side and becomes more domed, as it takes on more of a tent-shape again.

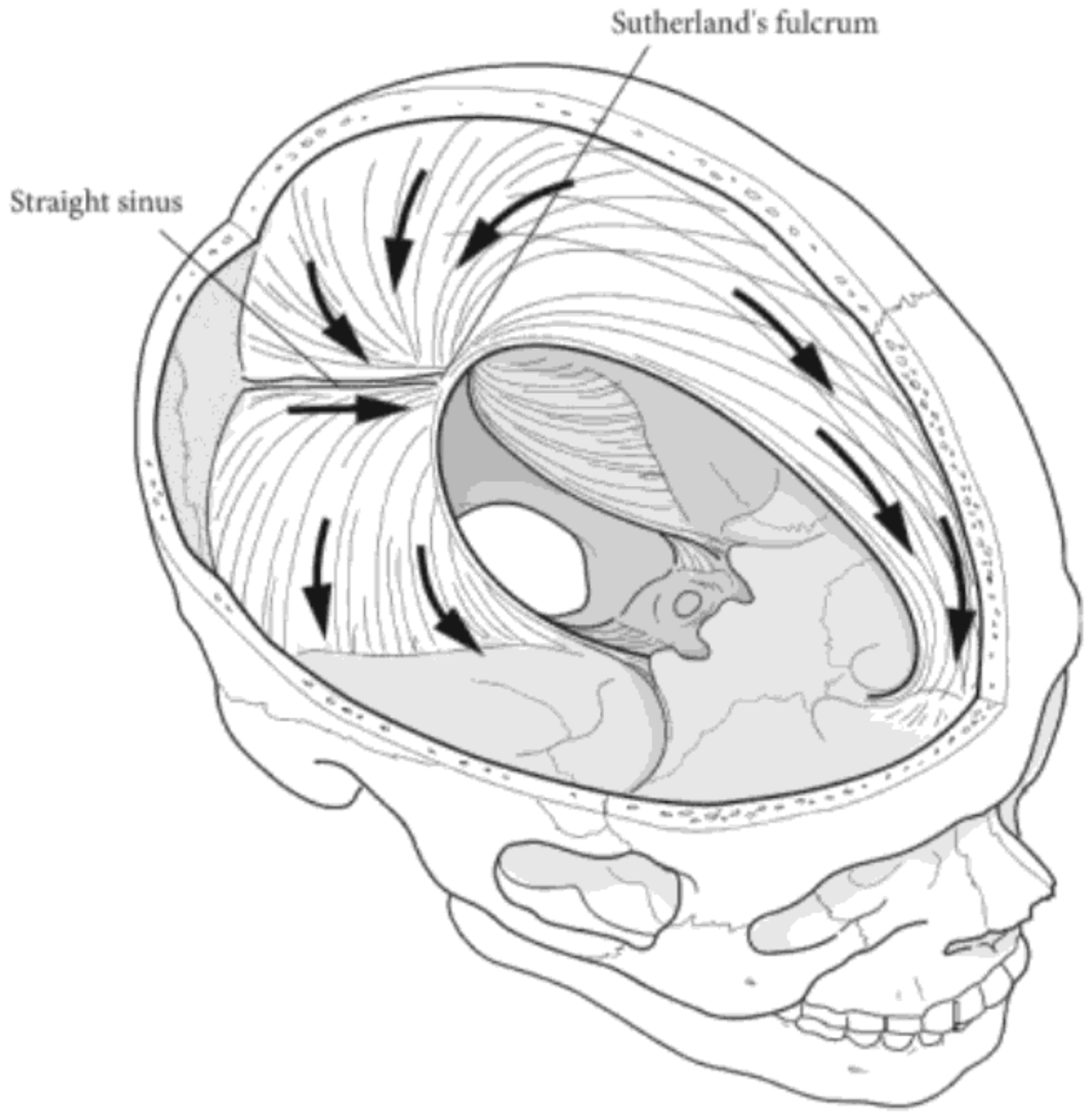

Figure 3.11: Inhalation/flexion phase of the reciprocal tension membranes

Sutherland's fulcrum

The junction formed at the meeting place of the falx cerebri, the tentorium cerebelli and the falx cerebelli, contains the straight sinus (see Figure 3.10, page 60). *Sutherland's fulcrum*, an important leverage point or pivot around which the reciprocal tension membranes express their motion, is located at the front part of the straight sinus. The different partitions of the reciprocal tension membrane system can be thought of as suspending from this important fulcrum.

