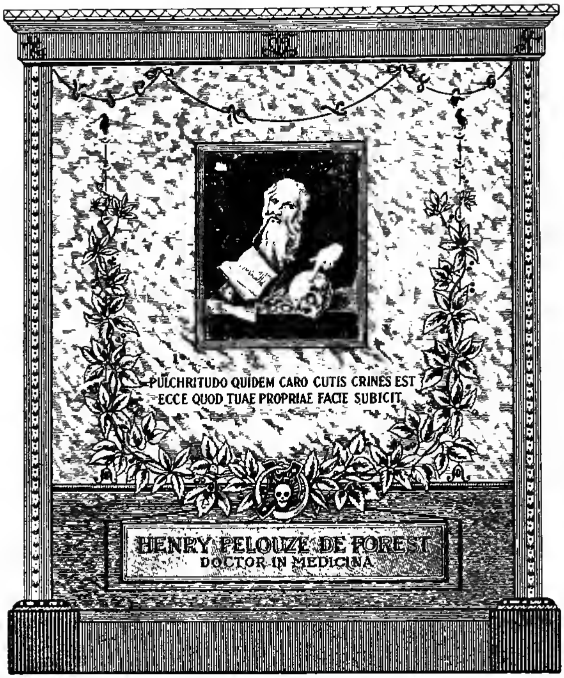
PULCHRITUDO QUIDEM CARO CUTIS CRINES EST
ECCE QUOD TUAE PROPRIAE FACIE SUBICIT
HENRY PELOUZE DE FOREST
DOCTOR IN MEDICINA

Carver's Chiropractic Analysis

OF

Chiropractic Principles

AS APPLIED TO

PATHOLOGY, RELATOLOGY, SYMPTOMOLOGY AND DIAGNOSIS

IN TWO VOLUMES
OF WHICH THIS IS VOLUME
ONE

BY

WILLARD CARVER, LL. B., D. C.

DEAN OF THE FACULTY AND GENERAL LECTURER ON ALL SUBJECTS OF THE CURRICULUM OF CARVER CHIROPRACTIC COLLEGES, MEMBER OF IOWA BAR SINCE 1891. AUTHOR OF APPLIED PSYCHOLOGY, STUDIES PREPARATORY TO THAT OF CHIROPRACTIC, ROUGH NUGGETS, PSYCHO-BIO-PHYSIOLOGY, ETC.

PRESIDENT

CARVER CHIROPRACTIC COLLEGE
OKLAHOMA CITY, OKLAHOMA
NEW YORK CITY

D. Y.

Dedication

TO ALL THOSE THAT HAVE CONSECRATED AND DEDICATED A LIBERAL SHARE OF THEIR LIVES AND FORTUNES TO THE ADVANCEMENT AND GENERAL DISSEMINATION OF SCIENCE, AND ESPECIALLY TO THOSE THAT HAVE DEVOTED SUCH EFFORT AND SUBSTANCE TO THE DISSEMINATION OF THE SCIENCE OF CHIROPRACTIC AND TO THOSE THAT SHALL COME IN LIKE SPIRIT IN THE FUTURE, AND TO THE MILLIONS EVERYWHERE THAT ARE SUFFERING FOR THE APPLICATION OF THE PRINCIPLES OF CHIROPRACTIC, THIS BOOK IS RESPECTFULLY DEDICATED

BY

WILLARD CARVER

Acknowledgment

IN the preparation of this text, books generally have been freely consulted, and to such an extent that to mention one before another would constitute an offense. Due acknowledgment and thankfulness, however, is returned for the assistance gained from all such sources.

I desire to expressly thank all those friends and co-workers that have, by their many expressions of confidence, made it possible for me to persevere to the conclusion of this self-imposed task.

While some, by their frequent contact with me, have given me more aid than others, I do not feel at liberty to mention any names. When I attempt to do so, my mind as readily goes back to experiences that occurred thirty-five years ago as to those of the past year, which immediately informs me that to attempt to individualize in my thanks is futile.

Frankness compels me to admit that I have not performed this work, which has taken thirty-five years, because I wished to, but because I have felt the irresistible urge to do it, and therefore, I am thankful that something in connection with the urge to do it has given me the capacity to persist to the conclusion of the work.

Preface and Introduction to Third Edition

The details of the Science of Chiropractic have accumulated so rapidly in the five years since the last revision of the "Analysis," that it has been found advisable to produce the work in several volumes.

"Psycho-Bio-Physiology" is the first volume of the series, and, as its name implies, is a complete treatise on psychology, biology, and physiology.

Psychology is treated with special attention to Chiropractic. That is to say, in such manner as to systematize and classify its principles, that stand out as causative factors in material formulation and conduct.

Biology is presented in such manner as to indicate and describe the incipient conduct of matter under the influence of animating force, in the formulation of all characters of so-called living structure, but particularly the origin, inception, formulation, and growth of the human organism. Much care has been taken to point out in detail causative factors, and to fully describe and illustrate their operations upon matter.

Carver's Chiropractic Analysis, third edition, is published in two volumes, because the subject matter has become so voluminous, and covers such a wide range of subjects, that it would not be so convenient for use if presented in one volume.

Volume Number One contains the discussion of Pathology and Relatology, complete to the last detail.

Pathology, as found in this volume, is the first treatise on that subject presented to the Chiropractic profession.

It is true that in the first and second editions of the "Analysis" I touched at considerable length upon some of the themes of pathology, but not definitely under that heading.

However, in this volume I am presenting Chiropractic Pathology completely, and for the first time. By completely I do not mean that I have exhausted the subject by any means, for details of pathology will continue to be added as long as the human family exists. I only mean to say that the principles of Chiropractic Pathology are all herein stated, systematized, classified, and described with sufficient of the details of their operation to lend clarity to the subject.

Relatology consists of two departments, which may be distinguished as: (1) the Science of Relation, and (2) the Art of securing Relation.

The Science of Relation consists in a complete discussion of somatic and visceral attitude from the standpoint of the structural architecture and mechanics of the human organism, deduced from the principles of Chiropractic.

Architectural and mechanical attitudes necessitate a discussion of the influences of these upon the various movements the human organ is capable of undergoing without injury, and the laws of conduct deducible therefrom, which is quite fully presented.

The art of securing Relation comprehends a full discussion of the tools of the Chiropractor, their proper use, and all of the means, methods, and conduct which he should employ in his effort to restore normal relation of distorted parts. These are fully detailed and discussed.

With these explanatory remarks, this volume is sent on to the profession with the good wishes of the author.

WILLARD CARVER.

January 24, 1921.

Department Index

PART ONE

PART TWO

PART THREE

TABLE OF CONTENTS

Topical Index

Part One

HISTORY AND SCIENTIFIC CHANGES RENDERED NECESSARY

PREFACE

(To First Edition.)

It is no small task to evolve an analytical, logical, consistent, and authoritative textbook which, in its comprehensiveness, presents for the first time a newly constructed science. In the beginning I shuddered at the task, and the weight of the responsibility of such an effort burdened me for more than a year before the first word of this book was dictated.

Now that the result of my effort lies before me, I am overwhelmingly conscious of details that should be perfected, of illustrations that should be offered, of demonstrations that should be explained, and yet, in spite of all these shortcomings, in the main I am gratified with the result. It far exceeds my somewhat modest and timid expectation. It is, at least, a trail extending far out into the labyrinth of truth, which others may follow and improve.

This work was not prepared for an Anatomy. That which is given is only intended to be sufficient to form a basis for the subjects that follow.

This book contains the first Chiropractic Physiology ever written or attempted, which will be found practically comprehensive.

The Chiropractic Principles herein stated are those that have been demonstrated by the author to be accurate, and to be capable of demonstration.

I have tried to couch this book in simple, modern English, removed as far as possible from the dead languages. There are many words in this book that will not be found in a dictionary.

It is not possible to express the principles of a newly constructed science without the invention of new words, or giving to old words a new meaning. For this liberty no apology is offered. It is an inalienable right of every human being to evolve a vehicle for the expression of his thoughts.

The glossary contained in this work is very limited, and is only intended to contain those words referred to in the foregoing paragraph and those words that express, or are related to the expression of function.

The definitions given primarily indicate the thoughts I have intended to convey by the use of the words, and may not always fully agree with the definitions given in the dictionaries. The pronunciation is that found in Webster's International Dictionary so far as the same applies.

It is not the intention of this book to discuss in detail all phases of abnormality, but only to state the principles entering into all, with the discussion of a sufficient number to make the principles plain, so that the student and practitioner may experience no difficulty in applying them.

In good time another edition of this book will appear, enlarged and corrected as to the text, and thoroughly and elaborately illustrated. For the present, however, it is hoped that this book will serve the student and practitioner as a necessary and efficient working tool.

WILLARD CARVER.

Oklahoma, Oklahoma,
December 16, 1909.

Preface and Introduction to Second Edition

FIVE years have now elasped since I began the preparation of the first edition of this work. In those five years the science of Chiropractic has grown more than in the preceding, nearly fifteen years of its existence.

The truth of the opening statement in the preface of the first edition was not so fully comprehended by me, at the time it was written, as it has since been and now is. I am now more fully impressed, with the tremendousness of the effort, to produce an authoritative textbook than I was then.

What makes it peculiarly difficult is, that it is so easy for readers to fail to get the viewpoint of the author, because of their unpreparedness and because the best selected words always fail to just exactly express the meanings the author would wish them to express. However, the work lies before us and is what it is.

It will be observed an embryologic and biologic portion have been added to the anatomical part, which has been greatly and carefully enlarged and to some extent illustrated.

The Chiropractic principles stated herein have not only been demonstrated, by the author, but they have been demonstrated under the most adverse situations, not only by the author but by hundreds of others.

The student's attention is called to the fact that there is, in the front part of this book, a complete index of chapters which will aid him to immediately find the general subject he desires discussed. Part five of the book is a glossary that gives the words with their peculiar meanings, as coined for the expression of the science of Chiropractic or changed for that purpose.

The student will also find preceding the table of contents a topical index which gives all of the principal topics discussed in the book and the page on which the discussion occurs.

Chiropractic physiology, given in the first edition, has been wholly rewritten and greatly enlarged in this work and enlarged in such manner as to conform to the principles laid down in psycho-biology.

Under symptomology, a thorough analysis of the phases of abnormality has been given, using many of the names therapeutists have given to so-called diseases. These names have been used for the purpose of illustrating to the student the fact that diseases, in the sense the therapeutists understand, really do not exist.

If a kindly Providence permits me to live to the end of another five years, I shall again revise this book; however, I believe that in its present form it contains substantially the essentials, of a thorough knowledge of the human body and the science of Chiropractic. The work makes no pretense of teaching the art of Chiropractic, for that can only be taught in clinic by demonstration.

In closing these remarks, the author can not refrain from requesting the student to be very painstaking in *his perusal of this work. It is very closely and briefly written and, therefore, requires careful study and thought in order that it shall be fully understood and of course, to be understood is the highest ambition of the author.*

WILLARD CARVER.

Oklahoma, Oklahoma,
June 16, 1915.

INTRODUCTION

(To First Edition.)

I

HISTORY

Ambition and egotism have sought in all ages to enshroud the origin of any advancement in doubt and obscurity, for personal advantage, and it has sometimes been found impossible to ascertain the origin and to give credit to the individual to whom due. This is an unimportant matter, because in the evolution of science individuality should be forgotten.

It is, however, usually possible to fix the date of a discovery with reasonable certainty and to give proper individual credit if the would-be historian approaches the task in an impersonal manner, unbiased by the lore that may be abroad concerning the same.

An attempt has been made to obscure the founding of Chiropractic, and to rob the rightful person of the honor which should attach to the proper individual, if considered at all.

There have been stories that Chiropractic was discovered and used more than fifty years ago in Bohemia, under the name Napravit. The matter, however, has been personally investigated by disinterested persons, and no such science existed fifty years ago, or at any other time in Bohemia.

Numerous upstarts over the country have impersonated Amerigo Vespucci, and have pronounced themselves the discoverers; but all such claims have been found to be based on nothing but the egotistical desire for aggrandizement.

The writer, since a child of seventeen, has known the founder of Chiropractic, and has taken pains to ascertain that Chiropractic was never practiced, at least in modern times, until practiced as herein related. He was present at about the time of the founding and received the then very crude application of its principles from the founder, and therefore finds himself in a position to authoritatively assert that the founder of Chiropractic was D. D. Palmer, at that time a Magnetic Doctor, at Davenport, Iowa.

Doctor D. D. Palmer made the discovery that a certain movement of a vertebra resulted in the removal of abnormality, on or about the fifteenth day of September, A.D. 1895, which time antedates the founding of Chiropractic, by him, many months.

Discoverers and inventors are rarely broad minded, patient individuals, endowed with the faculty of continuity. The axiom, "The narrower the edge of the tool, the deeper it will be driven by the same force," applies to the ordinary discoverer or inventor. This is a regrettable fact, and seriously retards evolution.

It is a pity that D. D. Palmer, the founder of the greatest science, which has come to bless humanity, was not a man of patience and continuity, and endowed with the qualities of a leader. If he had been, the science of Chiropractic would have been international, and in general use today; but not having these qualities, he has insisted upon standing in his own light, and in the way of advancement of the science which he gave to the world, in rudimentary form.

Notwithstanding that, however, many intelligent persons have seen the truth and beauty of the principles of the science, and have given to it their time and ability, until at the time of this writing, it is a well-developed and accurate science, comprehending all that is known of the human body in its normal and abnormal conditions.

No textbook has been written with an attempt to gather all that has been developed upon the subject and fully, fairly, and analytically state the same, until the present work. How well this effort will succeed is not yet history, and therefore, the statement of the intention brings the history of Chiropractic to date.

II

SCIENTIFIC CHANGES RENDERED NECESSARY

Society will get along with what it has until forced by circumstances, usually classified as accident, to recognize the necessity for a change.

When the accident or emergency, whatever it is, occurs and the recognition of the newly discovered truth becomes general, society is shocked that it did not sooner recognize the fact, and seeks to attach the blame in all directions, without pausing to make an analysis, which would disclose many additional duties with regard to the newly discovered fact.

Society, however, is improving in this respect, and will be interested to know what the newly discovered principles of Chiropractic have demonstrated as heretofore, unrecognized facts, and the duties it has disclosed with reference to changes in conformity with the principles involved. It will therefore be our pleasure to briefly outline these things.

The discovery of the principle which is the basis of Chiropractic, demonstrated primarily that anatomy as written and taught was grossly inadequate, incorrect, and unreliable.

If this had not been true, no place for Chiropractic would have existed, for under some other name its principles would have been recognized and an anatomy incorporating them would have been developed and written, and society would have been profiting by their application.

The discovery of the basic principles of Chiropractic, then not only disclosed the inadequacy and incorrectness of anatomy but the application of those principles disclosed in what particulars anatomy was inadequate and incorrect.

It must, however, be remembered that a disclosure of a thing does not always bring with it a discoverer or observer of that thing. At the time of the great flood, when the waters receded, the earth was disclosed, but many centuries intervened before mankind discovered or observed many parts of the earth's surface.

It is clear that the discovery of the basic principles of Chiropractic rendered it necessary, first to observe or discover in what particulars anatomy was incorrect and inadequate and to formulate and promulgate the truth in those very many respects; and also to follow out the effect of the application of the newly discovered truths, as to the manner in which they affect physiology, hygiene, diagnosis, and related subjects.

In the light of the newly discovered truth, as applied to anatomy, it was found that the teaching of the nerve system was entirely inadequate and incorrect, and that a revision of that entire subject, with the elimination of many theories, became necessary.

Next in order of importance, an extensive correction of the liquid transportation system, with many additions, became necessary and included a thorough revision of the anatomy of the depuratory system.

Much of the anatomy of the digestive system, as related to the physiology of digestion and depuration, was found to be wholly untrue and had to be corrected.

The anatomical revisions above referred to at once destroyed physiology as written, together with physical diagnosis, and rendered necessary the production of a physiology and hygiene in conformity therewith, and of course, a system of diagnosis in harmony with the new anatomy and physiology, and sufficiently extensive to comprehend all of the facts and principles set forth in both. This was a stupendous task, but earnestness and labor have finally accomplished it.

Much remains to be observed and discovered in anatomy, which in each instance must be followed by a correction of physiology, pathology, and diagnosis in harmony therewith.

If anatomists and physiologists do not again follow the line of least resistance, which ends in innoxious desuetude, but are really anxious to discover and to welcome discoveries, without personal ambition or jealousy, rapid advancement will be made in this apparently exhaustless field.

WILLARD CARVER.

Part Two

PATHOLOGY, WITH INTRODUCTORY PHASES, DEDUCED FROM BASIC PRINCIPLES OF CHIROPRACTIC

CHIROPRACTIC ANALYSIS

CHAPTER I

CHIROPRACTIC DEFINED

LANGUAGE consists wholly of sounds or signs to express mental or physical experiences.

At the beginning language was conveyed from one individual to another by vocal sounds, which are now called syllables. These sounds were frequently repeated, and were therefore remembered, as were also the ideas they expressed.

The next step in the construction of language was the relation of words into sentences, and, with all the growth and development of the human family of which we are so proud, this simple method is still in use today.

In the light of what has just been said, it clearly appears that each thing which bears a name does so as the result of having long been thought about, with the desire to designate it by the use of some definite or regular sound, indicated by a syllable or word as the name of that particular thing.

At this time in the world of advancing thought, the human beings engaged therein are very active in the production of such syllables and words.

I refer to such development as the wireless, aeroplane, and aviation, and certain innovations in chemistry and engineering which have been brought out during the World War.

These new terms are gradually received by society in general, because they are applied to things which do not conflict with social customs, which partake of the nature of religions. If the matter were otherwise, and they did conflict with social customs and habits, which partake of the nature of religions, they would not be so readily received. Indeed, they might be wholly repudiated.

However, from the beginning the endeavors of individuals to indicate and name things have finally been accepted. The sounds they produced in such effort have been reduced to syllables and words, and words into sentences, which accumulation, while simple in itself, forms a very intricate and comprehensive system of expression, the basis of which is what we call grammar.

Fundamentally each language reverts for authority as to its syllables and words to a dictionary.

The dictionary is produced with the intention of properly presenting syllables, and correctly relating them, into the words of the language, and to procuring, by certain marks to indicate the same, the pronunciation of each syllable and word precisely the same by all persons.

It is remarkable how much time students waste in the struggle to become educated, in trying to master the vain result indicated in the preceding paragraph as a matter of sheer memory. I say "vain result" because as a matter of memory no student may hope to learn to pronounce each syllable of his language in a given way, or even in the way the majority of those who speak his language pronounce that syllable.

It will be seen that each individual uses language according to his experience and his knowledge of the rest of humanity, and not otherwise. Therefore, the nearest approach that the student may make is to obtain as comprehensive a knowledge of his fellows as possible, and in this way keep abreast of the general understanding, use, and pronunciation of the syllables and words of his language.

In view of what has been said, it will be seen that a very accurate knowledge of the time, place, and circumstances under which a certain sound began to be used to indicate a certain thing is of the most profound value to a complete understanding of the meaning of that sound, whether it is now used as a syllable or as a word. It will also be seen that this knowledge will advise the student of the way such syllable or word should be used.

Incidentally an understanding of the time, place, and circumstances of the beginning of the use of a syllable or word will aid very materially in understanding how it should be pronounced. But in order to know exactly how it should be pronounced, the knowledge of the time, place, and circumstances of the beginning of its use should be supplemented by the history of its use to the present time. If students were taught language from this standpoint, it would be much easier to introduce necessary words by which to express newly constructed phases of science.

However, the thing the student should be particularly exercised about is to know the exact meaning of each syllable of his language, and this he can only do by tracing each syllable back to where it was introduced to give name to a particular thing. The signs by which these things may be traced occur of course in written and printed matter; but the ordinary student in attempting to study language seems to conceive that he is studying words instead of syllables, and that he is memorizing rules instead of studying history.

The evolution of language is not of today nor yesterday, but has been constant to our actual knowledge since the dawn of history, which leads us to know that in all of the thousands of years preceding that time it was also continuous.

In spite of the fact just stated, there is in our present day an aristocracy or standstillism which presents the most marked opposition to advancement in the language of scientific construction. And this is true of the reformation of all scientific phases, except those of the character referred to in this chapter directed to those subjects which do not partake of the nature of religions.

Notwithstanding this stand-pat disposition, however, the evolution of scientific language continues and will continue so long as the human family continues to evolve or grow in comprehensiveness of thought.

These thoughts with regard to language have been presented to make it clear to each scientific student that it is his first duty to grasp this situation in its entirety, and, therefore, to render himself fearless of that great mass of his fellows indicated, which represents the vast majority, to the end that his language may grow, and that the language of his fellows may have his aid in growing.

It is absolutely necessary if new phases of science are to be formulated; that those formulating them shall fearlessly exercise the liberty to give to old words new meaning; to take from old words parts of their meaning, and to coin new words, and to give to them such pronunciation and meaning as will meet the necessities of the occasion.

This liberty in the formulation of scientific phases must be indulged, because it is well known that nothing is new except in name. In other words, all that exists has always existed in some form, and that names are only necessary to designate forms that have not been designated, or to name forms that have been presented for the first time, if the thought is turned to matter.

If, however, the construction of language is turned to the thought of designating experiences, then new words must be coined to express those experiences not yet named, and new meanings must be applied to old words to express slight changes from original conception.

From what has been said it will be seen that the only discovery possible on the part of the human family is the recognition of material things not before recognized, or the recognition of the relationship thereof, and the recognition of new conceptions called original thought, all of which must be followed by changing names or by giving new names, if the result of the effort expended is to be preserved to mankind.

The last statement is so self-evident that its simplest pronouncement is its most profound argument. It is, therefore, not necessary that apology be made for giving new meaning to names of things already recognized, nor for giving new names to things that have not been named, though perhaps recognized, nor for giving new names to things that have not been formerly conceived or recognized.

CHIROPRACTIC is a new word.

The word Chiropractic was never used before the year 1895. The syllables from which the word was formulated had been used for "time out of mind." They were taken from the Greek language which had taken their meaning, not the same syllables, from languages preceding it. These syllables were related in such way as to produce this remarkable word.

The word produced is spelled C-H-I-R-O-P-R-A-C-T-I-C and is pronounced KI-RO-PRAK-TIK.

The word Chiropractic, spelled and pronounced as indicated, was intended to convey the thought "done with the hand."

It will be seen that the formulation of the word Chiropractic was for the purpose of expressing a peculiar and restricted meaning, because "done with the hand" was not a new thought, and had for hundreds of years been a common expression.

The Greek scholar who suggested the formulation of the name was a preacher, and that explains why the thought came to his mind, from the phrase "laying on of hands,'' which occurs with some frequency in the literature which he constantly used.

''Laying on of hands'' would have just as fully expressed the idea which the syllables used to compose the word Chiropractic meant in the language from which they were taken, or perhaps a little more so than the phrase ''done with the hand.'' However, the word Chiropractic was constructed to express the meaning ''done with the hand,'' and it was directed to an accomplishment of a particular and peculiar character.

It is not a part of the author's intention to criticize what was done, but it is his intention to direct the mind of the student to what it is necessary to now do in view of what was done. In other words, it is the author's purpose to give the student the history of the word Chiropractic to its present time.

There will be no argument that the word Chiropractic, in the sense of ''done with the hand,'' would apply to everything that human beings accomplish save only mental accomplishment and the comparatively few manual things that are accomplished by the use of the feet.

Given such breadth, however, the word Chiropractic would be useless upon the ground of uncertainty, and therefore, exercising the privileges which have been argued in this chapter as being necessary, the Founder used the word Chiropractic to mean ''adjusting the three hundred or more articulations of the human skeletal frame with the hand.''

Long before the word Chiropractic obtained anything like use in the ordinary sense of the word, its meaning was quite markedly changed to this phrase "adjusting the three hundred or more articulations of the human skeletal frame with the hand to remove pressure from nerves." The object of the work being added gives the whole word a circumscription with much meaning.

Undoubtedly the first intention of the Founder was to circumscribe the meaning of Chiropractic to relating articular displacements alone, but thereafter a very short time he recognized the fact that the relating of these articulations were for a specific purpose which should be stated, so he simply added to the meaning of the word "to remove pressure from nerves."

It will be seen that in this conception of Chiropractic it was reduced to the basis of a simple manual manipulation to relate any displaced articulation of "the three hundred or more articulations of the skeletal frame," and that the addition of the phrase "to remove pressure from nerves" did not add much to its scope of significance. In this phase of the situation it became necessary, and may yet be necessary, to add still more meanings to the word Chiropractic.

The first necessary addition to the Founder's meaning of the word Chiropractic was this: to place disrelated, anatomic parts of the human organism in normal relation for the purpose of removing interference with the transmission of nerve stimulus.

In view of the added meaning suggested in the preceding paragraph, it will be seen that the circumscription as to articulations is removed, and that the important thought, which was the one the Founder undoubtedly intended to name, anatomic disrelation, is comprehended so completely as to include the whole organism.

It will also be seen that instead of the purpose designated being "to remove pressure from nerves" the meaning is extended to include all other kinds of interference with the transmission of nerve stimulus. For it can plainly be seen that the Founder's intention was to remove interference instead of "pressure," for if "pressure" had not interfered he would not have desired its removal and would not have indicated it.

Chiropractic, as it is understood today, is a newly formulated science based upon a fundamental principle, from which all its tenets are deduced; with which each and every statement is harmonious and consistent.

The basic principle is fully discussed in my work Psycho-Bio-Physiology. I will only here state it in its briefest terms. The uninterrupted transmission of life force into and through its organized channels, the brain and nerves, causes all conduct which we call life, and which we should call animation. Interference with the transmission of life force, which is called nerve stimulus, causes all functional abnormality, and furnishes the reason for the basic tenet of Chiropractic.

Chiropractic is based upon the fact that disrelation of anatomic structures may be produced by environmental influence, and that when anatomic structures are disrelated they interfere with the transmission of nerve stimulus causing functional abnormality.

The basic fundamental of Chiropractic is, therefore, comprehended in relating disrelated anatomic parts; to removing disrelation, and to removing the functional abnormality which is the expression of anatomic disrelation.

All of the words used in the Science of Chiropractic are not new, lately recognized, or newly named. Yet it must be expected that many old words that are used are given a new meaning, for without having such new meaning they cannot express a portion of the new science. And some new words used are for the purpose of expressing an old meaning that had not been named. Each word used must be thought about from the standpoint of what it is intended to convey, and its meaning must be gained from that conception.

The Science of Chiropractic is very comprehensive at this time, for there has been developed around the original truth a vast array of facts which have been systematized in harmony with the basic principle stated, which has rendered necessary a complete revision of anatomy; the construction of an entirely new physiology, pathology, symptomology, and diagnosis.

CHAPTER II

TERMS OF CHIROPRACTIC DISCUSSED

THE development of the Science of Chiropractic has rendered it necessary to adopt and establish certain technical terms of expression, by the use of which alone can the science be expressed.

Society generally, and especially that portion of it which assumes to be educated, resists most strenuously any changes in the language of technical expression. Because of this attitude there is a hesitancy about the acceptance of terms which seem to be an encroachment upon the established nomenclature.

Notwithstanding this attitude, the formation of any science requires the adoption of new terms, the use of old words to which new meanings are added, and the coining of a number of words in order that the new phases of thought, necessary to scientific statement, may be clearly and nicely presented.

In this view of the situation Chiropractic is divided into two grand subdivisions: one, the science of conduct, two, relatology.

The science of conduct is of primary and very comprehensive importance, and includes biology, histology, anatomy, physiology, pathology, symptomology, and diagnosis.

The student will find the subject of biology quite fully discussed in my work Psycho-Bio-Physiology. An investigation of that work will disclose to the student that biology begins with a full understanding of what we know of the relation of the soul of a human being to the construction of his material body, and its maintenance in this phase of existence.

The student will also find, by a careful study of the work referred to, that in order to understand the whole question, he must know the relationship that the soul of a human being sustains to his anatomic formation, his physiology, and the conduct of his body when it is not in health.

If the student rightly understands biology, in its relation to anatomy, he will understand how the beginning phases of tissue are formed, which is histology, a study that if properly pursued leads to an exact knowledge of anatomy.

Anatomy is only the gross result of histology. In other words, anatomy is not more than the completion of histology. Formations become anatomic so soon as they may be well seen and understood, that is, so soon as their form, color, size, and relation may be ascertained, described, and pointed out.

It will be observed that therapeutically anatomy is not thought of as a going concern, but only as a static structure, which is described from two aspects: the visible or exterior appearance, called topographical, and the inside or dissective appearance, which is called structural.

Physiology, in the simplest language in which it can be expressed, is but a discussion of the anatomic parts of an organism in that conduct or action which we call animation.

Of course, the discussion is physiologic whether its object is a segment of the organism, one of its organs, or whether it is the discussion of the conduct of the entire organism.

The student will observe that physiology always relates to normal anatomy, that is to say, healthy construction and structure. Any deviation from such structure necessitates an abnormal conduct, which is not physiologic, but is pathologic.

Pathology is a discussion of the abnormal conduct of the body, either by segment, organ, or as a whole. It will be seen by a little thought that pathology cannot occur in normal anatomy. There must be faults in structure, or there must be abnormal disintegration, or injury, before there could be pathology. This subject will receive a great deal more extended notice further on in this work.

Symptomology is but a discussion of the various expressions from pathologic or abnormal processes. Of course there are symptoms of health, but they do not properly fall within the department of symptomology, because symptomology is incident to pathology, and not immediately incident to physiology. Although in the very broadest conception of the thought, physiology presents as marked a symptomology as does pathology, but not symptoms of disease.

Diagnosis consists in the reading or observance of pathologic expressions or symptoms, and such translation of them as to lead to an understanding of the adverse functional process, but particularly to an understanding of the actual anatomic changes that have occurred, which have changed physiology to pathology, and of course to a proper understanding of the procedure to restore the anatomy of the patient if possible, or to understand that because of anatomic changes, the situation is beyond remedy.

A declaration of the opinion reached, whether it be an opinion well founded or otherwise, is the prognosis, and under a proper heading much more will be said on the subject of prognosis.

The department of Chiropractic, properly called Relatology, consists of a discussion of place, in the sense of relationship of all the tissues and parts of the body.

Relatology consists of two principal parts. The part just referred to in the preceding paragraph, and that part which addresses itself to the method and manner of securing relationship of histologic or anatomic parts, and, therefore, falls within the art of Chiropractic.

It will be seen that primarily relatology relates to histology, in that part of it dealing with the relationship of the most infinitesimal parts of structure, and goes from that to the most complete investigation and discussion of all anatomic structures, particularly of their relationship.

The student will observe that relatology not only consists in a full consideration of the physics of Chiropractic; but also the laws which control adhesion, cohesion, ponderability, porosity, liquidity, density, dryness, and so on.

Relatology also deals with the laws of chemistry in that sense in which a knowledge thereof sheds light and understanding upon all the various subjects stated in the preceding paragraphs, and also as to color or lack of color, disintegration, reintegration, and the production of fungi, precipitation, and chemical resistance.

In addition to the subjects named, relatology also consists in a discussion of all the ways by which the subject matter indicated in the several preceding paragraphs may be isolated, understood, and discussed, which primarily refers to sight, feel, smell, and percussion.

That is to say, the student of relatology must become so proficient in the knowledge of the subjects indicated that he can translate sight into a knowledge of body processes; can translate feeling into a knowledge of body processes; can translate smell into a knowledge of body processes, and by sounding can translate body processes.

The student will observe that to become proficient in relatology one must have such knowledge of the organism as enables him to know its anatomic situation, and, therefore, its pathologic situation to the end that he may be prepared to properly apply the art of relating.

The art of relating consists primarily of a complete knowledge or mastery of relatology as a first prerequisite, and then requires a comprehensive knowledge of the geometry, which consists in the lines, planes, and angles along which force must be conducted in harmony with anatomic structure to secure relation of disrelated parts.

In addition to the knowledge stated in the preceding paragraph, the relator must understand the laws of poseology, that is to say, the various positions of his own body which are necessary in order that he may secure unit conduct, and the various positions of his patient's body in order that the application of his skill will secure unit conduct that will be evolutional in his body. This subject will be treated of more at length further on in this book.

CHAPTER III

INTRODUCTORY TERMINOLOGY

HAVING learned from the book preceding this, Psycho-Bio-Physiology, the methed by which the fundamental elements of tissue form into cells and add new cells in the process called growth, and how such tissue elements disintegrate and are removed, replaced, and restored by the process upon the one hand termed depuration, and upon the other hand the process of assimilation, which have back of them ingestion, digestion, absorption, liquid transportation, aeration, and extrusion; in other words, having learned that the human organism comes into existence by a process of original formation, and grows by a process of addition, we are now about to enter upon that branch of study in which we must learn the law of these functions in construction, and therefore normal procedure, and in destruction or abnormal procedure.

Before entering definitely upon this work, it is advisable to become a little more intimate with the technical language of expression it will be necessary to use. We shall, therefore, review to some extent the terminology which will be met with therein.

Students of a scientific turn of mind will readily observe that the selection of words is of paramount importance in the expression of all scientific thought, and are ready to perceive at once the extreme value of the delicate distinctions that may be made by such careful selection of words.

Nothing can give the scholar greater mental satisfaction than to obtain as nearly as possible certainty and clarity of expression, and that may only be accomplished by evolving to a fine ability in the selection of words with just the proper meanings, and then the regularity of the use of such words always in the expression of that thing.

At this juncture the student should realize that a little carelessness in the selection or use of terms renders anatomic, physiologic, pathologic, and symptomologic expression but a meaningless jargon, and he must have recognized that this element of carelessness and indifference accounts in large measure for the general lack of knowledge at the present time of the basic laws of animation.

In view of the facts just stated, and to the end that what is said in the future pages herein may be more perfectly comprehended, we shall at this time establish a vehicle for the conveyance of thought by stating and explaining what the author intends to convey by the use of a few of the basic terms which he finds it necessary to employ.

From the beginning of history much has been said about creation. Substantially all of the books that assume to be authoritative, discuss phases of creation, and some of them assume to give an account of creation.

None of them, however, goes into any details as to how creation was performed.

The Holy Bible covers that subject by saying "in the beginning God created" and then goes on to enumerate the things that were created adding "of the dust of the earth created He them." There is nothing in this statement to show how the transaction of creation was accomplished. This statement is not intended as a criticism, but is merely to call the student's attention to this important fact.

It is not the intention of the author to enter into a discussion of creation in this connection, but it is his intention to call attention to the fact that since the creation of matter upon the one hand, and power or force upon the other, any assertion of creation is a use of the wrong term, for since matter and force were produced nothing has been created, but matter has been formed into different phases, that is to say, shapes, forms, and relationships by the application of force to it.

The statement made is true whether force is looked upon in the abstract, or is conceived from the standpoint of intelligence, for intelligence is only a phase of force, which always acts upon or through matter.

It is futile at this time to discuss or think of creation in connection with human beings. In other words, it is perfectly clear that human beings are not created, but are formed by the application of force to the matter involved according to well-defined and specific law.

The matter which enters into the composition of a human being is not new material. It is not created for that purpose. In the given instance it is not created at all. It is in existence, and by the intelligent application of force, it is taken in the smallest particles of it, which may exist by themselves, and is placed in proper relation and caused to perform such conduct as to make it a part of the animate organism under construction.

In the beginning of each human being, particles of matter under the impulsion of intelligent force are brought into such relationship, and into the performance of such conduct, as to produce and maintain the beginning of a new person, which in the further formative steps takes on the full structure of the human organism.

It is because material elements are brought together and form a new person that the conception is so widely indulged, that in the procedure creation is taking place. However, creation is not occurring. In the remarkable phenomenon that is taking place, we have but the simple process of the formation of a new person by the action of a phase of eternal force controlling and directing infinitesimal particles of eternal matter.

Students are apt in learning certain phases of discussion of material things, but hesitate when it comes to discussing that side of nature which relates wholly to force or power. In other words, materialistic conceptions are widespread and common in human society.

It is not difficult to recognize the oneness of matter and that it is eternal, but it is difficult because of the newness of the proposition, to recognize the oneness of force, in precisely the same way and to the same extent.

And yet these conceptions must be mastered if the student is to go far in an understanding of the human organism.

The proper conception for the student then, in the beginning of a study of this kind, is to conceive that each human organism that is to be produced consists of two phases: An infinitesimal part of universal force, which includes intelligence set apart for the purpose of accomplishing a definite purpose in matter and a definite part of matter brought by relative mechanisms within the control of that force.

The student should conceive that the intelligence and force act first. The force acting upon the matter, brought within its influence as stated, causes the matter to respond to the intelligent force, resulting in a specific production according to a specific plan, which must be in harmony with the intelligence of the part of universal intelligence and force set apart for the accomplishment of that specific purpose.

Note one thing in connection with the statement of the last paragraph. The matter in consideration is brought under the control of the intelligent force by relative or accessory mechanisms. These mechanisms are in position to influence the result sought to be accomplished, and this fact accounts for the imperfections in structure in all forming organisms.

At the incipiency of the formation of a new organism the matter is brought into relation with the intelligent force by relative mechanisms such as the placenta, but at a certain stage of development the mechanism for bringing matter into relation with the intelligent force is constructed by the intelligent force and is a part of the organism. The last reference, of course, is to the respiratory and digestive systems, which are the departments of raw material intake.

In this connection it will be seen that an organism lives two phases of history. That is to say, the first phase in which relative mechanisms bring matter under control of the definite, intelligent force which is to form the organism, and the second phase which is the organism's existence after its machinery of raw material intake has been formed.

The first phase is the period of basic production of tissue elements, and the formulation of them into the first forms of tissue which we may designate as the animal cell or animal cells, and other primary forms of tissue. The second period is that portion of the existence of the organism after the formation of the organs of raw material intake.

It will be remembered that the first phase covers the period of the zygote, embryo, and fetus, and that the second phase of raw material intake does not begin its conduct until the commencement of extra-uterine existence.

It will be seen that adverse influences may as readily interrupt the accomplishment of the desired result in the first as in the second phase; with this very important exception: that when the organism has become sufficiently mature to have evolved mind function a better avoidance of adverse influences may be accomplished.

To render the last paragraph a little more clear. As the human organism matures, the brain is more perfectly developed, and other things being equal it functions to the production of stronger and better mind.

And mind becomes better informed, and just in ratio with these developments may the person or individual avoid those things in the way of raw material intake which would have for their effect an interference with the building, rebuilding, and maintenance of the organism.

The ultimates of function have been declared to be *absorption, depuration,* and *assimilation.*

Absorption, when addressed to the respiratory raw material intake, has as accessory to it respiration and transfusion, and when applied to the alimentary raw material intake it has as accessory to it ingestion, digestion, and elaboration.

Depuration has as accessory to it disintegration, liquid transportation, and elimination.

Assimilation has as accessory to it absorption, liquid transportation, aeration, elaboration, extrusion and cohesion.

The student will observe that the organism is divided into these several and important functional departments. (1) The power department, consisting of the brain and nerve system. (2) The raw material intake department, consisting of the respiratory system and the digestive system. (3) The department of transportation, consisting of the lymph and blood systems. (4) The department of use or formation, which is the department of the relation of matter under the intelligent control of force called elaboration and cohesion. (5) Depuratory department, consisting of disintegration, liquid transportation, and elimination.

CHAPTER IV

INTRODUCTORY PHASES

The subject of physiology has suffered much at the hands of the theorists. It has been supposed that physiology was a fluctuating thing, having no real scientific existence in fact, but more or less subject to the whims and caprices of those who assume to write about it.

As embarrassing as it seems, no two purported authors have ever agreed as to what physiology is, and this has been true, because, therapeutically speaking, there has never been a basic, physiologic truth from which facts might be deducted, but the whole subject has been involved and distorted by posed hypotheses.

Those who assume to be physiologists have not seemed to think it necessary that they should apologize for differing from each other, when it is perfectly clear that if the subject had been elucidated in a scientific manner, any considerable difference or divergence of opinion would have been an impossibility.

Fortunately we are privileged to congratulate ourselves that the fundamental principles of Chiropractic have put an end to uncertainty or irreconcilability in physiologic statement, and from the basis of Chiropractic, physiology is now clearly conceived to be a discussion of the processes of the related anatomic parts of the body, individually or collectively.

The clarity of conception as to physiology has rendered pathology a much easier subject to discuss, and has placed the discussion of pathology upon a sound and scientific basis, just as sound and scientific in fact as is the discussion of physiology.

Pathology in all of its phases is a deduction from the basic fact of Chiropractic, and because that is true the conclusions reached are just as definite and certain as are the fundamental principles of physiology.

Pathology is a discussion of the processes of the parts of the body, or the conduct of the body, when its parts or elements are not normally related to each other. That is to say, when its anatomic structures are so changed in their relation to each other for any reason whatever, that in such change they have passed the limit of normal variance.

It will be seen that pathology is precisely the same as physiology with the exception that pathology is a discussion of the conduct of abnormal parts of the body individually or collectively; whereas physiology is a discussion of the conduct of normal parts.

The author in making these statements is not unaware that they are made in the face of a definite, specific, and long-standing prejudice, for it has been the custom of therapeutists for many years to attempt to explain physiologic proceedings upon the spacious theories of chemistry, and they have sought just as strenuously and also just as vainly to treat pathologic themes in the same way.

However, that fact should not control where truth to the contrary has been clearly and universally established, and it shall not be permitted to exercise any detracting influence.

Chiropractic in its entirety is a very young theme; a quarter of a century is all too short a time to expect any phase of definite thought to take on all of the elements of deductive certainty and exactness.

However, so far as immediate, fundamental thinking has gone in Chiropractic development, it has been deductory and, therefore, exact and universal in its application. Many themes, however, have not occurred to the minds of those who have had charge of its unfoldment.

Many phases of Chiropractic have been discussed under indifferent and incompetent headings, simply because those who have considered them have had nothing to direct the mind to their proper classification. And, while that is true, the effects have not been misstated, and so in the growth of Chiropractic no real harm has been done except delay in clarity of vision.

The reference in the preceding paragraph is peculiarly to the matter of traumatic injury. Traumatic injury has been treated in a department quite by itself, and as though it were a theme entirely by itself. This, of course, has been clearly and definitely a grave error, resulting largely from failure of comprehensiveness of thinking.

All Chiropractic writers have, without thought, stated it as a fact clearly implied, that pathology is wholly a functional proposition. In other words, the treatment of the subject has carried with it the intimation that the only pathology that exists is that of abnormal function.

This has been a very grave error and really an unjustifiable one, for it is perfectly patent to any person who will candidly give consideration to all of the propositions entering into the subject, that pathology consists definitely of two departments: that of definite and specific injury which is usually referred to as traumatic, and injury that has heretofore been conceived as being latent or functional.

Pathology, then, consists peculiarly and definitely, and in its primary and exact significance, in injury to anatomic structures, and injury to anatomic structures may occur from extraneous sources, or may occur from internal or functional sources.

Pathology, therefore, consists of injury to anatomic structures which may occur suddenly, by a direct and specific force from an extraneous source, which is sufficient to overcome the resistance of cohesion of the anatomic elements involved, resulting in their distortion, or may occur solely by failure of physiologic processes which results in distortion of the anatomic elements involved, or by changes of chemical formulae, which have the effect of changing the size, shape, color, and consistence of anatomic parts which also necessarily includes their relationship.

The definite and extraneous injury referred to in the preceding paragraph will be recognized under such familiar terms as strains, sprains, lacerations, contusions, disintegrations, and enlargements, for it will be understood that all injuries from extraneous sources come under one or more, or a combination of all of these characters of injury.

The second proposition referred to, that is, the failure of physiologic functioning sufficient to produce the anatomic parts, by reason of which they become anatomically distorted, must, of course, be confined to an area, for this phase of pathology could never be incipient, but must always be a sequence of primary pathology elsewhere in the organism. However, the student must not allow that fact to carry his mind away from a proper appraisement of the gravity of this situation, and the certainty of its occurrence under certain, well-defined circumstances, which will be hereinafter detailed.

The third proposition, that is, the changes of chemical formulae affecting the relationship of anatomic parts, by changing their size, shape, color, and consistence, is a proposition of paramount importance, and while stated third in the order here, it is primary in the very extensive scope of its application. For, while traumatic injury in one sense of the word is generally incipient, still adverse chemistry may as easily be incipient, and by comparison of its effect with that of traumatic injury, causes the latter to pale into utter insignificance.

The latter statement is no more than saying that adverse chemicalization is the rule in the human family, instead of the correct and judicious introduction of chemistry.

The reference is particularly to the department of raw material intake, that is, to the respiratory and digestive systems, and is only equivalent to the statement that it is the custom to under respire, to undergo improper ventilation, and all the errors incident to abnormal respiratory procedures, and that the human family eats too much, badly selected foods, incorrectly and injuriously combined and masticated.

The student who has followed the analysis of this subject carefully to the present will be ready for the statement that pathology must be treated under three heads: (1) Department of traumatic injury; that is, strain, sprain, laceration, contusion, disintegration, and enlargement; (2) the department of physiologic failure to reproduce or maintain anatomic structures, and (3) the department of abnormal chemistry.

CHAPTER V

STIMULUS

The most remarkable phenomenon incident to what has been generally termed life, but which should be conceived as animation, is that its material aspects are the evidences of a process or conduct, and do not tend to established animation or so-called life as a thing.

Incident to animation, no matter whether of plants or animals, the paramount thing to be observed is that the entire, material process is being controlled and directed by an intelligent force.

By reviewing the subject in the beginning book, Psycho-Bio-Physiology, the student will recall that when impregnation occurs and the male and female pronuclei approach each other, and so completely separate into particles as to present a clear field, that the next thing observed is the granular center, which marks the field of development of the future human being. And all of the phenomena that take place are so systematic and regular as to establish the operation of an intelligent force.

Indeed, the whole embryonic transaction tends to prove, and in its entirety does prove, that before any material construction of the new human being occurs in the place where it finally develops, that this individualized intelligence and force operates to attract, relate, and cohere the primary particles that begin material organization.

It is true that impregnation of the human ovum has never been observed, and its first few phases are as yet unknown, and may remain so.

However, in animals similar to man, all but the very first phases of the conduct of impregnation have been observed, and we are put in a position to make deductions as to the incipient phases, by observing those that occur later, which give us the basis for deduction.

From these phases of observation we find that the first observable phenomenon so far made is growth or development, without any apparent machinery, which is afterwards recognized as essential to growth. Of course, it must be admitted that analogous machinery may exist; but it is also easily understood that the conduct may take place without the necessity for machinery as we afterwards know it.

The most astonishing phenomenon at this juncture is the fact that the growth or development that is taking place is doing so according to a *specific plan,* directed toward the production of a given or *distinct image.* That is to say, not only is the growth and development taking place in such manner as to produce a human being, but it is taking place in such manner as to produce a separate, distinct individual, different from any human being that was ever produced before.

Of course, it is impossible to state whence the force comes that we observe operating to produce a new human being. The materialists have assigned it to the "universal unrest of matter'' and to ''automatism,'' and some have finally admitted that such force could not be exhibited without its exhibition being caused by a force more than equal to all of that which is observable, commanding and controlling the same.

As a matter of knowledge obtained through our material organism, all we know about it is that there is a force that acts in a definite and specific way upon matter, causing the formation of a protoplasmic speck, to which it adds other particles, to the production of cells; to the production of segments; to the production of organs and parts; and finally to the production of the whole organism.

Where the force or power that accomplishes this wonderful phenomenon comes from, no one can say with an authority superior to that of intuition.

In the face of this phenomenon, the human being with all his assumption and egotism, must at last stand face to face with what he intuitively knows to be original formation; the operation of an essential, individual, formative energy, with which he is not in any sense familiar, but upon the operations of which he has looked at first with awe, but finally with commonplace emotion, so many times as to have forgotten its immaculateness.

In the construction of a human being there is observed the wondrous influence of an unseen, individual force—intelligent, active, persistent, and eternal—to which no name has been given until recently.

The operation, the growth or development of a human being, has been called creation by a part of the human family, and envolution by another part; but the force or energy causing the immediate conduct of so-called creation or evolution, properly called formation, has not been named by any author until, in the first edition of this work, the author used the term *kenetic energy*, as referring to the force before it enters the human body as such, and *stimulus* upon its entrance into operation within the material body.

Therapeutic writers have for a considerable time referred to the apparent force active in the body as nerve stimuli, which term, however, is the plural of stimulus, and they have accounted for stimuli upon the basis of kinetic energy, produced by material disturbance.

The very fact that therapeutists have used the word stimuli always in its plural form, is sufficient proof that they were not directing attention to the force which I have called kenetic energy in our first knowledge of it, and stimulus in its period of activity upon matter to construct and maintain the human organism.

In passing it seems necessary to call attention to the fact that stimulus is a phase of force emanating from an individual source and, therefore, the word cannot possibly have a plural formation.

There are multifold phases of the action of force upon matter, but it must be understood, that does not pluralize force, nor make a plural term applicable to it.