A fulcrum has been described as a point of rest on which a lever moves and from which it gets its power.[42] As such, Sutherland's fulcrum is a significant place for the balanced motion of the reciprocal tension membrane system. It is actually a moving leverage point that shifts back and forth along the angle of the straight sinus during the cycles of primary respiration. It moves anteriorly and superiorly during inhalation, and posteriorly and inferiorly during exhalation. Any restrictions that affect the balance of this dynamic, shifting fulcrum can upset the functioning of the entire reciprocal tension membrane system—and beyond.

Integrated motion

In the early stages of our embryological development, the reciprocal tension membranes are formed from the *mesenchym* (the same embryonic tissue as cranial bones). Part of this tissue hardens during the first few years of life to form cranial bones, and part of it remains as the dural membranes inside the skull. Therefore, the dural membranes and cranial bones can be seen as different elements within a continuity of tissue. In their expression of primary respiration, these bones and membranes act together as an integrated unit of function. Because the membranes are relatively inelastic any pull or strain has an effect on the motion of cranial bones, as do the cranial bones on the membranes. Consequently, the reciprocal tension membranes have often been described as helping to transmit and guide the motion of cranial bones.

Recognizing the synchronized motion between cranial bones and membranes, Dr. Sutherland referred to their restriction as a "membranous-articular strain."[43] It is not possible to have a strain in one without involving the other. Because the brain is enclosed and partitioned by the dural membranes, its shape and function can be influenced by them. Membranous-articular strains can thus limit the motility of the central nervous system, the motion of cerebrospinal fluid and the passage of fluid through the venous sinus system. The functioning of numerous cranial nerves that pass through the reciprocal tension membranes can also be affected. In fact, freedom of motion in the reciprocal tension membrane system is necessary for the proper functioning of all other aspects of the primary respiratory mechanism, which are either enclosed within it or directly attached to it.

The core link

The spinal dura is firmly attached to the occiput by a ring of connective tissue around the foramen magnum. From this point downwards it hangs relatively freely, encircling the spinal

cord, until it reaches the bottom of the spine. Here it is firmly attached to the second vertebral segment of the sacrum (S2) (see Figure 3.12). However, the dural tube usually has some small slips of tissue that connect it to the second and third vertebrae of the neck and sometimes to the lumbar spine, but these attachments do not fix it firmly to these points. The dural tube provides protection for the spinal cord and acts as a container for the inner layers of the meninges and the enclosed cerebrospinal fluid (C.S.F.).

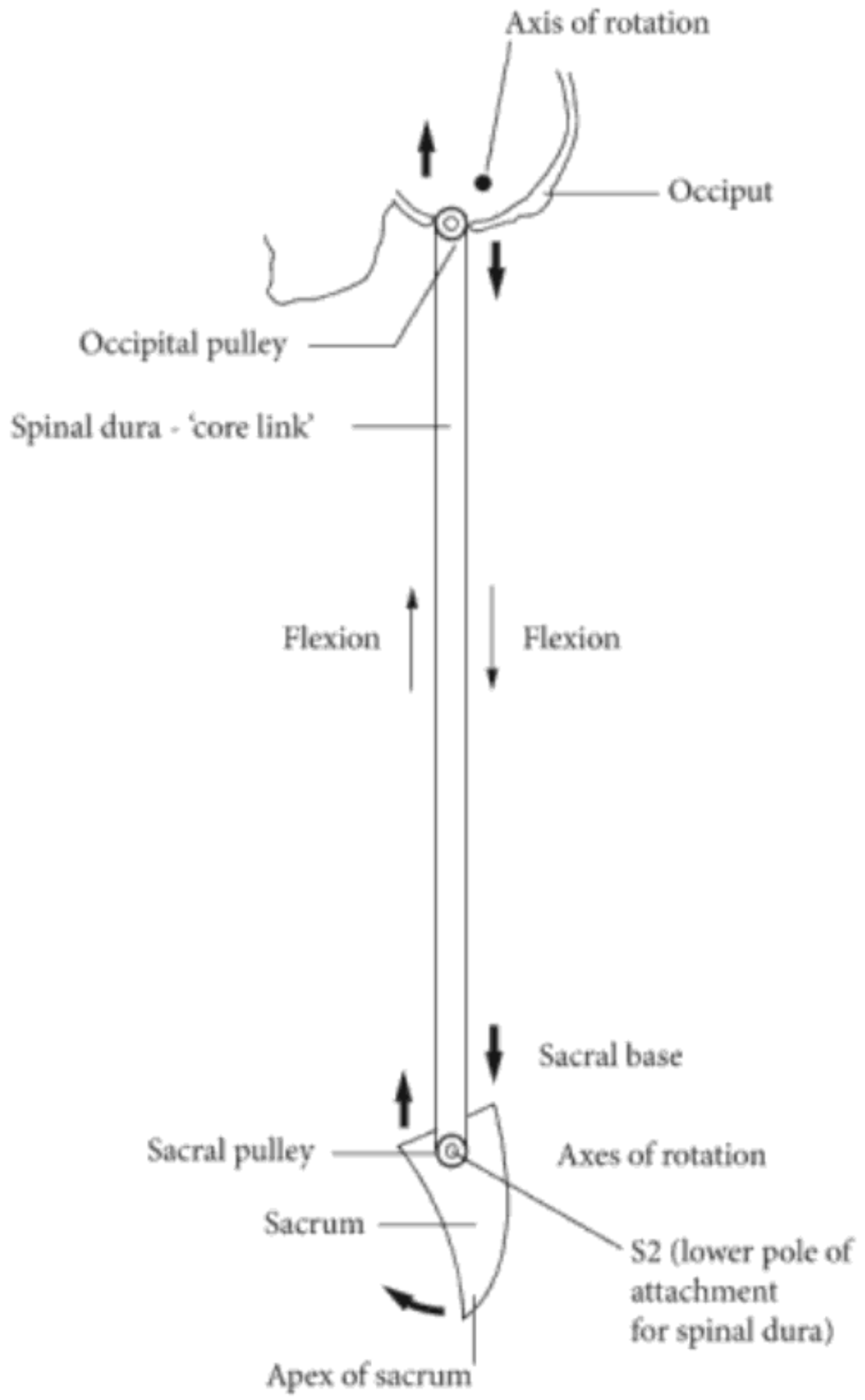

Figure 3.12: The core-link; pulley-motion as the sacrum is rocked into flexion

Because the spinal dura is relatively inelastic, forces can be easily transmitted through it between the occiput at its top end and the sacrum below. The spinal dura thus provides an important link between the primary respiration of the pelvis and the cranium. This connection was called the *core link* by Dr. Sutherland.[44]

During the inhalation phase of primary respiration, the spinal dura rises, following the upward movement of Sutherland's fulcrum. The opposite happens in the exhalation phase. Dr. John Upledger describes a pulley-like motion, during which the occiput and sacrum are reciprocally rocked into their craniosacral motion (C.R.I.) by the spinal dura.[45] When the occiput expresses its craniosacral motion in inhalation, the front part of the foramen magnum rises. This exerts a pull up along the front side of the dural tube, raising the front side of the sacrum and rocking it into flexion (see Figure 3.12). In the exhalation phase, a pull is transmitted along the back side of the dural tube, rocking the sacrum into extension.

However, the dural tube can lose its natural ability to glide freely within the spinal canal. This can affect the motion of the sacrum, cranial bones, spinal vertebrae, the circulation of C.S.F and cause irritation of the spinal cord. This type of problem commonly results from a whiplash injury or other kinds of back strain.

Summary

Here is a summary of the natural motion of the different parts of the reciprocal tension membrane system. During the inhalation phase of primary respiration:

- The falx cerebri shifts anteriorly towards its attachment at the ethmoid bone at the front, and shortens from front to back.
- The falx cerebelli shortens from front to back.
- The tentorium moves anteriorly, flattens and widens.
- The membrane system as a whole moves up and shortens from top to bottom.
- The spinal dural tube rises.

This motion has its pivot around Sutherland's fulcrum, located at the front part of the straight sinus. This is a moving, dynamic fulcrum that shifts position during the cycles of primary respiration.