Hudson and others have used the term *telekenisis* to indicate the energy or force that emanates from the soul of a human being. I do not like the form of the word used, and see no reason why it would not be better to adopt a simpler word such as kenetic energy, and I did so in the former editions of this work.

If it were not for the fact that there is such a small portion of the human family adequately informed upon psychologic subjects, and such a large number very disadvantageously misinformed, I would have used the word kenetic energy instead of the term stimulus.

But since the word kenetic particularly refers to the soul, it is perhaps better that the force emanating from it, when it applies itself to material elements to produce and maintain a human being, should have a different name, which would distinguish that fact, and for that purpose I know of no better word than stimulus.

Following the folklore of the subject, people have generally applied the qualification, nerve, and called it nerve stimulus. However, that is not at all necessary, and is not recommended, for it is not in any sense nerve stimulus. It is only stimulus, transmitted from the soul of man into and through his brain and nerve system, applying itself upon the material elements of his body.

When kenetic energy has brought together in that clear field of protoplasm the original protoplasmic speck, which by accretion and proliferation is to become a human person, the first thing developed is the brain, vertebral cord and the most important trunks, which are followed in the proper order of sequence by all the other nerves and organs of the body, until finally the full stature of the image after which the particular person in question is being constructed has been fully formed.

From what is stated in the last paragraph it is clear that kenetic energy first acts upon matter in such way as to bring it together and form channels for transmission, through which channels all of the various developments, ordinarily called growth, from that moment occur.

Therefore, we are impelled to say that the first and paramount function of the brain is to receive kenetic energy, which by virtue of its receipt becomes stimulus, and to transmit or radiate the same through the nerve channels to all parts of the organism, constructing all of its parts to full maturity, and then maintaining them, until the environmental circumstance renders their maintenance impossible.

For still further division and classification of the operation of the remarkable, constructive force under discussion, it may be said that it is kenetic energy until it enters the cortex of the brain; it then becomes brain stimulus, and when it is radiated into the nerves, it may be called nerve stimulus.

Nerve stimulus is the term almost universally met with in practice, but there is no necessity of using the word nerve in this connection, for, of course, animation cannot be produced except through the operation of this force, and it is in no sense derived from nerves, for it is impossible to think of this force as being *innate*. It does not inhere in the body, and is not generated or produced in the body, but is simply radiated through the body.

The energy or force, whether we call it kenetic, stimulus, or the force of life, is nevertheless intelligent and formative. It constructs the brain, and in it produces the seat of consciousness with its five phases which we call special senses, that is to say, seeing, hearing, smelling, tasting, and feeling, which after all are only parts of the same thing, for, of course, they are simply different appeals made to the seat of consciousness, through five phases of material functioning.

The seat of consciousness in the cortical areas of the brain is also the avenue through which impulse is made possible, and may be regulated.

In order to be prepared to understand the functions of the body, it must also be understood that in connection with the seat of consciousness, there is also produced in the brain the seat of *tissue sense,* which sustains a certain peculiar relationship to the seat of consciousness, so that in emergency of a sufficiently grave nature, *irritation* acting upon the seat of tissue sense, attracts conscious attention.

What has been looked upon as impulse is nothing more nor less than emotion. All of the conduct of the human body is accomplished through emotion, and, of course, in this sense of the use of the term there is emotion of which we are conscious, and emotion of which we are not conscious.

In other words, much the larger part of the conduct of the body is performed through the seat of tissue sense, while by comparison only a small part is accomplished through the seat of consciousness.

We have a way of thinking of emotion as only applying to disturbed conditions, to which we have applied such names as, pain and pleasure, joy and sorrow, love and hate, hope and despair, determination and discouragement, hopefulness and melancholy, etc. However, it must be remembered that these are but the disturbed phases of that wonderful emotion, the consciousness of existence; the actual sense of being!

Too frequently the simple sense of being, as an emotion is wholly overlooked, but a careful and liberal investigation of the whole subject renders it plain that the sense of being is a profound emotion. However, it is an emotion of a placid type, for the sense of being does not necessitate other than passive consciousness.

In connection with the statement made in the last paragraph the student should know that, given a normally constructed brain and nerve system, and therefore a normally constructed body operating in an environment, without other than normal influences, there would be no other emotion than that of the serene sense of existence.

What has been called emotion, and to be scientifically exact, the disturbances of emotion out of the placid state which has been indicated, requires something to be applied to the individual which is irritating to a part or all of the organism.

Just at the first glance, to those not used to the thought, this statement does not seem to be true, but a full and careful consideration of the whole matter will leave no room for doubt in the mind of any person capable of grasping the full situation.

Anything applied to the consciousness of the individual, which immediately serves to produce disturbance, falls within the scope of what we have called an irritant and causes adverse function commensurate with the gravity of the irritation.

Such results are accomplished by a direct appeal through the conscious seat by adverse suggestion to the soul, which is immediately returned as an adverse auto-suggestion, resulting in a change of function commensurate with the gravity of the irritation. Such irritations may be illustrated by love, hate, anger, disgust, revulsion, sorrow, etc.

There is another phase of irritation that the student should have well in mind which occurs as a sequence to immediate arousement of emotion, such as explained in the preceding paragraphs, and refers to the excitation of emotion in that department of consciousness which we conceive produces pleasure, such as love, mirth, joy, gladness, etc.

When any of these phases are carried to the point where the resistance of tissue elements is overcome, physiology ceases and pathology begins, and, of course, this statement applies equally and just as disastrously in the opposite direction, where the excitation is of anger, jealousy, pain, sorrow, etc., for when these have operated until resistance of the tissue elements involved is overcome, physiology ceases and pathology begins.

From what has been said in the two preceding paragraphs it will be understood that pleasant and painful are only terms to indicate certain degrees of consciousness, and that the ultimate effects upon the human organism, if continuously carried on in the same degree, would be precisely the same.

It is well known that a pleasurable sensation may be prolonged to the point of becoming painful, or in other words, cannot be prolonged beyond a certain point without becoming painful.

In this connection, and to close the chapter, the student will recall that we have, for the purpose of indicating different degrees of sensation or consciousness, various terms of expression, such as soothing, exciting, irritating, agitating, etc.

It must, however, be understood that any sensation that has reached the point where it is no longer pleasurable, that is to say, has reached the point where the resistance of the tissue elements involved in its production, are overcome, immediately marks the limit of physiology, and fixes the point where pathology has definitely begun.

CHAPTER VI

MOTOR REACTION

By reference to the preceding chapter, the student will observe that all excitation of emotion in the human organism is produced by irritation.

By review of the chapter, the student will understand that anything that produces excitation of emotion until the resistance of the tissue elements involved is overcome, or has passed the boundary of resistance, is an irritant, and that the pathologic processes introduced by means of the irritation continue and increase in gravity until the irritant is lessened in its capacity, or is neutralized or removed.

Tissue elements, usually referred to in this particular phase as cells of the organism, have specific, definite, and peculiar ways of responding to irritation, and these phases of response it now becomes our duty to investigate and understand so far as they are necessary to a further elucidation of the matters here to be discussed, that is, so far as they relate to pathology.

In speaking of the amoeba, or single-celled organism so-called, scientists have designated what they have seen fit to call "conduct of the amoeba under irritation."

Upon the response of the amoeba to irritation two propositions have been definitely laid down and maintained in all ways as if they were truth.

It has been announced that the amoeba, or single-celled organism, responds to the irritation of environment in two ways. That is, it moves for the purpose of nutrition, responding to the irritation of necessity for the same, and moves for protection, withdrawing from the influence of irritants.

In the first instance the amoeba moves towards its food, and takes it by absorption, urged on, of course, by the irritation of what we would call, in animals in which the intelligence department is much more greatly developed, hunger.

In the second instance referred to, the amoeba when irritated throws out a process on its side opposite from the irritation, and removes itself into the process, thus assuming a new position removed from the irritant, and, of course, removed from irritation.

In connection with the thought expressed in the last paragraph, the student must understand that in the case of the amoeba, if it were impossible for it to throw a process out from the opposite side from the irritant, and by thus removing itself escape the irritation, one of two things would perforce of necessity take place. The amoeba would either die, or become abnormal as to its form and chemical consistence in ratio with the gravity of the irritation.

The human organism is said to be composed of cells. That is to say, it is suggested that the unit of its structure is an animal cell, and, while the author wishes it understood that he is not in full accord with that proposition, still he is in accord with the proposition that the organism is composed of cells, but, of course, wishes it understood that the unit of the human organism is the smallest particle of matter that can be animate, as a distinctly individual proposition.

But for the purpose of this discussion the animal cell may be assumed as the unit of structure, for in any event the operation to be disclosed would be the same no matter what we consider as the unit of structure.

The author also wishes it understood in this connection that animal cells are not individual organisms; that while, of course, the cells of the body are animate, they do not have individual animation as such, but are animated from a common source, and in a universal manner. However, from the standpoint of immediate conduct, the cells of the organism act in the same manner as they would if they were single-celled organisms.

To put the matter in its most precise form, let it be understood that from the standpoint of immediate conduct the cells of the human organism act in precisely the same way as the amoeba.

That is to say, they have movement for nutrition, and they also have movement for protection. And here again the movement for nutrition is that conduct which we call assimilation, and the movement for protection is away from irritants, or from irritation.

With all of the multifold capacity of its conduct, when the whole matter is brought to its last analysis, the human organism has just two means of preservation, which in no sense distinguish it from the amoeba. That is to say, it has the capacity to move for protection, and also to move for nutrition, and aside from these two it has not different capacity.

It is a law, universal in its application, that when a cell or organism is irritated its one means of protection is to withdraw from the irritant.

It is a law, universal in its application, that if irritated the human organism has but one means of preservation, and that is to remove from the irritant.

Referring to the cells of the organism, the conduct under irritation might well be called amoeboid protection, if it were not for the fact of the indefiniteness of such a term, for it would fail to distinguish physiologic from pathologic procedures. So it is necessary that a term shall be adopted which will indicate definitely and clearly only pathologic procedures.

It is well known that all conduct in the organism is caused by the influence of stimulus, which is generally referred to as motor force. For a discussion of this phase the student should read the physiology of the nerve system in Psycho-Bio-Physiology.

The conduct, then, of any part of the body may well be termed, motor action. Now, it must be clearly understood that motor action refers distinctly to physiologic procedure, and since a part excessively irritated acts pathologically, that conduct has been called motor reaction.

The term motor reaction is not a satisfactory one, but it approaches as near to the expression of the actual conduct that takes place as any that have sugested themselves to the author.

The student will find no trouble with the term if he conceives that it simply directs itself to that unusual concentration of stimulus to the part, under irritation, in an attempt to remove it from the irritant.

In other words, motor reaction is simply the name given to the pathologic co-ordinance directed to neutralization, or removal from irritants, that is designated in amoeboid life as "moving for protection."

When a cell of the organism is responding to motor reaction, one of three things must result: First, it must be removed from the irritant. Second, the irritant must be neutralized or removed. Third, the cell must become abnormal as to its chemistry in ratio with the gravity of the irritation, or must cease to be animate.

Motor reaction is the process by which all phases of pathology are accomplished, whether the pathology comes under the classification of traumatic injury, failure of physiologic reproduction, or that of abnormal chemistry.

Irritants to the human organism or any part of it, may be from the extra-environment, or may occur from within the organism. In either event the injury is accomplished by the process of motor reaction.

Irritation from the extra-environment may be illustrated by such things as exposure to cold, heat, gunshots, cuts, lacerations, contusions, bruises, strains, sprains, fractures, etc.

The instant the organism is attacked by any of the means referred to in the preceding paragraph, the process of motor reaction begins, and continues until the irritant has been wholly removed upon the one hand, or until the irritation from the injury has resulted in inanimation of the part or organism upon the other. For neutralization would not be sufficient.

And these things are true, whether the injury applies to a cell, a few cells in an area, a segment, an organ, a part, or the whole organism.

Motor reaction begins from within the body when substances, because of injury or irritation elsewhere, have so changed in their chemical nature, by virtue of the operation of motor reaction, as to have failed to produce a cell, the cells of an area, a part, or an organ. This phase illustrates failure of physiologic reproduction of parts.

The second phase of internal motor reaction may be illustrated by the conduct that ensues when poisons have been ingested or inoculated as such, or where conines or ptomaines or other forms of poison have been produced by chemical change, any or all of which act as irritants and must so continue to act and, therefore, must continue to be met by motor reaction until they are either neutralized or eliminated from the body, or until animation in the part or organism has ceased.

It will be seen that every phase of pathology conceivable is fully explained upon the basis of motor reaction herein described and elucidated.

The student must understand as a concluding statement to this chapter, that the paramount structure involved in motor reaction will be that of the brain and nerve system.

That is to say, the first important thing influenced adversely will be the transmission of nerve stimulus, and, therefore, in the succeeding chapter the fundamentals of that phase of interference will be analyzed and elucidated.

CHAPTER VII

OCCLUSION OF STIMULUS

Occlusion of stimulus occurs when there is interference with the radiation of that force, whether we call it kenetic energy, the force of life, or nerve stimulus, in its transmission through its normal channels.

Occlusion is a word, the original significance of which was not quite sufficient to express what the author desired to convey, in that, from a literary standpoint, there was the phase of meaning directed to the thought of stopping. An exhaustive search, however, revealed no better word, so there has been added to the original word occlusion, the sense of interference, without the thought of stopping or checking the transmission.

The student of discerning thought will immediately recognize the fact that occlusion, as a primary proposition, may occur at three areas: First, kenetic energy may be occluded from entering the brain. Second, brain stimulus may be occluded from transmission through nerve channels. Third, nerve stimulus may be occluded from normal application upon tissue elements at the periphery of nerves.

Since every atom of the animate body is supplied with nerve stimulus, transmitted through nerve channels, it will be readily seen that each atom or particle of the organism may be the subject of occlusion of nerve stimulus.

It will be seen that any anatomic disrelation, no matter whether the same be of tissue elements, cells, segments, organs, or parts, will serve to occlude nerve stimulus. That is, the change of anatomic relationship introduces a situation which necessitates the action of stimulus upon the parts in an abnormal way, which always produces pathologic results.

It has already been seen that anatomic disrelation may occur in one of three ways. That is to say, by trauma, by failure of physiologic reproduction, and by chemical adversity.

It is now essential that these departments shall be taken up and discussed, giving the peculiar phases of each. But first a little further illustration of the thought of occlusion of stimulus will not be amiss.

Sufficient has been said to indicate that occlusion is a specific process, and that it produces peculiar and definite results. The student, however, must not make the mistake of thinking that when stimulus is occluded it is stopped or turned back in its course, because, of course, such a situation is very far from the truth.

It is impossible to stop force or turn it back. Matter impelled by force may be deflected, or may be stopped, but force that impels matter cannot be stopped.

We build houses to stop the wind, but we know that the force which impels the atmosphere in such streams as to be called wind is not stopped, although the atmosphere is deflected from the house.

A ball is thrown against a wall, and it bounds back. The force that impelled the ball is not stopped. It is simply the material in the ball that is stopped, and the rebound is the introduction of a new phase of force, acting in another direction.

In being occluded, nerve stimulus is not stopped. It is simply interfered with in its transmission through its channels, and, while it is not stopped by such interference, it is prevented from accomplishing the normal result.

Stimulus may be thus prevented from accomplishing physiologic results by changes in the relation or character of tissue involved in an area, in such way as to produce too much pressure upon the channels through which force is radiating, or from extension of the nerve channels, which prevents the transmission in normal volume to their ends; or by such chemical changes in the nerve and tissue elements as to interrupt the channels of transmission and application. Either of these changes results in pathology.

The nerve and tissue condition last mentioned may become so pronounced as to permit stimulus to escape through the nerves, and thus fail to be applied to the tissue elements at the periphery of the nerves.

There has been some doubt expressed as to whether stimulus could be occluded by interference, and it has been suggested that if the human being is produced, because the image after which he is patterned is impressed upon the soul, and by reason thereof the soul only knows how to produce according to that image and none other, it is impossible to prevent kenetic force from accomplishing that result.

In connection with the doubt stated in the preceding paragraph, let it be remembered that there is not a single accomplishment in the whole realm of nature, as we know it, that is not an illustration of the failure of force acting upon matter to produce the result, which seems to us to be the one immediately indicated, and intended. What seems to have been intended must be our criterion.

To illustrate the proposition last stated, it is only necessary to call attention to the fact that, while it seems to be the law that attraction of gravitation draws all things that are of the same consistence equally toward the center of the earth, yet we find by the tides of the sea, by the typhoon, tidal wave, etc., that this result is not regularly attained, but temporarily, and to some extent, the operation of gravitation is interfered with to the accomplishment of these and other catastrophes.

Again, it cannot be doubted that a fruit tree produces its seed, that they may become embedded in the soil and produce other trees of the same kind, and yet it is well known that a large portion of the seed produced, falls beneath the spread of the parent tree, and by reason thereof can never ultimate in fruitage.

There is a sufficiently wide-spread illustration of incidental failure in the realm of nature, that it is entirely unnecessary to add further illustrations.

Occlusion of nerve stimulus by traumatic injury occurs, when any extra-environmental force is applied to the tissue of the body with such momentum, or for such a length of time, with such suddenness, or in such adverse direction as to result in anatomic disrelation.

Occlusion of nerve stimulus by traumatic injury may occur in the following manner: (1) Disrelation, strain, sprain, laceration, contusion, bruise, subluxation, luxation, fracture, disintegration, enlargement, and the introduction of poisons of certain specific power.

These several characters of traumatic injury will be hereafter classified and discussed separately, and then collected into their relationships as they present themselves in tissue injury.

Occlusion of stimulus by failure of physiologic reproduction occurs as a sequel of traumatic injury. It can never occur incipiently. It, however, is a process which will be very carefully illustrated and taken into consideration at the right part of this work.

Suffice it for the present to say that such occlusion occurs for instance, where, because of traumatic injury, nerves of a given area are involved, and as a result cell elements at the periphery thereof cannot be reproduced, because of failure of assimilation, and because of the anatomic changes thus necessitated nerves in immediate areas are definitely affected.

Occlusion of this type is co-extensive with practically all phases of traumatic injury, and in that particular view of the situation are of great and far-reaching importance.

Occlusion of nerve stimulus by abnormal chemistry is that situation in which changes in anatomic structures are definitely produced by what are called toxins, or poisons, and in this particular phase differs from occlusion by failure of physiologic reproduction.

Occlusion by chemical adversity includes poisons that are taken into the body as such; poisons that form in the body because of abnormal accumulation, which, of course, includes that phase called autointoxication, and also includes the formation of conines and ptomaines.

The phase of occlusion last mentioned also includes all sorts of medication, serum injections, vaccines, and indeed every sort of chemical change, that in its effect results in chemical formula or in chemical formulae, which serve to change the anatomic relationship from the normal, sufficiently to interrupt transmission of stimulus through the nerves involved in tissues adversely so affected.

CHAPTER VIII

OCCLUSION—HOW PRODUCED

Occlusion of stimulus presents no degrees. To interfere with the operation of force upon matter is a definite thing, and presents no differences. In other words, it is always interference with the effect that the application of force to matter should produce.

It is clearly apparent that there seems to be differences in the interference of the application of force upon matter in the accomplishment of the object indicated, and likewise there seems to be differences in the effect of occlusion of stimulus. These apparent differences, it must be understood, are not different phases of occlusion, but are differences in the operation of matter under the application of force, and, therefore, are the different phases of conduct of matter under interference with the application of force.

There are many ways by which occlusion of stimulus can occur in the human body. A separate discussion of these, however, would be of no value to the student, since such discussion would furnish no basis for the phenomena, and no classification or systematization, and, therefore, that plan will not be followed.

The apparent difficulty, however, is very simple in this, that occlusion is produced by a series of definite and peculiar situations, and these may be readily systematized and classified, and that is the plan that will be here definitely followed.

The several ways of producing occlusion of stimulus, group themselves into the following classifications: (1) articular, (2) ossific, (3) skeletal tissue, (4) visceral tissue, (5) lacerational, (6) contusional, (7) disintegrational, and (8) enlargemental.

ARTICULAR OCCLUSION

Articular occlusion is that produced by interference with the transmission of stimulus through nerves that extend through articulations, or between or around the articulatory extremities of bones, or that extend in relation with the articulation of bones.

In order that the subject of occlusion produced by disrelated articulations may be fully comprehended, some discussion should be made of the various characters of joints in the relation they sustain to this subject.

The first classification of joints, looking to a discussion of articular occlusion, should be made as follows: (A) joints that contain, as incident to themselves, osseous foramen or foramina; (B) joints that contain, as incident to themselves, soft tissue foramen or foramina; (C) joints that present no neural foramina, but sustain intimate tissue relationship to nerve trunks and nerves.

(A) Joints that contain, as incident to themselves, interosseous foramina are particularly and prominently the joints of the vertebral column, and while these present many and peculiar differences, they are nevertheless all the same in the one fact of the presentation of interosseous foramina.

It will be recalled that this illustration is not so definitely carried out between the occiput and atlas, and still between the margins of the foramen magnum, and the margins of the arch of the atlas there are really interosseous foramina.

The foramina are very much more clearly presented between the atlas and axis, and yet have not taken on their completion here, but from the axis on throughout the column, the interosseous foramina are well and clearly formed.

In connection with this presentation, it must be remembered that the interosseous foramina of the vertebral joints are composed by notches in the headward and feetward margins of the pedicles of the arches of the vertebrae, placed in such relation with each other as to constitute foramina.

It will also be recalled that intervertebral foramina differ very remarkably in shape; those in the cervical region being nearly cylindrical, while those in the thoracic region are nearly oval, and those in the lumbar region are quite markedly elongated.

As stated in Relatology of this work, the intervertebral foramina are occupied by many kinds of tissue aside from nerve trunks, and while occlusion is produced by changes in the relationship of the osseous structures, still the immediate interference is caused by the soft tissues within the foramina.

Generally speaking, the vertebral column is comprehensive of the character of joints herein mentioned, and the vertebral foramina sustain a very prominent relationship to the subject of articular occlusion.

(B) The second character of joints referred to are those in which generally there are osseous grooves in which nerve trunks lie, being covered by soft tissue in such manner as to convert the situation into soft tissue foramina. Such soft tissue foramina are found in the following places and other similar situations:

The median nerve trunk of the brachial plexus as it nears the elbow passes through the cubital fossa beneath the bicipital fascia, which converts this situation into a foramen relative to the joint of the elbow.

Those branches of the median trunk which extend to the palmar aspect of the hand underneath the annular ligament and deep fascia of the muscles relative to the carpal joints, convert that situation into foramina at the wrist.

The ulnar nerve trunk extends either over the inner margin, or through the internal muscular septum, in front of the head of the triceps to reach the interval between the internal condyle of the humerus and the olecranon process, the last of which situations is converted into a canal-like foramen by the fascia, and the first is a foramen where the nerve trunk extends through the intermuscular septum as stated. These foramina are in relation with the elbow.

At the wrist the ulnar nerve trunk extends through the deep fascia and over the annular ligament into its relation with the pisiform bone. The foramen here is in connection with the articulation of the wrist.

Sacral Plexus—The articular portion of the collateral branch passes between the capsule of the hip and the gemelli muscles to supply the hip joint, the fascia converting the situation into a foramen.

The external popliteal nerve trunk enters the upper part of the popliteal space behind the knee joint, where it lies beneath the biceps, and extends lateralward between the tendon of the biceps and the external head of the gastrocnemius, which it passes over to reach the under surface of the deep fascia, dorsal to the head of the fibula. The deep fascia of this area converts the situation, in connection with the knee joint, into a foramen.

The posterior tibial nerve trunk passes dorsal to, and then underneath the internal malleolus, the deep fascia converting this extension into a canal or foramen in relation with the ankle joint.

The external or short saphenous nerve trunk extends down the dorso-lateral aspect of the feetward part of the leg, under and past the external malleolus; the fascia converting the relationship into a foramen or canal in connection with the ankle joint.

The author is aware that the illustrations given are not comprehensive of all this class of foramina to be found in the human organism, but believes that the most important of such foramina have been given, and leaves the remainder to be brought into prominence by the researches of the profession.

(C) The third sub-division of articulations, in connection with which occlusion may be produced, applies particularly to all of the appendal joints of the body, for it will be observed that at the joints all of the nerve trunks extend between the heads of muscles, beneath or between layers of fascia, beneath and between annular ligaments and bands, between the heads and between the aponeurotic origins and insertions of muscles, etc., which while they do not convert the nerve relationship to the joint into actual foramina, do nevertheless produce a relationship which by slight distortion, congestion, bruise, or injury of any kind, may very easily produce occlusion.

The facts as outlined are also peculiarly true of the joint relationships of the skull, but pronouncedly and prominently the joint relationship of the soft tissues to the articulations of the bones of the face.

OSSIFIC OCCLUSION

Ossific occlusion is that produced in neural foramina through bones, and may occur at those places where nerve trunks extend through foramina into the medullary cavity of bones, or where nerve trunks extend through foramina to escape from osseous cavities.

The most prominent foramina of the character now under consideration are those in the base of the skull, through which nerve trunks extend for ramification, and those of the dorsal and ventral aspects of the sacrum through which the sacral nerve trunks extend for distribution.

In addition to the foramina of the skull, and sacrum, there are a few incidental foramina which may be referred to, principal among which are the obturator foramina, and the foramina through which nerve trunks extend into the superior-maxillae, and into the mandible.

Of course, there are almost innumerable foramina of this character, for it must be remembered that the medullary center of bones, and indeed the animal parts thereof, are to a large extent supplied through osseous foramina.

It may be very easily seen that occlusion may be produced in any of these osseous foramina by changes in the relationship and attitude of the bones in which the foramen or foramina in question occur.

The student is encouraged to give the osseous foramina of the body very careful consideration, for he is here informed that much occlusion is produced in them as a result of change of relationship, not only of the bones in question to each other, but the changes in relationship of the soft tissues to them.

SKELETAL TISSUE OCCLUSION

Skeletal tissue occlusion is a peculiar and oft recurring phase. Indeed, there is no other phase of occlusion that is so frequent and usual as this type.

Occlusion of the type under consideration may occur in any part of the somatic body. That is to say, it may occur where nerve trunks extend between muscles, between layers of fascia, under aponeuroses, through muscular foramina, through interosseous areas, under tendons, through osseous grooves, and so on.

By the statement just made, it will be seen that this phase of occlusion production is so extensive that it is entirely beyond exact statement. The best that can be done is to point out a few of the more prominent locations, and leave the balance to the resource of the student.

Cranial Trunks—The extension of the optic nerve trunk into the orbit of the eye, and also the occulo-motor, abducens, and trochlear nerve trunks are many times occluded by soft tissues around and within the large and peculiarly formed foramina.

The same is true of those parts of the trigeminal nerve trunks that also enter the orbit.

The mandibular branch of the trigeminal nerve trunk, where it extends relative to the glenoid articulation of the mandible through a groove, which is converted into a foramen by the deep fascia of the area, is frequently a point and situation of occlusion.

The vagus or pneumogastric trunks extend through the jugular foramina in soft tissue compartments, composed by the substances which relegate them to the dorsal divisions of the middle compartment thereof.

Brachial Plexus—The musculo-spiral nerve trunk enters the musculo-spiral groove and traverses the space between the internal, and along the external head of the triceps to reach the lateral aspect of the arm.

The suprascapular nerve trunk extends into the supraspinous fossa through a notch in the upper border of the scapula, beneath the supraspinatus muscle, and curves in front of the spine of the scapula to the infraspinous fossa. The notch through which this nerve trunk extends is converted into a foramen by relative aponeurotic tissue, and the muscles under which it passes really convert the situation into a tube-like foramen.

The median nerve trunk extends, lying upon the flexor digitorum profundus and under the flexor digitorum sublimis, within two inches of the annular ligament of the wrist, where it lies between the tendons of the flexor digitorum sublimis and flexor carpi radialis, and to the ulnar side of the palmaris longus. It may be seen that this relationship seriously endangers this nerve trunk to occlusion by any disrelation of these muscles or tendons, resulting from immediate or remote distortion.

From this point the median trunk extends beneath the annular ligament of the wrist into the hand, the situation being a point of frequent occlusion.

The ulnar nerve trunk extends obliquely across the mesial head of the triceps, through the mesial intermuscular septum, and to the groove between the medial condyle of the olecranon, and at the elbow rests upon the dorsum of the medial condyle. It extends into the forearm between the two heads of the flexor carpi-ulnaris. It may be seen from this situation that the ulnar nerve trunk at the elbow may be very easily occluded by any slight disrelationship either osseous or muscular.

The next point of danger to the ulnar nerve trunk is further down the forearm, where it lies between the flexor profundus digitorum, and the flexor carpi-ulnaris, being bound down here by the fascia.

At the wrist the ulnar nerve trunk extends across the annular ligament, lateral to the pisiform bone, and enters the palm. Strains and sprains or any slight disrelation subjects this nerve trunk to occlusion.

The musculo-spiral nerve trunk is exposed to occlusion in the region of the axilla, where it passes ventral to the tendon of the latissimus dorsi, and teres major, which danger is increased as it winds around the humerus in the musculo-spiral groove, for here not only is this groove substantially converted into a foramen or tunnel by the fascia, but the muscular situation endangers the nerve trunk to occlusion, and there is always the danger of the trunk being bruised in its close confines.

At the point where the musculo-spinal extends through the lateral intermuscular septum between the brachialis anticus and the supinator longus muscles, it is much exposed to occlusion, as it is also where it lies upon the ventral aspect of the lateral condyle of the humerus.

The radial nerve trunk is exposed to occlusion by muscles throughout nearly its whole length, but especially where about three inches headward to the wrist it passes beneath the tendons of the supinator longus, extending through the deep fascia to the lateral border of the forearm.

The posterior interosseous nerve trunk extends to the back of the forearm through the supinator brevis muscle, and down between the superficial and deep layers to the middle of the forearm. This muscular relationship, which is practically a muscular foramen all the way, greatly endangers this trunk to occlusion.

From the point mentioned it extends to the wrist on the interosseous membrane. It will be seen that the relationship is a confining one, and that changes in the relation of the bones of the forearm greatly endanger this trunk.

At the headward end of the carpus, there is, on the inter-osseous nerve trunk, a ganglion from which small nerve trunks extend to supply the ligaments and articulations of the carpus. This ganglion is frequently subject to occlusion by slight changes in the osseous and aponeurotic relationship in the wrist.

The nerve trunks of the brachial plexus have thus far been very briefly followed; the purpose of the author being merely to direct the student's attention to the way in which skeletal occlusion of nerve trunks occurs in order that he may exhaustively investigate the subject, assuring him that such study will yield many satisfactory returns.

Lumbar Plexus—The nerve trunks of the lumbar plexus will incidentally be discussed together, because in the skeletal sense, to which attention is being directed, they are as one trunk.

It will be observed that each of the seven branches from the lumbar plexus after leaving the intervertebral foramen extends through a muscular foramen in the psoas magnus muscle, and then extends to its terminals.

The psoas magnus muscle has origin from the sides of the bodies of the vertebrae and the corresponding intervertebral substances, and from the transverse processes of the last thoracic and all of the lumbar vertebrae; from the bodies of the vertebrae by five slips, these slips extending from the headward and feetward margins of two vertebrae, and from the intervertebral substance between them.

The psoas muscle extends across the brim of the pelvis feetwardly, dorsal to Poupart's ligament, and ends in a tendon common to it and the iliacus, which is inserted into the lesser trochanter of the femur.

The situation here described is sufficient to indicate to the student the great danger of occlusion to any or all of the trunks named, and this situation is but intensified by the fact that the psoas muscle is prominent in all of the conduct of the thigh, and peculiarly influences certain conduct of the viscera of the abdomen.

It will not be doing justice to the student to leave this very important situation without calling his attention to the fact that the visceral nerve trunk, (formerly called the sympathetic), extends through the region of the origins of the psoas muscle, underneath the arches composed by the five muscular slips described, coming off of the contiguous margins of the vertebrae, through which arches not only the visceral nerve trunks extend, but the arteries accompanying them.

In this connection it will be seen that any change in the position of the lumbar column, or any constriction of the psoas muscle, or anything that will unusually press the abdominal viscera back against the psoas muscle, will serve to occlude the visceral nerve trunks.

I wish to impress the student in connection with the last statement, that here very profound occlusion is frequently removed.

A few illustrations of the most usual phases and ways of producing occlusion in the branches of the lumbar plexus will be given.

The iliac branch of the ilio-hypogastric nerve trunk extends through the mesial and lateral oblique muscles at the crest of the ilium, to be distributed to the gluteal region. This nerve trunk is frequently occluded at this point.

The ilio-inguinal nerve trunk extends through the obliquous muscle, and accompanies the spermatic cord through the inguinal canal, and extending through the ventral abdominal ring is distributed to the headward mesial part of the thigh, and to the scrotum of the male, and the labium of the female. This nerve trunk is frequently subject to occlusion in its extension through the inguinal canal and ventral abdominal ring.

The genital branch of the genitocrural nerve trunk extends through the transversalis fascia, and through the visceral abdominal ring, and down the dorsal aspect of the spermatic cord through the ventral abdominal ring. It is peculiarly subject to occlusion at the point where it passes through the transversalis fascia, and nearly as much so in the abdominal ring. This is especially true in the female, subject to prolapsus of the uterus, or dysmenorrhea.

The crural branch of the genitocrural nerve trunk extends beneath Poupart's ligament into the thigh, where it extends into the femoral sheath, thence through the ventral layer of the sheath and the fascia lata to supply the tissues of the thigh. It will be observed that its danger points to occlusion are particularly the extension under Poupart's ligament, and where it escapes from the femoral sheath.

The obturator nerve trunk, after extending through the psoas muscle, descends along the lateral wall of the pelvis to the obturator foramen, through which it enters the thigh to supply the obturator externus, and the adductor muscles.

A careful study of the obturator foramen will reveal to the student the great danger of occlusion of this nerve trunk, and when he recalls such phases of abnormality as paralysis, especially of the spastic type, locomotor ataxia, etc., he will understand the gravity of occlusion that frequently takes place in these foramina.

Sacral Plexus—This plexus may be discussed briefly. Anything like a full discussion would take vastly more space than we have in this connection. A few of the very most prominent points will be given, for the purpose of encouraging the student to a deeper investigation directed by these suggestions.

The muscular nerve trunks from the sacral plexus form within the pelvis, and extend from it through the great sacro-sciatic foramina, wind around the spines of ischia to re-enter the pelvis through the lesser sacro-sciatic foramina, being subjected at this aspect to occlusion from the gluteal muscles, and, of course, being subjected to occlusion at both the greater and lesser sciatic foramina. These nerve trunks supply the pyriformis, obturator internus, gemelli, and quadratus femoris muscles.

When the student remembers what an extensive amount of abnormality occurs in these tissues, interfering in all manners with conduct, and incidentally with relative functional procedure, he will understand how necessary it is for him to master reduction of occlusion in these locations.

It will be observed that all of the other nerve trunks from this plexus pass through the great sacro-sciatic foramina, and the general danger of occlusion at this point need not be further emphasized as to any of the nerve trunks of the sacral plexus.

The pudic nerve trunks follow an extension similar to the muscular nerve trunks. Extending out of the great sacro-sciatic foramina, they wind around the spines of the ischia, and re-enter the pelvis through the lesser sacro-sciatic foramina, thus being subjected to danger of occlusion in all of these foramina, and also to occlusion by all of the gluteal muscles. When the ramification of these nerve trunks are remembered, the importance of this situation will be apparent.

As to the great sacro-sciatic nerve trunks, all that is necessary to refer to is their great size and extensive ramification, and the fact that they extend through the great sacro-sciatic foramina and hamstring tissues to the knees, where they divide into the medial popliteal and lateral popliteal nerve trunks, and extend through the aponeurotic and fascial rigidity of the dorsal aspect of the knees into the legs where, by muscular relationship and interosseous relationship, they sustain the same general danger to occlusion as the nerve trunks already described in the arm, forearm, wrist, and hand, except that, because the weight of the body is borne upon the legs, ankles, and feet, they are very much more subject to occlusion than are the analogous nerve trunks of the headward extremities.

It would be of extreme interest and value to follow these very important themes further and into greater details, but the author believes that the suggestions so far given, as to occlusion produced by skeletal tissue, will suffice the student as an outline for extended study, and will be sufficient for the present needs.

VISCERAL OCCLUSION

Visceral occlusion is produced by disrelation of a viscus as an entirety, or of any of its parts, or of any part of viscera related to it.

Such relationship as is here indicated may occur because of change in the shape of the parietes of the splanchnic cavity, or by traumatic injury, or by disintegration in the visceral structures, or by failure of physiologic reproduction within the same.

It will be seen that if a viscus, such as a kidney, should be displaced from, or disturbed in its relationship with relative structures, such change of position would serve to produce traction of nerve trunks extending to the organ, and nerves within the organ itself, thus producing occlusion.

It will likewise be seen that when a viscus is displaced, it will impinge upon relative structures in one aspect, and traction upon relative structures in the other aspect. In other words, it will bear down upon the tissue toward which it is displaced, and traction that from which it is displaced, producing occlusion.

Chiropractors have not given much attention to this phase of occlusion, but the subject deserves the very most profound study. It is a character of occlusion production met with most frequently, and when it exists many times presents the most profoundly adverse situations.

A complete discussion of visceral occlusion will be found in Chapter XXX of this book, and the subject will not need to be followed further in the present connection.

LACERATIONAL OCCLUSION

Lacerational occlusion is, of course, produced by cutting nerve trunks, or severing them as though they were cut. Such situations are analogously presented by cuts, tears, and bruises. However, bruises take on other phases, and will be discussed later.

When a nerve is severed, there is, so far as the nerve is concerned, complete occlusion, and if the situation were not supported by stimulation from relative nerve terminals, the nerves severed would immediately die, and would commence immediate disintegration.

However, because of stimulation from relative nerve terminals, severed nerves retain the capacity, for a time, to reunite upon their severed parts being placed in apposition, and to renew transmission of stimulus as though never having been injured.

In the last paragraph the student's mind should be directed at once to the extreme necessity in cases of laceration, by which nerves are severed, to as quickly as possible have the nerves placed in correct apposition for healing, in order that complete occlusion might be prevented from occurring, and the effects therefrom be prevented from taking place.

CONTUSIONAL OCCLUSION

Contusional occlusion is produced by a peculiar character of traumatic injury, in which tissue elements are suddenly and forcibly disrelated, and disrelated in such manner as to render their immediate rehabilitation impossible.

This method of producing occlusion presents to the student a very extensive theme for investigation, and a subject for careful thought and extensive demonstration. For it will be seen that such occlusion may occur at any place, throughout the organism, and may present very damaging results.

In passing this proposition it must be suggested that contusional occlusion is always produced by impingement; the pressure being of such sudden and violent nature as to distort the tissue elements, which pressure is then as suddenly removed.

However, it must be remembered that by the sudden projection of force producing occlusion, nerve terminals and perhaps trunks are injured with the grosser structures, and that the new tissue elements thrown out for restoration, by virtue of stimulation to the area through nerves that are not injured, will serve in the first instance to form scar tissue and congestion, that will press upon and retard rehabilitation of the injured nerve terminals involved, and may retard restoration in the small nerve trunks involved.

It will be seen that the facts presented in the illustration suggested in the last paragraph are sufficient to introduce the process of motor reaction, which will serve to produce occlusion elsewhere, so that contusional occlusion is never confined to the area, but extends as far as motor reaction therefrom.

DISINTEGRATIONAL OCCLUSION

It will be observed that disintegrational occlusion is produced in nerves that extend through parts where abnormal disintegration is going on extensively, and where morbid accumulation exists, the chemical consistence of which is sufficiently damaging to produce disintegration in the nerves or nerve trunks under discussion, and is capable of producing such adverse chemical changes in the substance of nerves as to interrupt the normal transmission of stimulus through them.

It will be seen that disintegrational occlusion can never occur except as a sequence to primary occlusion produced by trauma, or the introduction, or accumulation, of poisons *per se.*

The problem of disintegrational occlusion reverts to the subject of irritants, and the student will find a complete elucidation of that subject in Chapter VI of this work, the preface of which will be found in Chapter V, which part of the work, it is now urged, should be carefully examined.

ENLARGEMENTAL OCCLUSION

Enlargemental occlusion occurs where, as a sequence to occlusion produced by trauma, or by the introduction or accumulation of poisons, irritation has produced giant cell aggregations, which of themselves produce relative occlusion, but which may also be in such position as to distinctly impinge upon or traction nerves of the immediate area, or nerve trunks extending through the immediate area.

Enlargements of the character just mentioned may occur relative to joints in or at the margins of foramina, both intervertebral and osseous, in such way as to interfere with nerves extending through them, and at intervertebral relationships, may occur in such places as to prevent normal articulation, thus producing and maintaining occlusion.

It will be seen that enlargemental occlusion is of frequent occurrence, and may be of most extensive effect. To emphasize this proposition it will only be necessary to refer to the grave effect of exostosis and calcification.

But the thing to which the student's attention is also very urgently directed is enlargement in soft structures, having many times a very marked effect upon the nerves of the area.

CHAPTER IX

EFFECT OF OCCLUSION

Having learned in the preceding chapter the various reasons names are given to the ways in which occlusion of stimulus occurs, we must here learn the tissue effect of occlusion of stimulus.

Occlusion of stimulus is the cause of all abnormal conduct.

In view of the last statement, it will be readily seen that a discussion of the effect of occlusion would be neither more nor less than a discussion of all abnormal conduct, and that such a discussion would be substantially endless, and would have no particular value to the student.

In order that a discussion of the effect of occlusion may sustain any value, the phenomena must be classified and systematized, and it will be the object of this chapter to so analyze the subject.

Fortunately all of the phases of effect of occlusion of stimulus are simply evidences of the operation of a few simple principles, and so it is not difficult to group all of the facts around those principles, and to state the principles, and illustrate them with sufficient clearness, that no difficulty will be found in making application of them to any phase of adverse process.

As a basis for the statement that occlusion of stimulus causes all abnormal function, it must also be stated and understood that there is no such thing as occlusion of stimulus without anatomic disrelation, the order of sequence, therefore, being stated in one of two ways: (1) Traumatic injury, anatomic disrelation, occlusion of stimulus, abnormal function, (2) injection or composition of toxins, anatomic disrelation, occlusion of stimulus, abnormal function.

The thing that renders an analysis, or clear discussion of the effect of occlusion of nerve stimulus, difficult, is the fact that there is always at the same time a co-ordinance of process tending to maintain the normal, and a co-ordinance of process tending to maintain the abnormal.

In the multiplicity of symptoms arising from the processes or phases under observation, the actual facts are obscured and lost sight of unless they are well understood beforehand. It is, therefore, necessary to simplify the process of investigation.

In order to understand the whole subject of the effect of occlusion of stimulus in its multiplicity of details, it is necessary first to understand, in their various classified steps, the phases of occlusion taking place as to one nerve, and the abnormal co-ordinance taking place as a sequence of the same.

The effect of occlusion of stimulus may be divided for definite and detailed consideration, into two phases as follows: (1) Complete occlusion, and (2) incomplete occlusion.

The effect of *complete occlusion* is the inanimation of the nerve itself from the point of occlusion on to its periphery as a primary proposition, and inanimation and disintegration of the tissue elements wholly supplied through such nerve.

The effect of *incomplete occlusion* of stimulus is a lessening of animation in the nerve itself from the point of occlusion to its periphery, in ratio with the gravity of occlusion, and a like inanimation and disintegration of the tissue elements stimulated through such nerve.

It must be explained that there is a peculiarity in the phases of inanimation by which nerves retain the capacity to be re-animated after complete occlusion within a certain length of time, and, of course, this would also apply to incomplete occlusion.

However, the length of time cannot be fixed upon, for it is always governed by so many contingencies, such as hereditary influence, tissue virility, etc., that it is impossible to state a fixed time.

From what has been said so far, the student will readily understand that the phenomena of the effect of occlusion of stimulus are divided into two definite phases: (1) The immediate effect of occlusion of stimulus, and (2) the remote effect.

As to the first of these subdivisions, it has already been seen that the effect of complete occlusion is the inanimation of the nerve, from the point thereof to the periphery.

But at this place it is necessary to discuss nerves collectively, and, therefore, this proposition must apply itself to nerve trunks, and it will be seen that this does not necessarily inject any new phases into the discussion, and yet a contingency is presented which must be explained.

A nerve trunk differs in no respect from a nerve, except that a nerve trunk has within it many nerves, and, of course, introduces a new phase of tissue consideration, in that a nerve trunk has a sheath which may be composed of a simple membrane or may be composed of myelin. In either event a tissue consideration is injected into the problem, which it must be explained does not come within the rules already stated, as to the effect of occlusion of stimulus in a nerve.

The nerves ensheathed within a trunk are each composed of elongated gray cells, attached together end to end, and insulated from each other by a neuroglia or nerve paste. Each nerve, therefore, stimulates itself from within, but the extra tissue elements that compose nerve trunks are stimulated by relative nerve periphery in the same way that any tissue elements are stimulated.

It will be seen, therefore, that while nerves stimulate themselves, nerve trunks must be stimulated by relative nerve periphery, and, therefore, the tissues of nerve trunks, aside from the actual nerves themselves, are stimulated in the same way as other tissue elements, and are affected by occlusion of nerve stimulus as are other tissue elements.

In complete occlusion of a nerve, the force escapes from the nerve, but by virtue of its escape, ceases to be nerve stimulus, and becomes a disintegrational force.

The force, being transmitted through a nerve trunk, in complete occlusion of the trunk, escapes from the nerves in the same way just described, and with the same effect, becoming a destructive force.

The remote effect of occlusion of stimulus in a nerve is relative to the tissue elements which should be normally supplied with stimulus through that nerve, and, of course, therefore, the same applies to the nerves contained in a nerve trunk.

The abnormality caused by the remote effect of occlusion is always in proportion to the gravity of occlusion in the nerves involved, and may be any change of process from the slightest loss of chemical equilibrium or activity in the tissue elements, cells, or parts involved, to inanimation.

By chemical equilibrium and activity, it must be understood that the reference is to the composition of the colloid out of which tissue elements are to be formed, being presented at the proper time and in exact consistence and proper amount.

The statement in the last paragraph necessarily includes final elaboration, which means that all preparation for assimilation has taken place in apt time, amount, and character, which means that the particles of right consistence and amount are being placed in proper distance and relation for cohesion into animate structures, and, of course, this renders it necessary that disintegration, which means the reduction of solids into colloids in preparation for depuration, and includes removal of such substance in proper time and amount, must go on.

It will be seen that the description just made is a synopsis of the ultimate processes of the body in its normal condition, and, of course, includes as a necessity the impulsion, in each part of the process, of normally transmitted and applied nerve stimulus.

It seems hardly necessary to describe the loss of equilibrium, for, of course, any change of the process outlined in the two preceding paragraphs would result in loss of equilibrium.

However, in order that the student shall be aided in every part of the investigation, it will be stated that equilibrium is lost when, as an effect of occlusion of stimulus, any part of the function described fails to be performed to any extent.

That is to say, if the effect of occlusion of stimulus causes a change in the chemical consistence of the colloid out of which the tissue elements are to be formed, or fails to deliver a proper colloid in proper amount and consistence, at the right place, at the right time, the chemical equilibrium is lost in ratio with the failure of such chemical consistence.

It will be seen, therefore, that the first effect of occlusion of nerve stimulus is to destroy chemical equilibrium, or, to state it in the converse, is to produce abnormal chemical combination.

The extent of abnormal chemical combination, which results from complete occlusion of nerve stimulus, is impossible of appraisement, because inanimation so quickly ensues that there is no opportunity to study symptoms arising from the effect, which is the only method of arriving at such an estimation, and, therefore, we are compelled to pass that proposition with the simple statement that chemical abnormality is sufficiently grave to render maintenance of animation impossible.

Having disposed of complete occlusion in the somewhat unsatisfactory manner just stated, we must now give attention to the effect of incomplete occlusion.

Abnormal, chemical combination is the medium through which every phase of abnormality is produced, whether the subject is turned to the thought of traumatic injury, such as a bullet shot through the brain that we say results in instant death, or any lesser phase of abnormality, for we know that the passage of the bullet with great velocity changes chemical and molecular relationship, and by friction and otherwise changes the chemical formula, thus rendering animation impossible, and, of course, in all lesser phases of abnormality, the chemical adversity is in ratio with the effect of occlusion.

In the preceding paragraph we have disposed of the most pronounced phase of abnormal chemical combination, and we now turn the attention to the simplest, which would be the least chemical change possible of conception, because the effect from the slightest occlusion possible to conceive. And such abnormal chemical combination may be conceived as continuing until, as the result of cumulative process, the most destructive tuberculosis has been reached.

In this connection it is well to remind the student that the human organism, in the aspect of it now under discussion, is but a chemical laboratory and that all of its processes act under the operation of intelligent energy, and that when all of the processes of the organism act in an unobstructed manner, the chemical formulae for every part of the body are produced in proper time, consistence, and amount, and are transported within apt time, in proper amount and consistence to the parts of the body where they are to be used, where they are timely, and in right proportion elaborated, combined, cohered, disintegrated, and removed in such manner as to produce and maintain all of the elements of which the organism is composed in correct chemical consistence.

The effect of occlusion of stimulus in any part of the body, in which these offices are performed, at once results in an abnormal chemical combination in that part of the body, because the elements of the compound, out of which the tissue elements of that part of the organism are to be formed, fail to arrive at proper time, in proper amount, at the proper place, and, therefore, fail to be placed in relation, so that they may be cohered into animate structures, and at the right time disintegrated and removed from the area, and such chemical combination and failure of process will be in proportion to occlusion of stimulus in that area.

In considering this proposition the student must not permit himself to be deceived by symptoms, for if a few nerves, ramifying a very small area, are occluded the abnormal chemical result will not be confined to the area, but will be distributed throughout the whole organism, until completely neutralized or eliminated; but the symptoms arising from such abnormal combination will, generally speaking, be confined almost entirely, if not wholly, to that area, and the perceptible evidences of such an area will be likewise circumscribed. Such a process may be illustrated by a small pimple or other like phase.

When a large number of nerves, even to a circumscribed area are occluded, the abnormal chemical combination will be marked, and the symptoms arising therefrom will be quite easily distinguished, and the abnormal chemical combination will be transmitted to the whole organism, or at least to the extent of being neutralized or eliminated; but generally neutralization of an abnormal chemical combination of such gravity is not accomplished before symptoms of its transmission to all parts of the body are plainly in evidence.

In such abnormal chemical combination, however, the most marked symptoms will be confined to the area affected by occlusion, and, of course, the pronounced symptoms will be confined to that area. However, symptoms arising from the abnormal chemical combination will occur as widely as the same is transported through the body.

It will be understood, therefore, that the paramount or proximate symptoms from the effect of occlusion will be confined to the area of the periphery of the nerves involved, but that relative symptoms of the effect of occlusion will be as widespread as the transportation of the abnormal chemical combination, and that the proximate symptoms of the effect of occlusion will be in ratio with the gravity of occlusion, and that the relative symptoms will be in ratio with abnormal chemical combination.

The pathologic proposition laid down in the preceding paragraph may be illustrated by the symptoms arising from a malignant carbuncle. In such a phase, occlusion is of many nerves to a circumscribed area. The proximate symptoms are confined to the area of the carbuncle, but the relative symptoms are in ratio with the gravity of the abnormal chemical combination, distributed from the carbuncle throughout the organism.

Abnormal chemical combination, caused by occlusion of nerve stimulus, is the basis of all of the different and peculiar symptoms that will be isolated, classified, discussed and systematized in that part of the second volume of this work, called Symptomology.

CHAPTER X

EFFECT OF REMOVING OCCLUSION

The symptoms incident to removal of occlusion of nerve stimulus are as numerous, complex, and confusing as those following occlusion, unless the principles are followed with great care.

A description of the symptoms following removal of occlusion would be an endless and profitless task; for this would be precisely a discussion in the abstract of each symptom presented in all of the multifold processes of abnormality.

The student will see that an abstract discussion of all of the symptoms of abnormality would be of no value to him for several reasons. In the first place, such a discussion would be of such volume that he would not have time to read it, and it would be so lacking in system as to be of no aid in a concrete case.

Fortunately such a discussion is not necessary, because to understand the various steps and phases of the removal of occlusion from one nerve, is to understand the entire subject of removal of occlusion.

The student will find it necessary to be able to understand the effect of removing occlusion in the most complex phases of abnormal co-ordination. With regard to certain phases of function he will find these subjects fully discussed under the department of Symptomology.

The effect following removal of occlusion will be considered under the same convenient terms as was occlusion, in the preceding chapter. That is, (1) immediate, and (2) remote.

IMMEDIATE EFFECT

The immediate effect, following the removal of occlusion, is that which occurs in the substance of the occluded nerve itself, which will be found to be in the inverse ratio of the gravity of occlusion that has existed. That is, if occlusion has been less than complete, the nerve is still in some degree animate, and the process of restoration will commence at once.

What is meant by the process of restoration commencing at once, is, that the disintegrated or morbid parts of the nerve will be depurated, and the place of such elements will be occupied by newly constructed parts, and this process of restoration will continue until the substance of the nerve is again normal, at which time the process of restoration, or the effect of removing occlusion, will terminate.

The time necessary for the process classified, as immediate effect of removing occlusion, to take place, or in other words, for the restoration of a nerve after removing occlusion from it, depends entirely upon the damage that has been done to the nerve, provided other things are equal.

What is meant in the last paragraph by saying "other things are equal" is that each case is bottomed upon the actual situation of the person involved, and will be controlled by hereditary tissue tendency, and congenital influence. But in the light of these, the effect of removing occlusion will always be in ratio with the gravity of occlusion, and, therefore, of course, will be proportionate to the injury in the given case.

Ordinarily, if the substance of the nerve is only slightly depleted, transmission of nerve stimulus through it will be practically normal from the instant of its release. But if the substance of the nerve is greatly depleted, it will take very much longer, for, of course, the nerve will first have to be rehabilitated, or constructed.

In an actual case these propositions would follow in this sequence; gravity of occlusion, effect of tissue tendency, effect of congenital influences, influences of hereditary degeneracy, and the actual amount of injury done in the given case.

The length of time for the recovery of a nerve after occlusion is removed, it will be seen, is based upon all of the conditions mentioned in the last paragraph, and the recovery will be slow or rapid, depending upon the actual situation.

If hereditary tissue tendency is to the production of virile and resilient substances, then recovery will be very rapid. If hereditary degeneracy is involved in the situation, the recovery will be proportionately slow.

In addition to the propositions already stated, it must also be remembered, that the length of time necessary for the substance of a nerve to return to normal function, will depend considerably upon the condition of substances through which the nerve extends, which is another way to say that the return of the nerve to normal function will be governed to a considerable extent by the effect of occlusion of other nerves in tissue elements relative to the nerve being considered, even though the effect of such relative occlusion is not sufficient to produce disintegration of that nerve, for the student will observe, that in such a situation the return of such a nerve to normal function will nevertheless be delayed by such relative situation.

The delay of return of a nerve, after removal of occlusion, to normal function by relative influences will be in ratio with the gravity of the same, and will be so, even though such adverse chemical influences are not sufficient to produce disintegrational occlusion.

Complete occlusion of a nerve seldom occurs. It has already been stated in this work that when complete occlusion occurs, which means that not only does the situation indicate complete occlusion, but the situation has remained a sufficient length of time to produce complete occlusion, the nerve is dead beyond the point of occlusion, and it is in a state of disintegration, or has disintegrated.

The fact that nerves may be cut, and be placed together, and heal, and the whole nerve remain animate, seems to be a refutation of the statement just made, but it is not, because in such an event complete occlusion does not take place immediately. That is, the nerve retains an ability, by virtue of the consistence of its chemistry, to take on animation from the point of severance, provided apposition is restored in apt time.

It is impossible to state the length of time that nerves may be severed and reunite, and the part beyond the point of severance become reanimated. However, in such a case we cannot reach the conclusion that complete occlusion has occurred, until such chemical change has taken place that the severed part, upon being placed in proper relation, will not again take on animation.

It must be understood that where a nerve is not severed, its complete occlusion could only result from a situation which would serve to change the chemistry in the nerve beyond the point of occlusion, just as definitely as though the nerve had in fact been severed.

In view of what has been said, it will be seen that the death of the organism is not an expression of complete occlusion in any one nerve necessarily, but generally is the result of such profound disturbances of transmission of stimulus, as to result in such adverse chemical combination, as to render the process of assimilation and cohesion at vital centers impossible.

Of course, in the situation indicated in the last paragraph, it must be admitted that at the very vital center, where the necessary functions for animation fail, nerves may be completely occluded, but it can also be seen that such a condition is not absolutely necessary.

In a case where complete occlusion of a nerve exists, and the nerve is dead beyond the point of occlusion, after the removal of the situation which formerly produced occlusion, the nerve involved forms a new ending sometimes at that very place, but frequently such a nerve extends considerably, and establishes a new termination, and in such an event functions at its new terminal exactly as it originally functioned at its periphery.

The effect indicated in the preceding paragraph is illustrated in the cavity left where the core of a boil has been eliminated, or where a chunk of flesh has been cut, lacerated, or jerked out.

In many such cases the cavity is never fully filled up, but is partly filled, and in such an event the cavity is filled to the extent that the nerves grow beyond their original point of severance.

Of course, many times following loss of tissue, the nerves grow sufficiently to entirely reconstruct the lost tissue.

The fact stated is illustrated by the situation that frequently occurs in the stump, where an appendal part has been removed, and where the surgeon has performed his work so indifferently that the nerves in the stump are left in an occluded condition.

In such a situation the nerves involved cannot form new terminals, and, therefore, continue to function as though extending to their periphery, and in this condition the individual often continues to sense the lost member. In other cases there is the production of neuroma, a fungus nerve tissue growth, which produces some tissue, but never normal sensation.

In the situation outlined in the preceding paragraph, it is only necessary that the stump of the member in question be opened, the nerves straightened out and freed, and arrangements made whereby healing in an undisturbed condition may occur, and the sense of the lost member disappears, and the nerves function in the stump as they originally did at their periphery.

After removal of situations of such gravity as to produce complete occlusion of stimulus, new extension of nerves cannot always be depended upon, and they very seldom occur in such way as to entirely overcome the injury. Indeed, the situation renders it necessary to say that they never occur so as to wholly overcome the injury, for, of course, at the best, scar tissue, or that which is analogous thereto, remains as a permanent injury.

REMOTE EFFECT

The remote effect of removing occlusion is found in the tissue elements which should be normally supplied with stimulus through the nerve affected.

Here again it will be seen that the effect of removing occlusion will be governed by hereditary tissue tendency, congenital influence, tissue degeneracy, and the gravity of the injury; but, with all these things considered, it will always be in ratio with the gravity of occlusion.

If the nerve involved is only slightly occluded, the tissue elements will only be slightly depleted, and, of course, after removal of occlusion the nerve will soon transmit normal stimulus, and the tissue elements will be quickly restored to the normal.

If the nerve has been gravely occluded, the tissue elements will have been in a very adverse situation, and even after rehabilitation of the nerve, the cell elements will have to be integrated, disintegrated, and reintegrated many times before they will be evolved to normal consistence.

In the process of removing occlusion from nerves that have suffered grave interference for a long time, tissue elements will integrate, and then disintegrate, and reintegrate, each time being constructed from a better chemistry, and, therefore, will continually approach normal consistence, until the normal formula has been produced and cohered.

In the remote effect of removing occlusion of stimulus, it, of course, will not be overlooked that the whole process of evolution of cell elements must await the primary rehabilitation of the nerve itself.

It must also be taken into account that hereditary influence, congenital adversity, and tissue tendency must always be elements entering into the process of tissue restoration, following removal of occlusion from nerves.

The adverse influences from conditions mentioned in the last paragraph may be of such an adverse nature that depuration cannot be accomplished, and, therefore, new assimilation or tissue formation cannot be had.

In such a case the remote effect of occlusion cannot be removed. Or, in other words, the phases of abnormality brought about by such conditions, are necessarily fatal.

After rehabilitation of the nerve, following removal of occlusion, the process of restoration of tissue elements must be accomplished by depuration of morbidity, and the reconstruction of tissue to fill the place. Of course, the first structure formed in such an area will be the nerves, followed by the machinery of liquid transportation, then cohesion of tissue elements of a general nature, sometimes incorrectly called common tissues.

The fact that the paramount process for the recovery of areas in the body affected by occlusion of stimulus is the depuration of morbidity, is one of far-reaching and comprehensive importance to the student, and a little illustration of the thought here will not be amiss.

If occlusion of nerves is to a small area, the depuration, following removal of occlusion, will be accomplished without necessarily attracting the attention of the individual in whom the process occurs, even though such occlusion has been grave, and depuration will be accomplished without presenting pronounced symptoms. This situation may be understood by reference to an infinitesimal abscess in the liver.

It is not generally known that infinitesimal abscesses occur in the glands of the body, or even in the brain, without the individual ever being able to detect any change in his physiologic procedure.

Another phase of occlusion of nerves to a small area in which the symptoms are known, may be illustrated by a small pimple, and yet in such a case depuration takes place without the general processes of the body being disturbed.

If a large number of nerves extending widely are gravely occluded, or if a large number of nerves extending to a given area are occluded, the morbid tissue elements resulting therefrom will be very considerable, and the reaction of the animate body upon the same will produce pronounced and marked symptoms.

The morbid accumulations indicated in the preceding paragraph have the effect of arousing pronounced reactions of the animate body upon them as specific toxins, and produce all of the phases that have been ordinarily denominated disease; which phases will be discussed in that part of this work called Symptomology.

CHAPTER XI

FUNCTIONAL REACTION

Functional reaction is the process which anatomic structures that, because of occlusion of nerve stimulus, have lost their relationship to each other through various processes of traumatic injury, failure of physiologic reproduction, and the effect of poisoning, undergo in the various phases of their restoration.

This phase of process is of a most awe-inspiring nature, when one comes to carefully consider and comprehend all of its various intricacies, for it is the process through which any tissue must go in its return from abnormal to normal condition.

It is, therefore, the succession of processes named in the order of sequence, release of occlusion of nerve stimulus, depuration of morbidity, increase of influx of tissue elements, better elaboration, and more perfect cohesion of tissue elements; which processes must continue ever increasing in favorable results, so that each disintegration may be succeeded by a better integration, until original consistence has been reached.

In the aspect of the reaction stated in the last paragraph the process results favorably. However, it must also be remembered in this connection, that functional reaction is the process that occurs in those cases in which morbid depuration from necessary areas is of such virulence as to constitute specific poisons, which produce marked motor reaction at vital areas, resulting in inanimation of the organism.

From what has been said in the preceding paragraph, it will be seen that functional reaction is the process by which one of two results is always reached.

That is to say, processes ever tending toward reconstruction of anatomic parts out of better chemical formulae, until the normal formula, with proper size, shape, color, etc., has been reached; in other words, to complete anatomic reproduction. Or, a process of depuration of morbidity of such extensive accumulation of adverse chemistry as, by irritation, to cause such profound motor reaction as to result in inanimation of the organism.

It will be seen that reaction is a process of a pathologic type, and is never anything else but a pathologic procedure. This is true whether the effect of the reaction is to return the pathologic condition to the physiologic, or to inanimation.

If reaction shall serve to return the body to the normal, that result is accomplished by reconstruction of better tissue, until the reactive process resolves itself into a physiologic procedure.

If the reaction finally results in inanimation, the reaction is accomplished by greater and more far-reaching anatomic disrelationship or disintegration.

It should appear clearly to the student's mind at this juncture that the word "reaction," applied to pathologic procedures, paramountly refers to the concentration to an area of an unusual amount of tissue sense, or what might be called tissue sense attention.

From the statement made in the last paragraph, the student must not jump to the conclusion that the application of an unusual tissue sense to a given area means that more than the normal amount of stimulus is directed to the area, but should understand that no matter how gravely stimulus is occluded, a greater concentration of stimulus will be applied to the area of irritation than is being applied to the general parts of the body.

The last statement will not always seem to be true. That is, it will not always seem that there is such a reactive process occurring in abnormal areas, but it must be remembered that this is because of the great depletion of the area, very largely, if not wholly, obscuring the actual fact.

A little illustration of this proposition will not be amiss in this connection. In the case of a dropsy which is finally overcome, it will be observed that the first symptoms of overcoming the dropsical process will be an elevation of temperature which will definitely encroach upon the dropsical area, and that the dropsical area will be removed just in ratio to the encroachment of the elevated temperature.

These symptoms would not be presented if it were not for the fact, that stimulus is concentrated differently to the areas of the encroachment upon the dropsical situation, than that being applied to the general dropsical area.

It is in the incipient phases of abnormality that the student will find himself able to follow the phases of reaction most definitely. Therefore, we shall proceed to state these in the order of their occurrence.

(A) Immediately following primary occlusion, such, for instance, as might occur as the result of traumatic injury, inflammation, or superheat, always follows as a sequence to primary nerve shock.

In other words, the first effect of trauma is shock-like, followed, unless occlusion is complete, by congestion with rise of temperature.

This abnormal temperature results from all of the effects of trauma, and is the result of the increased concentration of stimulus to the area, to overcome the injury that has been done.

In the illustration given, the remarkable situation presents itself that the unusual concentration of tissue sense to the area, amounts to increased stimulation compared with relative uninjured structures, and must result in one of two things. It must either secure a better relationship, a more favorable chemistry, and hence a process destined for tissue normality. Or, on the other hand, a process directed toward disintegration, morbid accumulation and finally inanimation.

(B) Incident to traumatic injury a large number of nerves are occluded to a given area, and the processes, as outlined in the last paragraph, result in the production in that area of a large amount of retained, disintegrated, morbid matter, while at the same time much morbid matter is carried away from the area in the vessels of liquid transportation and accumulates, relative to an area rich in nerve terminals in another part of the body, in which event this morbid accumulation irritates the periphery of those nerves, changing their vibration and producing definite motor reaction to that area, which in turn sets up a reaction looking to the neutralization and depuration of that morbid accumulation.

Incident to the last illustration, the student must keep in mind that, while the reaction is going on as a result of motor reaction to neutralize or depurate the accumulated morbidity of the area, physiologic reproduction in that area is overcome, and as a result, occlusion of nerve stimulus is ever widening, so long as neutralization is not gaining on morbid accumulation.

If neutralization or depuration or both are gaining on the situation, then, of course, failure of physiologic reproduction will only be commensurate therewith.

It must be remembered in this connection, that during processes of reaction the dreaded feature is failure of physiologic reproduction of anatomic parts, for if the morbidity should become more widespread and virile, failure of physiologic reproduction would become so extensive, that inanimation of the organism must occur by the influence thereof, combined with the effects of reaction.

(C) Chemical adversity, it has been seen, produces occlusion in very much the same manner as trauma. Indeed, in a certain sense it is traumatic injury, and it produces occlusion in much the same way and to the same extent. It must, however, be confessed that in another aspect it does partake of the nature of motor reaction, and that aspect must be given full scope of comprehension in the discussion of reaction.

If a poison *per se* is taken into the economy of the body by ingestion, inspiration, or inoculation, or results in the organism from an accumulation, it begins its adverse effect by causing relative structures to react upon it.

What is meant by animate structures reacting upon a poison, must be explained in the following manner and by the following sequence of events.

The first effect of a poison is to the periphery of the nerves of the area of the poison, in the form of irritation. This produces motor reaction. Motor reaction causes functional reaction. Functional reaction operates to produce, at the periphery of the nerves involved, a chemistry which will either serve to neutralize the poison, to aid in depurating it from the area, or will combine with it and increase the virulence of it.

If the poison is of sufficient so-called power and persistence, the shock to the nerves by the violent changing of their rhythm will be so great that the process will get no further than motor reaction. In such a case we say the person died immediately from the shock of poison. In all other cases there would be the further steps of functional reaction.

It must be understood in connection with the last statement that, where the poison is not of sufficient power to produce complete occlusion, and, therefore, motor reaction is succeeded by functional reaction, then the remaining steps and phases will be the same as that already illustrated in occlusion by traumatic injury. That is to say, the poison will be entirely neutralized or depurated, or both, or the poisons produced by reaction will combine with the specific poison introduced, and the result will be inanimation.

If there is functional reaction, poison incident to the neutralization and depuration will be transmitted widely throughout the organism, producing widespread motor reaction, and as a sequence widespread functional reaction, but of such a type, that final restoration results.

If, however, the toxin of the reaction combines with the specific poison, and there is failure of neutralization and depuration, then, of course, the combined poison will produce such widespread motor reaction and functional reaction, as to result in the inanimation of the organism.

The fundamental phases of functional reaction have been given, but in this connection it might not be amiss to give a few localizations to the thought by way of illustration to the student.

It is perfectly safe to say that more than half of all the phases of abnormality of the human family occur as a sequence of excessive eating. Eating bad combinations, and incorrectly prepared foods.

The human family resists following the rules, that it might well adopt from the members of the dear jungle folk that eat instinctively, that is to say, eat by direct instruction from the essential intelligence of the universe.

The human family wishes to use its inventive genius to change foods from their original condition as much as possible, and in doing so generally succeeds in producing a diet impossible of beneficial results.

The injury to the human family by adverse ingestion could not occur if it were not for the fact that by adverse eating, poisons are produced, either in the alimentary canal, or in parts of the body where there is an excess accumulation.

It will be clearly seen that so soon as the toxin is produced by adverse eating, all the steps and phases that have been carefully gone over in connection with poisons *per se,* and in connection with poisons transmitted from such areas, will occur in the form of pathologic reactions already illustrated.

Incorrect aeration, which most frequently occurs from lack of ventilation, results in an accumulation of toxins in the body, that produce motor reaction, which in turn produces pathologic reaction, which must continue until neutralization or elimination of the poison with the sequential toxins has been accomplished.

Excessive sex relationship or indulgence, not only results in an irritation from abnormal output, which results in motor reaction, but motor reaction in such a case results in pathologic reaction, which produces toxins that, being transmitted to various parts of the body, cause local pathologic reactions, especially in areas then acting under occluded stimulus to grave, and sometimes complete debilitation.

Continually dwelling upon a given theme, which has for its object the arousement of emotion to the extent of irritation, results in the production of motor reaction, which causes pathologic reaction and the production of toxins, which peculiarly tend to stasis in the area abnormally used, which, of course, in the given thought are cortical areas, preventing reconstruction of virile brain cells, finally resulting in loss of certain mental powers, or perhaps complete insanity, or the prostration of the organism in what has been recognized as some phase of brain disease.

These illustrations should be ample to carry the student's mind into a full understanding of reactions. However, it seems necessary to state the following series of facts.

Every phase of abnormality reaches its present gravity by the steps herein outlined. That is to say, it either begins by irritation, motor reaction, occlusion, pathologic reaction, and then on to neutralization and depuration of toxins, and ultimate recovery, or failure of these, which results in death or inanimation. Or, on the other hand, by incipient trauma, which produces occlusion, causing motor reaction, that results in pathologic reaction, with one of the two results stated in this paragraph.

It must be remembered, in connection with the statements of the last paragraph, that in the given case, if recovery is to occur, that result must be accomplished by a reversal of each step and phase of the pathologic procedure in the exactly reverse order of its incipient occurrence. This being true, the history of the patient, if it could be known from the incipiency of abnormality, will be the reverse of the order of the history of its recovery.

Starting, then, with the patient nearing dissolution from an accumulation of poisons, which are of such virile nature, and have so overcome tissue consistence, that motor reaction and pathologic reaction are not sufficient to produce normal temperature, still if administration of assistance is successful, neutralization, depuration, and elimination must be secured, until there will again appear the evidence of an elevated temperature, and that phase must continue until a tissue consistence has been reached, which does not require that character of pathologic reaction. And, if the patient recovers, he will do so by undergoing in the reverse order each symptom that he endured in reaching the present gravity of the case.

Fortunately for those called upon to undergo the ordeal of recovery from abnormality, if the case is properly handled, the types of the return steps may be greatly ameliorated, and in any event do not need to be endured for any considerable length of time.

In other words, the patient in reaching the present gravity, may have endured an elevated temperature for weeks, but in the return may only endure an elevated temperature for a few days. He may have suffered excruciating pain for days together, but in the return he may only suffer such pain for a few hours.

However, the student must remember, the fact remains, that in the recovery from abnormality, the patient must pass through every type and phase of symptom that he encountered in getting to the present gravity of the case, and this is true, because recovery is nothing more nor less than a process of restoring the original consistency, and, therefore, the original processes, and therefore, the original anatomic relationship.

CHAPTER XII

NORMAL TEMPERATURE

THE pathologic process which has throughout the history of the world down to this time been comprehended under the term "fever" could not occur if it were not for the fact of normal temperature, and before normal temperature can be accepted as a fact, what is meant by it must be explained.

By the word "temperature" the heat of the body is referred to, and that is a phenomenon which is usually accepted by the human family as a thing which is wholly unnecessary to explain, and yet it should be very plainly seen that unless the phenomenon of temperature is explained as a paramount proposition, no function of the body can be explained.

If we should assume the proposition of the body having temperature without any explanation thereof, which has been the habit of the therapeutic world, we could then just as readily pose an hypothesis of normal temperature. But neither can be scientifically done, and, therefore, neither will be done.

The heat of the animate body is caused just exactly in the same way that heat anywhere is caused or produced.

We meet with the same proposition at the threshold of this question that we do with light and sound. In the abstract we know that there are no such things as light and sound, any more than there are such things as taste and smell.

We know that taste and smell are names of sensations produced by relative disturbance. But we do not so willingly understand that light and sound are but the names of sensations, produced by relative disturbance.

We should understand that heat is only a name given to a characteristic sensation. In other words, things are not hot unless they are felt as being hot, any more than there is sound where there is no ear to hear, or that there is light where there is no eye to see.

The disturbance, then, that produces the sensation that we call heat, is the result of force, which produces friction.

Let it be remembered that heat so-called is caused in only one way, and that one way is by friction.

The chemists have sought to explain the phenomenon of heat, not by affirmative statement, but by innuendo that heat arises from a certain chemical relationship; but this explanation fails to explain, for without the application of force all chemistry is inert.

It must be remembered in connection with the statement in the last paragraph that if certain chemicals that seem to be passive are put together they produce much heat, but it must not be forgotten that it requires force to put them together and the force of putting them together introduces the element of friction, which is continuous in ratio with the amount of heat produced.

There has been an attempt to show that oxygen is a paramount element of combustion in heat producing chemical formulae, and yet it must be remembered that the rocky face of the mountain contains about forty-five per cent oxygen, but it requires the application of tremendous force, and very excessive friction to produce heat in such substances, yet by such force and friction heat is produced in them, and may be so produced to their complete liquidity.

Anthracite coal is very dense and very inert. It could not be caused to combust except by the application to it of a continuous and marked force, and a friction equally pronounced.

It is well known that to produce a fire with anthracite coal, loose and combustible materials are placed upon the grate of a stove, or other mechanism, well constructed for a draft of air to pass through it and into the air beyond. A match is scratched, which is a forceful proceeding, resulting in the friction of a very combustible substance. The highly vibrating chemistry of the match, with the accompanying phenomenon of flame, is applied to the soft material on the grate, which results in such vibration and friction as to produce heat and the phenomenon of flame, and this in turn soon begins to vibrate the coal, resulting in great friction, and the coal becomes very hot, with the accompanying phenomenon of flame, and we say the coal is burning and is emitting heat.

The coal is emitting force, resulting from the combined disturbance of its inherent chemical formula, and the friction incident thereto, both having been ushered in and maintained by the friction of a draft of air in conjunction with the friction from original ignition and the degree of heat will be in exact ratio with all of these.

If a piece of metal is submerged in a vat of water, and a drill turned into it for a sufficient length of time, the water will boil, emitting steam and vapor in exactly the same way as though a fire were under it. The friction and vibration of the force applied to cutting the metal with the drill having produced the phenomenon.

I do not think it is necessary to go further in illustration or demonstration to make it perfectly clear to the student's mind that there is no heat except that arising from friction produced by vibration, which results in relative disturbances.

If the student has followed these propositions to the present phase carefully he is ready for the statement that heat so-called of the human body is caused by the application of nerve stimulus to the tissue elements of the body, causing them to vibrate in that remarkable harmony that we call cohesion, which results in friction of the particles in such manner as to produce that remarkable phenomenon, which we sense in others as the temperature of the body, and which each senses as the temperature of his own body.

The therapeutic world has always discussed heat from the standpoint of normal and abnormal temperature, and in such discussion has generally referred to 98.6 degrees Fahrenheit as normal temperature.

In connection with this thought, I wish to say that there is no such thing as normal temperature from the standpoint of each organism being the same, and yet, of course, there is normal temperature, but the human organism in its normal expression of heat ranges all the way from 97 to 100 degrees Fahrenheit.

The normal temperature referred to in the preceding paragraph, of course, refers to normal procedure in the given organism, and, therefore, in order that an organism may express normal temperature the following things must be occurring in it: Normal receipt, transmission and application of nerve stimulus to tissue elements, and, therefore, normal absorption, transportation, aeration, elaboration, and cohesion, with the sequence of normal disintegration, normal depuration, and normal elimination.

All of the processes referred to in the preceding paragraph must be occurring normally, for it is impossible to conceive it otherwise, and when there is normal receipt, transmission, and application of nerve stimulus to tissue elements, there is normal vibration, for normal receipt, transmission, and application of nerve stimulus causes normal vibration, and such vibration results in normal friction, and normal friction in turn results in normal temperature, and this is true whether the thermometer measures it as 97, 100, or any other number of degrees.

It is one of the most peculiar facts appertaining to the human organism, as multitudinous as are the peculiarities and characteristics of a human being, that friction produced by the receipt, transmission, and application of nerve stimulus to tissue elements, should result in such slight deviations of heat, that the measure of it only varies by the thermometer about three degrees, and yet this fact teaches us that there is not so wide a range of chemical formulae in tissue consistence as has been formerly thought.

From what has been said, it will be seen that the normal heat production in a human organism varies considerably, and that its variance is determined by the scope of physiologic procedures therein.

In other words, so long as the receipt, transmission, and application of nerve stimulus, to tissue elements results in physiologic conduct, the temperature is normal, although it can be plainly seen that it will not always be the same, for the physiologic procedure is not always the same, and it will likewise be seen that when the limit of physiologic procedure has been reached, the limit of normal temperature and chemical formula has been reached, and that when pathology begins, abnormal temperature also begins.

In different periods of development of the human family, history reveals many strange explanations of the heat of the body, ranging into all of the extravagance of fantasy imaginable. Space will not permit much consideration of this, but it seems hardly proper to pass the subject without some slight reference to some of the most pronounced of these mental hegiras.

It was formerly thought that spirits or entities of life occupied the blood, and caused it to be alive, and that the blood caused the entire organism to have life, and incidentally all of the attributes presumed to be a part of life, one of which, and perhaps the paramount one, that of heat.

As time went on, however, it slowly dawned in budding thought, that to conceive the blood as being animated by spirits did not bring us any nearer an explanation of the phenomena of either life or heat, and the theory was slowly abandoned.

Then came the theory that each cell of the body was an independent organism, a kind of amoeba, and that the blood nourished these several lives, and without any attempt at an explanation of the phenomenon, it was suggested that the nerves transmitted electricity, and that heat was the result of electricity.

But the electric theory utterly failed to make any explanation of normal or abnormal temperature, and has been almost wholly abandoned. However, there still are a few so-called physiologists who occasionally present that hypothesis.

There is another theory which perhaps is still more remarkable than any of those already suggested, which is the present therapeutic one: that the blood furnishes the heat of the body, and this proposition would not be so remarkable, although without any fundamental fact to recommend it, if it were not for the fact that no attempt is made to explain how the blood is warmed, and from whence it gets its heat.

It is quite impossible to conceive that blood has inherent heat. For, in this connection, it must be remembered that the embryo had heat before it had blood, and the question can be raised as to whether the embryo gave the blood its heat, or if it got it some place else.

The facts presented are very simple. The blood is very largely water. Its liquid parts are so, with the exception of a very small amount of suspended solids, carried therein. Of course, the liquid of the blood is said to carry about forty-five per cent of its weight in the form of white and red corpusles.

There are no inherent heat properties in water, yet water contains chemistry to which force may be applied producing sufficient friction to result in the water becoming very hot, or in other words, producing a very great amount of heat. The water which is a constituent of the blood is not different from any other water.

The colloid substance, or the solids held in suspension in the blood, together with the corpuscles thereof, contain no different nor inherent heat producing properties than any other substances in the body, and yet the chemical consistence of that colloid is such that, application of force to it for a sufficient time produces friction sufficient to result in intense heat.

From the two preceding paragraphs it will be seen that heat in blood must be produced precisely in the same manner as heat produced anywhere, and the amount of heat produced will always depend upon the amount of friction produced.

And it will be seen that the last equation will depend, both for the amount of friction and the amount of heat, upon the character of the chemical formula of the blood to which force is being applied.

It is, therefore, no more scientific to say that blood produces the heat of the body than it would be to say that the muscles produce the heat of the body, or that the animal parts of bones produce the heat of the body; these suggestions making it very patent that the disturbance of vibration, which results in the friction that we call heat or temperature is but our measure of that conduct, because of its disturbance of the tissue elements of the organism.

It would be conduct deemed negligence on the part of the author if he passed this place without suggesting that the last and most violent theory for the production of heat in the human body is the suggestion, on the part of therapeutists and some others, that there is a heat center in the brain from which all body heat emanates, and that there is a set of nerves called "calorific," which transmit heat, while there is another set of nerves called "refrigerific," which transmit cold, and, of course, in order to conceive such a set of nerves as the latter, it would be also necessary to conceive that there is a refrigerific center in the brain. It is quite unnecessary to go further than to state these theories, since their simplest statement is their most profound refutation.

Before leaving the subject of temperature, however, it is necessary to state that there are three things that govern so-called heat production: (A) normal receipt, transmission, and application of nerve stimulus to tissue elements, (B) normal chemistry in tissue elements, and (C) normal friction.

In connection with the last paragraph the student must recall that a rule that is not universal in its application, that is to say, that does not equally explain all phenomena cannot rise to the dignity of a physiologic law, and, therefore, the rules of temperature laid down must either be universal in their application, or they are not laws of nature.

In this connection, it must be remembered that the explanation of normal temperature must go wider than the human organism, and must explain similar phenomena in the entire animate world. And, it must be remembered, that we have what are called hot-blooded animals, and cold-blooded animals, and that the phases presented by them must be explained by the rule stated or the rule must fail.

A so-called cold-blooded animal simply presents, as a part of his animate structure, a chemical formula less frictionable than the chemistry of a hot-blooded animal, and also presents the phenomena of the receipt, transmission, and application of nerve stimulus to his tissue elements in such amount and rapidity as to produce less vibration, and, therefore, less friction, and, therefore, less heat.

It will be observed that the difference here may be controlled by the amount or speed of force, by a slower vibration, by less friction, or by a chemistry less capable of friction. The explanation being a slower vibration of a chemistry less capable of friction, and hence a lower heat production.

It will be seen that heat production is not different from any other phenomenon of animation. It is simply the result of a process caused by the application of force to a chemical formula, resulting in the vibration of that formula consistent with its chemistry, which results in friction in harmony with both, and, therefore, with a heat production in harmony with each element of the process, which must, in each character of animal, result in the normal temperature of that animal.

Temperature of the human organism presents a temptation to wander quite widely from necessary statement, because the field has been so befogged by theory, but sufficient has been stated in this chapter to make the salient facts appear in all their simplicity, and that is all the author has sought to accomplish.

CHAPTER XIII

TEMPERATURE AFFECTED BY OCCLUSION

WE have seen in the preceding chapter what normal temperature is, and what is the process of its production. We must proceed in this chapter to extend our thought to a comprehension of all the phases of that conduct resulting in what is called abnormal temperature, or temperature differing from the usual in that organism.

In order that the student may grasp this situation he must recall all of the phases of physiology which enter into assimilation, or the production of tissue. That is to say, absorption, transportation, aeration, extrusion, elaboration, and cohesion.

To comprehend the present theme, the student must understand that each of the elements of the processes enumerated in the preceding paragraph must be accomplished in exact time, at the proper place, and in the proper amount, to produce the exact relation, and that if these steps are not taken in the order of sequence, then there will be abnormal chemical formula, interference with transmission of nerve stimulus, change of vibration, and, therefore, changes of friction resulting in abnormal temperature.

It has been seen that temperature, or heat of the body, is a phenomenon produced exactly as are all others—by the application of force to matter—which fact presents two phases for elucidation: (A) the amount and velocity of force, (B) the consistence of chemical formula.

Since force cannot be seen, weighed, measured, or understood except by its effect upon matter, it will be seen that we are confronted at this point by the most difficult problem that animation presents to us, but particularly that phase of animation now under discussion, abnormal temperature.

It would not be difficult to understand that a certain amount of force projected at a definite speed would have a certain effect upon a given volume of matter, the consistence of which is exactly known and understood.

We approach this phase of the solution somewhat in the thought of the regulation of the draft of a stove, or other mechanism used for the combustion of coal, for there the chemistry of the coal is approximately known, and we adjust the draft so as to secure the exact amount of air force desired to produce a certain friction and heat production.

The thing that makes the problem under consideration difficult is the fact that we do not know the consistence of the chemical formula to which the force of life is to be applied, and, therefore, we cannot tell in advance whether the present chemical formula is one that will respond readily to vibration, and friction, and hence to heat production or not.

We do know that under irritation, and as a result of motor reaction, we do concentrate upon the area of irritation a greater force than that which is required for ordinary conduct, and we cannot conceive of a greater force in the absence of accelerated movement, and, therefore, under motor reactive conduct we conceive that there is not only a greater force being radiated through the area of irritation, but we also conceive that it is being radiated with greater speed, although that is not necessarily true, and instead may well be conceived not to be true, for the greater force is sufficient to accomplish the phenomenon that takes place in the area; but it must be admitted that greater speed of the same radius of force would also accomplish the same result.

However, the controlling fact is, that a greater area is definitely covered, which establishes the fact that more force is directed to the area, and, therefore, the element of speed need not be determined.

In the problem of abnormal temperature there are other considerations that make it necessary to arrive at the conclusion stated in the last paragraph, and these are: that under abnormal chemical formula we have presented to us the remarkable phenomenon of temperature raised above the normal, and temperature reduced below the normal, notwithstanding the very extended area involved in motor reaction, and, therefore, the application of a greater amount of force.

These propositions seem to wholly eliminate the factor of greater speed, although they do not necessarily accomplish that result, for the results would be explained in the same way if there were both unusual force and speed applied in the area during the period of motor reaction.

It will be seen that if the chemistry involved in a given case remains the same, or of practically the same consistence, then the increase of force to the area, or the increase of force and speed to the area would increase the rapidity of vibration, and, therefore, would increase the amount of friction in the same ratio, and hence elevate the temperature or heat expression proportionately.

If, however, the chemical problem was not injected, the whole conduct would be very simple and easily explained as indicated, but the problem of chemistry is present, and must be solved.

It is a well known fact, and one about which there will be no argument, that different chemical formulae, vibrated by the same amount of force, will express different amounts of friction, and different amounts of heat.

Some formulae having a certain force applied, present very excessive heat, while other formulae with the same force applied present a very slight amount of heat.

These differences are plainly illustrated by recourse to the various characters of fuel burned in stoves and other heating mechanisms, and are of too common occurrence to necessitate further illustration.

It will be observed, then, that the problem of abnormal temperature in one aspect of it, always reverts to the chemical formula in the given consideration. This phase would not be difficult of solution if it were not for the fact that it is utterly impossible at a given time to know the chemical formula of the organism under consideration. The only knowledge that can be gained of that fact being obtained by the diagnostic ability of the investigator, which is very largely a comparison of the phases of the present process with those seen before.

However, the fact remains that we do know that chemistry may change from the normal to such consistence that the same amount of force acting through it will not produce the normal amount of friction, and, therefore, heat that was accomplished before the formula became abnormal.

There is another phase of this proposition which must always be kept in mind, and is, that whereas by motor reaction a greater amount of force is expended upon the area of irritation, there is also the reverse of that fact, which is expressed by that phenomenon where less than the normal amount of force may be directed to any given area.

In explanation of the problem last stated, it must be understood, that whereas motor reaction to an area is always in ratio with the irritation, so likewise minus motor action is always in proportion to lack of irritation. This last phase of the problem has not received much consideration, but is unquestionably true.

In connection with the statement in the last paragraph, the student must remember that the whole assimilative process of the human organism is definitely controlled by that department which has been called TISSUE SENSE, influenced to some extent by what has been called sensation, and it is a well known fact that in certain cases force may be concentrated to a given area of the body by accepted suggestion.

It is perfectly clear that the phenomenon last mentioned could not occur if more than the usual force could not be directed to an area, and that phase could not be true if it were not also possible that less than the usual force can be directed to an area.

It must also be remembered that dissolution of an organism could never take place if it were not possible for less than a normal amount of force to be directed to an area or to areas of the organism.

To put the matter in still stronger language: animation is but the result of the application of force, within the scope of a certain variance, through the channels of the organism, and primarily the fluctuations in the processes are the result of differences in the amount of force expended upon various parts of the organism, and the expression arising from the application of these phases of force are controlled in each case to a given extent by the character of chemical formula through and upon which they act.

The thing that makes the problem complex is, that the change in the amount of force to an area also serves to change the chemical formula of that area, and in these multitudinous changes the student is liable to be confused, unless he learns to give to each proposition its due weight of consideration, and carries in mind each necessary element of the solution. Fortunately there are sufficient symptoms generally to render the solution of a given problem definite and easy.

As has already been stated, there are two phases of abnormal temperature to be definitely considered: (1) Where the temperature, or heat production is in excess of that produced during the physiologic process, and (2) where the temperature or heat production is less than that produced under the physiologic process.

HEAT PLUS

Elevated temperature, or heat plus, has for many centuries been indicated by the word "fever," and therapeutists have constantly referred to certain phases of process as "fever," and the remarkable part of this fact is that they have undertaken to make a distinction between what they have called fever and inflammation, because of their desire to name fevers.

It will be sufficient in passing to say that there is no difference between inflammation and fever, and that both are the same in that both phases of conduct present an elevated temperature, or heat production in excess of physiologic process.

Heat plus, or elevated temperature, is almost universally produced in an area or in areas of the organism, and the heat arising therefrom is distributed through the body by means of the liquid transportation systems, and ordinary induction.

The statement in the last paragraph is made because it is impossible to conceive of the whole organism being subjected to an irritant, and, therefore, acting under the phase of motor reaction, and functional reaction, with heat production plus, for it can be seen that long before such a condition would be reached animation would have become an impossibility.

We make the mistake of thinking that the whole organism is involved in the process of plus heat production because the temperature of the whole organism is raised, but such an error must not be indulged. It is always possible to locate and isolate the area or areas in which heat plus is being produced.

The proposition announced in the last paragraph finds illustration when we think of a small boil, for there the irritation is slight, and the process of heat production plus is confined to a very small area, and the general temperature of the organism is not perceptibly increased.

The other phase of the process suggested is illustrated by a large boil or carbuncle in which the heat production area is also circumscribed, but through the liquid transportation systems the temperature of the entire organism is raised.

The illustrations last given apply as definitely, although not in such an isolated manner, to all phases of abnormal process in which there is elevated temperature.

Elevated temperature is proof of the following facts: (A) that unusual force is concentrated upon a given area, or upon given areas, (B) that in those areas there is abnormal chemistry of an active type, (C) that vibration in the area or areas is increased above the normal, (D) that friction in the area or areas is proportionately increased, (E) that heat production is increased in the ratio of all of these. All of which proves that actual function in the area or areas is less than normal instead of over function, as it has generally been proclaimed.

HEAT MINUS

Less heat than that produced by physiologic procedures has always been referred to as lowered temperature or minus temperature. It is a peculiar process evidenced by elements of inactivity.

Minus temperature has never received a name from therapy other than a reference to it. That is to say, there is no therapeutic word indicating minus heat, such as fever, to indicate plus temperature.

There are two situations that must be definitely considered in their relation to minus temperature, and these may be indicated as follows: (1) immediate effect of traumatic injury, and (2) pathologic injury, as the result of abnormal function.

Minus temperature is always concomitant with trauma, and is the withdrawal of force called shock, and, therefore, since all traumatic injury presents the element of shock, all traumatic injury incipiently presents the phase of minus temperature.

In connection with the statement in the last paragraph, it must not be forgotten that ingestion or inoculation of poison *per se* is traumatic injury, and that minus temperature is always a primary sequence of the process of poisoning.

So soon as reaction from shock, whether the same is introduced through traumatic injury in the ordinary sense, or the introduction of poison, begins definitely, minus temperature ceases, and the process always goes on to the production of heat plus.

Minus temperature, as the result of pathologic or abnormal process, it will be clearly seen, could never occur incipiently, but is always a sequel to plus or elevated temperature.

The statement in the last paragraph makes it clear that minus temperature as a result of pathologic process does not occur until the chemistries have undergone certain peculiar changes, which render them inactive, passive, or tending to inertia.

The chemical formula necessary to the production of minus temperature is produced by the failure of normal process in the given area or areas in the following manner and the following steps: (A) occlusion of stimulus to the area or areas, (B) reduction of liquid transportation in the area or areas, (C) failure of new material to arrive at the right time in the right amount, (D) failure of disintegrated morbid substance to be depurated from the area or areas in the right time and right amount, (E) accumulation of chemical formulae of negative reaction, (F) lessened assimilation, (G) increased disintegration, (H) bad cohesion in assimilation accomplished, (I) retained morbidity in the area or areas.

The various elements stated in the last paragraph compose what is ordinarily referred to as poor circulation with accumulated morbidity as a result of stasis, but the relation of these steps as stated is what makes the proposition an exact one, and makes its gravity capable of being isolated and understood.

The force element of the proposition of minus temperature must not be forgotten at this juncture, for as the chemistry of the area becomes abnormal in the manner described, and as the inactivity of the chemistry increases, it becomes less of an irritant, and, therefore, motor reaction is lessened proportionately, which means that less nerve stimulus is centered upon the area or areas, and, therefore, in the production of minus temperature, not only is the chemistry changed so that even normal nerve force transmitted through it would fail to produce normal heat, but there is the other element—lessened concentration of force to the area. The two phases inert chemistry and lessened force resulting in minus temperature.

It is thus seen, that in the production of minus temperature nerve force to the area is lessened; therefore, vibration is lessened, and the abnormal chemical compound is reduced in vibration proportionately, which in ratio reduces friction, and likewise reduces the production of heat.

Heat minus is always an unfavorable symptom, because it always indicates that there is a lack of stimulus being centered to the area, and aside from shock, that there is abnormal chemistry in the area, and, of course, the scope of such area or areas, together with the extent to which stimulus is reduced, will determine whether the organism can remain animate.

It will be clearly seen that it is impossible for the human organism to remain animate if very extended parts of it are operating under the process of heat production minus.

However, the student must remember that following every elevated temperature of any considerable duration, heat minus must occur for at least a short time.

CHAPTER XIV

ABNORMAL TISSUE

In order that we may understand abnormal tissue, it is first necessary to form a clear conception of what we mean by normal tissue.

The construction of normal tissue has been fully described in the book, Psycho-Bio-Physiology, and therefore, it will not be necessary to go into a very great amount of detail at this place. It is only necessary to state a few of the simple propositions which are elemental to the formation of tissue.

As a primary proposition, in order to get a clear conception of what normal tissue is, we must first conceive that the progenitors of an offspring have been absolutely normal for a sufficient length of time that no adverse influences or tissue tendencies have descended to the subject under examination. In addition we must conceive that the individual is properly placed upon the earth's surface, in a congenial atmosphere, and that all of the elements are acting harmoniously upon his organism, and that just an exact amount of nutriment is being prepared and elaborated, and delivered into the economy of his body in such a way as to be builded into his tissue elements in proper quality, time, amount, and relationship.

The student will perceive that the enumeration just made presents a very ideal condition, but he must remember that the ideality of the scheme necessary is no more exact than are the elemental parts of normal tissue.

To state the case in another way, it must be remembered that in order that the tissue of a person may be normal the ancestry must have been normal, conception must have been normal, all the phases of relationship must have been normal during the entire period of gestation. That is to say, the mother's body must have been well, and her mental attitude must have been what it should be. She must not have been exposed to shocks or inharmonies, and finally delivery of the child must have occurred at the right time and without adversity, and then there must have been correct ingestion, digestion, liquid transportation, respiration, aeration, extrusion, elaboration, cohesion, or assimilation, accompanied by proper disintegration, depuration, and elimination from the moment of conception, to the instant of observation.

It will be seen that when any of these very ideal conditions have failed, tissue is rendered abnormal to that extent, and it makes no difference which of the conditions fail. That is to say, if either ingestion, digestion, absorption, liquid transportation, respiration, aeration, extrusion, elaboration, cohesion, assimilation, disintegration, depuration, or elimination shall fail, that failure introduces the element necessary to the production of abnormal tissue.

Failure of ingestion may be considered under the head of lack of nutrition, for, of course, if one does not ingest he cannot nutrify. And likewise with digestion, and yet, of course, digestion goes into the subject of abnormal tissue construction much more particularly, for through the means of over-eating, eating bad combinations and the like, many substances incapable of normal tissue production are presented to the economy of the body.

Absorption is the medium through which abnormal chemistry furnished from digestion is introduced into the economy of the body, for it is well known that absorption is the means of taking into the body liquids and gases from the digestive and respiratory systems.

Liquid transportation includes, of course, both lymph and blood, and is entirely comprehensive of all of the new nutrient colloids that are brought into the economy of the body, and it must be remembered that it is in connection with the liquid transportation systems that aeration is accomplished, and if not properly accomplished, the result is that the liquid either retains the chemistry that should have been eliminated, or receives a chemistry through respiration which it should not have had. In either event there is again presented through this medium to the economy of the body an abnormal chemistry.