During the exhalation phase, the opposite motion occurs.

An exercise

To illustrate the integrated motion of the dural membrane system, imagine that your whole body represents these membranes. Stand with your knees slightly bent and your arms partly

outstretched at the sides. Imagine that your legs and trunk are the spinal membranes, your head and neck is the falx cerebri, and your forehead is where the front end of the falx cerebri attaches to the ethmoid bone. Your arms represent the tentorium. To demonstrate how the membrane system moves in its inhalation phase, slowly straighten your knees. As your body rises bend your head forward and down so that your forehead curls slightly backwards as you tuck in your chin. At the same time, spread your arms wider from side to side.

To demonstrate the exhalation phase, bend your knees to represent the lowering of the spinal dura. Uncurl your head, mimicking the action of the falx cerebri, and bring your arms closer to your body, following the motion of the tentorium. Interestingly, these movements are similar to some ancient Chi Kung exercises that apparently follow the natural designs of the body.[46]

4) The Motion of Cranial Bones

Dr. Sutherland began his investigations into primary respiration after recognizing the importance of cranial bony movement for our physiological functioning. There are twenty-two bones that form the adult human skull. Eight of these form the cranium that encloses and protects the brain, the "treasure in the citadel" (see Figure 3.13).[47] Fourteen bones form the face (see Figure 3.14). In addition, there are three *ossicles* (tiny bones) in each ear. The eight cranial bones are:

1	frontal bone
2–3	parietal bones (2)
4–5	temporal bones (2)
6	occipital bone
7	sphenoid bone
8	ethmoid bone

The fourteen facial bones are:

1–2	nasal bones (2)
3–4	maxillae (2)
5–6	zygomatic bones (2)
7	mandible
8–9	acrimal bones (2)
10–11	palatine bones (2)
12–13	inferior nasal conchae (2)
14	vomer