Extrusion refers to the projection of lymph through the winking valves of the capillaries into the so-called spaces of the body, and, of course, every phase of abnormal chemistry which lymph and blood have carried as the result of bad ingestion, digestion, respiration, and aeration, is here definitely brought into prominence, for all such chemical formulae may well be conceived to be admixed in the serum of the blood, and, therefore, to be extruded from it at all of the capillaries.

The substance extruded through the winking valves must be conceived to undergo elaboration within the so-called spaces of the body, which it is understood are concommitant with the areas of assimilation, for it is hardly thinkable that the substance extruded enters immediately into cohesion in the process of assimilation. In any event the process of cohesion is in a sense an elaboration, and elaboration and cohesion seem to be the essential steps.

It is perfectly clear that the substance extruded into the spaces of the body must admix at least to some extent with the colloids there contained. That is to say, with lymph left over from assimilation, and disintegrate substances held in suspension therein, and the tissue cohered cannot rise superior to the substances out of which it must be constructed, although by selectivity its formula is better than the general formula of the colloid out of which it is produced.

Assimilation, then, must depend for the character of tissue produced, upon the chemical formulae brought to an area from the sources of respiration and digestion, subjected to all of the adversities that may be introduced through them, and also the substances found in the areas of disintegration, and these elements must elaborate and must control the consistence and character of any tissue formed therein, except to the extent of selectivity.

It will be seen, therefore, that in the matter of tissue production, disintegration and depuration are as distinctly important, and stand in the same relation to tissue production, as do cohesion and assimilation.

In other words, if disintegration does not take place exactly in ratio with assimilation, then assimilation, and hence normal tissue production, will be interfered with, and, on the other hand, if disintegration takes place too rapidly, then the molecularity of tissue elements will be interfered with in the ratio thereof, and the phase of abnormal tissue will be again introduced.

It seems hardly necessary to state that if depuration does not take place in exact time and amount, disintegration will be retarded, as will also assimilation in the same manner and to the same extent, which is no more than saying that you cannot build a new cell or cell particles until the old cell or cell particles are not only disintegrated, but until the colloid of disintegration has been depurated.

It will be seen that after formation of the first tissue, disintegration must always precede depuration, and that depuration must also succeed disintegration and precede assimilation, and that abnormal tissue will finally occur, unless depuration is completed by elimination in right amount and time.

It will, of course, be understood that elimination refers to final expulsion from the organism, and this process is generally conceived to occur through well-defined channels, and, while each avenue of elimination is definite and specific, yet because of the reservoirs of the body, depuration may seem to go on for a period without the gross phase of elimination; still it must be remembered that in order to avoid the production of abnormal tissue, elimination must be as continuous, as regular, as specific, and exact as any other step or phase in the economy of tissue construction.

The author believes that by the time the student has reached this point in the analysis he will be prepared to understand that the construction of normal tissue is a very nice operation and one which can only be attained under the most unusually propitious circumstances, and that he will also be prepared for the statement that, in dealing with the human body as doctors, abnormal tissue is the rule, and that the great struggle presented is to secure such conditions in all phases of the process that have been mentioned in this chapter, as will tend to the production and maintenance of a better tissue.

If it were not for the fact that the soul of man is impressed with the intelligence to produce an organism after a specific plan, with a specific tissue texture, any approach to the production of normal tissue would be an impossibility, but because of the pertinacity, the continual and unabated struggle to produce the normal, organisms are able to approximate normal tissue, and to resist the encroachments which, viewed in the abstract, appear to present impossibilities.

The reference in the last paragraph is to such conditions as follows: bad heredity, uncongenial surroundings during gestation, unsatisfactory delivery, indifferent nourishment, to say nothing of actual dissipation, notwithstanding all of which tissues much more closely approximating the normal than could be expected, are nevertheless produced.

The suggestion made in the last paragraph is for the purpose of calling the student's attention definitely to the fact that there seems to be something amounting to selectivity in the areas of assimilation, and yet it must not be conceived that there is intelligence here that is fully selective, for if there were, then toxins and morbidity would have no influence upon tissue construction, and tissue would be normal regardless of bad ingestion, digestion, aeration, morbid retention, etc., or even the injection or accumulation of poison.

Abnormal tissue, then, is always proof that not only the consistence of the substance furnished to the areas, out of which tissue must be constructed, are improper, but it is also proof that selectivity of the best elements out of the compound has also been overcome.

In this connection I suggest the quality of selectivity, because it is plainly evident that tissue is always of better consistence than is the general formula of the colloid out of which it is produced. And yet it must be understood that the intelligent element of selectivity may be entirely overcome, and is always overcome in ratio with the abnormality of the colloid presented.

Keeping in mind the ratio just stated, another element must be introduced which is, that the character of tissue constructed is always at par with temperature, which is really not different than saying that, allowing for selectivity, the character of construction is proportioned to the substance out of which it is constructed. However, the point made emphatic is that tissue formation is abnormal in ratio with abnormality of temperature.

The statement in the last paragraph will be perfectly clear when it is remembered that the tissues formed in the area where abnormal temperature is being produced must be formed out of the same character of chemistry, which, by reason of its abnormality, is producing the temperature or friction called heat plus, or minus, and that the tissues formed must be as far from normal consistence as the formula from which they are produced, less only the effect of selectivity.

It is because of the facts stated in the preceding paragraph that an organism, undergoing so-called fever, continues to grow progressively weaker in proportion to the length of time and gravity of the fever, and presents the most profound weakness at the termination of the fever if the adverse process shall stop at that point, but if it does not, the organism continues to present greater weakness in ratio as the temperature becomes minus, to inanimation if the process continues so long.

It is frequently insisted that organisms derive their strength from substances eaten, and this proposition is stated in this connection to show that eating, as such, sustains no relation to the strength in the organism, but that the organism is strong or weak depending upon the character of tissue constructed therein, and, therefore, its adaptability to the application of force to it.

The amount eaten during a fever would not prevent the organism from continually growing weaker, so long as the adverse process lasted, if it continued until the fever abated and until a very pronounced minus temperature resulted.

These propositions are presented to cause it to clearly appear, that a fever is not the result of "over action," and a minus temperature "under action" of an organism, as therapy and others allege, but that heat plus as well as heat minus are under or less than normal procedures, for in each case there is failure to construct normal tissue, having normal virility, which means having capacity to respond to the application of stimulus to it, in such manner as to be called strong, resistant, or resilent.

It will be seen, therefore, that fever is as completely an under action, or as completely a less comprehensive process than normal conduct, as is the conduct incident to minus temperature, the difference being in degree and not in kind. That is, both adverse processes arise out of abnormal chemical combination resulting from the effect of occlusion of nerve stimulus, and, therefore, neither arises to the comprehensiveness of physiologic process.

There are two phases of abnormal tissue to which it seems necessary to call attention at this time: (1) abnormal tissue, as a result of functional process, and (2) abnormal tissue, as the result of original construction, or, to be more exact, original formulation.

(1) Abnormal tissue, as a result of functional process, refers the subject definitely to the present history of the organism in question, and, therefore, is confined to effects that are produced within the organism by occlusion produced by traumatic injury, or occlusion produced by

adverse chemical injury, and, therefore, includes such forms of tissue degeneracy as atrophy, anaemia, dropsy, paralysis, etc., meaning by these suggestions to comprehend all phases of tissue change that takes place by the various adverse processes that occur.

(2) Abnormal tissue, as a result of original construction, introduces that department which is generally referred to the subject of anomaly. However, in this connection the author desires to go a little further into such matters, and point out, as being clearly within the scope of this phase, all prenatal tissue abnormality as follows: (A) hereditary tissue tendency, (B) anomalous tissue formation, (C) birthmarks.

(A) Hereditary tissue tendency has perhaps been sufficiently discussed herein before. All that needs to be said of it in this connection is that if it were not for hereditary tissue tendency there would be no such thing as the resemblance of relatives, etc., which we know exists better than almost anything else.

We know that there is a tendency to produce the same character of tissue in the offspring that was dominant in the tissues of the parents, and if this were not true all efforts at evolving animals by selective breeding would be an impossibility. The matter of hereditary tissue tendency will have a more extended notice in Symptomology herein.

(B) Anomalous tissue formation, it must be admitted, partakes somewhat of the nature of hereditary tissue tendency, and yet there is a sufficient distinction to cause the two to be sufficiently differentiated. However, the element of heredity cannot be eliminated from the consideration of anomaly.

Anomalous tissue construction has been held to be the monstrous forms resulting as freaks of nature, but it must be clearly understood that nature has no freaks, and that always and ever where abnormal tissue is produced there is a definite and distinct cause for its production, and it must be understood, that definite and distinct interferences have occurred, which have served to defeat the production of the original image after which the particular organism in question was to have been patterned.

The defeat referred to in the preceding paragraph often results in an organism being produced without members, such as a hand or hands, the foot or feet, or of hands or feet produced in abnormal shapes, and many other strange, peculiar, and original formations of parts, which do not in any sense conform to the original plan after which the person was intended to be formed. The records show that substantially every part of the body has undergone anomaly or monstrous deformity. The records also show that the phenomenon is not understood.

The human family by its adverse living, conduct and attitude to the emotional relationship of sex has produced an ever-recurring and increasing anomalous condition to which I wish to call attention in passing, because of its widespread and adverse influence. That is, to the unusually long foreskin, or prepuce, of both the male and female, resulting frequently in the long, tight foreskin of the boy, and the hooded clitoris of the girl, conditions that are inimical to the growth and development of normal tissue formation and function in each.

(C) Birthmarks sometimes referred to as mother's marks, are really nothing but anomalies, and yet they present such a peculiar and individual aspect, that they may well be considered in a department by themselves; for they are produced under a more specific and circumscribed adverse influence, controlling tissue formation, than those grosser failures to produce tissue, or processes that produce monstrous tissue classified as anomaly.

A birthmark is definitely a tissue result of the acceptance on the mother's part, at exactly the right time, of an adverse suggestion, and accepting the suggestion so definitely, specifically, and positively as to impress the same telepathically upon the soul of the offspring in such a way as to interfere with the production of the part of the specific plan of formation then under construction, and to imprint upon it the image of the adverse suggestion.

One or two illustrations of birthmarks will be sufficient. A mother, just when her child's hand is forming, unconsciously puts her hand upon a toad, and the same hand of the offspring, or some part of it presents the skin of a toad. A mother at the right moment is frightened at a red bull, and puts her hand to her face. The child's face at the area touched presents skin and hair not characteristically different from that of the bull. A mother sees mashed strawberries. She takes the suggestion of blood, and some part of the skin of her offspring is marked as though the berries had been crushed upon the flesh, and so on to countless illustrations.

Birthmarks do not necessarily result in abnormal function of an injurious type, but it will be clearly seen that they might do so, but if they did they would probably come under the classification of anomalies instead of birthmarks.

In concluding this chapter it seems necessary to call attention to the fact that function of the body can only be normal in ratio with tissue construction.

In this connection it must be remembered, however, that a colloid may be produced in the body out of which tissues are to be formed, that is in better condition than the tissue in existence is, and it is through and by means of this fact that we are able to restore tissue to its normal consistence.

Attention must also be called to the fact that tissues of different characters integrate and disintegrate in different periods, and that this proposition sustains a very definite relationship not only to tissue abnormality, but to tissue recovery.

Brain and nerve tissue disintegrate and reintegrate more rapidly than any other tissue in the body. The lungs and glands follow next in order. Muscle, membrane, and ligament next in order, while bone, tendon, and cartilage, in the order named, are the slowest to disintegrate and reintegrate.

If the facts stated in this chapter are well remembered, they will bear a direct relation to the solution of the problems of restoration not only of normal tissue in an organism, but also of normal function, and to the time in which such results should be obtained.

CHAPTER XV

REMARKS ON DISEASE

For a long time it has been the custom of therapeutists to speak of disease as if it consisted of two definite parts, one of which they call organic and the other functional.

In the immediately preceding chapters of this work there has been discussed with perhaps sufficient fullness the first of these phases, that is, tissue abnormality, and if the therapeutist meant the same by organic disease as has been outlined as tissue abnormality, that phase of the matter would have been sufficiently covered.

It must be explained in this connection that there is a marked difference between what the therapeutist calls organic disease, and tissue abnormality as it actually occurs.

In therapy organic disease includes both tissue and function, and does not present either very clearly; the actual fact being that there is no such thing as functional disease as considered separately from organic or tissue abnormality.

In the light of what has been said, the student should understand that when abnormal function is here referred to, the thought is directed specifically to the changed function to conform to abnormal or anatomically distorted parts of the organism.

Abnormal function in the view stated is not interchangeable with functional disease, for it can be plainly seen that there is no such thing as functional disease.

In order to conceive functional disease as such, it would be necessary to entify it, which, of course, cannot be done, although that is exactly what therapy has always sought to do by isolating and classifying certain symptoms, all of which taken together, they say constitute a certain disease.

It is hardly necessary to say that symptoms do not constitute a disease, because they are only evidences of conduct. A symptom cannot be entified. It has no material existence, and hence a number of symptoms all occurring at once cannot be entified, for altogether they do not represent anything but so many evidences of adverse conduct.

Organic disease in the sense of disrelation is a mechanical condition of an organic structure, and, therefore, may be isolated, described, and known, and when such organically abnormal parts act, the conduct entered into is as abnormal as the parts are that enter into it, and it is this conduct that is called functional abnormality, and it would, for this reason, be improper to call it functional disease.

The human family by reason of adverse and erroneous instruction, first with regard to construction of structural parts of the body, and second with regard to functions of the body, have attained to very erroneous conceptions respecting the phase being discussed, and as a sequence are so steeped in prejudice, because of misunderstanding all of the fundamentals of existence, as to render it necessary to spend a certain amount of time and careful statement, in this connection, in order that they might find means of relieving themselves of the burden of error.

Disease has been one of the prominent, if not the most prominent, phase in the history of any time or any people.

The subject of disease has received at the hands of the human family a great deal more attention than has the subject of health.

Indeed, neither disease nor health obtain any attention from the human family until health is lost, and then, of course, there is disease, and disease has the entire attention of that human being until he has been restored to health, if such result happily occurs, when he immediately ceases to pay any attention to the matter whatever, and, therefore, never becomes acquainted with health, and never knows what health is.

It is one of the most common things in human experience that we never hear the music till the sweet voiced bird has flown, and that we always slight the violets till the lovely flowers are gone. And, so it is with health, for we never appreciate it when we have it, but when it has gone we study disease, not health, and when health returns we do not think upon health, but remember disease.

Because of these facts, humanity has been keen to know something of disease, but very careless toward the subject of health, and this situation has given opportunity for the acquisition of a very erroneous idea as to the subject of disease, which has had for its effect a serious and general devolution of the whole human family.

Those that have assumed to teach anything upon the subject of disease, until very recently, have taught that disease is an entity, a thing, and have held out to the human family the thought that disease attacks a person; that disease comes onto a person; that disease lays siege to the vitals of a person, etc., all of which is entirely without any fact to recommend or substantiate it.

People have also been taught that disease subtlely enters upon and grapples with their vitals, and that the body wrestles with disease, the discussion being carried on in language indicative of an actual struggle, and those who read the language think there is an actual struggle, and people, knowing the descriptive terms, and being told these things, believe there is a struggle between the body and the demon of disease, and that sickness comes about by virtue of the demon—a disease—getting the ascendency over health, all of which is most damaging and untrue.

People are also taught that disease is contagious, that it lies in wait for people, and when they come within a certain distance, or into its presence, it lays hold upon them and prostrates them. In this modern day, without thinking of it in the actual terms as then stated, people think of "diseases" from the same standpoint as if it were a fact that their bodies could be possessed by devils, just as in ye ancient days.

It seems hardly necessary to say that none of these strange and bizarre ideas are true, but that disease consists of three phases—interference with the application of force to matter, changes in the relationship of the consistent elements of matter, and changes in the conduct of material elements by reason of changes in their relationship.

These three phases, presented in different orders of sequence, comprehend the entire subject, of inoculation, of contagion, and all other phases comprehended in the discussion of disease.

It will be seen, therefore, that disease or abnormality is but one thing in the same sense that matter is but one thing. Matter, of course, is presented in a multitude of forms, and disease in like manner is presented in a multitude of phases.

It will likewise be seen that the multitudinous phases of the presentation of disease are what therapeutists have called diseases.

In other words, therapy has made the mistake of attempting to isolate the symptoms of a phase of abnormality and of calling the phase so isolated a disease, and this explains the vast amount of uncertainty that is found in the therapeutic world today as to so-called diseases.

It is well known that it is very seldom that two members of the therapeutic profession ever agree as to what disease a patient has, and this is not surprising when it is known that the reason they disagree is because the patient does not have a disease, but is simply presenting a phase of abnormality, or a phase of disease, if you will, but that he does not have a disease.

If the facts just stated had been known to the therapeutic world, the public would not have had to endure the sickening discussions that have been indulged as to "Spanish Influenza," what it is, where it came from, what its symptoms are, whether it is contagious, and all the rest of the meaningless jargon; for it would at once have been known that it was simply a phase of expression of abnormal anatomic relationship produced by the influence of some characteristic toxin in the atmosphere, and with the frivolous discussion thus put at an end, the public could have at once concentrated upon the eradication of the difficulty.

The strained, strange, and ridiculous attitudes with respect to so-called diseases would not be so remarkable if therapeutists alone indulged them, but it must be remembered that some members of the Chiropractic profession indulge the error, and hold that address must be made to one disease until it is removed, and then to the next disease in the order of its virulence, and so on to the eradication of all the diseases. This situation makes the understanding of the subject of disease a very important one, indeed a paramount necessity.

Sufficient has been said to make it clear to the student that it is absolutely impossible to have a symptom of abnormality without first having an equivalent tissue abnormality, and since that department of disease or abnormality, formerly called functional disease, consists entirely of symptoms, then the gravity of the symptoms must always be in exact proportion to the amount of tissue abnormality, and a careful investigation of the whole question makes this proposition stand out with distinctive certainty.

However, for fear the statement in the last paragraph may be misunderstood, suppose an individual is well, but eats substances that produce within him that process called cholera morbus. Is he suffering from organic disease? The therapeutist would say, "No, functional disease." The fact is that he is suffering tissue abnormality to the gravity of his symptoms. He has undergone specific poisoning, and he is suffering in proportion to the gravity of the poison. His symptoms are in ratio with the amount of tissue injury or anatomic disrelation the reaction upon the poison has produced.

The illustration stated will be overwhelmingly clear to those persons who have undergone cholera morbus, or any other phase of sudden and acute abnormality, for they will remember the extreme soreness throughout all of the tissues involved, and particularly the exquisite soreness of the abdominal tissues following cholera morbus. This soreness indicates the gravity of anatomic injury and disrelation incident to the poisoning process.

In view of what has been said, and since disease consists in anatomic disrelation, which is comprehensive of organic disease, it will be seen that the thing that is needed is reconstruction or rehabilitation of anatomic parts, and that, therefore, no treatment can be administered to the situation.

The whole subject of reconstruction reverts to the thought of instituting a constructive process that will ultimate in the reproduction of normal tissue or of normal parts, and that treatment in the sense that the word has been used; as an address to the supposed disease is entirely incomprehensive, for since there is no such thing as a disease there can be no such thing as treatment of "a disease."

It seems wholly unnecessary to carry these illustrations and statements further. Let the student understand that disease in its primary significance consists wholly in disrelationship, and the functional expressions incident to the abnormal conduct of such anatomic parts as a result of such disrelationship, and that recovering from disease consists solely in reconstruction or restoration of anatomic relationship.

CHAPTER XVI

ABNORMALITY—METHOD OF DISCUSSION

Having ascertained in Chapter XV what disease or abnormality is, we now revert to the necessary method of discussing abnormality.

We have learned that disease or abnormality is but one thing, and consists primarily in disrelationship, and that discussion of disrelationship can never be had without having in mind abnormal conduct, which has been termed functional disease.

From these statements it will appear that all discussion of abnormality must be based upon two conceptions: (1) local abnormality, and (2) general abnormality.

Local abnormality, therefore, must be conceived as being divided into two phases: (A) the department of specific injury from the application of force in excess of resistance in the area, whether that force is from extraneous sources, considered as being extra-environmental, or from chemical adversity within the organism itself, and (B) the immediate functional abnormality that of necessity arises out of the injury of whatever nature or extent that has occurred.

It will be seen that a discussion of that department classified under (A) will resolve itself into a discussion of every phase of specific injury that can occur, from the simplest disrelationship to the most profound distortion. These subjects, it must be seen, must be deferred for discussion to the department of this work called Symptomology.

That part of this subject classified under (B) would always be co-extensive with the injury that has occurred, and will always occur as incident to the injury, and a discussion of an injury is very nearly a discussion of local functional abnormality, for an injury cannot be described without including much adverse function, and yet it must be remembered that definite discussion of local abnormality may take a wider and more extended scope than is comprehended by the discussion of an injury *per se.*

General abnormality presents a very remarkable subject for consideration, and one about which a great deal of error has been indulged on the part of the therapeutic profession, and therapy has presented a series of errors in regard to it which have secured a very large following on the part of humanity in general, and some of the Chiropractic profession.

A little careful thought about general abnormality will make it quite clearly appear that the subject definitely referred to is that of functional abnormality as contra-distinguished from the abnormality of incipient injury, and yet that statement of the case is not entirely comprehensive of it.

The paramount subject to be discussed under abnormality is, of course, functional abnormality, but incident thereto there is always the subject of tissue injury.

The proposition, then, of general abnormality divides itself into two phases of discussion: (1) the discussion of functional abnormality, which arises from a local injury, and (2) the discussion of general injury that rises as an effect of functional abnormality.

The discussion of general functional abnormality which arises from local injury resolves itself into a discussion of the effect that adverse chemistry has upon other parts of the body. Indeed, it does not take the discussion out of the theme of local injury in order to bring it under any other phase than that which would obtain in discussing local abnormality, except that it puts the entire pathologic subject in the reverse order from that in local abnormality, as has already been seen.

In acute phases the discussion is first the injury and then the adverse function that flows therefrom, but under the discussion of general abnormality the discussion is confined to the abnormal chemistry, and the injurious effects of it upon tissues generally.

The discussion of general abnormality, then, finally results in the discussion of the production of abnormal tissue through and by means of the general distribution of abnormal chemistry.

It will be seen that a discussion of functional abnormality, as incident to the organism in general, is a discussion of all the phases of functional abnormality that can be conceived; all of the phases of functional abnormality that have been named as diseases, and all of the phases of abnormal conduct that have not received a name. These, of course, include all phases of fever, so-called inflammation, infection, contagion, tuberculosis, abnormal constriction, paralysis, dropsy, etc.

Of course, in the discussion of all these various phases, to remain strictly within the confines of functional abnormality, attention may only be directed to the symptoms that arise, and not to the absolute effect that results, for if attention should be given to the effect, the thought must necessarily revert to the anatomic relationship of tissue elements.

A discussion of the second phase of this proposition, that all general injury that arises from the effect of general functional abnormality is not directed to the symptoms that arise, but is peculiarly directed to the tissue elements of the organism generally, for the purpose of ascertaining the effect general abnormal function has had upon them.

Sufficient has been said for it to be understood that abnormality has its incipiency in tissue injury, and that instantly following tissue injury there is abnormal function, and that so soon as there is abnormal function there is abnormal chemistry.

It must also be remembered that tissue injury can begin in the *reverse* order, that is, by absorption, injection, or inoculation of adverse chemistry, which immediately produces tissue injury, which in turn causes occlusion of nerve stimulus, and proceeds to the production of abnormal chemistry generally.

In either phase of abnormality indicated in the preceding paragraph there is the effect—production of abnormal chemistry—and in all phases of abnormality it is through and by means of adverse chemistry produced in one of these ways that the organism undergoes general abnormality.

It requires no evidence to show that abnormal chemistry, being distributed generally throughout the body, through the lymph and blood vascular systems, will have the effect, if continued sufficiently long and in sufficient amount, to overcome tissue resistance and to produce abnormal tissue, or disrelated tissue elements in the whole organism.

We find the phase indicated in the last paragraph most profoundly illustrated in that abnormality called pernicious, chronic anaemia, and almost as good an illustration of it, in that phase called anasarca, or general dropsy.

The resistance of the organism to abnormal chemistry is so great for a given length of time in each case that not often in abnormality even of a grave type, is general tissue abnormality pronouncedly presented, and for that reason the profession has not obtained full scope of appreciation of the truth here stated. However, that the process is as stated is perfectly apparent from the situation as analyzed.

It will be seen, then, that in the department of Symptomology herein, the entire discussion will be based upon tissue injury, and that the more extended explanation of symptoms that will occur therewith is but a discussion of the evidences by which tissue injuries are manifested, by which they may be known and understood, and the gravity and character of tissue injury more fully comprehended.

Symptoms, it can be seen, will always be local and general. It is true symptoms of tissue injury may be local and may be general, but when such symptoms are other than local they are so because of the general tissue injury that occurs as incident to the distribution of abnormal chemistry which has been produced as a result of incipient injury in other parts of the organism, and has been transported and distributed generally.

In connection with the discussion of abnormality as local and general, there are two other phases that must be kept in mind and under consideration as the student progresses, and these are (1) the acute, and (2) the chronic.

Acute abnormality is of two types, (A) those symptoms which arise as the immediate functional reaction from shock-like conditions, whether the same occur from trauma or the introduction of poison, and (B) the immediate effect of tissue injury incident to the abnormal chemistry that is produced and distributed as a result of such functional reaction.

From the statements in the preceding paragraph it will be seen that acute abnormality from the Chiropractic standpoint is always of brief duration, very much more so than has been the conception of the therapeutic profession, and could never continue longer than the time required for contamination or disrelation of tissue elements directly influenced to occur.

In the light of the history of therapy, the statements made here, as to acute abnormality, will strike the student as being remarkable, but he must understand that they are only so because of erroneous misconceptions that have been held, and are not so in fact.

Chronic abnormality, of course, includes tissue injury, but not of the incipient type, but only that character of tissue injury, which, by reason of the adverse and prolonged invading of abnormal chemical combinations, has become chronic as a result of adaptative or accommodative influences.

Symptoms arising from chronic tissue situations are never so pronounced and acute as those arising from acute situations, but nevertheless chronic abnormality is very much more destructive than acute abnormality.

As explanatory to the statement in the last paragraph the student must remember that if it were not for chronic processes we would not have colds, we would not suffer from so-called infectious or contagious disease, and would not suffer from any of the phases of abnormality which arise from toxins incident to atmospheric conditions.

It is not necessary to go into further details with regard to chronic abnormality. The student must simply bear in mind that so soon as the situation is remote in point of time from the incipient injury the situation presented is chronic.

The student must always be very careful not to confuse acute and chronic phases, and he must remember that incident to every chronic process there must at all times be acute injury taking place, and, therefore, acute phases of functional expression.

The most complex problem presented to the student of function is that which is incident to acute phases of chronic abnormality, and, therefore, the propositions laid down in this chapter must be very definitely understood if the analysis of Symptomology and diagnosis is to be mastered.

CHAPTER XVII

PHASES OF ABNORMAL PROCESS

This subject cannot be considered by itself, but must always be considered with the thought of tissue conditions in mind, but in this chapter it is the purpose to give definite attention to certain characteristic procedures upon which the student may not only rely for diagnostic information, but upon which he may rely for deductive diagnostic purposes.

It will be recalled that under physiology of the brain in Psycho-Bio-Physiology it was declared that nerve stimulus enters the cortical cells, and is transmitted through the nerves, and applied to tissue elements at the ends of such nerves, and that, therefore, the brain is the paramount organ to all functions of the body, and in that sense is the principal organ of the body.

Since the brain is the paramount organ to all functions of the body, its relationship to the phases of abnormal function must be well understood by the student, in order that he may have the means of isolating, from the symptoms of an area, some knowledge, not only of the injury to the tissues of the brain, but such accessory injury as will necessarily occur to other parts of the body as a result thereof.

The therapeutic conception of so-called brain diseases is of such a general and indefinite nature as to be of little or no value in a frank and actual consideration of the situation now under discussion.

The most that can be said for therapeutists is that they have been very painstaking in noting symptoms, not only in connection with the phase of abnormal brain function, but of all characters of function, and the data thus obtained may be of considerable value, when it is translated under the light of the law of tissue disrelation.

The law of function referred to is that each anatomic part performs its conduct under the immediate impulsion of nerve stimulus transmitted to it from the brain through nerves, and, therefore, that all conduct in every part of the body sustains a direct relationship to normality or abnormality of the brain.

It must be understood that any phase of abnormality of the tissues of the brain instantly results in abnormality of both tissue and function in the parts of the body corresponding to those parts of the brain, and that the tissue, and, therefore, functional abnormality in the body will always be in ratio with the abnormality of the tissue of the brain.

If a limited area of the brain is affected, all parts of the organism ramified by nerves that have origin in the affected area will be as abnormal as the affected area, and, of course, the abnormal tissue both in the brain and body will necessitate a ratio of abnormal function in both brain and body exactly corresponding thereto.

This proposition is not always very clear, for it will be seen that if the cortical area in the brain is very small, and the nerves affected therein ramify very widely the tissues of the body, the symptoms of body abnormality will be very slight, and in such a case it would be very difficult indeed to approximate the body abnormality and prove that it exactly equaled the tissue abnormality of the brain, and yet it is perfectly clear that it would be exactly equal.

If the cortical area affected is somewhat extensive, and the nerves from the area ramify very widely, the symptoms of tissue abnormality in the body, and, therefore, functional abnormality would be so definite and profound as to attract much attention, and still it would be difficult to approximate these, and reach the conclusion that they exactly equal tissue and functional abnormality of the brain, and still it would not be difficult to do so.

If the cortical area in the brain, however, was quite extensive, and the ramification at least in some parts of it were concentrated to certain areas of the body definitely, then it would not be difficult to observe the symptoms of tissue and functional abnormality in the body, and it would not be difficult to observe that they equaled brain abnormality. Indeed the mistake made in such instances is usually the reverse, and the diagnostician reaches the conclusion that the tissue abnormality of the body is greatly in excess of that of the brain.

The illustrations stated in the three last paragraphs only make it plain, and serve to emphasize the remarkable fact that tissue abnormality of the body is always exactly equal to brain abnormality if the equation is taken by itself. However, it must also be understood that tissue abnormality of the brain will be exactly equaled by tissue abnormality in the body plus the effect of occlusion of nerves in the given case.

There are two sides to the last proposition, and hence it is necessary to state that tissue injury or abnormality in the body is exactly equaled by tissue abnormality of the brain, plus the effect of occlusion of returning nerves to the brain, and minus the effect of occlusion of other nerves.

If the equation of tissue injury of the body resulting in tissue injury in the brain could be considered by itself, that is to say, divorced from the subject of occlusion, then tissue abnormality in the body would always be exactly equaled by tissue abnormality in the brain, for it can be seen that an injury to tissue is a specific injury to the same relative amount of nerve tissue, and that the change in vibration and relationship of the nerve tissue involved changes the vibration and relationship of corresponding cortical brain areas, and this would be the case always, no matter what the character of tissue injury might be, whether traumatic or chemical.

In the proposition of returning nerves to the brain, it will be seen that in a given body tissue injury, if returning nerves to the cortical area were not, at the same time injured, then the brain area would be sustained by returning nerves, and would be injured in ratio with the body tissue, less the constructive influence of returning nerves, for its structures would be kept resistant by stimulus through the returning nerves.

Where nerves extending from the brain to certain body tissue are occluded, when such body tissue is injured, the change of vibration will not be definitely carried to the brain, and the injury to the tissue will be greater than the injury to the corresponding cortical brain areas, in the amount that the change in vibration is hindered by occlusion in existence before the tissue injury, and in this event nerve occlusion would seem to be friendly to brain tissue. However, it is not so much so as would at first appear, because by occlusion the cortical brain areas would have been in ratio depleted before the specific body tissue injury here referred to occurred.

The difficulty in distinguishing these conditions from the symptoms presented have already been reverted to, and these are still further rendered complex by the introduction of the intelligent phase into the consideration, and that proposition must in this connection be given full weight and consideration in order that the student may understand what relation the intelligent element sustains to the problem under discussion.

It is the general conception that a very large part of the brain is involved in the production of consciousness, or what has usually been carelessly referred to as the mind. This is an error. Only a very small portion of the cortical area is devoted to the production of the function of consciousness, and hence extensive cortical abnormality may exist with slight mind debility, and, the reverse, slight cortical tissue abnormality may exist with great mental debility.

If, without this introduction, it had been announced that in a case of so-called insanity, body tissue abnormality was in exact ratio with brain tissue abnormality, the statement would have been disbelieved, but with this prefatory statement the whole matter is made perfectly clear.

Another proposition that the student must keep in mind, is that any tissue abnormality that may occur anywhere may occur in cortical brain tissue, and that the symptoms arising from such tissue abnormality, if not related directly to the element of intelligence, will be characteristically the same as those that would arise from any tissue abnormality, except for the fact, that because of abnormality of brain tissue, there will be a corresponding amount of body tissue rendered abnormal with the same adverse conduct and symptoms arising therefrom.

In connection with what has been said in this chapter it will be seen that if it were not for the adaptative fact, that in emergency a greater cortical area can centralize more than the usual force upon a body area, which in one phase of body conduct has been called motor reaction, it would be impossible, once the resistance of tissue was broken down, or in other words, once abnormal or diseased tissues occurred, to ever secure restoration.

Restoration, therefore, from tissue abnormality depends upon securing a better stimulation from a wider range to the tissues affected. This does not call for an abnormal or excessive stimulation, but only that accommodative stimulation which the interramification of cortical areas of the brain, in preparation for unit procedure makes possible, shall be directed to a definite area when the necessity therefor occurs.

There is a law of pathologic procedure, which the steps so far taken has made it possible to lay down at this place, and in this connection, and this law is applicable to all tissues of the body, for in the further illustrations of this chapter it must be understood, reference is equally to all tissue.

The law is that all pathologic process, as has been explained in this work, results in either plus temperature or minus temperature. That is to say, pathology cannot take place and the temperature remain normal.

It is true that in passing from an elevated temperature to a sub-temperature, the Fahrenheit and other measurements will pass through the normal registration. However, it must be understood that the fact that a thermometer shows normal registration does not establish the fact that there is normal temperature.

Regardless of the registration, by any mechanism of the quantum of heat in any process, the question of whether temperature is normal or not will be determined by the chemical formula involved, and not by the amount of heat production registered, and if the chemical formula is abnormal it is quite indifferent what the thermometer may register, the temperature is nevertheless abnormal.

Chemical formulae incident to temperature may be considered as being separated into three subdivisions, and for the purpose of designating these the formula producing the normal temperature may be called *positive,* while that indicating plus temperature may be called *affirmative,* and that producing minus temperature may be called *negative.*

Sufficient has already been said about normal temperature. It is here only necessary to discuss affirmative chemistries and negative chemistries. Or, to simplify these terms, to discuss those pathologic chemistries that result in plus friction, and, therefore, plus heat; and those chemistries which present less than normal friction, and, therefore, minus heat.

Affirmative chemistry is always produced as a result of all shock-like conditions, and becomes apparent as soon as functional reaction from such situations begins to manifest itself; and, therefore, of course, affirmative chemistries are always paramount in all phases of acute functional reaction, or acute phases occurring as incident to chronic procedures.

The elements necessary to the production of affirmative, chemistry pathology, therefore, is occlusion of stimulus produced by acute injury, causing stasis of liquid transportation, and, therefore, morbid accumulation, decreased depuration, increased disintegration, and decreased assimilation, all acting under the effect of motor reaction.

Motor reaction in the situation stated, will continue until irritation ceases, and irritation will not cease until the affirmative chemistry is neutralized or depurated from the area, and, of course, eliminated from the organism if the affirmative chemistry is to be wholly overcome.

Negative chemistry never occurs as incident to occlusion produced by acute processes, but always as a sequel to plus temperatures. Negative chemistries are, therefore, the product of neutralized affirmative chemistries. They are chemical formulae in which the elements contained do not vibrate to the production of friction expressed by normal heat, but friction to the production of less heat than normal, or minus temperature.

It will be seen that negative chemistry can only occur to a limited extent in the organism, and animation be maintained.

Based upon the affirmative and negative chemistries there are two phases of process, which for convenience are designated by the same names. That is to say, the affirmative process of pathology being the expression from affirmative chemistry, and the negative process being the expression from negative chemistry.

The affirmative process is that which immediately succeeds to shock-like effects of traumatic injury, or injury from poisoning *per se,* and is the process that accompanies all of the changes, phases, and symptoms incident to all forms of so-called acute abnormality, and all acute phases of chronic abnormality.

The affirmative process, therefore, includes all inflammatory and fevered conditions, and includes all so-called infectious and contagious abnormality.

The negative process is that which occurs incident to all negative chemistries in the body. It is, therefore, never seen in acute abnormality, except as a phase of incipient chronic abnormality, and it is a dominant phase of all chronic abnormality.

The negative process is a sequel to the affirmative process, and begins where the affirmative process leaves off.

At the present time, since 98.6 degrees Fahrenheit is classified as normal temperature, the negative process may be said to begin when the temperature is less than that quantum.

However, the negative process actually begins when the temperature of the individual in question is less than normal, no matter what the registration of temperature in the particular organism may be.

It must be admitted that it is a difficult thing to tell just when the affirmative process ceases in a certain phase and the negative begins, but this is quite immaterial, for the negative process very soon makes itself apparent, and is as easily detected when definitely operative as is the affirmative process.

It will be seen that the negative process can never act by itself, for to assume that fact would be to conceive that negative chemistries were being produced in all parts of the body, and it may be readily seen that animation could not be maintained under such a situation. However, the negative process may be apparent in all parts of the organism.

The remarkable part of the negative process is that it is often an incident to the affirmative process. That is to say, the general organism may be operating under the affirmative process, and still circumscribed areas of it may be acting under the negative process. To illustrate this situation; suppose there is abscess of the liver. The general organism is acting under affirmative chemistries, and, therefore, under affirmative process. In the immediate area of the abscess, however, negative chemistry is finally produced, and incident to that chemistry the negative process occurs, of course, as a phase within the affirmative process.

Again, the person is suffering an elevated temperature, and the general chemistry of the body, of course, is affirmative, as is also the process, but the feet become dropsical, showing that the chemistry of that area is negative and here again we have the negative process as a phase of the affirmative process.

It is not difficult for the student, if he gives the matter proper attention, and keeps these processes well in mind, to detect the character of chemistry being produced in the various areas of the body, and, therefore, to formulate an analysis of the actual functional, pathologic process that is taking place in a given organism.

CHAPTER XVIII

PATHOLOGY BY SUGGESTION

It is impossible to separate the intelligent element from organic conduct.

Everything that takes place in the organism sustains a direct relation to the element of intelligence. From this statement the student must not suppose that mind is directly referred to in this connection, but only that department of intelligence, one phase of which is mind.

It has been seen that all conduct of the body is performed intelligently, and this could not occur if all function was not performed under the direction of intelligence. But it must be remembered in this connection that all intelligence is not mental, or in other words, does not refer to mind.

In Psycho-Bio-Physiology we learned that there are two departments of human intelligence, one, the seat of consciousness, comprehending all mind attributes, and, two, the department of tissue sense, which comprehends all phases of tissue construction and functional operation.

The department of tissue sense in a general way acts without reference to the department of consciousness, and this is entirely true so long as conduct is physiologic, but it is less true when conduct is in any amount pathologic, and indeed under pathologic procedures the conduct may very considerably encroach upon the department of consciousness.

The department of consciousness, comprehending all of the attributes of mind, may at any time produce conduct that will encroach to a considerable extent upon the department of tissue sense, greatly interrupting the operation thereof.

Suggestion is the means by which the department of consciousness can encroach upon the operations of the department of tissue sense, although this term standing alone and unexplained is scarcely sufficiently comprehensive to carry the thought which is intended to be conveyed.

A suggestion, in the sense now under consideration, is a conscious impulse directed to the soul, conveying the substance of thought based upon falsehood, which is returned by the soul to the department of tissue sense, changing functional conduct to conform to the untruth or error suggested.

The reason that it is here announced that the substance of thought, whereby the intelligence department of man may encroach upon the tissue sense department, must be untrue is because if suggestion of truth in such relation were made, the effect upon the department of tissue sense would always be beneficial, or at worst would not change functional conduct under the control of that department.

In order, therefore, that a suggestion may produce pathologic results, that is to say, may adversely change conduct in the department of tissue sense in the human organism, the suggestion must be untrue, must be accepted by the soul as true, and returned to the department of tissue sense, changing its conduct to conform therewith.

It has been laid down that man is capable of receiving suggestion which will produce pathology in his body. The proposition has had much debate. It, however, is not a debatable proposition. That pathology may be and is produced by suggestion is a matter of too frequent occurrence to permit of discussion.

Suggestions that produce pathology in the human body are of two characters: (A) extraneous suggestion, that is to say, suggestion received from others or from sources outside the organism; and (B) auto-suggestion, that is to say, suggestion arising within the mind or intelligence department of the person himself.

Extraneous suggestions are so many and varied as to render it substantially impossible to outline the same comprehensively. However, some illustration may be made that will be beneficial.

The commonest phases of suggestion that produce pathology in the human body are those arising from false conceptions as to heat, cold, moisture, and effect from atmospheric change. These are constantly exercising certain influences upon the human family.

There is also fear as incident to false conceptions of religion, false conceptions of political situations and governmental results; false conceptions as to obtaining food and nourishment, in other words, adverse suggestions growing out of misconceptions as to economics, etc.

There are other still more dangerous and damaging suggestions springing from false conceptions as to disease, functional process, contagion, contamination of air, water, etc., and misconceptions of human relationship, domestic and otherwise.

All of the characters of suggestion indicated, and a multitude of others, continually have for their effect the encroachment of the department of consciousness upon the department of tissue sense.

Auto-suggestions that produce pathologic conditions arise out of practically all of the subjects that have been mentioned, but instead of receiving the information from others, the person produces such morbid maunderings in his own mind, and not only receives the suggestion once and definitely acts upon it, but is in a sense continually receiving it and continually acting upon it.

It will be seen from the last paragraph that adverse auto-suggestions, that is to say, self-suggestions which are not true, are the most damaging that may occur, from the fact of their persistence and continuance.

Extraneous suggestions, it will be observed, that have for their effect the production of pathology do not differ from auto-suggestions in their effect upon the present, for really after all in a limited sense they are nothing but auto-suggestions, for it would be impossible for a suggestion to do damage, or produce pathology, if it was not adopted by the individual, and as soon as the substance of a suggestion is adopted by the individual, it to that extent becomes an auto-suggestion.

However, for the purpose of keeping the field of thought clear, it must be remembered that there is a difference between the two phases of suggestion, and that morbid suggestions, originating in the mind of the individual himself, are of much the more damaging type.

There is no phase of fact more familiar than that a person by thinking he is sick actually becomes so. This is a proposition now agreed to by substantially all intelligent persons, and it must be remembered, that the only way in which a person could become sick by thinking he was so, and being told by others that he is sick, would be by auto-suggestion, and the influence of extraneous suggestion, and if suggestion was not capable of producing pathology in the human body, then no matter whether a person thought he was sick or not, he would not become so as a result of suggestion.

We are also familiar with the fact that love takes away the appetite; that fear and anger change all of the physiologic processes into pathology; that anger changes the character of all glandular excretions, and, of course, this could not be true unless the actual character of the glandular structures were first changed, by controlling the conduct of the department of tissue sense.

All persons are familiar with the fact that there is little hope of recovering a person who is sick, if that person has made up his mind that he is afflicted with a fatal malady, and that he is going to die. This fact would not receive support from practically all human beings, if it were not true that a person under such circumstances, by auto-suggestion, continually causes his conscious department to encroach upon the department of tissue sense to the production of a very excessive pathology.

In examining a patient, then, to discover his present pathologic situation, it is just as important to know how much and what character of pathology he is producing by adverse suggestion, as to know how other phases of pathology are being produced in his body and to what extent.

It is also just as necessary, in order that the person shall be recovered, that phases of pathology occurring from adverse suggestion shall be traced out and understood and eradicated as it is that all other phases of pathology should be traced out, understood, and eradicated.

The student must understand that in dealing with the human body he is always dealing with the intelligent department thereof, and that, therefore, that department must always be taken into account, and controlled and directed if he is to attain to the highest and best success of which the circumstances permit, and it is for this reason that he will find a full discussion of the fundamentals of these propositions stated and discussed in the book Psycho-Bio-Physiology, which is the first volume of this series.

CHAPTER XIX

THE GERMS

The therapeutic theory of germs as a causation of disease is about fifty to fifty-five years old. How such a ridiculous and unsubstantiated theory ever obtained its start is buried in the mystery of such things. There is nothing in the whole experience of the human family to sustain it.

The theory is that certain diseases are caused by a microscopic germ, the breeding, number, and activity of which, cause or produce the symptoms of the so-called disease.

Of course, in order to bring such a theory into a working hypothesis it must be conceived that the germs, which cause the disease in one individual, in order to cause that disease to take place in another, must be transmitted from the sick organism to the well one, and thus produce its effects.

There is another theory, that the inert or embryonic germs, or eggs, may be transmitted from one individual to another, and in the case of the embryonic germs that they become active, and in the case of the eggs that they hatch out and become active.

The most striking feature of this theory rests in the fact that therapy admits that no such phenomenon could occur, unless the organism in which the germs or eggs are emplanted contains sufficient morbidity of a particular type to furnish the character of food that will maintain, and permit of the propagation of the germs.

It is remarkable how widely the theory of germ causation of disease has been disseminated and adopted, and that especially in the most enlightened parts of the world, when an actual and unbiased scrutiny reveals the fact that there is no evidence that germs were ever transmitted from one person to another, or that embryonic germs or eggs were ever transmitted and afterwards became active or hatched out. This proposition will receive greater clarity in the succeeding chapter.

In connection with the remarkable germ theory of disease causation and its acceptance, it must be remembered that there are many reasons why the germ proposition has been so carefully promulgated, and has been so widely accepted. Its promulgation and acceptance has served to increase the necessities of the people, and has thus propagated certain phases of industry and commerce almost beyond measure.

The reference is particularly to the fact that the germ theory has been the basis for the necessity for the individual drinking cup, the sterilized handkerchief, done up in a high-priced commercial package, and all that array of innovations, which are an accompaniment to our modern life. And the thing most remarkable in connection with all of this is that germ diseases so-called, against the spread of which all these things are declared as necessities, have been continually and progressively on the increase during the entire period of the evolution and adoption of all such folderols.

With all of the individual drinking cups, sterilized handkerchiefs, towels, and amphigory so different from the plain and simple methods of our ancestors, the so-called white plague is on the continual increase, as are all the other so-called germ diseases. This is certainly an indictment against the intelligence of humanity, and yet it must go on in this treadmill until perchance sufficient intelligence is evolved to understand the false foibles through which humanity is now being abused.

In this day of extreme enlightenment, in substantially all directions, it is most astonishing that human beings can be made to believe such bizarre things about their bodies, and still it is not so strange when one comes to understand that the one thing about which the human family is definitely and distinctly ignorant is the human body itself. Even those who have addressed themselves to the human body with intent to learn about it, generally know very little of it.

It is hoped that very soon the human family will become aroused to the recognition of this fact, and will set itself to becoming as definitely informed about the human body as it is about other things appertaining to human existence, and when it does, it will be impossible for visionaries to exploit such ridiculous propositions, as the germ theory of causation of disease.

In connection with what has just been said, it is not so very strange that therapeutists should make pronouncement of such strange and unsupported propositions as the germ theory of causation of disease, when we come to consider and understand what the cause of disease is. If the therapeutists had understood the cause of disease, they would never have made the mistake of announcing the germ theory.

The laymen votaries of therapy, of course, cannot be blamed for following blindly in the footsteps of the therapeutists to whom they look for information, believing them to be informed, and capable of giving information, except that any person in this age must bear his share of blame for not knowing truth, which actually has been recorded and noised abroad, and which he may possess by putting forth sufficient effort to master it.

It is now well understood that the cause of functional abnormality is occlusion of nerve stimulus, and that occlusion of nerve stimulus occurs as a result of anatomic disrelation, and it may be easily seen that germs could not cause anatomic disrelation, and that germs *per se* could not cause occlusion of nerve stimulus either directly or indirectly.

If therapeutists and their votaries could get the cause of disease clearly in mind, the germ theory of causation would pass out of human conception in a very short time.

Having placed the matter of the germ theory of causation of disease clearly before the student, which furnishes a certain excuse for the error now held by therapeutists and their votaries, the actual facts appertaining to germs will now be discussed in the order of sequence.

It is not the purpose of the author to enter the field of theory and speculation in this chapter. No theory with respect to germs will be stated. All that is stated will be the simple facts which are common and patent to all that will observe and learn them, and indeed such facts as are constantly being demonstrated before the eyes of all humanity.