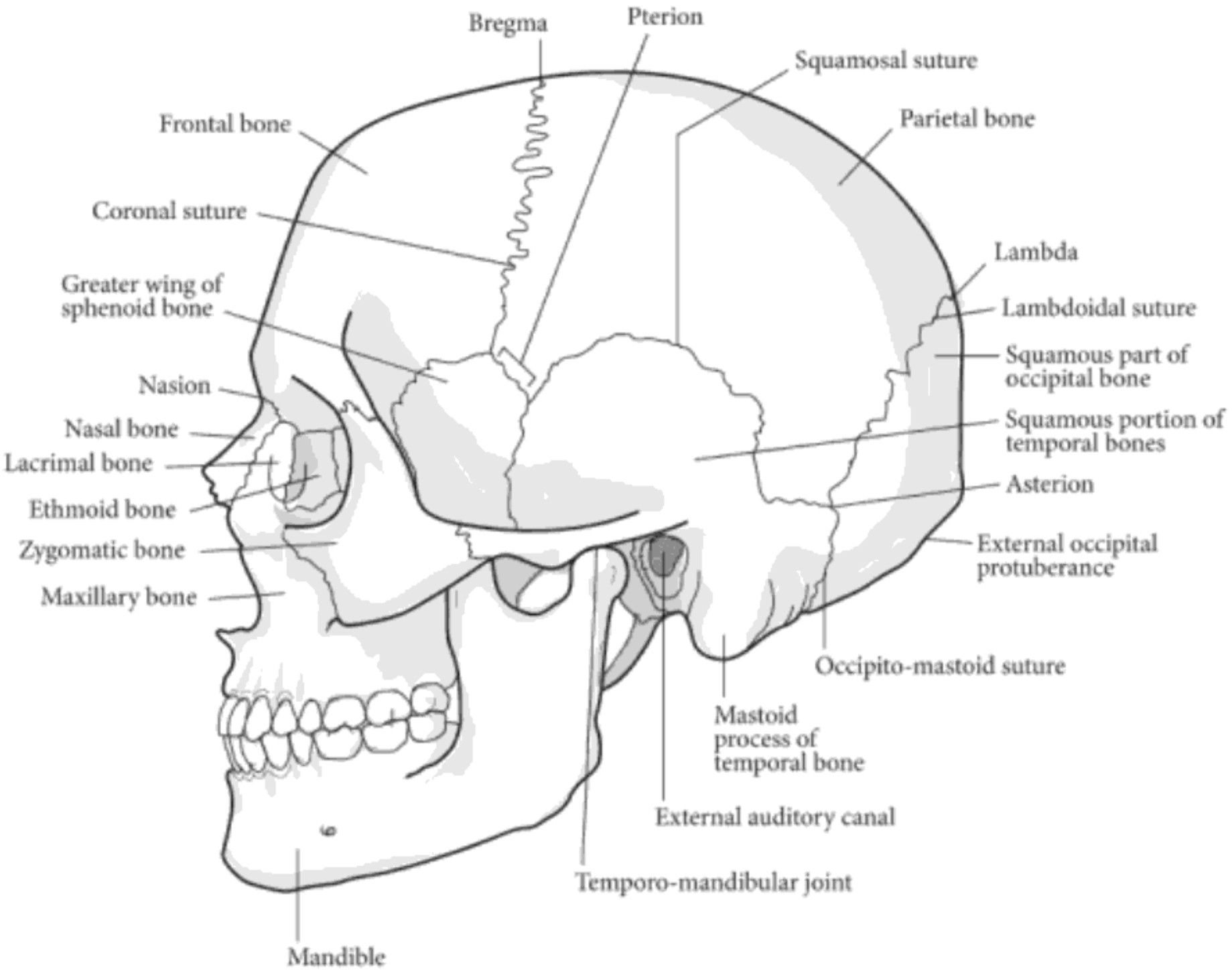

Figure 3.13: Bones of the skull—side view

In accordance with the Greek legend, the cranial bones are carried on the shoulders of *atlas*, the name of the uppermost vertebra of the neck. The individual bones of the skull articulate with each other by a variety of differently shaped joints that allow for various kinds of movement. These specialized articulations in the cranium are called *sutures*. It was while examining the design of these sutures that Dr. Sutherland first had the insight that they were intended for motion. As Dr. Magoun says,

> *Why should there be articular surfaces at all if not for movement? Indeed the only factor physiologically capable of maintaining such joint surfaces throughout life . . . is motion.*[48]