It is a law, universal in its operation, that all morbid or dead flesh at or near sea level, within a certain scope of temperature, if undisturbed is disintegrated by germs, which evolve into being within the flesh soon after it becomes inanimate.

If, instantly upon an animal's becoming inanimate, the carcass is inclosed in an air-tight receptacle, which is sufficiently large not to exclude the elements necessary to animate existence, which receptacle is at or near sea level and in the right temperature, the fact that it is hermetically sealed will not prevent the carcass from being disintegrated by animate germs.

The hermetically sealed receptacle in which the carcass of the animal is encased, in the illustration mentioned, is not for the purpose of excluding the possibility of animation, but is for the purpose of excluding the possibility of eggs being laid in the carcass after death, which has been the explanation of the germ advocates.

With the carcass inclosed in the air-tight receptacle, at or near ocean level and within the right temperature for disintegration, while there is no possibility for eggs to be laid therein, the flesh will nevertheless soon be occupied by myriads of germs which will proceed to completely disintegrate it.

A careful observation of the germs disintegrating the flesh inclosed within the receptacle will reveal the fact that each distinctive character of flesh is being disintegrated by a different character of germ, which fact accounts for the numerous kinds of germs, according to the various phases of morbidity, that are produced in the human body under pathologic conditions.

As to how these germs come into existence in the air-tight receptacle, we are no better advised than we are as to how life, as we call it, or animation, came into existence on this planet originally. We have sufficient evidence to show that new phases of animal life are constantly coming into existence, and that phases of animal life that have existed have become entirely extinct, and yet knowing these facts has not furnished us any means by which we have arrived at an explanation of them.

For the present occasion, however, it is sufficient that we know the facts, and to know that apparently the necessity for a given character of animal life brings that character of animal life into being, and this fact is sufficient to explain the phenomenon that when there is a peculiar character of morbidity within a certain distance from sea level, with a certain amount of heat and moisture, phases of germ life evolve into being for the purpose of aiding in the disintegration of that morbidity. It seems bootless to add that at other elevations and without the heat and moisture no such germ life appears and no such disintegration takes place.

This phase of truth is paramount in this connection. The force of life, acting unrestrainedly upon the chemical elements of the organism, causes them to cohere and remain cohered, and also causes such depuratory and eliminative processes as prevent the formation of morbid accumulation, and, therefore, to avoid the necessity of the assistance of germ life in procedures within the scope of the physiologic.

However, under occlusion of nerve stimulus, such as occurs under anatomic disrelation in the human organism, cohesion and the maintenance thereof is so reduced that assimilation is greatly lessened, and disintegration is greatly increased, and depuration and elimination are greatly decreased, resulting in morbid accumulation, or in other words, in pathologic process. This morbid accumulation may become so excessive as to establish a necessity for germ life to aid in its disintegration, if animation of the organism is to be maintained, in which event that germ life is produced if the elevation, heat, and moisture are right for it, otherwise not.

Such a situation is very familiar in the vegetable world. There is nothing more familiar to the observer than the fact that certain parasites are known to originate in the morbid accumulations upon the surfaces of jellies, etc., and the morbid accumulations within the body are not essentially different in germ propagation from these.

In this connection it must be remembered that all advocates of the germ theory of causation of disease recognize the fact, that certain preparatory steps must have been taken in the organism or the germs of a particular type could not live in it, in the first place, and could not produce the symptoms of such so-called disease in it in the second place.

The author received the first official recognition of any Chiropractor in the world when the first Governor of

Oklahoma, the Hon. Charles N. Haskell, appointed him a delegate to the International Congress on Tuberculosis held in Washington, D. C., in 1908, in which congress every nation of the world of any importance was represented by what was considered a celebrated authority on the theory of germ causation of pulmonary tuberculosis.

Each paper read at The Congress on Tuberculosis introduced itself in substantially these words, "Of course, there must be a recipient condition of the tissues of the body before the tubercle germ can occupy it, and produce the symptoms which are called tuberculosis." This is not assumed as a quotation, but is substantially what was said on the subject.

Now, what is this recipient condition that each speaker or writer referred to? Of course, he did not know. He would have classified it as a certain negative condition, and then if he had been called upon to explain what he meant by a certain negative condition, he would have found himself unable to explain.

The condition referred to as a recipient one is that phase of process found in an organism where there is occlusion of stimulus, and lessened assimilation, increased disintegration, decreased depuration and elimination, so that there are areas of morbid accumulation of sufficient amount to make it necessary for germ assistance in disintegration and neutralization.

When such conditions occur germs evolve into being, and the germ evolved is peculiar to the type of morbidity which invites its existence, and this accounts for the many phases of germ life that have been isolated by the therapeutic investigators, such as the pneumococcus, gonococcus, etc.

But let the theory be followed a bit further in order that its impossibilities may appear. There are just three ways that germs occupying the body of a person could be transmitted to the body of another person for the supposed purpose of causing a disease to take place in his body. The first of these is called inoculation and is discussed in the next chapter. The second is through the respiratory system and the third through the digestive system.

Germs taken through the respiratory system would have to pass with the air into the lungs and would have to go through the winking valves of the air cells of the lungs, into the intertubular spaces, and thence through the winking valves of the pulmonary capillaries into the blood, and finally be extruded from the blood in its plasma or lymph, through the winking valves of the systemic capillaries, before they would reach an area, where a feeding and breeding ground for them could be established.

The transmission of germs in the way described seems so perfectly and utterly impossible as to need no further refutation than the simple statement of the process which has just been made. For it is well-known that exposure to air, light, and physiologic liquids is all that is necessary to destroy such germ life at any time, and in any event.

Germs that would enter the body through the alimentary canal would have to resist the influences of light and air before ingestion, and then all of the refinements of digestion, and pass with the lymph through the infinitesimal apertures of the absorbents and thence into the blood, and with it through all of the trying influences of aeration in the lungs, and finally reach extrusion through the winking valves of the systemic capillaries, which would bring them into the same place and to the same surroundings as those that came by the way of respiration, for the establishment of a breeding and feeding ground.

It will be seen that the advent of such germs through the intricacies of this system would be just as difficult as those that came by way of respiration, and, therefore, the proposition of their entrance by this route is just as completely refuted.

In the theory of the transmission of eggs of the various characters of germs, it will be seen that the eggs would have to come through the same channels, which it must be seen would destroy them as such, for they would have to be exposed to light and air, and there would be such inhospitable, physiologic chemistry without the necessary congenial morbidity to their existence and such normal surroundings as would render their preservation impossible.

However, passing by all of these apparently impossible propositions to the establishment of the theory of germ causation of disease, it must be seen that the germs in the one case, and the eggs in the other, after having been extruded through the winking valves of the systemic capillaries into the spaces of the body, would have to land by accident in a stased area, that is to say, where there was morbid accumulation of the exact character for their propagation and maintenance, for otherwise they would be swept on through the spaces of the body by the depuratory processes, and finally into the open channels of the body, to either undergo further danger from anatomic structure and physiologic process, or else to be eliminated from the body.

Sufficient has been said to make it clearly appear, in order that the theory of causation of disease by germs may be maintained, that the germs must finally meet with the same conditions in the body before they can be maintained, that are necessary to the evolvement of such germs in the first place, and, therefore, all of the roundabout story is entirely unnecessary except as an apology for the theory of transmission of disease from one to another.

However, since the theory of germ causation of disease rests upon the fact of accumulated morbidity, or a recipient condition, all of the other phases may well be cast aside, and we may at once accept the proposition which is overwhelmingly proven, that when pathologic conditions have risen to sufficient gravity, and there is sufficient accumulation of morbid matter, then germ life evolves into existence, to aid in the disintegration and neutralization of such morbid accumulation.

The proposition stated in the last paragraph has this remarkable thing to sustain it, that it is overwhelmingly demonstrated to be true, and is continually occurring in the very presence of the human family all of the time. It is provable, while the theory of transmission of disease germs from one to another has never been proved, and there is nothing to indicate that it ever will be.

Incident to the evolvement of germ life or its maintenance there must be morbidity, and in order that there shall be morbid accumulations, there must have been occluded stimulus, increased disintegration with lessened depuration until by the process of stasis the feeding and breeding ground is produced.

From what has been said it will be observed that every phase of abnormality, therapeutically classed as a germ disease, must in its first phase be simply abnormality caused by occlusion of nerve stimulus, which has produced a stasis or stases in which sufficient morbidity has accumulated for the evolvement of germs, or to conform to the theory of therapy, the hatching of germs or the production of activity of embryo germs.

From what has been stated the student will be prepared for the proposition that in the multitude of germs, which may occur as incident to the human organism, there are but two distinct kinds: (1) scavenger germs, and (2) germs of prey.

Scavenger germs are that character of germ that evolves in morbid substance for the express purpose of aiding in the disintegration and neutralization of its toxins, which process in large part is accomplished by transmutation of morbid matter through germ animation into its original elements, so that new elaborations may occur conformed to the consistence of normal formulae.

Scavenger germs have no power to encroach upon normal tissue, but come into being and activity only where there is morbidity, and are destined to live only so long as the morbidity lasts, when they must, for lack of sustenance, pass out of existence with the passage of the incidents that called them into being.

It will be seen that the scavenger germs include all of the germs so far isolated by therapy as being the cause of certain so-called diseases, including such germs, therefore, as the gonococcus, pneumococcus, tubercular germs, etc.

Therapy talks about germs that cause smallpox, measles, malaria, typhoid fever, meningitis, diphtheria, etc., and incident to the morbid process in any of these phases there are germs, and these are always the character of germs that have been pointed out particularly as being scavengers, and, therefore, cleansers of the body instead of disease causers. And therapy has wholly failed to produce a scintilla of proof that germs cause such so-called diseases.

Germs of prey are those that have the capacity to attack and encroach upon the animate tissues of the body.

There are many kinds of germs of prey that under certain phases of process are found in the body. The so-called trichina spiralis and the seat worm are of that character.

Germs of prey will receive proper attention in the right place in Symptomology in this work.

It is sufficient in passing at this place to suggest to the student that in his investigations of germ life in the human body he must be very careful not to confuse germs of prey with scavenger germs.

CHAPTER XX

INOCULATION—RELATION TO CONTAGION

The word inoculation, as used in therapy, means the injection into an organism of a specific pus, virus, serum, or other form of toxin for the purpose of securing certain specific effects. The word itself simply means "to inject into."

The therapeutic theory of inoculation of virus, or injection of serum, is to create a specific poisoning of the organism, thereby causing it to react upon the poison, and in its reaction to produce the symptoms of the disease which it is conceived is caused by that poison, thereby rendering the organism immune from that disease.

The theory presented in the last paragraph is indeed a strange and bizarre one. It presents the remarkable mental fallacy that it is advantageous to make a well person sick in order that the person made sick shall thereafter remain well.

The theory of immunity, as a result of poisoning of an organism in the manner suggested, forms the basis for all vaccination and serum injections, which just at this time have taken such an extensive hold upon the minds of the people; indeed, have become a fad of very extensive adoption with great injury to the human family, to say nothing of domestic animals, with the proof all of the time against immunity obtained in this way.

In order to understand the theory of contagion, the proposition must here be definitely analyzed. The crassest advocate of contagion will admit that the disease, as he calls it, cannot be transmitted to a person in whose body there is no preparation or recipient condition.

The only preparation that renders an organism hospitable to any phase of abnormality is the accumulation within it of morbidity, or poison of the characteristic type which is necessary to the functional phases which occur as incident to the so-called disease.

Of course, the therapeutic theory of vaccination and serum injection is, that the poison inoculated will neutralize the poisoned condition, and in that general process, in some mysterious way which no author has sought to explain, will render the organism immune to that character of toxin.

This theory is a wonderfully ingenious one, and would be of great value to the human family if it would work, or if the slightest evidence could be produced to prove that the theory is correct or that it had ever demonstrated. But the difficulty about it is, that the evidence disproving it is overwhelming.

Contagion, then, is based upon the proposition that if an individual who has produced a negativity in his organism to a certain character of poisoning by the retention of the same kind of poison will, upon coming in contact with one having that so-called disease, be sufficiently poisoned to produce that disease in his organism.

It must be observed by the most casual thinker that such a possibility or contingency is indeed very remote.

It is very well known that an organism is not susceptible to poisoning from such mild toxins as emanate from the earth, or are contained in the air, except when its chemistry has been rendered very negative by long continued adverse process and tissue injury incident to erroneous living until not only chronically abnormal tissues have been produced, but, of course, chronically adverse processes have been definitely expressed.

From what has been said it will be seen that it is not difficult to so live, and indeed it is usual for people to live so abnormally that they produce such negativity, such abnormal chemistry in their bodies, that resistance is frequently overcome by the combined toxic influence of the emanations from both the earth and air, to such extent that very grave and extensive epidemics result.

But in this connection it must be remembered that epidemics are the result of general influences incident to chronic abnormality, and that they argue very strongly in favor of the production of abnormal process called disease, within the bodies of many people in a given area, but at the same time argue very strongly against the possibility of so-called contagion.

It must be remembered that the theory of contagion is that any human being who comes in contact with another suffering from a so-called contagious disease, immediately becomes inoculated, and must at a given time, the end of the period of incubation, respond to the various symptoms of that so-called disease. The proof that no such thing takes place in the human family is overwhelming. Witness four children of a family all living alike:

there is an epidemic of measles, two of the children show the process, the other two remain well; where is the contagion?

As a scientific proposition the author feels called upon to state in this connection that it might be possible for a body to be so fully occupied and dominated by adverse chemistry as to not only render it subject to adverse processes as incident to atmospheric toxins or those emanating from the earth, but also to render it subject to adverse functional expression by toxins arising from the body of one undergoing functional abnormality, and yet he wishes it distinctly understood that this is in no sense an admission of the possibility of contagion. Indeed, it establishes the contrary fact.

The remarkable situation in connection with the statement in the last paragraph is that a person so abnormal, coming in contact with one suffering some aggravated phase of disease, frequently takes sick, but presents symptoms altogether out of harmony with those of the sick person.

For instance, in illustration of the last paragraph, it is not at all uncommon for a person gravely abnormal, and, therefore, containing much abnormal chemistry, upon being confined for much time with those said to have typhoid fever, to take sick with a symptomatic process peculiarly like that called pneumonia, or even so-called smallpox, measles, diphtheria, or the like, all of which proves that inoculation is a fact, but that contagion is not.

One of the things that is better known than any other by the human family is the possibility of the transmission of morbidity or toxin from one individual to another. This has been learned by the specific poisons that occur as incident to venereal abnormality. But in this particular relation it is also definitely known that such poisons can only be transmitted by transmission of the morbid substances from one organism to the other, and the further fact that in the transmission of such toxins there must be actual inoculation. That is to say, the pus or virus from one organism must actually be forced into the economy of the other organism, or the poisoning does not take place.

In connection with the transmission of morbidity as stated in the preceding paragraph, it must also be remembered that inoculation of such morbidity or pus will not produce the phase of venereal process in the organism unless there is chronic abnormality or negative chemistry, which is invitatory thereto in the vaccinated organism.

One of the remarkable things incident to the transmission of morbidity from one individual to another is the fact that it is not necessary that there shall be any germs in the morbidity that is transmitted in order that the poison thus transmitted will proceed to join with the poisons already in that organism, and thus overcome its resistance, precipitating a shock-like effect, resulting in functional reaction to the neutralization of the poisons indicated, or to the demonstration that the tissue has not enough resistance to undergo such reaction.

Vaccine, such as is used for vaccination purposes, does not contain germs, but is a specific virus, and it does not "work" in those persons who have sufficient resistance to present no invitation to such morbidity, but it is in those who present a combining morbidity that the effects of the vaccine and toxin are sufficient to overcome resistance.

It must also be remembered that serums are not cultures and do not contain germs, but are simply compounds produced from morbidity, and produced through a process of germ production and destruction, and when such serums are inoculated into the body of one recipient thereto, there is a combination of the serum with the morbidity of that organism, which results in functional reaction. If there is no recipiency, there will be no combination and, therefore, no noticeable effect.

Sufficient has been said herein to make it perfectly clear that inoculation of poisons from one organism to another may result in the production, in that organism, of a functional reactive process of a particular type. Even in this proposition it must be remembered that the character of adverse process produced will vary according to the morbidity accumulated and retained in the organism, and that no two individuals inoculated by the same virus will functionally react to the production of the same symptoms.

The propositions herein stated are only intended to give emphasis to the doctrine of inoculation as a scientific fact, and to indicate the unproven situation of contagion, and to explain how entirely impossible such a thing is.

It must be admitted that under the most pronouncedly adverse situations when an organism has gone on accumulating poisons until it is upon the verge of giving way thereto, it might be overcome by being brought in contact with any kind of toxin, whether the same emanated from a sick person or some other source, but this fact does not establish contagion, even though the phase of process produced is similar to that of the person with whom the organism has been brought in contact, but is only proof that the organism in question has finally accumulated enough toxin to produce that character of expression from functional reaction upon the poison.

The student is cautioned to give careful attention to the subject of vaccination and serum injections, and to scrutinize with much care all statements in connection with contagion, and, if he will do so, he will be able to accumulate overwhelming proof that contagion *per se* is not a fact, and not only that, but is an impossibility.

Finally when all other facts that tend to disprove the possibility of contagion have been considered and accepted or rejected, let the student ask himself this question. Where did the first person who ever had a so-called contagious disease catch it? Whom did he catch it from? How was he exposed? And the answer will resolve the whole matter. For the answer must be that he could not have been exposed to it, therefore could not have "caught it" anywhere, but just accumulated the poison in his own body that finally reacted upon it to the production of the adverse process.

Part Three

RELATOLOGY, WITH TISSUE ANALYSIS, POSEOLOGY AND THE ART OF RELATING, FULLY DEMONSTRATED

TERMINOLOGY OF UNIVERSAL DIRECTIONAL APPLICATION

CARDINAL DIRECTIONS

- HEADWARD
- FEETWARD
- DORSAL
- VENTRAL
- MEDIAL
- LATERAL

SIMPLE COMBINATIONS

- Head—Ventral
- Head—Dorsal
- Feet—Ventral
- Feet—Dorsal
- Ventro—Headward
- Ventro—Feetward
- Dorso—Headward
- Dorso—Feetward
- Latero—Headward
- Latero—Feetward
- Medio—Headward
- Medio—Feetward

COMPLEX COMBINATIONS

- Head—Ventro—Lateral
- Head—Ventro—Medial
- Head—Dorso—Lateral
- Head—Dorso—Medial
- Feet—Ventro—Lateral
- Feet—Ventro—Medial
- Feet—Dorso—Lateral
- Feet—Dorso—Medial

CHAPTER XXI

ANALYSIS OF TISSUE

From the embryonic part of the impregnated ovum all of the different characters of tissue finally result. The phases of this accomplishment will be discussed at some length in the next chapter.

Tissues are divided for our consideration into several classes, more for convenience than anything else. In dividing tissues into these classes the primary things considered are size, shape, location, relation, and use or function.

As a primary consideration, of course all tissues are connective. The other names given to tissue are in addition to connective tissue, and are given to help distinguish for individualizing and descriptive purposes, and not with the intention of having the student forget that a particular tissue still remains connective, although given another name.

The splanchnic cavity contains that tissue to which is given the general name of viscera. Anatomists have not given it other classification names, but by inclusiveness of terms it has been included in the several tissue classifications. Viscera are composed primarily of connective tissues which are capable of being separated into many of the other classification names.

The respiratory system is composed of cartilage, membrane, muscle, grandular substances, and the parenchyma referred to generally as lung substance proper.

The alimentary canal is composed of muscle, membrane, and glandular substance. It is attached to the wall of the body by structures termed ligaments, and the parts of it are related and attached to each other by membrane, some aspects of which are termed ligaments.

The pelvic viscera, aside from the alimentary canal, which in the female comprehends the ovaries and their ligaments, uterus and its appendages, vagina, bladder, ureters, and urethra, and in the male the vas deferens, seminal vesicles, ejaculatory ducts, prostrate gland, bladder and urethra, which are attached to each other respectively, and to the abdominal wall by ligaments and muscular structures.

The female pelvic organs referred to in the preceding paragraph are composed of muscles and membranes, with a rich interlacement of nerves and grandular structures, and this is true also of the male pelvic viscera. The lymph and blood vascular systems, which occupy the viscera mentioned in the preceding paragraph, are composed of tubes, the walls of which are muscular and membranous, and are attached in many ways to the organs and parts in which they ramify, and to the walls of the cavities in which the viscera are placed.

It must not be overlooked that the tissue comprising each of the classes of viscera described is nothing more nor less than connective tissue.

The brain and nerve system, in a specific way of speaking, are not attached to any other character of tissue.

They are simply related to other structures, but are not attached. If it were not for the tortuousness of the nerve trunks and nerves, the brain and nerve system could be lifted out of the body without the necessity of tearing it loose from any other structure.

Nerves and their accompanying ganglia of course occupy the viscera that have been already discussed, and while they are not attached to the viscera they are nevertheless a connective tissue within it, and in that sense a part of it.

The brain is in every respect a connective tissue, its general organization not being very different from a large gland. The cortex of the brain everywhere covers its medullary center. The medullary center is a trabeculated sustentacular or supporting substance. The structures of the brain that correspond to ligaments and membranes give it form and hold it in shape. This structure is not inanalogous to the general arrangement, for example, of the liver. However, it must be remembered that nothing that is attached to the brain is in any way related to the framework of the body.

There are several structures that because of their marked prominence in skeletal construction are specifically referred to as the connective tissues of the body, and while studying these the student must keep in mind what has already been said with respect to connective tissues in the former paragraphs in this chapter.

The most definite connective tissues of the body are classified in three groups: (1) *fibrous connective tissue,* (2) *cartilage,* (3) *bone.*

FIBROUS CONNECTIVE TISSUE

The most active and refined form of fibrous connective tissue is that called muscle. Muscle is the tissue that connects fascia or aponeuroses of origin, to tendons, fascia, and aponeuroses of insertion.

It will be seen that muscle does not attach to bones, but simply connects denser connective tissue structures at different parts of the body.

Muscle connective tissue is that character of structure which has the quality under nerve stimulus of contracting; that is to say, reducing its length by increasing its circumference at certain areas. It consists of bundles of red, yellow, and white fibers said to be basicly composed of cells.

Any fibrous connective tissue of either color mentioned which has the capacity of shortening and thickening in the conduct called contraction, and when released of returning to its original length and size is muscle tissue. Muscle fibers are inclosed in a web called internal perimysium. The fibers lay parallel to each other and are surrounded by a sheath of areolar tissue or membrane which is called external perimysium. A bundle of fibers so arranged is called a fasciculus.

A muscle cell is inclosed in a sheath called sarcolemma. They are said to be short, never exceeding an inch and a half in length and terminate either by being connected to neighboring cells by means of sarcolemma or to tendons or aponeuroses at the ends of muscles.

Red muscle tissue is described as being striped and unstriped. There has been an endeavor on the part of anatomists and physiologists to show that these structures are named as voluntary and involuntary. There is signal failure, however, to accomplish this result, for it is found that both characters of muscle tissue exhibit phases that would be called voluntary and involuntary.

In the first place, there is not a muscle in the human organism that is clearly voluntary. Of course, certain muscles are capable of being brought to a very high state of education. That is to say, human beings can learn, through the nerves that ramify certain muscles to control those muscles very definitely, and I think it would not be argued that to come within the sense of being voluntary a muscle would have to be capable of being brought under complete control.

There is no muscle in the body that is wholly uncontrollable. All muscles of the organism respond more or less to volition. However, there are many muscles in the organism that may not be brought under any very definite volitional control.

All muscle tissue of no matter what color that has to do with maintaining vital function is incapable of being brought under any considerable discipline, not because volitional control of such muscle structure is impossible, but because intuition renders the mind incapable of persisting in an endeavor to control such structures. For instance, the heart muscle is one of these. There is no doubt that an individual has the capacity to stop the heart by volition. This is proved, because it is stopped many times as a result of sudden fear. However, the individual will find that intuitively he will not persist in an endeavor to stop the heart, even though he may desire to commit suicide.

There is still another proof that the heart muscle can be controlled volitionally, which is found in the fact that we are all capable of steadying the action of the heart by mental control. Nothing is so common to the doctor as the art of securing his patients to observe this power, and he continuously exercises this art in the presence of his patients to their benefit.

I am quite sure that any person who will reflect upon this matter for a few moments will recall many times when he has checked and steadied his heart's wild beating in the presence of a great fear or some other emergency. No illustration could be more common than that of the bashful swain stilling his heart in the sudden presence of his lady love. These illustrations prove that even the heart muscles are volitional to the extent that we can exercise mental control of them.

Muscles are so attached to the skeletal frame as to hold in equilibrium and in proper relation all parts of the osseous and soft tissue body, and are so arranged as to move all parts of the body.

The vertebral column is the axis of all muscular attachment, and the muscles are so arranged in relation with it that the position of the vertebral column exercises a muscular control of the attitude of all parts of the body, and in turn any part of the body exercises a muscular influence upon the vertebral column which influences it.

The co-ordinants in equilibrium, in opponent, and accessory resistance form a very complex and valuable study, the basis for which will be found in a careful knowledge of the human organism, together with an understanding of the geometry of the conduct of mechanical structures, and the laws of physics applied to the organism.

CHAPTER XXII

WHITE AND YELLOW MUSCLE

White and yellow muscle tissue enter into the formation of the fasciae, ligaments, tendons, aponeuroses, and areolar tissue.

It will seem just a little strange to those who have studied anatomy, in the ordinary sense of that term, and in the therapeutic schools, to think of discussing white and yellow muscle; for, of course, the teaching of such books and in such institutions is that muscle is red. However, the proposition laid down in the preceding chapter must govern, and any tissue that has the quality of shortening and thickening, and when tension is removed of returning to its original length, and performs this conduct to move relative parts to which it is attached, is muscle, no matter what its color.

The anatomists describe fascia as being superficial and deep. This description is not very satisfactory to the student, because it does not lead far in any definite direction. It should be explained that what is meant by superficial fascia is that a layer of white, dense membrane which lies under the skin to which it is attached by the subcutaneous areolar tissue, and which attaches the skin in a loose manner to the deep structures of the body.

In this connection it should be remembered that the mucous and serous linings of the so-called cavities of the body, and the tubes of the body are attached to the muscular and membranous walls thereof in the same general manner.

Deep fascia is attached in various manners, that is, by spicula, laminae, etc., to the superficial fascia. It consists of shining fibers arranged parallel to each other, connected by cross fibers, thus forming a dense reticular structure which has very little contractility, and is not readily distended by traction.

Deep fascia binds down by a peculiar investment the muscles of each region, and gives a separate sheath to each muscle. The student will understand that the epimysium, perimysium, and endomysium, which enter into the basic arrangement of muscle tissue, are a part of the deep fascia.

It will also be seen that deep fascia enters into the formation of aponeuroses and tendons. Where great strength with rigidity is required of the muscle area there is considerable aggregation of deep fascia, such, for instance, as the lateral, headward, two-thirds of the thigh, which is called the fascia lata.

Aponeuroses are flattened tissues of pearly white color, similar in structure to ligaments and tendons. They are connected on one hand with muscles, and on the other with movable structures, such as bone, cartilage, ligaments, fibrous membrane, including synovial membrane and other tissues.

White fibrous tissue, which has been described as superficial and deep fascia, serves (1) to bind bones together in the form of ligaments, (2) to connect muscles to bones and other structures in the form of tendons and aponeuroses, (3) in the form of membrane such as has already been described to furnish protection and investment to the various organs and structures of the body, and (4) to bind muscles down and together where solidity as a basis for the expression of great strength is required.

The three divisions of fibrous connective tissue have already been indicated. They are (1) red muscle tissue, (2) white muscle tissue, (3) yellow muscle tissue. It will be observed that (1) and (2) of these have been discussed. We now turn to a discussion of the yellow muscle tissue.

In order to fully understand the differences that exist between these three characters of structure, it must be understood that their differences lie in the ratio of white and yellow fibers contained in the mesh of their formation.

In red muscle tissue there is a comparatively very small amount of white and yellow muscle fibers. However, both are present to some extent. In the somatic muscles the white fibers greatly predominate over the yellow, while in the muscles of the viscera the yellow fibers are a great deal more numerous.

White muscle tissue does not wholly exist by itself as such, but is that white structure, which has been quite extensively discussed, which is in juxtaposition with red muscle and acts with the red muscle. It contains some red fibers, but the white fibers are greatly in excess of both the red and yellow. However, it contains both of these.

The yellow muscle consists peculiarly and much more extensively of yellow fibers than the others, and yet it contains some red fibers, and always contains a large number of white fibers. But it is named from its characteristic yellow appearance from the excess of yellow fibers in its structure.

Yellow muscle tissue acts immediately in conjunction with the red and white structure. It serves a very important purpose where a greater yielding in all directions is required than could be accomplished by either of the other structures, because of the great contractility of the red, and the rigidity of the white.

The yellow structure under discussion appears in two characters, one of which merges from muscular conduct, to an elastic quality which consists in an ability to extend to greater than a given length, and when tension is removed of returning to the original length. Because of this character of the yellow structure its other classifications must be here discussed.

Yellow connective tissue, in addition to its muscular quality, is still further divided into (1) yellow elastic, and (2) areolar tissue.

Yellow elastic tissue is possessed of a great ability to extend, and when traction is removed to return to its normal length. Because of this remarkable ability, which as will be seen, is directly opposed to red muscular conduct or function, it is placed at such parts of the body as to opponent the conduct of muscle, or the red and white structures.

Yellow elastic tissue is, therefore, found in the ligamenta subflava, vocal cords, the longitudinal coat of the trachea and bronchial tubes, the inner coats of blood vessels, and at many other places.

It is important that the student of Chiropractic carefully observes the conduct of the ligamenta subflava. These structures, as will be remembered, connect the laminae of vertebrae closing the dorsal aspect of the neural canal. When the vertebral column is flexed each ligamentum is extended, and when muscular tension is released each ligamentum returns the laminae to which it is attached to original relation, thus acting as a direct opponent to the muscles of flexion, and also to securing and maintaining exact relationship of the laminae.

The conduct of yellow elastic tissue in other parts may be left to the fertility of the student to understand. It will, therefore, be passed with this statement: that yellow muscle and yellow elastic tissue are capable of the most profound fixation under abnormality, and, therefore, the student should carefully search out all of the yellow structures, and not only understand their normal conduct, but understand their mechanical effects when constricted or fixed.

Areolar tissue is given its name because its white and yellow fibers are loosely placed together in a reticulated arrangement, so that their meshes are easily distended. It is because of this fact that it is sometimes called cellular membrane.

The chief use of areolar tissue is to bind parts together loosely so that they may easily move in relation with each other. It is the tissue chosen because of its loose and easily movable structure for the general extension of nerves and vessels of liquid movement; that is to say, lymph and blood.

Areolar tissue has the most extensive disposition of any especially charactered tissue in the body, and is distributed so widely, because it is the special tissue of nerve trunk and vascular ramification. It must be understood that areolar tissue really permeates all other structures.

On account of the looseness of the mesh of areolar tissue, it is subjected in many parts of the body, and in some persons indeed in nearly all parts of the body, to a peculiar loading with a composition called adipose.

It has been announced by physiologists that adipose tissue is distributed to almost all parts of the body. This statement is a little aside from the fact. There is a refined, oily matter, usually called fat, that is distributed as widely as is areolar tissue, being found even in the brain and the structure of the heart. This substance is not, strictly speaking, adipose tissue, but is for the purpose of accomplishing the necessary function of lubrication to very active parts.

Adipose tissue, however, is widely distributed in all persons who are normal. Its purpose is to give rotundity to the body, serve as cushions for nerves and other delicate structures, and in this sense to act as a protection as well as a reservoir for immediate nutrient supply to vital centers in emergency.

A normal organism has a proper distribution of oily or fatty matters, and a small amount of adipose tissue. This structure, however, in some individuals is very abundant. When it thus occurs it is always a badge of abnormality, and indicates a phase of abnormality of the liver and kidneys. Persons having it are subjects of voracious and undisciplined appetite.

In a differential way, white and yellow connective tissue is still further presented in the form of what is called lymphoid tissue and basement membrane.

Lymphoid tissue is generally referred to as mucoid. It consists of nucleated cells which become connected so as to form trabaculae, in which is contained a jelly-like protoplasm containing mucin and albumen.

Mucin is a substance of which the umbilical cord is formed; also the pulp of young teeth, and the vitreous humor of the eye. Mucin is the basic form of structure, through which all connective tissues evolve in the process of becoming differentiated structures.

Lymphoid structures compose the retiform basis in which a large amount of glandular tissue is arranged. And in this sense, while it is not areolar tissue, it is a very important component of it.

Another form of lymphoid tissue is called adenoid. This is a tissue formed of fine fibrils containing stellate cells, the interspaces being filled with corpuscles. This structure is best illustrated in the neuroglia that invests and insulates nerves as distinguished from nerve trunks. It is found throughout the entire nerve system.

Adenoid tissue is also found aggregated in many parts of the body where its congestion, by interference with nerve stimulus, results in what is called adenoid growths. These are generally referred to as of the tonsillar ring of the throat or pharynx. However, these structures occur widely throughout the body.

Basement membranes are those structures which support epithelia of the various parts of the body. Their differentiation from epithelia is the denseness and closeness of apposition of their cells. These structures have been fully discussed in Psycho-Bio-Physiology.

In the cells of all classes of connective tissue, which really includes all tissue, there is a certain amount of coloring matter deposited, which gives to the different structures their various shades. If it were not for this fact the tissue of the body would be colorless.

The coloring matter referred to is called pigment. This substance is found in varying amounts in the cells of all the tissues of the body except the refracting media of the eyes, and the external layer of cuticle. It is also found in the corpuscles of the lymph and blood.

CHAPTER XXIII

CARTILAGE AND BONE

The fibrous connective tissues of the body have all been considered briefly with the exception of cartilage and bone. That is to say, by general reference connective tissues have been discussed from the formative structure, mucin, up through the differentiations to brain and nerve structure, and then the grosser tissue such as muscle, fascia, membrane, ligament, and tendon.

The tissues now to be discussed are the densest and most rigid to be found in the body. They are the structures used where solidity and direct resistance to either distension or compression is required.

Cartilage and bone are a development from the primitive phases of tissue construction. They are, therefore, a final development from mucin. The thing that gives them permanence from the tissue standpoint is their extreme differentiations from the so-called soft tissues of the body.

CARTILAGE

Cartilage is a peculiar form of lymph vascular connective structure found in various parts of the body, but in the adult is chiefly found in, or in relation with, the joints of the skeletal frame.

In the earlier existence of the individual cartilage is found in many parts of the body. Indeed, it is the structure from which all the bones are formed.

Cartilage is found in the trachea and other air passages, including the nostrils, and in all of the tubes of the body which are intended to be kept permanently patent or open.

The student must remember that in the formative period each part of the entire skeletal frame is at one time cartilage, in the process of development from a softer and more delicate structure.

Cartilage is divided into two grand subdivisions in post-uterine existence (1) temporary cartilage, and (2) permanent cartilage.

Temporary cartilage comprises that character of structure in the matrix of the cells of which ossific granules continue to deposit until the structure is classified as being bone. There is much of this character of cartilage.

Of course, the student will understand that this classification of cartilage only comprises those structures which by normal operation ossify, for he is to learn that under abnormal process many permanent cartilages calcify, and seem in that condition like bone.

Permanent cartilage is that character of dense, compact structure which is so constructed that ossific granules only deposit within the matrix of its cells sufficiently to give it density and firm resistance, and there the process of ossification ceases.

Under the subdivisions of cartilage we will first consider those of a permanent nature. Temporary cartilage will be considered under the next subtitle.

Permanent cartilage is considered under three distinct heads (1) hyaline cartilage, (2) fibro-cartilage, (3) yellow elastic cartilage.

Hyaline cartilage is a peculiarly refined structure, and is the highest type of permanent cartilage. It consists of a gristly mass of firm consistence. It is of a pearly-bluish color, and has considerable elasticity.

Wherever hyaline cartilage is found it is covered by a peculiar, refined, tough membrane called perichondrium, except on the articular ends of bones. It is under this membrane that lymph vessels ramify the substance of the cartilage carrying to its cellular structure nutritive elements.

Hyaline cartilage is principally found on the articular surface of bones where movement with the least friction is required, and at places on the ends of bones, or near the ends of bones, where marked flexuousness is required.

Hyaline cartilage is a structure found in the embryo where bones are to be formed. It will be seen, therefore, that it only becomes a permanent cartilage during extra-uterine existence.

During the existence of the individual after birth hyaline cartilage is found composing the framework of the nose, larynx, trachea, bronchial tubes, symphyses, epiphyses, and costal cartilages. While this form of cartilage is very yielding within a certain scope, it is the most resistant of any soft tissue.

Hyaline cartilage is peculiarly subject to the abnormal process called calcification. In such phases of abnormality it very readily retains the solids of lime and urates, and other residuary substances of similar character in the matrix of its cells.

Calcification is very frequent in the trachea and the costal cartilages. In the artificial and adverse methods of living at the present time it is the rule that by middle life costal cartilages have become quite rigid from this adverse process, while the tissues of the larynx will have become sufficiently rigid to somewhat interrupt or change the voice.

Fibro-cartilage consists of a mixture of small white fibers with cellular structure, in the matrix of the cells of which there is a considerable ossific deposit. Of course, the amounts of this deposit determine the rigidity of the cartilage.

The flexibility and toughness of fibro-cartilage is from the quality of the white fibers that compose it, and it derives its rigidity from the amount of ossific granules that have been deposited in its cells.

Fibro-cartilage is discussed in four groups, which are designated principally from the function performed at the various places where it is found. These are (1) interarticular, (2) connecting, (3) circumferential, (4) stratiform.

Interarticular cartilage is so called because it occupies a position between the joints. It occurs with some idiosyncrasy at several places in the body, but is uniform and reaches its most complete illustration at the wrist, between the joints connecting the cartilage with the ulna upon the one hand, and with the carpus on the other.

It will be seen that the cartilage is between these two joints.

Connecting cartilage is dense and fibrous, and its function is to connect bones between which there is little movement, such for instance as the sutures of the skull.

Circumferential cartilage is dense and fibrous, and is used to construct rim-like margins for several cavities, but reaches its highest illustration at the acetabulum, where it composes the wall of the socket for the occupancy of the head of the femur.

Stratiform cartilage is a dense, refined structure, and is so placed as to form a bedding in grooves of bones through which tendons and other structures are constructed to glide or slide; such as the tendons at the wrist.

Yellow elastic cartilage is the most flexible of all the cartilages, and yields the least readily to the abnormal process of calcification. Its peculiar quality is its ability to extend under tension, and return to its original length when tension is removed.

Yellow elastic cartilage is found in the walls of tubes where, to accommodate the necessities of function, a considerable extension is essential. These structures are particularly the epiglottis, exterior ear, Eustachian tubes, and the head-dorsal cartilages of the larynx.

BONE

Bone is the most rigid form of white connective tissue. It is the hardest and densest structure of the body, with the exception of the enamel of the teeth.

Ordinarily, one would not think so, but bone is possessed of great toughness and a certain amount of elasticity. Bones will stretch slightly, and are capable of a considerable compression. They are white externally, while internally they range all the way from light yellow to a deep red color, depending upon the character of liquid transportation through them.

Bone is classified as being composed of two characters of tissue (1) an outside, compact texture similar to ivory, (2) an inside, loose alveolar structure resembling a lattice work and called cancellous tissue.

The compact structure of bones forms their surfaces, and is therefore where great resistance and solidity is essential to their function.

Cancellous tissue forms the interior of bones, but is chiefly found within what is called the extremities of shaft-like bones.

The proportion of compact and cancellous bone structure varies much in different bones, and varies in different parts of the same bone, depending upon the functional necessity. Where density and strength is the essential the compact structure greatly predominates.

Bones are classified under four characters, which are not very clearly defined in many cases. These are (1) long bones, (2) short bones, (3) irregular bones, (4) flat bones. It will be observed that really these differentiations when analyzed result in two characters: (A) shaft-like, and (B) flat-like.

Shaft-like bones have a tube through their central part called the medullary cavity, which is occupied by an oily, lymphoid, colloid called marrow, the different characters of which are chiefly determined by the size and length of the bones.

Flat-like bones do not possess medullary cavities, but have cancellous interiors which, because of the fact that they are richly blood vascular, range in color all the way from pink to deep red. The red and pink interior of bones is called diploe, and there is frequently oil or fat in diploe.

Bones are supplied with very extensive lymph vascular systems and with blood vascular systems, but the shaft-like bones by comparison are not richly supplied with blood vascularity.

Conforming to the rule everywhere in tissue, nerves accompany the entire vascular systems, both lymph and blood, throughout the structure of bones.

All of the tissues of the body are composed of a certain ratio of animal and earthy parts; that is to say, all parts are produced from vegetable and animal structures, with certain elements from the mineral kingdom.

Bones present the largest per cent of mineral or earthy substances of any tissue of the body. They are said to be composed of about one-third animal matter and about two-thirds earthy or mineral matter.

The student will understand in connection with the last statement that the amounts of animal and earthy matter in bones greatly vary, and particularly in youth, developing bones being rich in animal substance, and in maturity varying remarkably with health or disease, and this phase continues far into old age.

It has been generally laid down that old bones are brittle because of excess mineral matter. This is not true if the person has lived a life of health.

Bones are formed by a process of ossification, which consists of a deposit of a peculiar granule in the matrix of a cell composed to receive and retain it. It is by this means that tissues of a softer character, which are termed temporary membrane and cartilage, are converted into bone.

From the standpoint of the last paragraph the student will observe that temporary cartilage in this view of the situation includes temporary membrane, and it will also be seen that temporary cartilages and membranes are only a transformed stage from actual soft tissue to a denser and denser tissue, by the continual deposit of ossific granules, until they finally become bone, but that the process we are here discussing is merely the culminating step in the production of bone.

The process of ossification is considered under two subdivisions, (1) intracartilaginous, and (2) intramembranous.

Intracartilaginous ossification is the deposit of ossific granules in the matrix of the cells of temporary cartilage, finally resulting in bone structure. The highest illustration of this form of ossification is found in the long bones of the body, while, of course, the short and irregular bones will come within the same classification.

Intramembranous ossification is accomplished by the deposit of ossific granules in the matrix of the cells of certain temporary membrane in the process of producing bone. This form of ossification reaches its highest illustration in the bones of the skull.

Bones form the rigid basis of the framework of the body, and considered from that standpoint are of the very greatest importance. They are the structures through the use of which all definite movement is made possible, by means of muscular attachment and conduct.

Shaft-like bones are hollow for two reasons: first, to give opportunity for the extension of nerves and vascular systems into the bone; and, second, to render the bones light, and give to them a greater elasticity as well as flexuousness.

Shaft-like bones are said to have two extremities. The one under immediate examination, called proximal, while the other is called distal. Such bones are curved, grooved, arched, and expanded for the purpose of giving opportunity for the origin and insertion of muscles, and applications thereof in order to have fulcrums or bases over which to pull as levers, and over which to act as guys for the purpose of restoring to the bone the direct strength lost by its curve, and to give to relative parts of the body definite movement and compensatory capacity.

All curves in normal bones are produced with relation to the line of gravitation; the curves and arches in the bones being compensated for by the application of fascia, muscles, ligaments, and tendons always presenting the greatest resistance to direct gravitation in proportion to the amount of tissue used.

Shaft-like bones are said to present articular extremities at their ends, except so-called terminal bones. Flat-like bones present margins and articular surfaces.

There are two hundred and six bones in the adult skeletal frame. These include the ossicles of the ear.

CHAPTER XXIV

ANATOMY OF JOINTS

What is said in this chapter is based upon the thought that the student has mastered anatomy of the tissues entering into the construction of the skeletal frame.

The skeletal frame is a very complex structure composed basicly of bone. The end, side or edge of a certain bone is in relation with the end, side or edge of another bone, thus constituting an articulation.

The statement last made is true of all the bones of the body, with the exception of the hyoid bone, and that class of bones denominated terminal bones. The hyoid bone is not in relation with any other bone, and the terminals are the end bones of the phalanges.

The places where bones are articulated with each other are, together with the tissues attaching them, called joints.

The tissues necessary to the construction of joints vary somewhat, depending upon the size, location, and use of the joint. Joints range all the way from those which have been classified as immovable, which it will be understood are those which admit of the slightest movement, to those that admit of the freest and most extensive movement.

In order that a joint may be formed some character of structure must be interposed between the articulating parts of bones. Such substances may be attached to the articular aspects of the bones directly, or they may be indirectly attached.

In addition to the substances that are between the bones there must be some form of connective tissue attaching the ends, edges, or sides of the articulating bones to each other. These are usually membrane, ligaments, and tendons, but there may also be cartilage.

Substances involved in the construction of joints are named in the order of their importance: Bone, hyaline cartilage, fibro-cartilage, ligament, tendon, and synovial membrane.

A few moments thought will make it clear to the student that not all of the substances named in the preceding paragraph are necessary to the construction of a joint, but that two or more of them is sufficient.

The two forms of substance that are essential to the joint are bone in every joint, and either membrane or cartilage.

The simplest joint that can be conceived is one that contains only bone and membrane, such for instance as the sutures of the skull; or present only bone and fibro-cartilage, such as the joints between the centra of vertebrae.

It will be seen that in the sense indicated from a tissue standpoint the least complex joints that are presented contain but two structures.

It must, however, be remembered in this connection that even in the sutures between the skull bones there is substance which may be called a ligament paste, for the want of a better term, that aids in the cohesion of the joint.

It must also be kept in mind that in the character of joint, such as those between the centra of vertebrae, there is also really an articular membrane that does not wholly lose its character. This is sometimes referred to as hyaline cartilage, and indeed that is what it was before its transition.

Within the fibro-cartilage pad of vertebral joints there is also found in many cases synovial membrane.

Joints such as the ones discussed are those classified as being immovable or those having the least movement. As other structures are added, the joints move with greater freedom.

When a joint is constructed for actual joint movement, the elements entering into its construction are bones, hyaline cartilage, synovial membrane, ligaments, and usually tendons.

In freely movable joints the articular extremities of bones are covered with a smooth, fine cushion of hyaline cartilage, relative to the apposition surfaces of which there is a sack composed of synovial membrane, thus forming what are called arthrodial joints. Ligaments, and usually tendons, also extend across the joint lengthwise of the bones, wholly inclosing the synovial membranous sack within the joint ligaments. Such joints move with greater or lesser freedom, depending upon the shape of the bones entering into them, and also the shape of the articulation thus composed.

The articular extremities of shaft-like bones are composed almost wholly of cancellous tissue, tipped with a thin plate of compact structure called articular lamella, and these articular lamellae are covered with hyaline cartilage lamellae.

The hyaline cartilage articular lamellae are of different shapes and thicknesses to meet with the requirements of the situation. If the weight to be borne by the articulation is in its center, the hyaline cartilage lamella is thick in the center and thin at the edges. If the greater weight is to be borne upon the edges of the surface, then the articular lamella is thickest at the circumferential margins and these differences occur incidentally if greater weight is to be borne at one or more areas of the articular surface.

LIGAMENTS

Ligament is a peculiar, tough, flexible, fibrous, connective tissue and is of two characters: (1) white ligament, and (2) yellow elastic ligament.

White ligaments are composed of bundles of fibrous connective tissue placed parallel with each other, or closely interlaced with each other, the whole presenting a white, shining aspect. The fibers of white ligament are in bundles or fasciculi and are held together by a sort of cement substance.

White ligaments are very pliant and flexible, allowing the most perfect movement within the scope of their extension. They are, however, composed of the most inextensible soft tissue known. White ligaments are used peculiarly in places where parts are to move freely within a limited scope, but when they have reached a certain distance are to be held with great firmness.

White ligaments are used to compose joints, and in such use either extend across the joint longitudinally or in annular bands around the joint, thus giving to the joint easy movement within a certain scope, but great resistance at that limit.

White ligament that is used to inclose the cavity between the joint ends of bones by attaching to both bones, is classified as capsular ligament.. White ligaments are flat, and occur in laminae or plates.

Tendons are not more than ligament presented in an almost cylindrical form. Tendons are used as attachments of white ligaments at the ends of muscles to aponeuroses or bones.

The most pronounced illustration of tendon in the human body is the tendon of Achilles, which extends from the gastrocnemius and soleus and is inserted in the lower dorsal part of the oscalcis.

Many of the long muscles have their insertion through and by means of tendons. These tendons generally extend through osseous grooves lined with stratiform, fibrocartilage, as at the wrist and ankle.

Yellow elastic ligaments are composed of yellow, elastic, connective tissue fibers, which have the remarkable quality of extension under traction and are capable of overcoming much resistance in returning to their original length.

Yellow elastic ligament, because of its remarkable capacity of returning to its original length when traction is removed, is an opponent to red muscle and aids in returning structures to their proper relationship following muscular tension. It reaches its highest illustration, as has been mentioned, between the laminae of vertebrae in the ligamentum subflavum.

MEMBRANES

Elsewhere in this work membrane has been discussed at some length incident to other structures. It is only necessary to say here that the membranes of the body are, generally speaking, for the purpose of investment of other structures. They are found investing fasciculi, muscles, ligaments, and tendons, and in constructing septa in tissue, etc.

The most definitely organized and distinctively important membranes of the body are: (1) mucous membrane, lining the tubes and cavities that are exposed to air, (2) serous membrane, lining tubes and cavities that are not exposed to air, and (3) synovial membrane.

Mucous membrane consists of a basement membrane of closely placed fibrous connective tissue upon which is an epithelia. This membrane lines the tubes of respiration and those of alimentation, also all tubes, the orifices of which open to the surface of the body either directly or indirectly.

Serous membrane lines the thorax, and is there called pleura and the pericardial sac as endopericardium, the heart as endocardium, and also lines the arteries, veins, capillaries, and lymph vessels; in this office having received no definite name.

Serous membrane lines the abdomen, and invests the abdominal viscera as peritoneum, and also lines all other closed cavities of the body, including the ventricles of the brain and cord and largely composes the meninges thereof.

Synovial membrane consists of a loose connective tissue containing a peculiar form of oily fat and is richly supplied with nerves and vessels of liquid transportation. It consists of a basement membrane of fibrous connective tissue upon which there are usually stratiform epithelia, the surface layer of which is composed of a single layer of flat cells joined together by synovial cement.

Synovial membrane is mostly used to compose the lining of joints within the capsular cavities. Synovial membrane is divided by its use into three classes (1) articular, (2) bursal, and (3) vaginal.

Articular synovial membrane is found in every freely movable joint. It is arranged within the joint cavity so as to form a sac arranged to keep synovin between the hyaline lamella of the extremities of the bones, between the joint elements in an interarticular joint or within fibro-cartilage pads.

In any event the synovial capsule of a joint is bound around with the white capsular ligament of the joint in which it is placed. The synovial membranous sac of a joint is attached by its outside surface to the complete joint cavity.

Synovial joint surfaces look toward each other through the synovin, a slightly yellowish liquid, which normally discharges from the synovial membrane in such quantity as to keep the joint cavity sufficiently lubricated to reduce friction of movement to the minimum.

Bursal synovial membrane is used to line sacs or capsules which are interposed between surfaces that move upon each other as between tendons or muscles that ply over bones, or under the integument where it moves over bones or cartilages.

Bursa are of two kinds: (A) subtendinous or submuscular, (B) subcutaneous. Subtendinous or submuscular bursa are those which are placed upon bones underneath tendons or muscles in order that the smooth, synovial surface of the capsule continually moistened by synovin shall reduce the friction of movement to the minimum, thus preventing cleavage in the tissues involved.

This character of bursa may be illustrated by the arrangement between the subscapularis and the neck of the scapula which communicates with the shoulder joint, and that beneath the tendon of the patella at the knee joint.

Subcutaneous bursa, as has been stated, are those that lie upon bones under the skin, the best illustration being that found between the integument and the ventral surface of the patella at the knee.

Vaginal synovial membrane is used to line stratiform fibro-cartilaginous grooves in the osseous grooves of the bones. The surface of such membrane placed toward the cartilage is closely related or attached to it.

It will be seen that such grooves form a smooth channel through which tendons may glide, moistened at all times with synovin so that the friction of movement will be reduced to the minimum.

In the normal process grooves that are lined with synovial membrane in the manner described permit of the insensible movement of the tendons without any apparent friction.

However, what is usually referred to as sprained wrist, sprained ankle, etc., are simply marked disturbances of tendons within such synovial grooves whereby inflammation is engendered, with cessation of the exudation of synovin to such an extent as to render the groove dry, the movement then being accomplished with great pain, or in the worst cases not at all.

It is because of the very close relationship of such grooves to the sliding tendons that cause such sprains to recover so slowly under ordinary care, which amounts to no care—that is, to wrap them up and let them remain idle.

Vaginal synovial membrane is placed in the grooves at the wrists and ankles, and the flexor and extensor grooves of the fingers and toes. There are some of these elsewhere, but those named are the principal grooves of this character.

Around the outside of synovial membrane in joints there is usually a certain amount of adipose tissue. This acts as a pad and filling to the joint interstices, and adapts itself readily to changes of shape during movement. These adipose accumulations are also a reservoir of emergency to joint lubrication in extreme activity.

CHAPTER XXV

TERMINOLOGY OF JOINTS

From the preceding analysis three characters of joints are isolated. They are (1) synarthrosis, (2) amphiarthrosis, (3) diarthrosis.

The construction and use of each of these characters of joints needs a somewhat detailed analysis at this place, and if the student will fix the same in his mind, he will find what is here said of great assistance to him in the application of the art of securing tissue relation.

SYNARTHROSIS

Synarthrosis is classified by anatomists as being an immovable joint. Of course, it will be seen that such a term is fanciful, for the fact that it is a joint necessitates a certain amount of movement. To be very accurate, this joint is so constructed as to admit of the very least movement, and is found only in the most rigid relationships.

The joint called synarthrosis is only found where bones articulate closely, being separated by membrane, or by masses of connective tissue which attach them closely together, and in which joint there is no cavity, and the movement is so slight as to be ordinarily indiscernible.

This form of joint reaches its highest illustration in the bones of the cranium, the face, and that of the lower jaw or mandible.

Synarthrosis is considered under three classifications: (A) suture, (B) schindylesis, and (C) synchondrosis.

Suture. This word means a seam, and is that form of joint met with only in the articulations of the skull bones, the margins of which are separated by a sutural membrane derived from the dura mater which covers the inside surface of the skull bones, and extends through the sutures and covers the outside of the skull bones as the pericranium.

The sutural membrane firmly attaches the edges of the bones together, but not so firmly but what there is movement, and it must be remembered that the very purpose of sutures in the skull is to permit such movement as will neutralize shocks.

Sutures are not found in straight lines, but are very tortuous, some very much more so than others, and the more tortuous the suture, other things being equal, the greater movement is permitted thereby. For a detail of sutures the student is referred to works on anatomy.

Schindylesis. This word means a fissure, and is that character of joint where a thin plate of bone is received between two plates of another bone, which are attached to each other by connective tissue.

From the ordinary meaning of the word, this articulation does not amount to a joint at all, and yet in the young subject, and by analogy, it falls within the scope of a joint. It, of course, permits of slight movement during the whole experience of the organism, but in advanced life the movement is so slight as to be almost negligible.

The form of joint under discussion is found in the articulation of the rostrum of the sphenoid with the perpendicular plate of the ethmoid and vomer.

Synchondrosis. This articulation really does not come within the scope of a joint. But, as before stated by analogy, it must be so considered, because for a time in development it occupies a relationship between two centers of ossification. It is found at the transition period of hyaline cartilage into bone in the young. It is, therefore, an incident to maturity of ossification. It occurs between the shaft and epiphyses of the long bones.

AMPHIARTHROSIS

Amphiarthrosis is that articulation classified by anatomists as a mixed joint. It will be seen that this classification is also fanciful and remarkably novel, because a joint cannot be both movable and immovable; it must either be one or the other.

However, in the class of joints which receive this designation the student must know that there are two characters of joints, in one of which there is very limited movement, and in the other very extensive movement.

In amphiarthroses the joints are composed of bone, ligament, synovial membrane, fibro-cartilage, and usually hyaline cartilage.

This form of joint is found in articulations where the surfaces of the bones are connected, without actual joint movement except of a flexuous nature, by broad flattened discs of fibro-cartilage. These joints are in a majority of cases found in connection with other joints of a different character, and the student must be very careful to get a clear cut and perfect differentiation of these in his mind.

Amphiarthroses are illustrated in the joints between the centra or bodies of vertebrae to produce the vertebral column, those of the pubic bones, in the production of the pubic symphysis and the manubrium with the gladiolus of the sternum or breast bone.

In this form of joint there is no synovial membrane in the same sense as in the freely movable joints, but within the interior of the pad there is a somewhat deficient capsule of synovial membrane in those of the intervertebral discs and the cartilage of the pubic symphysis. The capsule of the pubic symphysis is very evident in young subjects, but less so in age.

The amphiarthroses of the vertebral column need a little more definite comment just here. The student must not conceive that these joints include all of the characters of joint that occur between two vertebrae, for this would be very far from the truth. The fact is that in the articulation of two vertebrae in a typical case there are two arthrodial and one so-called amphiarthrosis.

The suggestion given in the preceding paragraph is made to prevent the student from indulging the usual error that all of the joints in the articulation of typical vertebrae constitute one amphiarthrosis. This is not the case. Amphiarthrosis only refers to the joint between the bodies of the vertebrae.

The amphiarthrosis found between the pubic bones not only presents the deficient synovial capsule, especially in young subjects, but also presents the hyaline cartilage, which endures throughout the life of the subject unless destroyed by the abnormal process of calcification.

There is another form of joint which anatomists have included in amphiarthrosis, and which does not quite come within that classification, but since it has no other classification it will be here included. It is that character of joint where bones are connected by an interosseous ligament as well as other elements of joints. This joint is found in the tibio-fibular articulation and is called *syndesmosis*.

DIARTHROSIS

Diarthrosis is that form of joint in which all of the articular elements are used in its construction which give to it the most complete movement. However, the amount of movement permitted in such a joint is again controlled by the object for which the joint is produced.

Diarthroses include the greater number of joints of the skeletal frame. In all joints of this character movement is the distinguishing feature.

A diarthrosis is composed of bone extremities, hyaline cartilage, fibro-cartilage, synovial membrane, white membrane, ligaments, and usually tendons. In certain joints of this character there is also an interarticular fibro-cartilage.

Diarthroses have been characterized by the kinds of movement which are permitted. These are: (A) axial, (B) biaxial, (C) polyaxial, and (D) gliding or arthodial joints.

Axial joint has also been called hinge or ginglymus, and is that form of joint in which the articular surfaces are so connected as to permit free movement only in one plane, the movement in that plane being very considerable.

The most perfect illustration of axial joint is found in the articulation of the phalanges, those of the humerus with the ulna, and those of the femur with the tibia.

Axial joint is also illustrated, but not so fully, in the rotary joint between the head of the radius and ulna, and between the odontoid process of the axis and the dorsal aspect of the ventral arch of the atlas. It will be seen that the movement here is to merely roll in one direction to a limited extent, and then back in the opposite direction to the place of beginning, the movement, however, being in but one plane.

Biaxial joint is one in which motion is permitted in two directions. This is produced by an ovoid articulation, which not only permits hinge joint conduct, but at the same time permits movement at right angles with the basic movement. Therefore, it permits hinge movement with adduction and abduction, and these permit circumduction, but not axial rotation.

Biaxial joints reach their highest illustration in those between the forearm and carpus; in other words, the joint at the wrist. It will be remembered that here circumduction is easily accomplished, but not axial rotation. This joint is also found in the carpometacarpal, or saddle joint of the thumb.

Polyaxial is that form of joint sometimes also referred to as enarthrosis, or ball and socket joint.

In the polyaxial joint the construction is such that a deep cup-like cavity is produced by the formation of the osseous structure aided by cartilaginous rims of fibro-cartilage, into which the globular head of bone is inserted and attached.

It will be seen in the arrangement indicated in the preceding paragraph that, while the proximal part of the bone does not move in any direction, the distal extremity may be moved around the center of the joint in an indefinite number of axes.

The best and highest forms of polyaxial joint are those of the hip joint and shoulder joint, usually referred to as the ball and socket joints; the one at the shoulder will be remembered as the glenoid cavity, in which the head of the humerus is articulated, and the acetabulum at the hip into which the head of the femur is articulated.

Arthrodia is that form of joint which is generally referred to as gliding joint, and it is so called from the fact that the articular surfaces are flat and possess hyaline cartilage lamellae, and synovial capsules; the movement, therefore, being a glide in a given direction markedly, but usually admitting of slightly deviating movements in other directions.

The most complete illustration of the arthrodia, or gliding joint, is found in those between the articular processes of the arches and vertebrae. Here the student must observe that the pronounced movement is ventral flexion and dorsal extension. However, because of the flexuousness of the immediately relative amphiarthrotic joint between the bodies of the vertebrae, a certain amount of gliding laterally in either direction is necessary in order that lateral flexuousness of the trunk may be accomplished.

The student of Chiropractic is here definitely cautioned to give to the two preceding paragraphs his most profound attention. It is because of failure to grasp these very important facts that many Chiropractors find themselves much embarrassed in their work, and especially in explaining general joint conduct and its effects. The arthrodial joint is also illustrated between the carpal and tarsal bones.

The foregoing chapter, although brief, contains a sufficiently extensive analysis of all of the joints of the skeletal frame. However, to make these statements complete we must here revert to the hyoid bone which, while it does not articulate with other bones, does sustain a relationship to the styloid processes of the temporal bones, which is accomplished by ligaments. It is also membranously attached to the thyroid cartilage of the larynx, and these several attachments act very largely in the capacity of joints.

The ligaments attaching the hyoid bone to the styloid processes sometimes in advanced age, and sometimes because of very grave abnormality, become calcified, converting the flexuous attachment into a rigid one.

CHAPTER XXVI

THE PURPOSE OF JOINTS

PRIMARILY, joints are constructed to permit bending in the freest and most flexible manner, and, while this fact is universally recognized, it is only the occasional person who closely and carefully investigates what joints are actually for.

If bending was the only purpose to be accomplished by joints, that function might have been secured without such an array of beautifully chiseled and mechanically constructed parts. It is very apparent that joints are constructed to accomplish much more than the simple purpose of flexing or flexuousness.

Joints are placed at those portions of the organism where movement of a definite and particular character is essential to the function to be accomplished. This fact does not become so apparent if only the appendal parts of the organism are taken into consideration. But when we take into consideration the trunk, the fact becomes very apparent.

Basicly, the trunk of the human organism is composed of an extensive array of bones, which would very definitely interfere with all of its functions if it were not for the joints between those bones permitting such movement as accommodate the necessities of function.

At this point the student should analyze this proposition somewhat in detail, and to assist in that work the following definite statements are made.

Osseously the trunk consists of the vertebral column, which in the adult consists of twenty-six segments, and therefore twenty-five definite joint areas.

In twenty-three of these joint areas, each consists of three definite joints, one amphiarthrodial; two arthrodial; these pertaining to the vertebrae themselves.

In the thoracic portion of the trunk typically there are twelve segments, and therefore eleven definite joint areas, which comprise thirty-three joints in the thoracic column itself. To these must be added the joints at the heads of twenty-four ribs, and typically the joints between the necks of twenty ribs and transverse processes.

To the joint areas definitely in the vertebral column, and relative thereto as enumerated in the last paragraph, there must be added the costal articulation of fourteen ribs with the costal cartilages, and the fourteen articulations of the costal cartilages with the sternum, and then the two joints between the clavicles and manubrium and the joint between the manubrium and gladiolus, and the gladiolus and ensiform cartilage. To these must also be added the six articulations of the sterno-costal cartilages and the six attachments of those cartilages to their ribs respectively.

Casting up the number of thoracic joints found to be within the thorax by the character of analysis followed, we find that there are one hundred and twenty-one. Now if we shall add thereto the joints between the clavicles and scapulae we have one hundred and twenty-three, and then, to make the analysis complete, we must remember that in practically all functional movements not only do these one hundred and twenty-three joints move, but those in the cervical and lumbar regions also move in co-ordination with them.

It is a remarkable fact, and one not usually appreciated, that at each breath inspired or expired the person definitely moves each of these one hundred and twenty-three joints as well as those mentioned as being co-ordinate to them.

We should not refrain from calling the student's attention at this place to the remarkable influence upon respiration that must ensue from any abnormal conduct of the one hundred and twenty-three and their co-ordinating joints.

A careful investigation of this subject definitely at this time, directed solely to the matter of respiration, will give some basis for understanding the remarkable value of Chiropractic which definitely addresses itself to the three hundred or more joints of the body.

Of course, since respiration is one of the paramount processes of the body, and is the means of furnishing to the body economy its paramount and continuously necessary gaseous nutrition, we are prone to give that function consideration, and neglect to give full scope to other functions which, while not so definitely patent, are nevertheless in the scope of their capacity just as essential.

The heart and great arteries occupying their positions in the mediastinum are definitely affected by the freedom with which the one hundred and twenty-three joints referred to move, but more especially by the movement of the headward six joint areas of the thoracic vertebrae, and movement of the feetward three joint areas of the cervical vertebrae, constituting twenty-seven vertebral joints, and the joints at the heads and necks of ten ribs, which makes forty-seven joints. To these would also be added the two joints of the sternum, the two joints of the clavicles with the sternum and the clavicles with the scapulae, making in all fifty-three joints.

The student must not jump to the conclusion that each of these fifty-three joints enumerated exercises the same influence upon the conduct of the heart and arteries within the mediastinum, for such a conclusion would be aside from the truth. It is, nevertheless, true that each of these joints exercises a certain relative influence upon the conduct of the heart and arteries from the standpoint of room and capacity, to say nothing of immediate stimulus through nerves influenced thereby.

It is now well known that the most definite influence upon the conduct of the heart is exercised by the headward thoracic joints, but that effect does not change nor influence the statement just made.

The conduct of the one hundred and twenty-three joints enumerated exercises definite influence upon thoracic capacity and accommodation, and, therefore, has direct influence upon liquid transportation throughout the whole thoracic area, which exercises an immediate influence upon aeration, depuration, and assimilation, to say nothing of elimination through the skin over the area.

The conduct of the one hundred and twenty-three joints and their co-ordinating joints exercises a marked influence upon the shape and elasticity of the ribs, and, therefore, the sternum and thorax generally, which includes the intercostal muscles, nerve trunks, liquid vessels, and all other tissues therein placed, and placed relative thereto.

It will be seen that the statements made in the last paragraph bring us, by the same form of analysis, to the diaphragm, which is the most definite, largest and most important somatic muscle.

A careful investigation of the thorax in its relation to the diaphragm will show that the movement of the one hundred and twenty-three thoracic joints named, together with the joints of the lumbar region, exercises a marked influence upon the conduct of the diaphragm. The lumbar vertebrae must be included in this consideration, because the diaphragm is definitely attached by its crura to three and sometimes four of these vertebrae.

Students of the human body are prone to think that the diaphragm exercises a marked influence upon the movements of the joints referred to, but especially those of the feetward thoracic and lumbar joints, and it does, but in normal condition the diaphragm cannot be moved in any direction without the movement of the joints to which it is attached and those relative as indicated and outlined herein.

The use and conduct of the joints already mentioned exercise a marked influence upon the shape and capacity of the abdomen, and the conduct of the organs therein contained.

To get a full comprehension of the influence of joints upon the abdomen and its contents the analysis must be carried on through the fifteen joints of the lumbar column, to which must be definitely added the two joint areas of the eleventh and twelfth thoracic vertebrae, which adds ten joints, and the two sacro-iliac joints and the symphysis pubis. These twenty-eight joints definitely and specifically influence the conduct of abdominal viscera.

The conduct of each of these twenty-eight joints is influenced to some extent by the remaining one hundred and eighteen joints definitely within the thorax and those headward to it co-ordinating.

It will be easily seen that these joints definitely control the size, shape, and attitude of the abdomen, and because of this fact exercise definite influence upon the muscle tissues comprising the parieties of the abdomen, which, of course, includes the nerves and vessels of liquid movement. They also influence the visceral contents of the abdomen in the same way and to the same extent.

The student must not overlook the fact, while considering the influence of these twenty-eight joints, that the two thigh joints also exercise a co-ordinating influence with them.

Turning the attention to the superimposed structure, it will be seen that the attitude of the twenty-four joints of the cervical region will be definitely influenced by all of the joints of the body between the cervical area and the feet to some extent, but will be definitely influenced by the one hundred and eighteen joints of the thorax, together with the twenty-eight joints relative to the abdomen, or the one hundred and forty-six joints of the trunk, including the two thigh joints.

Again, the student must be cautioned not to reach the conclusion that each of these one hundred and forty-six joints exercises the same influence upon the cervical joints, for they do not, but each exercises a certain co-ordinating influence.

In this connection, however, it must be understood that certain of these joints exercise definite, specific, and controlling influence on the conduct of the twenty-four cervical joints. And, again, some of these more than others, but in each case certain joints of the abdominal and thoracic regions exercise definite influence upon the joints of certain cervical regions.

Turning the subject to a consideration of the appendal body, it will be seen that the joints of the feetward cervical region and the headward thoracic region, in conjunction with those of the sternum, clavicles, and scapulae, exercise a marked influence upon the joint of the arm with the shoulder, and incidentally carry that influence out through the remaining joints of the arms, wrists, hands, and fingers. However, to a large extent, here the analysis stops with relation to the upper extremities.

It is quite a different matter when the subject is turned to the lower extremities. There the joints of the trunk as referred to exercise a certain influence upon the joints of the thighs, knees, ankles, feet, and toes. However, this is an incidental rather than a basic influence. The basic influence is that of the joints of the toes, feet, ankles, knees, and thighs upon the joints of the superimposed body, and these are marked, definite, specific, and controlling. This subject will be fully considered under compensation herein.

There is no more fascinating and delightful study to the person of scientific mind than a definite and careful investigation of joints. This knowledge is positively essential to the student of Chiropractic, and he is here definitely encouraged to allow this chapter to be his guide into a wider and fuller consideration of this important subject.

CHAPTER XXVII

WHAT IS THE VERTEBRAL COLUMN

For a long time students of physiology and anatomy have been impressed by the statement: the vertebral column, or spine as it is improperly called, is the axis of the body. This statement cannot be denied, and yet it does not furnish much help to the student in his search for knowledge.

By the statement that the vertebral column is the axis of the body authors intend to convey the thought that the column is a rigid center around which the body is attached, and yet there is such an indefiniteness about this statement that it is not very satisfactory to the ordinary student of inquiring mind.

There has been very little careful and painstaking consideration given to the vertebral column, from the standpoint of a knowledge of what it really is. In most instances it is simply passed by with some general statements that serve for the time.

The animal kingdom is divided for consideration into two grand subdivisions: the invertebrates, those animals that have no vertebral column, and vertebrates, those animals which present a definite vertebral column.

In an attempt to discuss the vertebrates many important things have been frequently overlooked. For instance, it has been contended that vertebrates, because of the peculiar construction of the vertebral column, were intended to go upon all fours, and there has been a general endeavor to place man in the category with four-legged animals for that reason.

It is not the purpose of this chapter to enter into any controversy upon the descent of man, or to pose any opinion as to the evolution of human creatures from lower forms of animal life.

It is the purpose of this chapter to definitely discuss the situation for the purpose of disclosing what the vertebral column is, without allowing what is stated to enter the field of the controversial.

The vertebrae of the column in a general way of speaking in the more pronounced vertebrates are articulated substantially in the same manner whether the animal goes on all fours or assumes the erect posture. That is to say, the bodies of the vertebrae are attached by fibro-cartilaginous discs, while the articular processes are attached by arthrodial joints.

The arrangement suggested in the last paragraph presents itself to us differently as we look upon it from different standpoints.

From the standpoint of weight-bearing ability, if we take into consideration only the joints between the centra of the vertebrae, we would be led to the conclusion that vertebrates were all intended to stand erect, or on the hind feet, while if we take into consideration the articular processes only we would be forced to the conclusion that all vertebrates were intended to go upon all fours.

In view of the dilemma presented in the preceding paragraph it seems perfectly clear that we must search for a different explanation than that which is disclosed by the articulation of the bones themselves, for very little can be determined therefrom.

It is well known that our four-footed friend, the horse, has a vertebral column with many points of similarity to the human column, and still he is able to bear a prodigious load upon his back, and is also able, by his shoulders, to project as great a force, which must be maintained by his column longitudinally.

The gorilla, which is a man-like member of the jungle folk, for the most part goes upon his hind feet, and yet he is able to exert great power that affects his vertebral column lengthwise; or from dorsum to ventral aspect. He seems to be as strong in one respect as the other.

These illustrations have been given for the purpose of leading the student's mind to the place where he can readily conceive that the determining proposition is found in the relative structures to it, instead of the vertebral column itself.

The vertebral column is constructed in such manner as to form a centrified base around, over and through which other structures may attach and operate to secure bases, levers, pulleys, ropes and guys that sustain, move, and hold other structures in relative position.

In a certain circumscribed sense the vertebral column is not the axis of the body, for the axis of the body definitely speaking, should be within it and equidistant from all of its surfaces. The most casual glance shows this not to be true of the vertebral column. It is, therefore, more scientific to say that the vertebral column is the rigid basis of the body.

The word verterie means to turn, and a segment of bone received the name vertebra because of this meaning. Vertebrae, therefore, are irregular bones that are so related as to turn upon each other.

The vertebral column, then, is the rigid basis of the trunk composed of bones that, because of the peculiarity of articulation, turn in their relation with each other.

Formerly the bones of the skull were included as vertebrae, but since there is never a period when they may be said to turn in relation with each other they are clearly excluded from that classification.

However, the occipital bone turns in its relation with the atlas, and because of that fact, the whole head as presented by the occipital aspect may be classed as a vertebra.

Anatomists have generally maintained that the sacrum is typically composed of five vertebrae and the coccyx of four, but since the segments of the sacrum and coccyx are simply departmental, and at no time turn as joints in their segmental relationship, their segments are excluded as vertebrae.

In this view of the situation the sacrum in its entirety constitutes a vertebra. And in the case where the coccyx turns as a joint in relation with the sacrum it is also a vertebra.

To be exactly definite the vertebral column is the rigid, osseous, and cartilaginous basis of the trunk, typically composed of twenty-six vertebrae, which furnish a center of attachment for relative structures, and which turn in their joint relationship with each other.

It should be added as a concluding statement that one of the definite properties of the vertebra, aside from its turning in its relationship with its fellows, is weight bearing or weight resistance.

The statement that in a typical vertebral column there are twenty-six segments is made because by this last statement the coccyx never bearing any weight is excluded as a vertebra, but at best it only turns in its relation with the sacrum and never bears or resists any weight.

CHAPTER XXVIII

REMARKS ON THE VERTEBRAL COLUMN

It is not the intention of this chapter to give the details, specifically speaking, of typical vertebrae, or to go into an analysis of the vertebral column, but it is the purpose to bring to the student's attention certain very important phases of the column which in his present study becomes very important to him.

It is, therefore, the purpose to review the general terms with reference to the vertebral column, and to offer a few suggestions touching upon its construction and use.

The vertebral column is said to consist of the following segments: Occipital one, cervical seven, thoracic twelve, lumbar five, sacral one. To these, as suggested in the preceding chapter as a turning segment, the coccyx should be added.

In books of anatomy perfunctory descriptions of a typical vertebra or of typical vertebrae are given. The student should be very careful to caution himself at this juncture that in a certain circumscribed sense no such thing or things exist.

The statement made in the preceding paragraph should be explained by the further statement that vertebrae in different individuals are as different as any other part of the person is different. For instance, the fifth thoracic vertebra in two individuals are not necessarily any more nearly alike than are the bones of those two persons' noses, cheeks, or jaws.

It may be said that the nose bones, the cheek bones, and the jaw bones of human beings are typical of human beings, but are not necessarily typical in a comparison of human beings.

With these explanations the student should be prepared for the statement, that he will never find two vertebrae of precisely the same shape in any two human beings, but that he should be prepared to find them different, and he must evolve the ability to quickly detect the differences in vertebrae.

It must be understood in connection with these statements that vertebrae in different parts of the vertebral column, even in different individuals, are typical of the part. That is to say, cervical vertebrae are typical of the cervical region; thoracic vertebrae of the thoracic region and lumbar vertebrae of the lumbar region.

In the various regions of the vertebral column, however, the student must not lose sight of the fact that as one region approaches another the vertebrae lose their definite type and partake of the nature of the other, so that the seventh cervical has many of the aspects of the first thoracic, while the first thoracic has some resemblance to the seventh cervical vertebra.

The last peculiarity referred to is very pronounced at the thoraco-lumbar articulation. Here the last three thoracic vertebrae continue progressively to vary from the thoracic type toward the lumbar type. That is to say, shortening in the dorso-ventral diameter, and widening in the transverse diameter, while the spinous processes shorten and thicken and the transverse processes shorten, so that finally the twelfth thoracic by its lumbar aspect is typical of the lumbar region.

The first lumbar vertebra is narrow and deep as to its body by comparison with the other lumbar vertebrae, and has many similarities to the thoracic type.

At the lumbo-sacral articulation the lumbar type is largely lost, and the typical aspect of the first sacral segment is very largely assumed. That is to say, the centra of the fifth lumbar is very broad in its lateral aspect and thin dorso-ventrally with broad, strong transverse processes.

While it is true that we find all of the peculiarities in the last several paragraphs to be indeed quite typical, still it must be remembered in connection with all of them that each person presents these types, but presents them in a dissimilar manner, and with many idiosyncrasies and peculiarities sometimes so pronounced as to present other and distinguishing types. So the student must be constantly upon his guard and must be able to differentiate these things.

For the purpose of offering some slight illustration of the last paragraph, ordinarily if a person presents large, coarse, strong bones in one part of the body, the same character of bones will be presented in all parts of the body, but this cannot be relied upon, and this is peculiarly true of the vertebral column.

It is not at all unusual to find a person whose headward six thoracic vertebrae are very heavy, coarse, and strong, whose feetward thoracic vertebrae are small and weak, and the reverse of this proposition.

Many times a person will be examined whose innominate bones, sacrum, and lumbar vertebrae are coarse, wide, deep, and strong, and yet whose thoracic vertebrae are small, narrow, shallow, and weak.

Many times the same peculiarity is found in a person who presents a large, strong sacrum and innominate bones, and yet whose lumbar vertebrae are narrow, shallow, and weak, or who presents strong headward thoracic vertebrae, but thin, narrow, and weak cervical vertebrae.

While the subject under discussion is the vertebral column, I cannot resist stating that this general idiosyncrasy that has just been discussed applies equally to the whole organism. It is not at all infrequent that at about the level of the eleventh thoracic vertebra the whole person changes as to type; all feetward from that point representing, for instance, a coarse, strong-boned, strong-muscled, powerful person, while headward from that area presenting a long, slender-boned, graceful, but not unusually strong person.

Because of the peculiarity just stated it is not infrequent that we find the long, slender, graceful hands of an artist in a person with the strong, large, coarse feet of the person of heavy toil, and the reverse; the long, slender, graceful feet with the large, coarse, powerful, hairy hands, indicating great strength and resistance.

The feet and hands have been peculiarly mentioned in this reference because they are generally more exposed, and are, therefore, more generally observed.

A comparison of the head with the feet or the head with the hands presents the same peculiarities.

However, the head and hands more usually follow the same type in the presentation of such peculiarities than does the head and feet.

The ordinary person thinks of the vertebral column as simply being composed of bones, and thinks of all bones as being white, and with that lets the matter drop.

However, the student of the vertebral column should know that bones differ as markedly in color in a certain sense as does other tissue of the body, and that the bones are as characteristic in their appearance as any of the various features with which we are all so generally familiar; such as the shape and color of the face, the general figure, and the various colorings of the tissues of the body.

A student that would become a Chiropractor must understand that his knowledge of the vertebral column must be so intimate that each detail of it is indelibly impressed upon his mind, and while that is true, it must be so impressed that upon occasion, when necessity demands it, he can mentally visualize any of the details of the column to which his immediate attention is directed.

The knowledge referred to as being necessary in the last paragraph is in order to prepare the student to compare the present case under examination by palpation and otherwise with his mental picture of a typical vertebra of the same region, and by thus comparing arrive at the fact of the exact shape and relation of the area under consideration.

A so-called typical vertebra consists of a body called a centrum, and an arch. The body of the vertebra is the heavy, osseous segment that lies ventral to the vertebral cord and dorsal to the trunk cavity.

The arch of the vertebra is that part of it which lies generally lateral and dorsal to the neural canal, and forms the dorsal wall of the neural canal. It is composed of a pedicle on each side, which are attached to the body of the vertebra ventrally, and are dorsally attached to a lamina on each side, the two laminae meeting and attaching together at the dorsal median line.

The statements in the preceding paragraph make it clear that the arch proper is composed of four segments, two pedicles and two laminae.

The arch thus produced presents seven processes, two headward articular processes, one on each side; two feetward articular, one on each side; one transverse process extending laterally on each side; and a spinous process extending from the junction of the laminae dorsal from the median line.

When vertebrae so composed are articulated the centra form the vertebral column and the ventral wall of the neural canal, while the arches, together with the soft tissues between them, form the lateral and dorsal boundaries of the neural canal.

It will be seen that in the recent condition the neural canal is inclosed by bone, cartilage, ligament, membrane, and muscle tissue except an opening at each side between the pedicles of the arches.

The openings on each side are formed by notches in the headward and feetward margins of the pedicles, and in such relation with each other as to form somewhat irregular rounded or flattened openings called foramina, one opening being called a foramen.

In the dry bones the foramina are quite large, and would give the impression that in the recent condition they are so, but in fact they are indeed very small, because each foramen is encroached upon by cartilage, ligament, capsular and otherwise, and by connective tissue, aponeurotic and muscular tissue, and by arteries, veins, lymph vessels, and small ramifying nerve trunks, so that the actual foramen is indeed quite small in comparison with the osseous foramen.

The foramina are for occupancy of the intervertebral nerve trunks which extend from the vertebral cord laterally through them, and in each instance the osseous foramen with its soft tissue compliment is just the right size to be comfortably and normally filled by them.

The observing student will see that the definite relationship of the foramen to the intervertebral nerve trunk is composed of soft tissue, and that at no place does the osseous tissue directly relate to the nerve trunk.

It will be understood that because of the nicety and exactness of relationship of the soft tissues lining the foramina to the intervertebral nerve trunks, that the slightest change in the shape of an osseous foramen will produce such characteristic changes in the apposition surface, or surfaces of those tissues to the nerve trunk, that a change in the shape of the nerve trunk or its position to accommodate the situation is rendered necessary.

Such interference with the nerve trunk has the effect of changing the character of transmission of nerve stimulus through it, and the proximate cause of the interference is found in the diverse relationships of the soft tissue of the foramen.

It is true that changes in the shape of the foramina, and therefore in the relationship of the soft tissues thereof, to the nerve trunks do have marked effects upon the transmission of nerve stimulus through them, and if these interferences were directly produced by the osseous foramina, as distinguished from the soft tissue foramina, animation of vertebrates would indeed be very precarious.

It is because interferences with these intervertebral nerves are produced by the relative soft tissues of the foramina that accommodations are made in a short time, which to a large extent ameliorate the situation, and reduce the diverse symptoms caused thereby to a large extent without the osseous tissues having been in any part corrected in their relationship to each other.

In this connection it should be observed that such changes in the relation of foraminal surfaces to nerve trunks may present any degree of effect, from interference of stimulus through one faciculus or a few small trunks to interference of stimulus through all of the trunks of the organism.

The joints of the vertebral column have been to some extent discussed in former chapters. They are somewhat complex, and as has been suggested each joint area consists of an amphiarthrosis between the bodies of the vertebrae, and two arthrodial joints between the articular processes.

This joint arrangement, however, is sufficiently typical and regular to be quite easily understood, provided that each part of the column is carefully and definitely taken into consideration at the beginning of any investigation.

The analysis of these areas will be given in the succeeding chapter, using this chapter as an introduction thereto.

CHAPTER XXIX

DISCUSSION OF VERTEBRAL AREAS

After a full consideration has been given to the entire vertebral column intrinsically, there still remain six areas that must be definitely analyzed and carefully understood. These are: (1) the occipito-atlantal, (2) the atlanto-axial, (3) the vertebro-costal, (4) the lumbo-sacral, (5) the sacro-iliac, and (6) the sacro-coccygeal.

The *occipito-atlantal area* contains two condyloid joints. That is to say, there is a separate and distinct joint between the right condyle of the occiput and the right headward surface of the lateral mass of the atlas, and the same character of joint between the left condyle and left headward surface of the lateral mass of the atlas.

These condyloid joints are so constructed as to permit only a specific rocking of the convex condyles of the occiput in the concave articular surfaces of the lateral masses of the atlas.

The joints so constructed are definitely arthrodial. They are really not more than hinge joints.

In connection with these joints, however, it must be explained to the student that because of the arrangement of the cartilaginous lamella of the articulating surfaces, a lateral springing is permitted. That is, by movement of the head strongly lateralward, the condyle of that side may be pressed deeply into the articular cartilage, while that of the other side may be raised from its articular pressure to the extent that the joint capsule of that side will permit.

Because of the accommodative lateral movement indicated in the preceding paragraph many persons have jumped to the conclusion that there is actually biaxial movement in these joints, which there is not, the joint *per se* being solely that of the hinge variety.

The construction of these joints presents a peculiarity that must be observed here. The ventral wall of the condyloid depression in the headward surface of the lateral mass of the atlas is an abrupt wall. The condyloid depressions converge at their ventral ends, and diverge at their dorsal extremities, and the dorsal ends, contrary to the ventral ends, are open and expansive.

Because of the peculiarity of construction of the condyloid depression, when the occiput is tipped dorsalward as when one looks upward, the condyles roll against the bony wall at the ventral end of the condyloid depressions, and thus mark the limit of possible movement in that direction.

Because of this fact with normal construction a person can only throw the occiput back far enough for him to look straight up.

In looking down, the condyles roll toward the open dorsal extremities of the articulations, and are only held in situ by the capsules and ligaments of the joints, and a greater accommodative movement is permitted.

Before passing these parts it should be suggested that proper and definite exercise of these joints both in flexion and extension as well as in laterality of movement should be continuously indulged by all. This fact is mentioned because these joints from an exercise standpoint are almost wholly neglected.

Another marked peculiarity of these joints, that takes them definitely out of analogy with any of the other joints of the vertebral column, is the fact that the atlas has no body, and that the whole weight of the superimposed structure rests upon the articular surfaces.

The headward articular surfaces of the atlas carry the weight of the whole head upon the two condyles. Each of the two condyloid joints are bound together at the front by the occipito-atlantal, and behind by the occipito-atlantal ligaments, and each joint has a separate capsular ligament.

The *atlanto-axial area* is very remarkable for its construction. It contains four distinctly movable joints of the arthrodial type.

In this area there is a joint between the ventral surface of the odontoid process, and the dorsal surface of the ventral arch of the atlas. There is a joint between the dorsal surface of the odontoid process and the ventral surface of the transverse ligament, and there is an arthrodial joint on each side of the odontoid process between the articular processes of the axis and atlas.

The atlanto-axial area is distinguished from any other in the vertebral column by the fact that the articular processes of the axis rest quite definitely upon the pedicles, and only incidentally upon the body of the axis, and that the articular surfaces are oval, and present a surface convex in all directions, being constructed to oppose an obliquely converging pressure, principally from the latero-headward aspect, but to a certain extent also from both the dorsal and ventral aspects.

It will, of course, be seen from this description that the axis really fits to a large extent like an old-fashioned knuckle into the grasp of the cylinder-like articular surfaces of the atlas, very definitely completing the illustration by the articulation of the odontoid process between the ventral arch of the atlas and the transverse ligament.

The student of mechanical conception will readily grasp the thought here that these two bones, the axis and atlas, by their intimate and complex articulation with each other, really constitute but one vertebra, for by their arrangement the only movement that is permitted between them is specifically and definitely that of rotation of the atlas around the odontoid process of the axis a given distance and back in the same plane.

There is no flexion or bilateral movement between the axis and atlas except such slight springing as is permitted by the thickness of the hyaline lamellae upon their articulated processes, and the slight movement that may be permitted by the springing of the transverse ligament of the atlas, and the facet on the dorsal aspect of the ventral arch with which the odontoid is articulated.

Students have had the false conception of other movements between the axis and atlas. However, I desire at this place to definitely point out and make it perfectly clear that the only joint movement between the axis and atlas is the gliding movement of the atlas around the articular surfaces and odontoid process of the axis, rotating for instance to the right a given distance, and then rotating back to the left to the same extent.

Here again it will be observed that the articular processes of the axis carry the entire weight of superimposed structures. However, the surfaces are so constructed that the weight is converged and centers upon the body of the axis, or in other words, strikes the mesial plane of the body, and for the first time reaches the gravity axis of the body.

The atlas and axis are bound together ventrally by the atlanto-axial ligaments and dorsally by the atlanto-axial ligaments, while the arch of the atlas is bound to the odontoid process by the transverse ligament, and the articular processes are definitely attached by the capsular ligaments, and of course, there are two capsular ligaments relative to the joints on the odontoid process.

The *vertebro-costal area* is very remarkable indeed, and has been to some extent analyzed in the chapter on "the purpose of joints." However, certain of its mechanical aspects will be here discussed.

The vertebro-costal area in its first aspect consists of the twenty-four joints between the heads of the ribs and the vertebral column, and, in its second aspect, of the necks of twenty ribs with the transverse processes of ten vertebrae. The heads of the first ribs on each side articulate definitely with the body of the first thoracic vertebra, as also do the heads of the tenth, eleventh, and twelfth ribs with their respective vertebrae.

The intervening ribs, that is the second to the ninth, inclusive, articulate by their heads definitely with the intervertebral substance between the vertebrae, and relatively with the two vertebrae at each area respectively.

The heads of the second pair of ribs articulate in a wedge-shaped way directly with the intervertebral cartilage between the first and second thoracic vertebrae, and by a sloping, converging facet with the relative aspects of the first and second thoracic vertebrae, and this arrangement is typically carried out with all of the ribs down to and including the ninth.

The necks of the first ten pairs of ribs articulate with the transverse processes of their respective vertebrae.

It will be observed that the relationship revealed by the statements already made have the effect of necessitating the movement of six ribs and three vertebrae in accomplishing the simplest vertebral movement that may be conceived except at the two ends of the thorax, for it cannot be conceived that a vertebra can move without flexuousness in the cartilage by which it is attached to other vertebrae in both directions.

This fact necessitates the movement of at least the attached ends of the two contiguous vertebrae with the one to be definitely moved, and of course the attached ribs move also.

The movement of the three vertebrae, as stated definitely, moves at least three pairs of ribs, and because of the longitudinal ligaments of the column, the intertransverse ligaments and muscles, and the intercostal muscles, it is not at all unlikely that the better approximation is that in the slightest vertebral movements, five pairs of ribs are moved, the central pair definitely, and the relative pairs, in each direction, in ratio with the movement of the vertebra to which they are attached.

The first ten pairs of ribs also have costo-sternal attachment, and in that peculiar sense constitute ten vertebro-costo-sternal body rings, all of which must co-ordinate in movement relatively, or must co-ordinate in resistance to movement relatively.

The conclusion reached in the last paragraph is of the utmost value to the student of function of the human body, for a careful application of that fact will aid very materially in understanding normal function of the body as well as abnormal conduct.

It will be observed that in the vertebro-costal area there are twenty-four joints at the heads of the ribs, twenty joints at the necks of the ribs, twenty costal cartilage joints, twenty costo-sternal joints, two sterno-clavicular, and two clavico-scapular joints, and the two joints of the sternum; ninety joints in all that are to be considered as incident to any thoracic movement.

The *lumbo-sacral area* needs no further discussion than to call attention to the fact that its lateral relationships are purely muscular, and in this respect it is not to any remarkable extent different from the cervical region in its lateral aspects.

However, there is this difference in lateral relationship: that the lumbar column bears the weight of the whole trunk, which is peculiarly centered upon the lumbo-sacral area. Gravity, therefore, centers upon this point from an area of large circumference, while in the cervical region gravity only centers upon the cervico-thoracic base from a small area (that of the size of the head) and there is no great weight to be borne.

The remarkable thing regarding the lumbo-sacral area, is the abrupt curve that here takes place. The promontory of the sacrum, in the normal, looks ventral with a slight inclination headward, the angle being near thirty degrees from the perpendicular.

The space between the ventral aspects of the centra of both the sacrum and fifth lumbar is very wide, and the intervertebral disc is very thick at this aspect and comparatively thin at the dorsal aspect, presenting a situation markedly different from any other joint in the vertebral column.

The peculiar and apparent weakness presented by the pronounced lumbo-sacral curve is overcome in the first instance by the fact that at this point there are two additional, powerful ligaments on the dorsal aspect on each side, which by attachment to the much longer and stronger transverse processes aid in overcoming the weakness.

The ligaments mentioned are the lumbo-sacral on each side, which extend from the feet-ventral aspect of the transverse processes of the fifth lumbar obliquely lateral and feetward, and attach to the latero-dorsal surfaces of the base of the sacrum, head-mesial to the sacro-iliac articulations; and the lumbo-iliac ligaments, which extend horizontally lateralward from the apex of each transverse process of the fifth lumbar to the crest of the ilium on each side, ventral to the sacro-iliac articulations.

The apparent weakness of the lumbo-sacral articulation is also made up in large measure by the fact, that the longitudinal muscles in this region are very thick and strong, and extend toward the thorax from broad bases which are attached to the sacrum, the fifth lumbar, and indeed the whole lumbar region, converting the structure into a sort of suspension bridge between the osseous pelvic base, and the osseous thoracic base.

A careful understanding of the relationship of the lumbo-sacral area is absolutely essential to the Chiropractor, for the attitude of this area is always influenced from other areas, but to secure its proper co-ordination with other areas its construction and conduct must be thoroughly known.

The *sacro-iliac area* consists of two independent joints, one between the sacrum and right ilium, and the other between the sacrum and left ilium.

The joints in this area are declared by anatomists to be amphiarthrodial. They are not such joints in construction, but to some extent fall within that classification if movement only is considered.

From the standpoint of movement the sacro-iliac joints are not freely movable except within a limited scope, but within the scope of their movement they are as freely movable as any joints in the body.

The reason for the limited movement in the sacro-iliac joints is that the articulating surfaces are attached together by irregular patches of soft fibro-cartilage, and at the headward extremities by fine fibers of interosseous tissue.

Notwithstanding the encroachments upon the movement of the joints by the structures mentioned in the last paragraph, in other respects the joints are constructed as true arthrodia.

In addition to the resistance to extensive movement incident to the tissues mentioned, the student will recall the very irregular surfaces of the articular aspects of the ilia, which, of course, interpose still further resistance to great movement.

All of these statements, however, must not be permitted to cause the student to think that these joints do not move freely, and to place a slight appraisement upon the value of such movement, for freedom of movement of the sacro-iliac joints is not only an essential to easy movement of the whole body, but is essential to normal function in the viscera, and especially in that part of it denominated pelvic viscera.

In connection with these thoughts attention is also directed to the fact that the ligaments of the dorsal aspect of the sacrum attach around and over the parts of the sacral foramina, while the ligaments of the ventral aspects of the sacrum attach in the same way in relation to the ventral foramina of the sacrum, and these foramina are also encroached upon by aponeurotic and membranous tissues.

The most important thing that I wish to point out in connection with this area is the very remarkable relationship which the ilia sustain to the sacrum. It is perfectly clear that the position of these bones command the position of the sacrum so long as the sacro-iliac joints remain practically uninjured.

It is perfectly clear also that the relationship of the ilia not only command the position of the sacrum, but through it command the attitude of the superimposed vertebral column, so long as the sacro-iliac joints remain practically uninjured.

However, it is also clear that when the sacro-iliac joints are injured, then idiosyncrasy of position of the sacrum occurs, and introduces a great deal of complexity into the relationship of the sacrum not only with the ilia, but as to its influence upon the entire vertebral column. The analysis and details of the situation here touched upon will be carefully considered in subsequent chapters of this book.

The *sacro-coccygeal area* is of very small importance from the vertebral standpoint, because the coccyx at no time bears weight. It is only peculiarly for the attachment of muscles and membranes that have to do with composing the pelvic diaphragm.

It will not be forgotten that the ganglia impar are just ventral to the coccyx. It is, therefore, possible that ventro-headward displacement of the coccyx might press upon these ganglia enough to disturb stimulus. But, while admitting that fact, I must add that in my whole experience I have never found a case in which direct attention to the coccyx itself was essential or was even of any definite assistance.

The sacro-coccygeal area by the time maturity is reached has usually become rigid. The position of the apex of the sacrum, therefore, to a very large extent, controls the position of the coccyx. These matters should receive definite attention.

CHAPTER XXX

ANALYSIS OF BASIC COMPENSATION

In attempting to analyze the vertebral column certain prefatory consideration must be gone into and thoroughly understood.

The first thing that is apparent is that the vertebral column definitely so-called must have a base for its operations, and before it can be analyzed its base must be pointed out and analyzed.

To arrive at a proper discussion of the base of the vertebral column we will begin at the feet, for of course, the weight of the trunk is borne by the feet, through the ankles, legs, thighs and innominates.

It will be seen that since there are two feet the gravity of the superimposed body is divided into two parts. Other things being equal, half of the weight going down to each foot.

All of the segments of the feet, legs, thighs, and innominates must be of the same length and the same general size in order that each articular, iliac surface will look toward the articular aspects of the sacrum in the proper direction, and in the same horizontal and coronal planes.

It will be seen that the iliac surfaces, definitely speaking, are the bases of the vertebral column, for it is upon or in relation with these surfaces that the sacrum rests, and it is these surfaces that must bear the weight superimposed upon the sacrum.