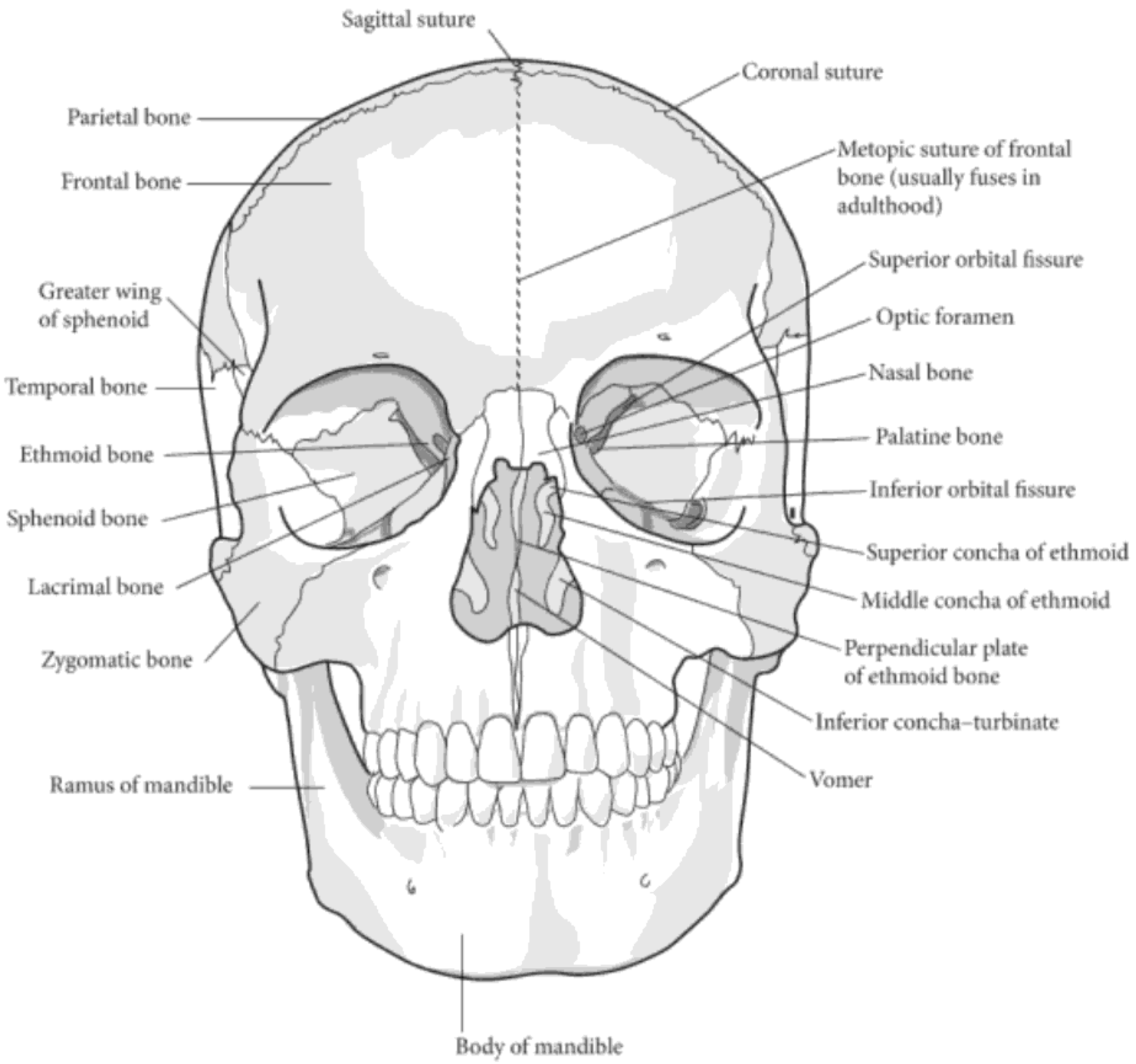

Figure 3.14: Bones of the face—anterior view

Formation of sutures

At the time of our birth, cranial bones still largely consist of either membrane or cartilage, and their sutures have not yet formed. Many sutures do not properly develop until about six years of age. The particular design that a suture acquires helps to determine the motion that can take place. However, there is also evidence to suggest that their design is at least partly formed as a consequence of the motion they express.[49] In other words, the bones form according to how they function. This reflects one of the key principles in osteopathic medicine—the structure and function of the body are reciprocally interrelated (see Chapter 4).

Some sutures are bevelled, with bones meeting each other at angled surfaces (see Figure 1.1, page 3). This design allows for a gliding or separating motion. Other sutures are serrated or corrugated, allowing for separation and a variety of hinge-like motions. Others are formed like sockets, allowing for rotatory or gliding motions. The shape of these "articular gears"[50] is particular to each individual, and a unique expression of individual function. I have examined many skull specimens and have never seen two bones that are alike.

The bones of the adult skull fit together like an intricate jigsaw, producing over 100 sutural articulations. They are like the tectonic plates of the earth's crust that shift on the earth's surface according to deeper forces, which make them move.

Axes of rotation

Traditionally, the primary respiration of each bone is described in relationship to how it moves around imaginary lines called *axes of rotation*. All the bones of the body express motion in specific ways around a particular axis. An axis of rotation can be located in any of three planes (see Figure 3.15):

1. Anterior-posterior axis—an imaginary line from front to back.
2. Horizontal axis—an imaginary line from side to side.
3. Vertical axis—an imaginary line from top to bottom.

To help picture each of these axes of rotation, use a pencil to play the part of the axis. First, hold the pencil so that the two ends point from your front to back. Then take a small piece of paper and fold a crease along the middle of the paper. Rest the crease of the folded paper on the pencil and rotate it over the pencil. This is how motion occurs around an anterior-posterior axis. If you then hold the pencil pointing from side to side—left to right—a horizontal axis of rotation for the paper is provided. Finally, hold the pencil pointing from top to bottom to see how motion occurs around a vertical axis. (Don't forget to keep hold of the paper for this one!) In practice, most bones move around a combination of these axes.

Midline bones

The terms *flexion* and *extension* are traditionally used to describe the primary respiration of all the single, midline bones of the body. These motions occur around a horizontal axis of rotation. During the inhalation phase of primary respiration, all single midline bones move into flexion. During the exhalation phase, they move into extension.