In other words, and to state the fact in another way, it is at the sacro-iliac joints that the line of gravity is again separated to be directed through two channels to the feet.

The statements so far made render it perfectly clear that any difference in the length of the ankles, legs, thighs or innominates cause a definite influence upon the attitude of the sacrum, and therefore the whole vertebral column.

In order to discuss this matter in an understandable way it is first necessary to give in sequential order the law of equilibrium and its definite operation upon the parts of the body.

Compensation is a restoration of that which has been expended, or something in lieu of that which has been expended. The laborer receives his hire in compensation for the service performed.

However, when we turn the thought of compensation in the human organism to equilibrium, it means that when a basic structure is moved in a given direction relative parts are compelled to move so as to maintain a certain relationship to that base, or equilibrium is lost.

To illustrate certain phases of equilibrium: If a person desires to bend sufficiently to pick up an object from the floor without flexing the vertebral column, he must flex his ankles, his knees, and his body at the thighs, and to accomplish this feat the angularity of the legs from the feet to the knees must be exactly the reverse of that from the knees to the hip joints, and then the angularity of the trunk must be exactly the reverse of that of the thighs.

If these compensations are not accomplished equilibrium will be lost either dorsally or ventrally, or will be maintained at the expense of muscular strain.

If a person should permit flexion of the type just mentioned to take place on one side and not on the other, equilibrium would be lost lateralward in the direction of the flexing, and he would fall exactly in that direction.

However, in the last illustration if the flexing was permitted upon the left side, for instance, while there was an attempt to stand erect upon the right side, and that attempt failed and slight flexing was permitted toward the ventral aspect on the right side, then the person would fall obliquely to the left and ventrally, whereas if the flexing was dorsalward he would fall dorsolaterally to the left.

These simple laws of equilibrium must be constantly kept in mind by the student of Chiropractic if he is ever to become master of skeletal diagnosis, and indeed functional diagnosis, for functional diagnosis is always a sequel to skeletal situations.

With the laws of compensation in mind, then, we will return to the analysis where we left it.

In analyzing any part of the vertebral column, or indeed any part of the body, it is essential to keep certain lines and planes in mind. The first of these is the median line, and in addition to this as many sagittal lines as the occasion requires. Also there must be kept in mind any number of dorso-ventral lines, transverse and oblique lines, and also the line of gravity.

The student will here observe that the most important thing in connection with any and all of these lines is that he shall constantly keep in mind the relation sustained by the gravity line, to the mesial plane of the body.

At first thought the gravity line would seem to be within the mesial plane. It is so only in the normal body, and never in any other body, although it may cross the mesial plane frequently, therefore the relation which the gravity line and mesial plane sustain to each other is the criterion to the amount of lateral distortion in the given case.

The planes that must be remembered are basicly the horizontal plane which ordinarily is the earth or floor, but Chiropracticly it is the top of the relating table, the mesial plane, and as many sagittal planes as are necessary, the transverse planes, and as many of them as the occasion requires, and as many oblique planes as the occasion renders helpful.

It will be seen that when considering the person from the erect posture, the horizontal plane, the coronal plane, the mesial plane, and the gravity line are the four phases definitely under consideration, and that will be considered and understood.

When a person is lying prone upon the relating table for examination, it is the evidences of the effect of gravity upon the body with relation to the mesial plane that is constantly being observed and thought about, for the purpose of arriving at a proper solution of the situation.

While the person is lying prone upon the table for examination two propositions are constantly being worked out by the examiner. The first is to arrive at the solution of the effect of gravity upon the body while in the erect posture, and the second is to work out and solve the problem of what to do to assist in overcoming these compensatory influences. These two propositions the student must not confuse, for they are very different.

In view of what has been said, it will be seen that if the ankle, leg, thigh, or all of these are shorter upon one side than they are upon the other, the iliac base of that side will be more feetward than the other side, and that, therefore, the sacrum will be turned out of equilibrium in that direction.

For illustration, let us say that the short member or members referred to are on the right side. Then the sacrum will be turned out of equilibrium to the right; that is, the base of it will be brought to the right of the mesial plane, and such left and right compensations will be necessitated on headward through the body as will restore equilibrium, and, of course, the reverse of this proposition is true.

Given ankles, legs, and thighs that are the same length, if one innominate bone is shorter than the other, the sacrum will be turned out of equilibrium in the direction of the short innominate, producing the same general result as that indicated in the preceding paragraph. And the same general effect will occur if the acetabulum of one side is not symmetrically placed, but is nearer or further from the crest or tuberosity than is its fellow of the opposite side.

The statements and illustrations so far given will be sufficient as to lateral compensation with relation to the base of the column, and attention is now turned definitely to a consideration of ventro-dorsal compensation as the same relates to the base of the column.

Any deviation from the normal which carries the gravity line ventral or dorsal in its relation to the transverse plane of the body, considered from its erect posture, will have the influence of necessitating compensation in the opposite direction.

To illustrate the proposition last stated, if the heads of the fibulae are displaced ventrally, thinning the leg at that aspect dorso-ventrally, the pelvic body will be thrown ventrally in ratio, and dorsal compensations must be accomplished in the more headward aspects of the vertebral column.

If the great trochanters are ventral to their position, thus carrying the gravity line ventral in its relation to the coronal plane, compensations must be made for this in the column above its base, and this would be true in the same way if the acetabula were nearer the ventral aspect of the innominates than they should be, or if the heads of the femurs encroached in that direction more than they should, which sometimes occurs.

If both innominates are displaced ventrally as an entirety, the gravity plane is carried too far ventral, and a lessening of all the curves of the body headward must occur.

If, however, the ischial tuberosities are carried too far ventrally, dorsal compensation of the lumbar and thoracic areas must occur, balanced by ventral compensation in the cervical region.

On the other hand, if the iliac portions of the innominates are ventral to their position, then compensation must occur by increase of the ventral curve of both the lumbar and cervical regions, and increase of the dorsal curve in the thoracic region.

These statements will be sufficient to illustrate the compensation necessitated by ventral positions of the gravity line. We will now revert to dorsal positions of the gravity line.

If the heads of the fibulae are dorsal to their position, the gravity line will be thrown dorsal to its position where it strikes the trunk, necessitating increase of the pelvic and cervical ventrality and increase of the thoracic dorsality.

If the great trochanters are dorsal to their position, there will be decrease of the lumbar curve, the thoracic curve, and the cervical curve.

If the heads of the femurs are dorsal to their position, the lumbar and cervical curves will be increased, while the thoracic curve will be decreased.

If the ischial tuberosities are dorsal to their position, there will be a necessary increase in the lumbar and cervical curves, and the dorsal curve.

If the iliac portions of the innominate bones are dorsal to their position, there will be a lessening of the lumbar, thoracic, and cervical curves, and the same is true in a marked degree if the innominates are dorsal to their position as an entirety.

These statements will be sufficient to illustrate dorsal placing of the gravity line from its position. We shall now revert to a discussion of the position of the sacrum, which will be followed by an analysis of the complexities that arise out of the relationships already stated, and those that are to be stated in connection with the sacrum.

If the sacrum is ventral as an entirety it will cause compensation that will reduce the lumbar and cervical curves and increase the thoracic.

If the sacrum is displaced dorsally as an entirety, it will have the effect of kyphosing the lumbar curve and straightening the remainder of the column.

If the base of the sacrum is ventral to its position, it will increase all of the curves in the column.

If the apex of the sacrum is ventral to its position, it will decrease the curves in the lumbar and cervical regions and increase the thoracic curve.

If the apex of the sacrum is dorsal to its position, it will increase the curves in the lumbar and cervical area and not change or will decrease the thoracic curve depending on amount of displacement.

The student will understand that all of the statements made in regard to the sacrum so far are based upon the thought of the innominate bones occupying the positions which they should occupy.

Complexities occurring out of these conditions unless fully understood sometimes seem to vary the statements so far made, but when they do an investigation of the oblique complexities will solve the problem.

The statements made will be sufficient to illustrate ventral and dorsal compensation as it relates to the sacrum, and we now turn to the subject of oblique compensation.

If the base or weight carrying part relative to the base on one side is carried ventral, the body must compensate by four opponent twists in opposite directions, equal to the primary failure of relation.

If will be seen that there are two characters of twisting compensations to keep carefully in mind, the first of which is compensatory twists that occur from bases that are in the same horizontal plane, and second, compensation from bases that are in different horizontal planes. These characters will be immediately illustrated.

The legs being the same length, if one fibula is dorsal to the other, four twists to compensate therefor are thrown upon the entire body, and notwithstanding the fact that the weight-carrying bases are in the same horizontal plane, the compensatory twists as they go headward will slightly increase in obliquity with the distance from the base.

A twist in the reverse direction would be produced in the same manner if the head of the fibula on one side was ventral to its position.

If the great trochanter on one side is dorsal to its position, the gravity base on that side will be dorsal to its position and dorsal to the other side, and the same character of twisting compensation will ensue that was illustrated in the preceding paragraph.

The reverse compensation would occur as a result of the great trochanter on the one side being carried ventral to its position. These illustrations are true in the same manner of the head of the femur.

If, for instance, the left innominate bone is ventral as an entirety, the right one remaining in situ, the left side of the sacrum will be carried ventral with the left innominate, thus twisting the ventral aspect of the sacrum to the right, together with the fifth and fourth lumbars, and four twisting compensations, with the bases in the same horizontal plane will ensue, and again the lengths of the compensatory twists will increase with the distance from the bases.

The same compensations in the opposite direction will ensue if the right innominate bone for instance is dorsal to its position as an entirety, thus carrying the right side of the sacrum dorsal with it, and the same as formerly illustrated would occur if the right innominate were ventral as an entirety.

If the sacrum is rotated in its relation with the innominate bones so that one side is ventral and the other dorsal, twisting compensation must ensue throughout the length of the column, but because of the narrowness of the base compelling compensation, the four compensatory twists will occur in substantially the same horizontal plane.

The illustrations given complete the analysis as to basic changes in the same horizontal planes. In other words, complete the first division of oblique compensation.

We now revert to the illustration of the oblique compensation that occurs where the bases are not in the same horizontal plane.

It will be seen that these occur in all the illustrations which have already been given where a base or weight-carrying aspect upon one side is lower or higher than the other, while at the same time the co-ordinating base or weight-carrying center is ventral or dorsal in its relation to the gravity line. A few illustrations will be sufficient to make this proposition clear.

If the necks of the femurs are of a different angle so as to give the effect of a short leg on one side, the body will be thrown toward the side of the apparent short leg.

Now if at the same time one of the innominates is ventral or dorsal to the other, not only lateral compensation will be necessitated, but ventro-dorsal compensation at the same time, and the combination of these produce oblique compensation, primarily toward the short leg, and relatively in such oblique direction as will restore equilibrium to the superimposed structure.

Again, if, for instance, the right innominate is headward in its relation with the sacrum and incidentally to the left innominate, the apparent situation of a short leg on the right side will have been produced.

If at the same time the crest of the left innominate is ventral, the body will careen to the right and will also twist primarily to the right ventro-obliquely, and then to the left dorso-obliquely, and then again to the right ventro-obliquely, and then to the left dorso-obliquely, completing the compensation by the rotation of the atlas to the left in its relation with the axis.

The student will observe that each of the statements will be identically the same in the converse of the statement, and therefore direct illustration is not necessary, especially since all of these matters must again be detailed in that part of this book devoted to an analysis of relatology.

In closing this chapter I feel constrained to say that at least ninety per cent of compensation that occurs in the human body is oblique, and fully seventy per cent illustrates the second variety or springs from the weight-carrying parts or bases being in different horizontal planes, as well as structures of the same type being in different coronal planes; these planes, of course, figured from the erect posture.

All twisting compensations from the base or from weight-carrying aspects below the base produce four alternating twists in opposite directions. For instance, to the right, to the left, to the right, to the left, or if the base is primarily turned the opposite way, to the left, to the right, to the left, and to the right again.

However, it must be stated that fully ninety per cent of all twisting compensations begin by turning to the right.

CHAPTER XXXI

ANALYSIS OF VERTEBRAL COLUMN

The vertebral column will be analyzed from the standpoint of the person being in the erect posture, for it will be understood that even though the examination, which is to form the basis of the analysis, is made with the body lying upon the venter, yet, the analysis will be made from the standpoint of the effects of gravitation, from the erect posture as the same will be found impressed upon the tissues and revealed by them.

As a beginning consideration the vertebral column as such, figured from the standpoint of the analysis of compensation, as given in the preceding chapter, has for its base the lumbar aspect or promontory of the sacrum, and in that circumscribed sense will be conceived as resting upon the intervertebral cartilaginous disc between the fifth lumbar vertebra and the sacrum, the relation being maintained by ligaments and muscles.

However, the student must not let this proposition deceive him, nor at this place wander from the fact. The truth is that the sacrum is the basic segment of the vertebral column, and that the articular surfaces of the ilia are the dual bases of the column.

The student must understand that we begin with the lumbo-sacral relation, as a base for the vertebral column in this chapter, simply because the analysis of compensation has covered and dealt with the first segment of the column, to-wit, the sacrum.

The condition of the intervertebral segment between the sacrum and the fifth lumbar vertebra, by reason of the fact that it is attached feetwardly to the promontory or base of the sacrum, and headwardly to the fifth lumbar, causes it to control to a certain extent the position of the fifth lumbar in its relation to the sacrum. Control would be complete but for cartilaginous distortion.

To be exact about it, the intervertebral cartilage mentioned would absolutely control the position of the fifth lumbar, if it were not for the fact that the disc may be changed as to its shape both temporarily and permanently, and to the extent of this adaptation it does not control the position of the fifth lumbar.

What has been said as to the intervertebral segment between the sacrum and the fifth lumbar is precisely true of the intervertebral segment between the fifth and fourth lumbar vertebrae.

The intervertebral cartilaginous segments exercise the same relative influence upon the position and relation of each superimposed vertebra throughout the entire column, to and including the body of the axis.

Having understood the statement in the last paragraph, the student is likely to reach the conclusion that if the compensatory influences up to the base of the sacrum are such as to turn the venter of the sacrum to the right, that, therefore, the venter of each superimposed vertebra will also be turned to the right, and he will also see in this connection that if that conception were true that by the time the axis is reached it would be facing the right or left.

He is here definitely informed that such is not the case, and that it is the present purpose to understand why that is not true.

At this juncture we learn the very important lesson that it will not do to study the vertebral column as an individual and separate construction, but that the vertebral column must be studied definitely and in detail from the standpoint of its segments and their relationship, and then from the standpoint of its relationship to all other structures of the body or organism, and the influences the same cast upon it.

The student must understand at this juncture that the vertebral column sustains a direct and controlling relation to each other part of the whole organism, and then he must not fail to add to that the converse proposition, which is, that each part of the entire organism exercises a direct relative influence upon each part of the vertebral column.

The proposition stated is now going to be explained, and for that purpose the first tissues taken into consideration are the intervertebral cartilages, next the ventral and dorsal longitudinal ligaments of the vertebral column, next the ligamenta subflava, next the intertransverse and interspinous ligaments, then the immediate musculature of the vertebral column, then incidentally the spreading ilia and the ischial tuberosities, then the floating ribs, true ribs, costo-sternal cartilages, sternum, clavicles, and scapulae, and in connection with these the muscles extending relatively from the vertebral column and attaching to various osseous structures.

It is not doing violence to the subject to conclude that the human organism was made for use in its upright position, and was constructed to meet with the incidental contingencies of the environment in which it was intended to function, and from this basis we have the remarkable situation presented in the succeeding paragraphs.

Assume that the person is standing erect. An object obliquely leaving the ground sufficiently near his feet to strike the buttock, will be resisted from the tuberosities toward the spines of the ilia, thence out through the soft muscular body to the ensiform attachment of the diaphragm, and will be definitely resisted by the diaphragm, the feetward intercostal muscles, and the headward muscles of the parietes of the abdomen.

If, however, the object rises near the feet, sufficiently vertical to miss the buttock, it will not strike upon the superimposed body.

If an object rises far enough dorsal to the feet, and takes an oblique line which passes the buttock, it will not strike the body until it reaches that portion of the column which is extending obliquely dorsalward from the depth of the lumbar curve; to be exact, not before it has reached the spine of the second lumbar vertebra, and the segments immediately headward thereto.

If the impact from the object occurs at the second lumbar spine the muscles of opponent resistance will be basicly the diaphragm, because the area of contact is directly dorsal to the crura and tendon of the diaphragm.

The force of the impact will, therefore, be directed as the string of a bow from the base of the diaphragm to a point about two inches headward from the ensiform attachment thereof.

The force will, therefore, be resisted peculiarly by the diaphragm and relatively by the headward aspect of the abdominal muscles, but more definitely by the intercostal muscles relative to the diaphragm.

If an object in its ascent is directed sufficiently dorsalward to pass the area of the dorsal curve, or in other words, does not strike upon the body until the gibbosity of the thoracic column has been reached, it will deliver no impact to the trunk whatever, but will pass upward, striking the base of the skull at the neck, and this impact will be peculiarly resisted by the sterno-cleido-mastoid muscles, and those which act accessory thereto, that is the longus colli, the scalenus medius, and ventricus, etc.

Of course, if an object should go far enough dorsalward to strike the rotundity of the occiput, it will either be reflected, or the occiput will be forced ventralward to let it pass.

The student will observe that in the several paragraphs coming headward, the thought has been entirely directed to the subject of opponent resistance.

It will be seen that in each instance the structures of immediate resistance will be the intrinsic tissues of the vertebral column itself and those muscles, either having origin from or insertion into the vertebral column, and hence the muscles that play over the column or relative to it in their normal conduct.

Now take the proposition in the reverse order, and go feetward down the column, giving consideration only to the tissues of opponent resistance.

If an object falls upon the head, it will be resisted by the muscles of the venter and dorsum in equilibrium, but if the object passes far enough dorsalward to miss the occiput, and is going obliquely, it may strike upon the base of the neck or the cervico-thoracic area, and if it does, it will center its force somewhere from the sixth cervical to the fourth thoracic spine.

The musculature of resistance to such an impact is that centered around the manubrium, continuing down a little further than the middle of the sternum, including the muscles of the chest and intercostal muscles of the area directly, and the diaphragm incidentally, for it must be remembered that any impact upon the trunk is incidentally resisted by the diaphragm.

If an object passes sufficiently horizontal to strike directly upon the gibbosity of the thorax, presuming that to be on a level with the fifth thoracic spine, then the resistance to the impact will be at the middle of the gladiolus, and will include all of the chest muscles, and intercostal muscles headward from that point; the chest and intercostal muscles and headward abdominal muscles and diaphragm feetward from that point.

The two sets of opponent musculatures described exactly balance each other in their resistance to impact, and this is the only place in the human anatomy mechanically constructed in that way.

If a descending object is following a line sufficiently oblique to pass the gibbosity of the thorax, and still to strike the body, it will not strike it until it reaches the dorsally directed lumbar curve; to be exact, at the third lumbar spine and those immediately succeeding thereto.

The impact will be upon the third, fourth, or fifth lumbar area or altogether, and will be resisted by the feetward muscles of the abdomen and the first third of all of the muscles on the ventral aspect of the thighs, peculiarly those that have origin relative to the ventral spines of the ilia. The exact center of resistance being determined from the place and line of impact.

If an object in its descent goes far enough dorsal to miss the ischial tuberosities, it will not strike upon the body unless perhaps upon the lower extremities, and the muscular arrangement there is sufficiently known without further reference, but to say, that such impact would be resisted by the extensors of the legs and flexors of the thighs.

The resistants so far pointed out, while peculiarly opponent in their nature, nevertheless are based upon the thought of the immediate resistance, as has been hinted in the preceding paragraphs. The resistances indicated have been ventro-dorsal. To complete the thought attention must now be turned to the venter of the body.

If an object leaves the ground sufficiently oblique to strike the trunk at the pubis or the feetward part of the abdomen, it will be resisted by the musculatures of the headward portion of the buttock, and the feetward aspect of the lumbar region; the musculature, to be exact, from the third lumbar down to the gibbosity of the sacrum.

If an object should pass the ventral rotundity of the abdomen, the next place it would strike would be relative to the epigastric region. The impact would be resisted incidentally by the diaphragm as a bow, the ribs, and the intercostal muscles, and the muscles of the dorsum from the gibbosity of the thorax to about the third thoracic vertebra, depending, of course, upon the place of impact and the direction of force.

If the object struck the sternum, the impact would be resisted by the musculature from the third thoracic to the fourth cervical vertebra, of course, including the intercostal muscles of this whole area and the muscles of the subscapular areas.

If the object passed the manubrium its next point of impact would be upon the mandible or ventral aspect of the neck, which would be resisted generally speaking by the muscles at the base of the skull, and incidentally the scaleni and the sterno-cleido-mastoid muscles.

Reversing the analysis and going feetward, if the object passes sufficiently ventral to miss the face, going vertical, it would not strike the body at all; but if it were going sufficiently oblique its next point of impact would be at the manubrium and from that point down to the gibbosity of the thorax.

Such impact would be resisted by the muscles of the dorsum below the thoracic gibbosity down to and including the area of the second lumbar spine, again including the diaphragm as a bow, and the relative intercostal muscles; the exact center of resistance being determined by the place of impact, and the exact direction of force.

If the object passed the gibbosity of the thorax, the next point of impact would be the rotundity of the abdomen, the resistants would be the musculatures of the glutea, and the pelvic diaphragm, and incidentally, of course, the abdominal muscles of the area relative to the dorsum.

If the object should pass the rotundity of the abdomen, it would not again strike the body unless upon the thighs, the resistance here not being necessary to state, because sufficiently patent to the understanding of all.

Just at this point it will occur to the student that we have discussed the situation so far solely from the idea of the body being an unilateral structure. Therefore, he must now recall the fact that the body from the standpoint of its equilibrium is a bilateral structure, the vertebral column being the median axis thereof, and, since the vertebral column has breadth, it is not only a median axis, but it furnishes a bilateral aspect that must be definitely taken into consideration at all times.

The bilateral aspects of the column are peculiarly presented by the transverse processes to which, and relative to which, structures have origin and insertion, that extend away from the column to other attachments.

In connection with this thought the spinous processes also present bilateral influences, because the musculatures attached to them are inserted relatively, and exercise lateral influences in both directions.

In connection with the fundamental proposition laid down, it must also be remembered that on the venter of the trunk, the pubic symphysis, the rectus abdominus muscles with their aponeuroses, and the sternum really constitute a ventral column not inanalogous to the vertebral column; for throughout the whole length of this area these structures form origins and insertions for relative structures that exercise a bilateral influence upon equilibrium.

From what has been said, then, it will be seen that we have not finished the analysis until we have definitely pointed out the influences cast upon the vertebral column from these bilateral and relative aspects.

The laws laid down so far would be entirely sufficient if the influences cast upon the vertebral column were always dorso-ventral or ventro-dorsal.

We are now to consider lateral resistance, uninfluenced by abnormal structures.

If, then, an object strikes the left ischial tuberosity at the lateral, mesial line, it will be resisted by the feetward portion of the abdominal muscles and headward muscles of the opposite thigh primarily, and relatively by the intercostal muscles of the feetward thoracic area on the same side, with the accessory resistance of the diaphragm.

If, however, the object should pass the great trochanter it would not strike the trunk until the bulging costal area of the feetward portion of the left thorax, in which event it would be resisted by the musculatures of the right headward thorax, those of the scapula and the subscapular and subclavicular regions, and again incidentally by the right aspect of the diaphragm.

If the force should strike the trunk higher up, the impact would be relative to the left axilla and the resistance would be by the muscles of the right side of the neck and the headward aspect of the right shoulder near the neck.

To reverse the thought and go feetward; if the object struck upon the right shoulder near the neck, the resistants would be the intercostal and chest muscles of the left side, those of the walls of the axilla, the lower subscapular, and incidentally the diaphragm.

If the object missed the shoulder the impact would be upon the bulging aspect of the lateral right chest, and would be definitely resisted by the diaphragm as a bow, and by the headward lumbar and abdominal muscles of the left side.

If the object missed the point named, the next point of impact would be below the waist at the bulging aspect of the body relative to the headward aspect of the right ilium, in which event the resistance would be the feetward thigh and gluteal muscles of the opposite side.

So far we have accounted for the dorso-ventral and ventro-dorsal resistance, and the lateral oblique resistance.

In the lateral aspect we have not discussed direct impacts, and those need not take our attention, since they do not aid us in the relating analysis, in which the important feature is oblique resistances.

It will be seen from what has been said that if the object should strike upon the left hip in its dorso-lateral aspect, the impact would be carried obliquely headward, and to the right, and would therefore be resisted by the lower feetward abdominal muscles of that side, and the headward musculature of the thigh, which impact would be again obliquely resisted by the ventro-lateral musculatures of the left side relative to the bulging of the thorax at about the ninth rib, which would include the intercostal muscles of that area, and definitely the diaphragm on that side. This impact would be definitely resisted by the ventro-lateral musculatures of the right headward thorax relative to the shoulder, which would again be resisted by the left ventro-lateral musculatures of the neck.

Without going into the minute details, a force striking the left aspect of the neck would be resisted through the same zig-zag course to the gravity base of the body.

Of course the same thing would be true if an object should strike the body at any of the intermediate points, for instance, at the bulge of the left ventro-lateral thorax, the resistance from there on would be the same as already described. This would be true no matter at what point the oblique impact should occur.

The student will observe that in analyzing the vertebral column his most difficult and intricate solutions will be those that involve oblique impact upon the body, because in solving the effect of oblique impact he must always take into consideration ventro-dorsal and lateral resistances, and he will find that the line of resistance will always be a point agreeable to both, and intermediate between both of these resistances.

The author is aware that the analysis just given may seem formidable to the beginner, but the student is encouraged to understand that when he has completed his anatomic information, his knowledge of mechanics and physics, as well as the geometry of Chiropractic, these statements will resolve themselves into great simplicity.

CHAPTER XXXII

EFFECT OF RESISTANCE UPON COMPENSATION

The statements in the preceding chapter have by well-defined steps brought the student to a comprehension of the peculiar and definite muscular construction for the purpose of immediate and opponent resistance.

No mention was made in that chapter of the fact that immediate resistance, at the point of contact of an object to the body and opponent resistance to an impact, had anything to do with compensation. But all the statements were merely directed to the fundamental thought of resistance.

The student must now understand that all of the propositions laid down in chapters XXX and XXXI must be carried in mind, and used to explain and to assist in understanding what is definitely stated in this chapter.

This chapter is basicly and fundamentally directed to the thought of equilibrium. Equilibrium is maintained by equality of resistance, and support in all parts of the organism.

In this connection it must not be overlooked that in order to maintain equilibrium, multifold compensations of a most peculiar, intricate, and complex nature frequently take place.

Of course, when discussing the subject of equilibrium the thought is directed primarily to ponderability, and the ponderable area without compensating influences is as great as the circumference of the most extensive portion of the body under consideration.

To illustrate the last proposition: If the object discussed is a man, and his greatest circumference is around the shoulders, chest, and dorsum, and if there are no hindering influences upon gravitation, the scope of gravity will be an area of the same size marked off on the horizontal plane upon which the man stands.

The most superficial observer knows that such, however, is not the case, but that the scope of gravitation is converged through the application of muscular structures, so that the whole area is borne upon the feet.

This could not be accomplished if it were not for the fact that the musculatures are arranged into immediate and opponent resistants, so that the gravity of the body is centered and circumscribed to the feet.

The same character of influence obtains throughout the whole of the superimposed body. There are two feet, two legs, two thighs, and two innominate bones which converge at the sacrum to one bone.

In a sense the centers of gravity up to the sacrum are dual, and at the sacrum they unite, and up to the headward surface of the body of the axis, there is but one gravity center. At this point it again divides, represented by the condyles of the occiput.

It has already been stated that differences in lengths of the feet, legs, thighs, or innominates throw the body out of equilibrium toward the short side.

If the body was incapable of muscular compensation, and it was six feet tall, and by reason of short members on one side, no matter which, it was shorter by one inch, and the transverse across the horizontal plane of the feet was ten inches, then the head would be thrown out of equilibrium toward the short side 7.2 inches.

The result indicated in the preceding paragraph does not occur. The head remains in equilibrium, and the way it is maintained in that position is by compensations throughout the length of the trunk accomplished by means of muscular action.

Little or no muscular compensation can take place up to the acetabula, because the lines of gravity are dual, but by convergence through the innominates and sacrum of the lines of gravity, compensatory influences are cast upon the trunk by the relative musculatures.

However, the chief compensations are made by the muscles that have origin from or insertion into the vertebral column. This is permitted because the gravity center is single, and constantly exercises definite relationship to the mesial plane of the body.

To make the last proposition perfectly clear, in the normal, the axis of gravitation in the trunk is in the mesial plane of the body, but when for any reason compensation either dorso-ventrally or laterally is necessary, the gravity line diverges from the mesial plane.

The divergence from the mesial plane is always greater where lateral compensation is necessitated, but it occurs when only dorso-ventral compensation is necessitated, because the musculatures, as described, are not directly dorso-ventral from each other, the opponents being at a different level from the muscles of immediate resistance.

In a definite, specific case, where all that is required is dorso-ventral compensation, the divergence lateralward is very slight.

It is in oblique compensation, in which both lateral and dorso-ventral compensation is necessitated, that the divergence of the gravity line from the mesial plane is greatest.

It must be kept in mind that practically all compensation in the human body is of the oblique type, and this is true, because the weight-bearing structures are substantially always out of both the horizontal and transverse or coronal planes. These situations necessitate oblique compensation, and they are the type nearly always found in practical experience.

In order that the student may properly understand the propositions now to be announced, he must recall anatomy and remember that musculatures of immediate dorsal resistance are placed upon, attached to, and are relative to the vertebral column.

That is to say, such muscles are applied to the dorsal aspect of the vertebral column, and to the arches of the vertebrae and not to the bodies, there being no muscle on the ventral aspect of the vertebral column except some attenuated structures in the cervical region.

The muscles of ventral resistance are on the other side of the splanchnic cavity from those of immediate resistance and these musculatures are bilateral in their application. In addition the muscles of directly lateral resistance must be kept in mind.

If the area of origin or attachment of musculatures of immediate resistance is moved ventral to its normal position, it releases dorso-lateral resistance, and releasing dorso-lateral resistance permits the vertebral column to lean ventro-lateral in the opposite direction, which rotates its ventral aspect away from the holding area.

The situation outlined causes the musculatures of immediate resistance on the opposite side to pull too much dorso-laterally, thus still further turning the column in the direction already indicated.

In such a situation, in order that the superimposed body may be held in equilibrium, the column must be turned back toward the side from which it leaned and rotated, and the turning back to equilibrium must be accomplished by a direct muscular process on the opposite side.

In order that an illustration may be carried in the student's mind, conceive that it is the crest of the left innominate that is ventral to its position. Then the muscles and ligaments of the left side are not sufficiently taut to oppose those directly across on the right side, because they are ventral with the bone, which causes their opponents of the other side to hold dorsalward.

In the situation stated in order to remain in equilibrium the intercostal musculature of the left thorax and diaphragm will have to hypertonicize to rotate the trunk back to the left and dorsally, and this will cause the tissues, on the right side, attached to the spines and transverse processes from about the second lumbar to the eighth thoracic to hold the spinous processes in alignment, compelling the ventral aspects of those vertebrae to rotate divergingly to the left.

The situation last described requires that the headward thorax shall be carried back to the right and dorsally, otherwise equilibrium would be lost to the left by the superimposed body. So there will be tonicis of the intercostal muscles of the right side, and all of the muscles of the dorsum of that area, which is usually from the sixth thoracic to the first, pulling the ribs of that area dorsalward, increasing their primary angles.

This compensative pull of the musculature to the right to restore equilibrium relaxes the deep musculature of the same level on the left dorsum. From about the level of the sixth thoracic spine headwardly to a level with the first, the superficial musculatures will be hypertonicized, as will that of the left shoulder, the effect of which is to turn the ventral aspects of the fifth, fourth, third, and second thoracic vertebrae to the right, while their spines remain in alignment.

Between the two tonicized areas, and extending obliquely across the body from a point about three inches to the left of the eleventh thoracic, obliquely toward the right shoulder to the level of the fifth spine, there is a rigid area which causes the retraction of the ribs on the right side of the sternum with increased convexity just below the axilla, while in the same region on the opposite side, the ribs will be flattened or their convexity lost and their sternal aspects protruded ventrally.

The rotation just described has the effect of leaning the cervical region to the right and rotating its ventral aspect to the right. In order that equilibrium may be restored, the cervical region must be muscularly bent back to the left, and must be muscularly rotated ventrally left.

Here again the musculatures are attached to the transverse and spinous processes, and in the muscular effort to bend the neck to the left and rotate it dorsally, the muscles attached to the left base of the cervical aspect from the thorax are hypertonicized, while their fellows on the right side are relaxed.

The muscular effort bends the neck at the base to the left and dorsally, which has the effect of throwing the head in that direction, so the musculatures to the right, from being less than normally tonicized at the base of the neck, increase in tone, reaching hypertonicis at the fifth cervical, which increases to the second.

This has the effect of bending the headward cervical region to the right from the fourth, but does not serve to bring the ventral median line of the column to the gravity center by the time the axis is reached.

Therefore, in order that the head shall poise over the gravity center, the atlas must be rotated by its dorsal aspect to the left, which means that its ventral aspect looks to the right, thus bringing the left transverse too near the left mastoid, while the right transverse is too far dorsal from the right mastoid.

The illustration would, of course, be the same, only in the directly reverse in every particular if it were the right basic muscular area that was carried ventral instead of the left.

To conclude these illustrations, it is only necessary to say that if the right innominate is headward the right muscular base is, by virtue thereof, carried headward, producing the same characteristic rotations that have just been described, starting with the relaxation of the musculature extending from the base on the right side, thus hypertonicizing the fellow muscles on the left side, and setting in motion the same compensatory rotations already illustrated.

In concluding this chapter, the student must remember that the diaphragm exercises a remarkable influence upon equilibrium, and basicly compels a change in the shape of the whole thorax to comport with the necessities of maintaining equilibrium of the body.

It is because of this fact that in maintaining equilibrium the angularity and rotundity of the rib areas are so remarkably affected.

It is from the effect of diaphragmatic action in maintaining equilibrium that the body is thinned dorso-ventrally in so many cases, and in other cases is so markedly increased in diameter dorso-ventrally, and thinned laterally.

These trunk distortions are changes made in order to accomplish the comprehensions necessary to maintain equilibrium, and always revert for their explanation to the bases of muscular influence in sustaining the superimposed body, and, therefore, relate particularly to the weight-carrying centers, which are also the bases of attachment of muscles that secure and maintain erection of the trunk.

CHAPTER XXXIII

VISCERAL COMPENSATION

The statements made in this chapter are based upon all of those made in this book previous hereto. It is, therefore, not necessary to make any recapitulation or to direct the student's attention further than already indicated.

For the purpose of this chapter the structural relationships already indicated will be used for the basis of discussion. However, the student will at this time revert to the feetward aspect of the trunk to begin his analysis of visceral compensation.

If the sacrum as an entirety is dorsal to its normal position the pelvic viscera that relate to it, that is to say, in the male, the rectum, seminal vesicles, prostate gland, and bladder; and in the female the rectum, vagina, uterus, and bladder, will occupy a position too far dorsalward in exact ratio with the dorsality of the sacrum.

In connection with the statement in the last paragraph, it should be explained that the tissues referred to that are in immediate relation with the sacrum, that is, the rectum in each case, will be more definitely dorsal, for it will immediately follow the sacrum, and those structures next related will be tractioned or, in other words, will have abnormal tension upon them in the dorso-ventral aspect.

These structures, it will be remembered, are the seminal vesicles and the prostate glands of the male, and the vagina and uterus of the female, while the tissues lying further away will not be so definitely affected, and yet will be analogously affected in the same manner.

However, the statements made in the last paragraph should have this explanation: that the tissues more ventral from the surface will, by virtue of extending over a longer distance than normal, receive a greater pressure from the superposed viscera, which constantly tends to prolapsus of the structures mentioned, including in the male the seminal vesicles, prostate gland, and bladder, and in the female, the vagina, uterus, and the bladder.

In each case there will be an unusual pressure of these structures dorsalward, impinging upon the ventral wall of the rectum, and projecting unusual pressure upon the pelvic diaphragm.

If the sacrum is too far ventral in its relationship with the innominates, that situation will carry the tissues immediately ventral to the sacrum too far ventral.

That is to say, the rectum, seminal vesicles, and prostate of the male, and the rectum, vagina, and uterus of the female will, in each instance, be pressed against the ventral pelvic wall, enforcing a lessened capacity of each of these, and an unusual pressure head-ventral, and feet-dorsal, having the effect of holding the headward viscera on a higher level than usual, and placing a heavier pressure upon the pelvic diaphragm.

If the sacrum is dorsal to its position, and is rotated, that is, turned upon its axis, the viscera ventral to it will be turned toward the side to which the ventral aspect of the sacrum is turned, while the viscera on the other side of the sacrum will be permitted to fall dorso-lateral to its position, and this change will be incident to all of the pelvic viscera on that side to the ventral wall of the pelvis.

If the sacrum is ventral to its position, and is rotated, that is turned upon its axis, the same situation will be true that has just been stated. That is, there will be compression of the pelvic viscera dorso-ventrally, and in addition thereto it will be turned toward that side of the pelvis toward which the ventral surface of the sacrum is turned, with other pressures as before stated.

If the sacrum is not dorsal nor ventral to its position, but is turned upon its axis, that is rotated, the pelvic viscera will nevertheless be turned toward, and compressed to the side toward which the ventral surface of the sacrum is turned. It will be seen that this compensation does not have so extensive nor aggravating an effect as those already given.

If one of the innominate bones is ventral as an entirety to its position it will necessitate the viscera in the iliac fossa being carried ventral to its position, and mesial or lateral, depending upon whether the innominate in question is rotated by its ventral spine mesial or lateral.

If an innominate is dorsal as an entirety to its position, the viscera related to it will be carried dorsal to its position, twisting the relative viscera of the pelvis in that direction, and tractioning upon it, and permitting a descent of the superposed abdominal viscera feet-dorsally.

If the crest of an innominate is ventral to its position, while the tuberosity is in the same degree dorsal, the viscera related to the iliac portion of the innominate will be forced ventral to its position, while that deep in the pelvis, related to the ischial portion of the innominate, will be forced dorsal to its position.

This situation will necessitate a compression of the deep pelvic viscera to that side, while the iliac portion of the innominate will enforce a compression of the viscera toward the opposite side of the pelvis.

If the crest of an innominate is dorsal to its position, while the tuberosity is in the same ratio ventral, the reverse of the situation of the last paragraph will be found.

In such a situation viscera related to the ischial portion of the innominate will be forced ventral to its position, and will be pressed to the other side of the pelvis, while the viscera related to the iliac portion of the innominate will be dorsal to its position impelling a compression of the whole pelvic viscera toward it, and also an added gravitation from the superposed abdominal viscera.

The conditions illustrated in the last several paragraphs will be intensified in the direction already given, if in addition to the situations outlined, the innominate is rotated in either direction; that is, if the tuberosity is rotated mesial while the ventral spine is rotated lateral, there will be a marked compression of the deep pelvic viscera to the side away from the mesially rotated tuberosity, while the intensity of the lateral compression of the viscera in the iliac fossa will be increased in ratio with the rotation of the innominate.

And, of course, if the tuberosity is rotated laterally, while the ventral spine is rotated mesially, then the deep pelvic viscera will be severely tractioned toward the lateral tuberosity, while the iliac viscera will be compressed toward the iliac fossa of the other side.

In this connection, it should be stated that in displacement of the innominate ventrally or dorsally as an entirety, the sacrum usually follows the innominate. It does not always do so, but in a great majority of cases it does.

In cases where the iliac portion of the innominate is ventral to its position the related aspect of the sacrum usually follows that portion of the innominate. However, that is not always true.

The further facts with regard to this phase will be explained in connection with the pathology of displacement.

If the lumbar curve of the vertebral column is increased, it is lengthened in ratio upon the ventral aspect, and decreased in length in ratio on the dorsal aspect; pathology being equal on both aspects.

The situation referred to in the preceding paragraph requires a thickening of the intervertebral cartilages over the ventral aspect and thinning of the same over the dorsal aspect of the whole lumbar curve.

This makes it necessary for the visceral nerve trunks (heretofore known as the sympathetic nerve) to extend over a longer distance than normal, and they are occluded by the process of traction.

It also requires that the descending eleventh and twelfth thoracic nerve trunks, and the first and second lumbar trunks shall extend throughout a longer distance to reach the tissues of their supply, while the third and fourth pairs of lumbar trunks will not have to reach so far, but these will be pressed more tightly against the viscera than they should be, and this will also be true of the fifth lumbar, and perhaps the first sacral trunks, which on account of rigid confines will be more affected.

The twelfth thoracic and headward four lumbar trunks extend through the psoas magnus muscles and will be compressed by the increased pressure of the muscles against the abdominal viscera.

Not only will the statement made be true, but there will be an increased pressure upon the visceral nerve trunks for the same reason, in ratio with the increase of the lumbar curve, and this increased pressure will apply itself distinctly to the solar ganglionic plexus, for it will be remembered that it lies directly ventral to the first and second lumbar vertebrae.

The dorsal wall of the abdomen will be carried forward with the lumbar column, bearing upon it the structures already mentioned, and will compress them against the viscera directly ventral thereto, which it will be remembered, are the kidneys, suprarenal capsules, ureters, flexures of the colon, transverse colon, duodenum, pancreas, feetward aspect of the spleen, the liver and stomach, and headward aspect of the small intestines generally.

These viscera will be crowded forward toward the ventral abdominal wall, while the abdominal cavity over this area will be thinned dorso-ventrally in ratio with the increase of curve, and increased laterally in the same ratio.

The changes described will have a tendency to distend the domes of the diaphragm laterally and decrease the diaphragmatic spread dorso-ventrally, and to thus raise the lungs headward to their position.

Unless the increase of curve is marked, this effect will not be great, but in such a situation there will be a pronounced projection of the viscera of the lower abdomen feet-dorsally, which, of course, will vary according to the increase of curve.

If the lumbar curve is decreased, the longitudinal distance on its dorsal aspect will be increased, while the longitudinal distance of the ventral aspect will be decreased, pathology of both aspects being equal. The intervertebral cartilages on the dorsal aspect will be increased in thickness, while those on the ventral aspect will be decreased in the same ratio.

This situation will carry the viscera immediately ventral to the lumbar column, and its relative tissues dorsalward. There will be no traction of the nerve cords involved on the ventral or visceral aspect, but there will be traction of the nerve trunk on the dorsal or somatic aspect, which situation will be discussed elsewhere.

However, in the situation described, the abdominal viscera will be carried dorsal to its position, that part of *it* immediately related to the dorsal wall of the abdomen in ratio with the decrease of lumbar curve. The viscera further away not in the same ratio, because there will be a certain amount of accommodation by traction.

The situation outlined will serve to take the support out from under the superposed ventral viscera, which will produce its feetward displacement. And because the crura of the diaphragm are dorsalward, necessitating a dorsal position of the ventral aspect of the diaphragm, bringing the feetward end of the sternum down and dorsalward, drawing the headward extremity of the rectus abdominus, and relative abdominal musculatures dorsalward, thus weakening the thoracic holding base, and having the effect of producing ptosis of all the abdominal viscera relative to the ventral wall.

This will compress the viscera carried dorsalward by the decreased curve, and will cause the feetward abdominal viscera to gravitate over the crest of the pubes in an appendal manner, increasing pressure at the visceral abdominal rings as well as at the umbilicus. The abdomen will also be thickened dorso-ventrally, and narrowed in its lateral aspect.

The rotations of the lumbar column serve to compress the viscera in the direction toward which the ventral aspect of the column turns and to traction it from the opposite direction.

Fortunately in the compensation of the column, it is seldom, if ever, that the whole lumbar column rotates in the same direction; usually it changes the direction of its rotation at the second or third lumbar.

No discussion of the ventrally increased or dorsally decreased lumbar curve need be suggested in connection with the thought of rotation just given, for they have been explained in connection with the rotations of the sacrum with which rotational effects here are analogously similar.

If the thoracic curve is increased, the longitudinal distance along its dorsal aspect will be increased, and the longitudinal distance along its ventral aspect will be decreased, and with pathology of each aspect equal, these will occur in ratio with the increase of curve.

The arch of the dorsal thoracic curve will also be increased in ratio with the increase of curve, thus carrying the dorsal thoracic wall in the form of an increasing arch dorsalward in ratio with the increase of curve, thus approximating the headward and feetward aspects of the thorax.

In other words, the inlet of the thorax at the vertebral aspect will be nearer in a straight line to the diaphragmatic attachment to the twelfth thoracic vertebra, which distance will be decreased in ratio with the increase of the curve.

Viscera relative to the middle of the dorsal curve will be carried dorsalward in ratio with the increased curve, as will that relatively headward and feetward from that area. And, while that is true, the viscera in relation with the headward and feetward aspects of the thorax, will be approximated and compressed obliquely ventralward in each instance.

This last situation, however, is somewhat ameliorated by the fact that the sternum, pathology being equal, is always in ratio curved ventrally with the increased dorsal curvature, which fact permits the head, ventral thoracic viscera to be released from compression by assuming a more feetward position, which, however, increases the lateral compression and traction of its structures.

It will be observed in connection with the statements last made that the situation will increase the dorso-ventral distance of the diaphragm, while its lateral spread will be equally decreased, as will also the curvature of the ribs, so that while the thorax is increased dorso-ventrally in depth, it will in ratio be decreased laterally, thus compressing the viscera in the lateral aspécts, while room by traction is given it in the dorso-ventral aspect.

If the thoracic curve is decreased, then its longitudinal distance on the ventral aspect is increased, while that of its dorsal aspect is decreased, and, with pathology equal, the increase and decrease will be equal on both aspects.

The situation results in carrying the dorsal thoracic wall too far ventrally, which is responded to, if pathology is equal, by a dorsality of the sternum in ratio, and an increase in the lateral curvature of the ribs, so that the distance dorso-ventrally of the thorax is decreased in ratio with the lessened thoracic curve, while the lateral aspect of the thorax is increased in ratio therewith. This situation operates to compress the viscera in the dorso-ventral aspect, and to distend it in the lateral aspect.

It will, of course, be seen that the situation just described will lessen the dorso-ventral distance of the diaphragm, and will increase its lateral scope, resulting in its domes occupying a position too far headward, thus decreasing thoracic capacity, and also lessening the power of the diaphragm, because of the approximation of its bases, thus weakening the entire muscular organism.

It will be seen that in the illustration given of increased and decreased thoracic curves, that these situations will also prevail. In the increase of the thoracic curve the visceral nerve trunks will be decreased in their extension, but they will be impinged upon by the compression dorsalward of the viscera.

In the lessening of the thoracic curve, the visceral nerve trunks will be compelled to extend a longer distance, and they will again be compressed or impinged by being pressed too tightly against the thoracic viscera. These situations will be pathologically detailed later on.

Rotations of the thoracic column will be in every sense analogous to those stated with regard to the pelvic viscera, with the exception that in rotation of the thoracic column there is always a more complex compensatory distortion of the thorax than of the pelvis, which situations are more definitely referred to in pathology than here.

However, it should be added in connection with the last statements that if the feetward aspect of the thoracic column is rotated ventrally to the left, then the heads of the ribs of that area will be carried ventral to their position, on the right side, while the heads of the ribs of the left side of the column will be carried dorsal to their position.

This distortion will have the effect of increasing the primary angularity of the ribs over that area on the right side, while it will have the effect of decreasing the angularity of the ribs on the left side. It will also have the effect of causing the relative ribs to distend widely apart on the right side, while it will converge them closely together over the same area on the left side, and this because the longitudinal distance is increased on the right side, while it is decreased over the same area on the left side.

If, as is usual, the headward aspect of the thoracic column compensatorily turns back by its ventral aspect to the right, the heads of the ribs on the right side will be carried dorsal to their position, while their fellows on the opposite side will be carried ventral to their position, thus increasing the primary angularity of the ribs on the right side, and decreasing the primary angularity of their fellows on the left side.

This compensation will produce a dorsal position of the right aspect of the thorax, while it will produce a ventral projection of the left side of the sternum with a protruding of the costo-chrondral aspect of the ribs upon the left side.

These situations must not be left without explaining that many deflections and incidental complexities occur in actual practice, which do not sufficiently follow any definite rule to render them possible of statement in a text like this.

However, the analysis here given will be sufficient to aid the student in analyzing any such peculiar or incidental compensations as are referred to, and the statements here made are sufficiently comprehensive to outline all of the situations that come within definite and rulable conduct.

CHAPTER XXXIV

THE LAW OF BODY CONDUCT

THE body is a unit.

We have been wont from the beginning of human history to speak of the body as an organism, and to talk about the different organs it contains.

In later times it has been the habit of those who have addressed themselves to the human body to not only speak of its organs in a separate and distinct manner, but to indicate that the organs of the body are separate and distinct, and also to talk about its members.

It is perfectly in keeping, if it aids any in human understanding, to indulge the thought that the body is composed of organs, members and parts that act, in a circumscribed sense, independently.

It is true that we may isolate the alimentary canal or digestive system for certain phases of discussion, and to enable us to understand certain things in connection therewith, but the mistake has been made of concluding that the digestive system is a separate part of the body.

The alimentary system is only separate in the light of the narrow fact of digestion, and in that form of discussion, but in every other respect it is inseparably connected, directly and indirectly, with all other parts of the body.

In the first place, the alimentary canal is connected with the nose and ears, and then with structures from the vertebral column throughout its whole length.

It is ramified by nerves contributed from several of the cranial trunks and serially from practically all of the intervertebral nerve trunks.

The alimentary canal portion of the digestive system, being attached to the vertebral column and relative structures of the dorsum by aponeurotic and membranous tissues, sustains a direct relationship to all muscular action in which the vertebral column is in any sense involved, which we have seen is comprehensive of the entire conduct of the organism.

It is impossible, then, that any adverse situation could occur to the nerve system without immediately affecting the digestive system, and it is just as impossible that anything adverse could happen to the digestive apparatus without having its immediate and proportional effect upon the nerve system, and upon the conduct of the nerve system.

Students of the human body do not scrutinize with a sufficient amount of painstaking care, the intimacy and interdependability that exists in conduct between the alimentary canal and the nerve system.

What has been said of the alimentary canal applies equally in proportion to each accessory gland in the digestive system, for these glands have aponeurotic and muscular relationship to the skeletal body, which brings them into harmony of response to the movement of all relative structures, and especially, finally, the conduct of the vertebral column.

The respiratory system is connected with the mouth, nose, ears, and pharynx, and through the feetward aspect of the pharynx, with the esophagus and trachea, and through the medium of membranes with the vertebral column.

The bronchial tubes are connected with the dorsum of the thorax. The lungs sustain a relationship by plural membrane to the mediastinal structures, which have their base from the vertebral column and dorsum of the thorax, and with the whole costal and intercostal thorax in its relation with the vertebral column, by virtue of the relationship of the lungs to the parietal pleura within the plural cavities.

The respiratory system is related to the nerve system through the medium of at least four cranial trunks and contributions through all of the cervical, and generally speaking, most of the thoracic, intervertebral trunks.

It will be seen that no conduct could occur in the respiratory body that does not immediately and in proportion affect the somatic body, not only in its thoracic portion, but relatively and incidentally in all of it, for it is well known that respiration cannot take place without moving definitely each part of the body.

No injury can occur to the nerve system that does not produce a direct effect upon respiration, the direct effect being in ratio with the nearness of nerve ramification, the most marked effect being produced by interference with the nerve system in that part of it that directly ramifies the respiratory system.

It is likewise true that any adverse condition of the respiratory apparatus directly affects the brain and that part of the nerve system that ramifies it, and relatively affects the entire nerve system in the ratio of the remoteness of ramification.

Since the entire raw material supply to the human organism reaches it through the two avenues discussed, the digestive and respiratory, it must be recalled that adverse chemistry entering the body through either of these avenues exercises a directly adverse influence upon the whole organism, by virtue of the fact that these two systems are, through liquid transportation, in immediate connection with all parts of the body.

Of course, those parts of the body that are acting under unusual disability will receive the first and most pronouncedly adverse effects from the introduction of adverse chemistry, and this is also true in the production of adverse chemistry in connection with traumatic injury which primarily affects the digestive or respiratory organs.

It must also be remembered that the introduction of adverse chemistries through either the digestive or respiratory system or both, immediately affects the whole system of liquid transportation and the nerves of supply thereto, and injury to the nerve system produces a direct effect upon the tissues of liquid transportation, and in this manner injures both the respiratory and digestive systems, and incidentally all other tissues of the body.

Having thus introduced the theme with the steps of analysis that have preceded, it is here proper to state that, since the liquid transportation systems are as comprehensive of the animate body as is the nerve system, and that there is a portion of a liquid transportation system supplied with nerves in every part of the animate body, then any interference with the nerves, no matter how slight, will have a direct proportional effect upon liquid transportation, and the reverse; that the introduction of adverse chemistries into the channels of liquid transportation will have an immediate and directly proportional effect upon the nerve system.

The analysis has assumed sufficient breadth at this time, that the attentive student will see that each part of the viscera, including the procreative apparatus, acts in conjunction with each other part of the viscera, and will not be astonished at the announcement that the whole viscera is capable of unit procedure; that is to say, of acting directly and accessorily to the accomplishment of just one object.

To put direct and immediate point to the proposition just stated, no higher illustration of unit visceral procedure can be mentioned than that of the procreative act itself, which requires unit conduct.

To give additional illustration of visceral unit procedure, it is only necessary to call attention to the effect of emotion upon visceral conduct. One may be hungry, and may have just sat down to a table spread with inviting viands, when upon receipt of painful news, all appetite disappears, and the entire viscera concentrates upon the emotion directly and accessorily.

The effect of emotion upon visceral conduct is too familiar to need further illustration. It is urged, however, that the student go over in his mind all of the many experiences that establish this fact.

Keeping in mind that all of the viscera are related directly or indirectly to the vertebral column, but in any event to the somatic body, we turn our attention from the viscera to the somatic body to further illustrate unit conduct.

The diaphragm is the great muscular bridge which separates the dorsum from the venter, and sustains laterally the sides of the body.

The ventral attachment of the diaphragm is connected with the headward part of the thoracic column through the medium of the sternum, clavicles, scapulae, and the close rigidity of three headward pairs of ribs.

The ventral aspect of the diaphragm is also again connected with the feetward extremity of the vertebral column, indirectly through the medium of the rectus abdominus muscles, which are attached to the sternum, and the relative abdominal aponeuroses and muscles, the pubis, the rami of the pubis, the rami of the ischium, and through the ischia with the iliac portion of the innominates and through the sacro-iliac articulations with the sacrum.

In the relations of the diaphragm as outlined, it exercises direct influence upon every position of the trunk, and by reason of the vertebral relation of the cervical region to the headward part of the thoracic column, and the cervical muscular relations with the trunk, the diaphragm also exercises influence upon every position of the head, and likewise each position of the head exercises an influence upon the diaphragm.

The upper extremities, by virtue of their attachment to the shoulder girdle and their relative muscular attachments to the trunk, receive a direct influence in all of their conduct from the diaphragm and exert a direct influence in all of their conduct upon the diaphragm.

The feetward extremities, by being attached through the medium of the femurs, and the acetabulum, and muscles of the pelvic girdle to the thighs, and muscles from within the pelvis to the thighs, brings all of these structures under the influence of the vertebral column, which means that the diaphragm exercises a direct influence upon their every conduct, and that they in turn exercise a direct influence upon the conduct of the diaphragm.

By the remarkable interrelationship indicated between the somatic body and the diaphragm, it is perfectly clear that the whole somatic body is constructed for the purpose of accomplishing unit conduct, and that any procedure of an extended nature that is not accomplished by means of unit conduct will in ratio be accompanied by strain or injury to the entire body.

It is, of course, true that in an incidental way, and in conduct taking slight effort, we may use one hand, and we may think we are using it by itself, but a little careful thought will reveal that in connection with the use of the hand we incidentally use the whole organism.

Now, if we are using the whole organism in such way as to be accessory to the conduct of the single hand, the work will be accomplished with the minimum of friction, the minimum of tissue loss, and the minimum of exertion, and will be performed with a maximum of exactness of results, for accuracy is only attained by the correct use of all parts of a machine.

By way of still further illustrating this proposition, a person may use a shovel, but may stand with the legs straight, and bend his back in the lumbar and thoracic regions so as to bring himself sufficiently near the ground that he may use the shovel. However, in that posture he is attempting to accomplish the work by individual parts of his body, with the result that he is putting the somatic body in a very great strain; he is also bringing the viscera into a strained relationship, and he will not only accomplish the work very indifferently, but will do it with a proportionate exhaustion and definite injury.

If the shoveler would bring his legs and feet into such relationship with the trunk as to permit the bending to take place in the ball and socket joints of the hips, carrying the trunk ventrally, but without distorting it or bending the dorsal or lumbar column, he will be able to hold the diaphragm in its proper relation to all of the parts of the trunk and its contents, as well as the extremities, so that he will perform the work of shoveling with ease and exactness, and with a minimum of weariness and danger, and the maximum of definite results, because he is intelligently applying unit procedure to his whole body.

Many illustrations of these facts might be given, but sufficient has been said to direct the mind to the character of illustrations, and the fullness of demonstration may be left to the student's fertility of resource.

This chapter has been written with the purpose of calling to the student's mind the scientific and technical value of the suggestions made, and to the extreme value of adopting unit procedure in his future work as a Chiropractor.

The work of a Chiropractor is very intensive, and if he does not adopt the unit procedure, and does not constantly school himself to such use of his body, he will find himself being progressively injured by his work, but if, on the other hand, he will adopt unit procedure and shall constantly study to put himself into such positions as are necessary to unit conduct, he will be evolved by his work. This statement is made with the understanding that he will not follow his work to exhaustion.

ART OF RELATING

TYPICAL, COMPLEX, OPPOSED, ROTATIONAL SCOLIOSIS

Right innominate headward in its relation to the sacrum; left innominate crest-ventral; sacrum rotated ventral aspect to the right turning the fifth and fourth lumbars with it, but less far in proportion to distortion of intervertebral discs; third lumbar in gravity plane or crossing; second and first lumbars rotated by the ventral aspect to the left as are also the twelfth, eleventh, tenth, and ninth thoracics; eighth and seventh in gravity plane; sixth, fifth, fourth, third and second thoracics rotated by their ventral aspects to the right, forming a right scoliosis; first thoracic and seventh cervical in gravity plane; sixth, fifth, fourth, third and second cervicals rotated by their ventral aspects to the left, which fails to bring the axis fully to the gravity plane, hence the atlas is rotated by its ventral aspect to the right, sufficiently to bring its weight-carrying aspects to the gravity plane.

CHAPTER XXXV

THOUGHTS ON RELATING

THE important object of all of our study up to this time has been to acquire such information as would render us capable of relating distorted parts of the human organism.

The proposition of adjusting—relating—the several parts of the human organism must not be taken too seriously, that is, in the sense of too perfunctorily, for it can be well understood that in the concrete we are not able to place parts of the human organism into exact relation with each other, but are only able to secure such approach to relationship as will render it possible for the immanent forces acting through the body to finish the relationship by a better and more exact functioning.

Based upon the early and immature conceptions of Chiropractic, it was formerly conceived that "adjustment" must be accomplished by the unaided application of the hands to the human organism. This, it will be seen, is too perfunctory, and is altogether too allopathic, for it may easily be seen that the sublime object is to secure relationship. The method by which it is secured in some respects is quite immaterial.

The thing to be altogether desired is to secure the exact relationship of the parts so near as may be, and even if that result must be attained by instrumental aids to the hands, that fact in itself does not necessarily make any change in the value of what is accomplished.

The allopathic theory has been advanced that unless all relating procedures are carried on solely by application of the unaided hands to the body, the result is not the application of the principles of Chiropractic. This proposition, it will be seen, is altogether too narrow to meet with the necessities of the situation.

The situation with which the human family is confronted is that the tissues of the body are disrelated and must be related; the deep tissues as well as the superficial, and it is utterly impossible to relate deep tissues of the body by the application of the hands.

Deep tissues of the body may only be related by the application of force to the surface aspects of the body, directed in such manner as to cause movement to take place throughout the body, that results in the tissue correction, even though that effect takes place a considerable distance from the point of application. This fact is made very clear by reference to chapters, XXVIII to XXXIV both included, in this work, which are addressed to the tissues immediately incident to the art of relating.

For a still wider illustration of the necessity of correcting relation, that cannot be accomplished by the direct application of the hands, it is only necessary to call attention to the reduction of luxations, or what are usually referred to as dislocations, and fractures.

In the reduction of dislocation or luxation it is impossible that the hands shall come into immediate contact with the disrelated tissues. The force in such event must be applied to the structures in such way as to accomplish relation at some distance and quite remote from the area or areas of application.

In the reduction of fractures it is also perfectly clear that the hands cannot be applied to those parts of the bone which are being related. The knowledge of the relationship of the two ends of a shaft-like bone completely fractured must be had, and force must be applied to the relative soft structures in such way as to bring those ends into apposition and proper relation without the hands ever having touched the area where the correction is going on, and where the "adjustment" is to be accomplished.

It frequently becomes necessary to replace the head of the femur into the acetabulum, and because of the great rigidity and strength of the musculature of that area, it is impossible to do so by direct application of the hands to the parts, but the result must be accomplished, using the thigh and leg as levers through which deft movement may be applied to the right area to secure the relation of the head of the femur in the acetabulum.

The same thing is just as true of the glenoid cavity at the shoulder. On account of the great strength and size of the musculature attached to the humerus, and because of the peculiar situation of the head of the humerus to the glenoid cavity, it is impossible to adjust this joint by direct and unaided application of the hands to the bones composing the joint itself. Here again the arm and forearm must be used as levers whereby the head of the humerus may be properly placed in the glenoid cavity, and this is true whether it is a complete dislocation or is only a subluxation in which the head of the humerus is mesial, lateral, dorsal, or ventral.

In the areas indicated surely no sane person would say that these luxations or subluxations should not be corrected, but on the contrary, because of the remarkable array of abnormality that arise from them, would insist that it is of the first necessity that they should be corrected, and since their relating removes occlusion of nerve stimulus and secures the removal of some very grave pathology, it cannot be denied that their relating is definitely the application of the principles of Chiropractic.

It has frequently been suggested that if "adjustment" is performed anywhere else in the human body than upon "the twenty-four movable segments of the vertebral column," that the work performed is not Chiropractic, and is not the application of the principles of Chiropractic. Statements of this kind are so profoundly allopathic as to need no argument for their refutation further than the simplest statement of them that may be made.

It is perfectly clear that the only purpose of relating vertebrae is to remove interference with the transmission of nerve stimulus, which we have called occlusion of nerve stimulus, and that to remove interference with the transmission of nerve stimulus at one place is just as important as another, in the abstract. In the concrete, removal of interference with the transmission of nerve stimulus directly or indirectly affecting vital function is of paramount importance, whether the same occurs from disrelated vertebrae, osseous, skeletal or visceral tissues, or from abnormal chemistry.

The address, however, to be taught in this work, is the relating of disrelated tissues of the body by hand both directly and indirectly, for the purpose of removing occlusion of nerve stimulus.

In order to teach the art of relating tissues to remove occlusion of nerve stimulus by hand, the subject must be very considerably circumscribed from what it would be in its ultimate aspects, but the departments aside from those here presented are now accomplished indirectly through and by means of several branches of surgery, and for the present the author reluctantly feels that he must leave them to such departments, at least for the purposes of the present book.

The reference made to departments of surgery in the preceding paragraph must be understood to refer in one aspect to the department called obstetrics. The obstetrician should understand, as a paramount preparation for his work, the effect of occlusion of nerve stimulus and the ways in which occlusion occurs incident to his work, and should definitely understand how to relate the tissues incident to the delivery of the fetus; but this subject must be left for some subsequent work.

Another department of surgery specifically referred to is that which is devoted to the reduction of dislocations, luxations, fractures, and orthopedia in its true sense, which would also include podiatry in many of its aspects.

The other division of surgery to which reference is made is that of correcting anomalous formations which have the effect of occluding nerve stimulus, and of irritating the periphery of nerves in such way as to produce violent or at least injurious motor reactions.

The best understood phase of this department at this time is classified as orificial correction, although it must be understood that to thus grossly designate it falls very far short of the conceptions of the author, and the promise is here made that in the second volume the subject of occlusion of nerve stimulus through anomaly shall be definitely taken up and discussed in all of its details as a subject peculiarly within the purview of the science of Chiropractic.

The subject, then, now definitely under consideration, that is to say, the art of relating tissue for the purpose of removing occlusion of nerve stimulus, will be definitely confined, so far as the joints and bones of the body are concerned, to simple displacement, constriction, distention, and subluxation, and so far as other tissues are concerned to disrelation of skeletal tissues, and disrelation of viscera.

It will be seen, therefore, that the vertebral column being the axis of the human organism, and being the structure around which all of the remainder of the organism is assembled, and over, through, and by means of which it is balanced and supported, is the first subject to which specific attention will be directed.

The student must not jump to the conclusion that because the vertebral column is the paramount structure to which his attention is directed, that his attention is to be directed to the vertebral column as an individual part of the body, but he must understand that his attention is to be directed to the vertebral column as an integral part of the trunk, and a primary, necessary element which must first be analyzed and understood in order that through it he may understand the tissues which are attached to it, and must move with it.

In view of what was said in the last paragraph, next in order following the vertebral column, is the skeletal body, including all of its cartilages, ligaments, tendons, membranes, and muscles, and the corrective relationship of each to each area of the vertebral column.

In order to fully understand and to apply the relating process to the skeletal tissues of the body, it will require, in addition to application of force through the vertebral column to secure skeletal relation, the institution of auxiliary relating, or the application of force directed to skeletal tissues to correct their relationship, and incidentally to correct the relation of osseous structures including the vertebrae that are controlled by such skeletal tissues.

Last and finally, but not least, the corrective thought will be directed to the viscera, as will also the relating procedure, for it cannot be doubted by any person with sufficient instruction to place him beyond the scope of the novice, that visceral distortion occludes vital stimulus, and, therefore, it is very essential that such occlusion shall be definitely removed, and in order that the same may be accomplished, the art of visceral relating must be well understood and be within the complete control of the relator.

The student of relating is counseled at this juncture to proceed carefully in his thought along the lines of the analysis to be given in the subsequent pages of this book, weighing carefully each proposition and making himself certain that he understands the subject definitely, and to all of its ultimates, and if he will follow this advice he is assured he will master the art of relating, which is one of the most difficult, if not the most difficult, arts in which a human being can engage and which he may master.

The student must remember that to become an expert in the art of relating, his technique must be equal to that of the masters called musicians, painters or artists in any of the other departments; the difference being that the musician must not only have an intuitive knowledge of the science of music and harmony, but must also have secured a wonderful mastery of his physical operations as incident thereto; the painter must not only know the harmony of form and color but must have mastery of his body; and this is no less true of the Chiropractor, except that his knowledge must be intuitive of anatomy, physiology, pathology, and also of relatology, and then he must have acquired complete mastery of every part of his body used in the accomplishment of his art.

CHAPTER XXXVI

VERTEBRAL RELATING—TRACTION

DIRECTING attention, as was stated in the former chapter, to vertebral relating or to securing relationship of the segments of the vertebral column, it will be necessary before entering upon a discussion of the details of that work, to state certain principles that must be followed in order to be successful in accomplishing the desired result.

The system of relating art to be analyzed herein is comprehended under the term, the traction-thrust system.

As the name of the system would indicate, the person who would become adept in vertebral or joint relating, but particularly vertebral relating, must pursue a line of procedure well calculated to secure the result desired, and, therefore, must observe certain principles which are here to be laid down.

It is perfectly apparent to any person familiar with the vertebral column and its musculature both immediate and remote, which have been classified as tissues of immediate and opponent resistance, that they constantly present the quality called tone. In other words, their normal condition is tonic.

It has been already seen in this work that under the affirmative process all muscular and analogous structures undergo the change called hypertonicis, the ordinary term for which is constriction, and the amount of this constriction or tonicis is a fact always necessary to be obtained in order that the relating art may be applied.

It is true that the degrees of tonicity of muscular and analogous tissues vary remarkably, not only in the same area of different individuals, but in different areas of the same individual, and that in a condition of so-called health this proposition under the affirmative phase is still more pronounced, and expresses a wider range of hypertonicity in abnormal conditions.

It is, therefore, a first essential to the performance of the relating art that the operator shall know the hypertonicity, constriction, or what is still better termed, the resistance of not only the musculature of the area of application of force, but the resistance in structures that are opponents to those of the area of application.

The relator ascertains the facts referred to in the preceding paragraph by a process of testing, which is called traction; to obtain knowledge of not only immediate resistance, but also opponent resistance.

Traction for the purpose of ascertaining the amount of resistance is accomplished by applying the hand to the area where application of force is desired, with the application surface of the hand directed toward the center of anatomic resistance to the area of contact, and then, taking one of the positions which are herein later to be described, he projects steady force upon the area, carefully noting the symptoms of response to his effort, and by these means he is able to determine how the immediate surface of his contact responds, and how the opponent surface responds to the immediate surface, and also how the whole body responds or co-operates with each of these.

By the simple traction as outlined in the preceding paragraph, the relator becomes possessed of the truth, which discloses to him the line through which his force must be projected when he is ready for the relating thrust to secure relation of the distorted parts.

It seems hardly necessary to stop at this place to caution the student that the process of tractioning, to secure knowledge of the line along which force must travel to secure relationship, is a very intricate and delicate proceeding, which must be accomplished very artfully if the operator shall receive the highest intelligence, as a result, obtainable, and that the accomplishment of such traction is beset with many difficulties.

The student's anatomic and pathologic knowledge will make it possible for him to comprehend at a glance that he may meet with many and peculiar tissue attitudes, such as hypertonicis of one muscle or set of muscles in the area of immediate application, or accessory to the area of immediate application, which will compel him to change the line of direction of his force to meet and overcome that contingency.

By a careful review of chapters XXXI, XXXII, and XXXIII herein, the student will obtain much advantage, and will better understand the propositions that are here being set forth.

By reverting to the parts of this book suggested, the student will learn that from the relating standpoint the trunk is a bilateral structure, and that for his traction advice he must remember that muscles are paired against each other, and that in order to know where to place the line of his force he must by traction compare the tonicis of each of the pairs of musculature both of immediate and opponent areas, and those of accessory influence thereto.

The relator performing his traction not only obtains knowledge of the line of thrust governed by muscles that run in a general way longitudinally, but also that line of force governed by other muscular and analogous structures. These are the diaphragm and the muscles that are in a certain sense within the cavity of the trunk, such as the psoas magnus, iliacus, pyriformis, etc.

The paramount musculature not running lengthwise of the trunk to be studied in obtaining knowledge of the line of relating force is the diaphragm, and, as has been formerly stated in Chapter XXXII of this work, the diaphragm is not only a bilateral structure, but it is multilateral, that is to say, it has a median tendon and two cupola, which slope ventrally, dorsally, and laterally in both directions; therefore, the diaphragm has a double lateral resistance, and a single bilateral dorso-ventral resistance, each of these receiving accessory support from the tendon, and from the somatic muscles.

It must also be remembered that the diaphragm is the muscular bridge of the trunk, and is so placed as to affect the conduct of the dorsal and ventral muscles the whole length thereof; therefore, the diaphragm always presents a controlling influence in the application of force to the body.

The relator, then, in making his traction must definitely consider the influence of the diaphragm upon the muscles of immediate and opponent resistance, and the muscles accessory thereto.

In the feetward part of the trunk the psoas and iliacus muscles also exercise marked influence upon the direction of force to be applied through the body and must always be taken into account by the relator in making his traction.

At this juncture the student must also understand that in the cavities of the trunk the viscera exercises an influence in many respects similar to muscular resistance and somewhat affect the line of thrust. There is not much influence of this character to be considered in the thorax, except in that part called the mediastinum.

In the abdominal region, frequently by construction or hypertonicis, there is sufficient resistance to change the line of thrust, and when there is such a situation, it is of the utmost importance that the relator shall know it, and provide for it; otherwise he will do injury by his thrust.

The mesentery, and indeed the muscular walls of the intestines, and other visceral organs of the abdomen, frequently by hypertonicis present a marked resistance to the application of force, and these have a direct effect upon the line through which force must be directed to secure relationship. And it is always of the utmost importance that the relator shall know and observe this character of resistance.

Many other areas may be mentioned with some profit in this connection, but it is believed that students who have made a careful study of the parts of the work that precede this chapter will be sufficiently prepared with these suggestions to enter fully into the entire scope of the subject of tractioning, to ascertain the line over which force shall be projected for each relative purpose.

When all of these phases of resistance have been resolved, and the student has determined the line over which force should be projected, he must then proceed to determine the amount of resistance which his force shall meet in securing sufficient movement for relating purposes.

To ascertain the fact referred to in the preceding paragraph the relator must again carefully use his traction, and in this instance must use it along the line ascertained, but use it singled to the one purpose of ascertaining the aggregate resistance to the thrust to be applied.

When the relator has applied traction until he has ascertained the line along which he desires to direct his force, and has ascertained the amount of resistance he will meet with, he is ready for the final and ultimate act of his art, which is the delivery of the thrust, and it is needless to say that the thrust must be projected over exactly the same line that has been ascertained by traction.

The student is encouraged to be very persistent and painstaking in bringing himself to a full knowledge and understanding of the art of traction, for by completely mastering this art, he has taken the first necessary step in becoming a relator of accuracy and dependence, who can always secure constructive results.

CHAPTER XXXVII

LAWS OF VERTEBRAL RELATING

INCIDENT to the tissue construction that has been so carefully detailed in that department of this work addressed to the tissues incident to vertebral relating, several facts of characteristic construction have been outlined and detailed, which if properly understood by the student, will prepare him for the statements that are to be made in this chapter in connection with the laws of relating.

Deduced from the anatomic structures, as outlined in those portions of this work, three laws must here be clearly outlined and understood.

It must be understood that the laws of the traction-thrust system must control every phase of the work of the relator, and are, therefore, paramount in his consideration relative to vertebral relating.

The three rules of the traction-thrust system are (1) each portion of the vertebral column or trunk upon which force is to be applied must be anchored, that is to say, directly supported, (2) each thrust must be measured by approximating the amount of disrelation as incident to the amount of immediate, opponent, and accessory resistance, and (3) each thrust or application of force must be stopped through or upon osseous or cartilaginous tissue.

In order that the student shall make no mistake as to the rules just stated, it is necessary at this juncture to take up each rule in its order and detail its meaning, and fully analyze its application, and for that purpose the student must recall the incidents of tissue construction and the physics herein before detailed and explained.

The exact situation to which rule (1) applies is in the application of force to the body as incident to what is called vertebral relating, and for that purpose it is not material whether the application is directly to a vertebra or to vertebral areas, or to an accessory area or areas. The law, nevertheless, applies in the same way.

The word anchored as used in this rule does not mean anchored in the sense of being tied to, but in the sense of being supported by, but supported at some distance and not rigidly.

The statement in the last paragraph is made to prevent the student from jumping to the conclusion that by supported is meant something of a supporting nature, immediately in juxtaposition with the area of contact, which would be very much aside from the fact.

The word anchored is used to indicate that a place of support is selected, and that the area of contact is placed in an anatomic relation to such support, and then that force is applied through the anatomic structures always toward the point of support.

To illustrate the statement made in the last paragraph, suppose the patient is placed upon a relating table which is opened to a twenty inch gap. The pelvis is lying upon an eight inch roll with the manubrium and shoulders placed upon the hind end of the front division of the table, the point of relating contact being relative to the eighth thoracic spine. The anatomic resistance here is from the eighth spine to the articulation between the manubrium and the gladiolus, but in the position of the patient, and because of the influence of the diaphragm, the line of force will be directed toward the manubrium. Now, if the line of force is directed correctly with the patient in this position, the part upon which corrective force is applied is anchored by the support under the manubrium, although it is not directly under the area of contact.

For still further illustration with the table in the same position as indicated in the preceding paragraph, if force is to be applied over the third lumbar spine area, the resistance will be feetward toward the abdominal muscles, and the headward portions of the thigh muscles, and, notwithstanding the fact that there is nothing vertical under the third lumbar vertebra, still if the force is directed toward the center of resistance as indicated, the part upon which the force is applied is nevertheless anchored.

From the two illustrations given, it will be seen that the tissue relationship is significant and controlling, and that always the question of whether a part is anchored depends, first upon the line over which force should be applied, and finally by the line through which force is applied.

By measure of thrust, as referred to in the second law of the traction-thrust system, is meant the distance which the immediate area of contact must be moved in order that the relationship desired shall be accomplished.

It will be observed that the distance through which the surface of the relating hand moves in accomplishing the result would be very different in different circumstances, or in different styles of application of force in the correcting effort.

If, in the relating effort the operator does not precede the thrust with traction, he must make application to the tonicized body, and must thrust from the height of tonicity, and the distance through which the surface of the relating hand passes is considerable, and that is the reason for the second law.

The student must keep in mind that it has already been laid down that traction must be first used, which will remove or measure tone or tonicis, and that the thrust must be made in consonance with the fact so ascertained in order that injury shall not occur.

The distance of thrust-movement, therefore, is only ascertained by approximating the distance from the depth of traction to the place of relationship, and this must always be ascertained in full comprehension of the relative influences of the musculatures of immediate, opponent, and accessory resistance.

It will be plainly seen that any change in the conduct of the musculatures of the body may very markedly change the corrective distance, and, therefore, a careful estimate of muscular resistance is paramount in determining relating distance.

The student must understand that the law simply provides that the operator must traction, and from the depth of traction must approximate the distance of displacement, and the amount and character of resistance to relation, and from these determine the distance of relating movement.

The third law, that relating force must be stopped through osseous or cartilaginous tissue, is a statement of very far-reaching and comprehensive importance in the relator's art.

What is meant by a thrust being stopped through osseous or cartilaginous tissue is, that no matter what the area of application, the force must nevertheless be directed in such a way as to pass through relative cartilaginous and osseous structures.

There is opportunity for the student, in connection with the statement in the last paragraph, to make a grave error. For instance, if he should place his hand upon the area of the spinous process of the second lumbar vertebra, the patient lying upon an open table, the abdomen being unsupported, and thrust straight down it would seem that the force would die away through cartilaginous tissue. This, however, would not be true, because the force would expend itself upon cartilaginous tissue, and pass on through the unsupported abdomen.

The law stated, then, it must be understood is based upon the formation of the tissues incident to relatology, and the law must be construed in the light of the immediate, opponent, and accessory resistants, and therefore, of course the line of thrust must always be either headward or feetward from the place of contact, unless the place of contact is at a gibbosity, the opponent musculatures to which are equally divided headwardly and feetwardly.

To illustrate the law under consideration; if, with the patient lying upon an open table with the pelvis upon the roll and the manubrium anchored upon the hind end of the front table, the thrust is to be delivered over the second lumbar area, the point of resistance will be at the ensiform area, and therefore, the law means that the force must be applied in such way that it shall be stopped through the intervertebral cartilage between the second and first lumbar, and the intervertebral substance between the first lumbar and twelfth thoracic vertebra.

With the few and simple illustrations of the rule herein stated, it is believed that the student will be able to make application of the laws here laid down to relating procedures, no matter where made in connection with vertebral relating, and of course the laws here stated do not apply except to a vertebral area, or to vertebral areas.

The student is cautioned to very carefully and fully acquaint himself with the three laws stated and illustrated herein, and make himself master of them before attempting to proceed with any further phases of the corrective procedure.

CHAPTER XXXVIII

VERTEBRAL RELATING AREAS

CONFINING the thought as has been suggested to the vertebral column as an incident to the body for its corrective purposes, we find that its anatomic structure divides it into the following areas:

(1) *The Sub-occipital Area.* This area consists primarily of the atlas and axis, but incidentally of the occiput and third cervical.

The remarkable thing about this area is that the atlas and axis really constitute but one vertebra. That is to say, the axis by means of its odontoid process is so completely and definitely related to the atlas by the transverse ligament that the two act as a single vertebra.

The student's mind will be peculiarly refreshed upon these matters by a review of Chapter XXIX of this work.

Relating in the sub-occipital area, then, is peculiarly for the purpose of maintaining such relaxation of the muscles that apply from the occiput to these cervical vertebrae as to permit freedom of conduct in the occipito-atlantal joints, and the atlanto-axial joints.

There is another corrective object here, and that is to secure and maintain equal tonicis of the bilateral musculatures in order that the atlas shall not be forced into a rotated or tipped position, and held there rigidly.

Disrelation in this region may occur by compression of the hyaline cartilages between the atlas and occiput and the condylar articulations, and between the atlas and axis, and if distortion is occurring in any direction, it is desirable to overcome it.

As has been before stated in this work, no matter which direction the atlas is displaced, the axis is always displaced in the same direction and to the same extent, with the exception of the compressibility of the cartilages mentioned in the preceding paragraph. There are three ways it could be otherwise; fracture of the odontoid process, the arch of the atlas, or rupture of the transverse ligament.

The atlas, and therefore the axis, are capable of being displaced ventrally and slightly lateralward, and the axis is capable of being rotated, and when the axis is rotated the atlas is rotated in the opposite direction.

To make the statement in the preceding paragraph perfectly clear, if the atlas is displaced to the left it is certain that the body of the axis with its odontoid process is also displaced to the left, which, from dorsal palpation, will make it appear to be displaced to the right, for in such displacement the spine of the axis will always be to the right of the mesial line. The student must not allow himself to be deceived. In such displacement the body of the axis is always to the left and the spine to the right.

Continuing the illustration of the preceding paragraph, the atlas being to the left necessitates that the body of the axis and odontoid process shall also be to the left, and there is some rotation of the third cervical by its headward aspect to the left; in any event there is distortion of the intervertebral cartilage between the axis and the third cervical.

The student must remember that displacement in the sub-occipital region is always very largely the result of compensatory influence cast upon the region from the weight-carrying aspects of the body. However, it is possible for traumatic injury to occur in this area, but when it does, the displacement will be the same as those that have already been described.

The student must remember that the atlas and axis are never displaced dorsally, although in such attitudes as that of locomotor ataxia, it sometimes looks so, because of changes in curves elsewhere, but the student must know that such appearance is deceiving, and the fact is that the atlas and axis are never displaced dorsally.

(2) *The Cervical Area Proper.* This area consists of the third, fourth, fifth, and sixth cervical vertebrae usually, but not always, for sometimes the sixth cervical vertebra is properly a trunk vertebra, and when it is, it is classified with the thoracic vertebrae.

It is a fact not well known, because attention has not been called to it, that because of the different phases of construction of the trunk, cervical vertebrae are differently related to it, and that because of the construction of the musculature in many persons, the neck actually begins at the fifth cervical, while in others it begins at the sixth cervical. In those persons where the neck begins at the fifth cervical, the so-called shoulders are very sloping, while in those with square shoulders the neck sometimes really begins at the headward margin of the seventh cervical. In those cases where the shoulders are very sloping, the sixth cervical is really a trunk vertebra.

The area under discussion from the corrective standpoint presents no definite peculiarities. Its distortions are practically always compensatory, and because this is true they are corrected in areas, never less than three vertebrae at a time, and sometimes four, five, and even six.

It is of course possible that vertebrae in this area may be displaced as a result of definite trauma. This, however, very seldom occurs, and when it does a vertebra and part of the contiguous ones are distorted, and, therefore, relating is performed exactly in the same way as it would be had the displacement occurred as the result of compensation.

Distortion in the cervical area is practically always of a rotary nature, and this is true because it is nearly always produced by response to a compensatory influence from the weight-carrying centers of the body.

(3) *The Cervico-thoracic Area.* This area consists of the seventh cervical and the first, second, third, and fourth thoracic vertebrae, to which is sometimes added the sixth cervical vertebra in those cases in which it stands in the relation of a trunk vertebra.

The corrective features of this area are not very complex, and, so far as the vertebral column itself is concerned, are based entirely upon the peculiarity of the musculatures relative to the area, those of immediate contact and the opponents thereto.

Incident to the immediate and opponent musculatures, there is a complexity of the vertebro-costal situation, which the student will find carefully detailed in Chapter XXIX herein, and of course in connection with this the accessory musculatures incident to the ribs and general trunk including also the diaphragm.

The student will not fail to observe that distortion in this area is very largely caused by compensatory influences from the basis of the trunk, occurring out of the necessity of not only maintaining equilibrium, but also of maintaining the body in or parallel to the weight-carrying aspects, which of course, generally speaking, are the acetabula.

This area contains the point of third opposition to compensation, so that it presents the center or crossing where vertebrae in the typical scoliosis cease to ventrally rotate to the right, and begin ventral rotation to the left. And the same thing would be true, except in the directly reverse, if the primary scoliosis was the reverse from the typical.

The most remarkable relating phase of this area is that all force applied to it must be markedly feet-ventral.

(4) *Mid-thoracic Area.* This area, generally speaking, contains but the fifth thoracic vertebra with the feetward end of the fourth and the headward end of the sixth. However, this may markedly change by changes in the point of gibbosity in the column.

When the fifth thoracic vertebra is the gibbosity of the thoracic column, which is normal, the statement in the preceding paragraph, is true, but if the gibbosity has gone feetward and at the same time the thoracic column is kyphosed, then the fifth and sixth with the headward end of the seventh will be in this area. If the gibbosity has gone headward then the fourth with the feetward end of the third is in this area.

Of course, the vertebro-costal complexity is involved in this area, and must be studied from the standpoint of the discussion found in Chapter XXIX herein. When the thoracic column is kyphosed with the gibbosity headward from its normal position, the complexity of correcting frequently is, that the fourth thoracic vertebra is a scoliotic key, and is also in this area.

It will be remembered that the immediate and opponent musculatures relative to this area are divided equally headwardly and feetwardly, and when the curves of the column dorso-ventrally are normal, force applied to this area is directly through the body and with the subject upon the venter is directly vertical.

The student must observe that this is the only place in the entire vertebral column where vertical force with the patient lying upon the venter is permissible.

(5) *The Imbricated Area.* This area extends from the sixth thoracic to and including the ninth thoracic generally, and sometimes the tenth; this depending upon certain differences of structure in different individuals.

The most important thing in connection with the imbricated area from the corrective standpoint is that force applied anywhere in this area must not be permitted to go deeply into the body, and is therefore very oblique, always being directed superficially headward so that the line of force never touches the ventral aspect of the body. That is, never goes ventral to that aspect.

The relations of the spinous processes in the imbricated area are such that arthrodial movement between the articular processes can only be had by the application of force directed very superficially, for otherwise the spinous process of contact will inpinge upon the one ventral to it and prevent joint vacillation, or if vacillation occurs, it will be with such profound friction between the spinous processes as to injure the tissue.

One thing that the student must remember is that relating force with subject on the venter is never to be applied vertically or feetwardly in the imbricated area, for in such application the spinous process of contact will anchor upon the process ventral to it, forming a fulcrum, over which spraining of the relation of the vertebrae to the intervertebral segments two vertebrae below the one of contact will occur. In force directed feetwardly two such areas will be definitely strained or sprained, one as first described, and the other by muscular recoil in the lumbar region.

(6) *The Thoracico-lumbar Area.* This area includes the eleventh and twelfth thoracic, and the first and second lumbar vertebrae to which is sometimes added the tenth thoracic. Indeed the tenth thoracic is generally included in this area.

The paramount thing of importance in connection with this area is that the diaphragm attaches to the twelfth thoracic, and the crura to the first and second lumbars. The diaphragm, being so definitely related to this area as an entirety, exercises a remarkable control over it, and it exercises much control over the diaphragm.

From the corrective standpoint no force can be applied to any aspect of this area without definite, immediate, and paramount consideration of the diaphragm, and it is for that reason that any force applied to this area is applied ventro-headwardly. That is to say, obliquely through the diaphragm, converting certain parts of it into a bow, the line of force acting as the string, the exact line of force always being determined from the point of contact, and must always be influenced to some extent by the degree of distortion, but no variance is sufficient to change the rule as stated.

Again, in this region the caution is carefully given, that with the patient on the venter no force is to be applied vertically or feetwardly, for the reason that in the thoracic portion of the area the column is not supported by ribs attached to the costal arch, but receives its definite support from the diaphragm which is obliquely head-ventral to the area, and in the lumbar portion the crura of the diaphragm are the principle resistants to the psoas major, quadratus lumborum and abdominal muscles, and, therefore, is the peculiar support of this part of the area, and all relating force must always be directed toward the muscular support of any area.

(7) *The Lumbo-sacral Area.* The extent of this area is the third, fourth, and fifth lumbar vertebrae, and the attachment of these to the base of the sacrum.

From the corrective aspect this area presents this peculiar fact, that relating force is never applied to these vertebrae, except in conformity with the distortions of the sacrum. In other words, so far as these lumbar vertebrae themselves are concerned, they are only corrected in consonance with the sacrum, and in ratio with the correction of the sacrum.

In this area force should never be applied except in the ventro-feetward direction, and the reason therefor lies in the fact that the muscular resistants to impact at any point in this area are the musculatures around the pubis and the headward third of the thighs on the ventral aspect.

(8) *The Sacro-iliac Area.* This area consists of the sacrum and the sacrum's attachments to the innominate bones.

The corrective aspect of this area is divided into two parts. That part which is definitely applied to the sacrum itself, and that which is applied to the relation of the sacrum to the articular aspects of the ilia.

Definitely speaking the sacrum itself only comes in for relating consideration when it has sustained greenstick fracture, or other forms of distortion. In all other phases corrective force is applied to the sacrum incident to its relation with the ilia.

At the base of the sacrum, force should be applied ventro-feetward. At the apex of the sacrum ventro-feetward, but less so than at the base. At the gibbosity of the sacrum, if its curvature is normal, force should be applied vertically when the patient is on the venter.

(9) *The Sacro-coccygeal Area.* This area comprises the articulation of the sacrum and coccyx.

From the corrective standpoint this area is of very little importance; the coccyx never needs relating except in connection with the apex of the sacrum.

The student is urged to fix these areas well in mind for the reason that the entire analysis of relating to be given herein, will be directed to these areas in as far as it applies to the vertebral column, and without understanding the area, the scope of it and the reason for it, he will not be able to understand the instruction given.

CHAPTER XXXIX

THE THRUST

In the beginning days of Chiropractic the corrective thrust was given much scope and consideration.

The thrust was described as being a unique and unusual movement of the hands to secure replacement of a displaced vertebra.

In the conceptions of a few Chiropractors, who have hardly kept abreast of Chiropractic advancement, the thrust is still presumed to be an application of the hand to a vertebra for the purpose of "adjustment."

Some authors formerly described the thrust as a therapeutic means of great value.

Such persons undertook to show that the sudden force applied to the tissues secured an arousement of animation by something approaching irritation, and in this manner to introduce a certain phase of cure.

The most of these short-sighted explanations and statements have now fortunately disappeared, and all scientific Chiropractors give hearty support to the statement that the Chiropractic thrust is a simple and well-defined means of applying sudden force to tissues for the purpose of securing their better relationship.

The relating thrust is a means of applying force with the hand to a specific area in a definite direction, a certain distance, with carefully prearranged stoppage.

It must be admitted that the corrective thrust presents a phase of shock-like effect, which, if judiciously applied, tends to secure functional reaction, which ultimates beneficially, but in this respect is not more beneficial than any other shock-like influence not applied more excessively.

One of the commonest truths with which we are familiar is that our entire relationship with the extra-environment consists of a series of shock-like effects, and these shock-like effects are beneficial or otherwise, depending on whether they are applied to our bodies in such manner as to overcome resistance, or so as to be in harmony with resistance.

To illustrate the statement in the last paragraph—the wind playing upon the body is a shock-like effect. Now, if the wind does not blow too hard, and the exposure to it does not last too long, the effect is to arouse resistance, and to result beneficially. If, on the other hand, the wind blows too hard, and the exposure is for too long a time, the effect is a shock-like condition, and the results are disbeneficial.

Placing water upon the body is another illustration of shock-like influence, and here again if too much of the body is not wet at once, or the water is not too cold, or the exposure to it is not too prolonged, the result of the shock-like effect is to arouse resistance and ultimates beneficially. But if too much of the body is exposed to the water, or if the water is too cold, or if the exposure is for too long a time, then the shock-like effect is intense, and the result of it is very disbeneficial.

Eating is another shock-like effect. Witness how it produces sweat in warm weather, and yet, if only a sufficient amount of food of the right consistence is taken, the shock-like effect arouses resistance, and the result is beneficial, but, if the organism is exposed to too much food, the shock-like effect is pronounced, resistance is overcome, and abnormality ensues.

The foregoing illustrations should direct the student's mind into a sufficiently broad channel to make him understand that the experience of the organism is simply a transition from one shock-like effect to another, and that it maintains its health in opposition to these shock-like effects, and its disease is simply the giving away of the organism to shock-like effects exercised beyond its resistance.

In the same sense indicated in the preceding paragraph the relating thrust is beneficial or disbeneficial. That is to say, if it is applied correctly, it arouses resistance and is beneficial. If it is applied in such manner as to overcome resistance, its shock-like effect is devoluting, and may result in much injury.

Based upon the statement last made, the student will understand that the art of applying the relating thrust is one of great nicety indeed, and should be used only by those who have attained to a very special mastery of it.

The thrust itself should always be a very definitely and specifically controlled application of force from one well-defined area toward another, and should always be stopped at a point to be determined from the resistance of the tissues involved, and, therefore, no recoil thrusts should ever be administered.

The mode of applying the relating thrust differs somewhat according to the area of application. Therefore, the first discussion of it will be made from the standpoint of its application to the vertebral areas as stated in the preceding chapter, and then will go to such other details of application as will be found necessary.

For the purpose of delivering the thrust any portion of the palmar surface of the hand may be selected, however, in a large majority of cases the heel of the application surface should be used, and the center of force may be applied anywhere from the area a little removed from the pisiform bone to the ball of the little finger. The hand thus applied is called the hand of application, while the other one is called the hand of guidance, or the "guide hand."

In the ordinary sense of the word the operator stands with his face toward the head of the subject, on the right or left side of the table. If upon the right side the right hand is the hand of application, and if upon the left side the left hand is the hand of application, and of course the other hand is always the hand of guidance.

The application hand should be laid flat upon the person with the palmar surface relaxed, and in this position it should be extended until the wrist leaves the hand substantially at a right angle. The elbows and shoulders of both the application and guide hand should be rigid. The guide hand should be placed upon the back of the other, in the transverse direction, with the thumb on the ventral aspect of the wrist.

With the hands thus applied the body of the operator should be put into one of the three positions hereinafter to be described, and by unit movement of the entire body, such force as has been estimated to be necessary in the direction and to the extent approximated, should be projected to the surface of the application hand.

It should be observed in this connection that unit movement is accomplished by an instantaneous movement of all parts of the body to the accomplishment of the definite object in view.

The student will find that the acquisition of unit movement is a very difficult task; one which can only be mastered by persistent and intelligent practice. It is not definitely different from the fine arts of dancing, ball-throwing, rowing, horseback riding, etc.

One of the most forceful illustrations of unit movement is seen in the trained elocutionist, whose entire body moves in sympathy with the thought he is expressing so completely that the fact that he is moving at all is lost to the auditor, but the sympathetic harmony of the voice, gesture, glance, attitude, and every movement is so completely within the rhythmic swing of the thought being expressed that they are not observed, because they are unit procedures, and, therefore, do not stand out as individual movements.

The same thing is true of the impassioned or eloquent speaker. What he is doing with his hands or with his feet or with any definite part of himself is utterly lost, because all and each of these are swayed into harmony with the rhythm and expression of his thought, and do not exercise individual influence upon the auditor, but because they are unit conduct affect him as of a oneness of procedure.

The Chiropractic relator must evolve to such art, that his whole body unites immediately and relatively into the accomplishment of the one definite and specific movement so completely that no part of it expresses individual conduct, but that the conduct of each part is definitely related to the object to be attained, and is so exactly measured and related to the conduct of all other parts as to secure the result with harmonious instantaneousness.

There are many deviations from the character of thrust delivered to vertebral areas. These are: the thrust to release osseous keys either scoliotic or lordotic; the thrust to release gravity keys; the knife thrust; the thumb thrust; and the thrust to release lordosis.

Osseous key release is accomplished to release the scoliotic key by placing the heel of the hand of application upon the transverse process of the key vertebra with the anti-heel upon the spinous process, turning the hand at the wrist out of the axis of the arm so as to bring the heel-side of the hand sufficiently below the anti-heel. The force is delivered ventrally with headward impulsion. The distance of movement is very short and quick.

The movement last indicated is indeed very slightly headward, only sufficient to vacillate the arthrodial joints. The ventrality of the thrust is very slight. Just enough to release the keyed centrum of the vertebra in relation with its fellows in both directions headwardly and feetwardly.

The release of a lordotic key is accomplished by one of two phases of application: the saddle-back, or the two-hand single contact.

The saddle-back release is accomplished by placing the hand upon the lordosed area, the carpal aspect resting upon the musculature laterally, and relative to the transverse processes of one side, while the fingers are upon the same relative musculatures of the opposite side with the hand bent like a saddle, the guide hand in this instance being applied in such manner as to give rigidity to the fingers and hand in the position indicated, particularly reinforcing the fingers.

Of necessity the saddle-back must be given with the elbows bent, but while the elbows are bent no movement is permitted either at the elbows or shoulders, the force being applied by unit movement in such direction as to cross beneath the lordosed area, and to cause recoil of the muscles of the opposite sides back to the mesial line at such point as to lift the keyed vertebra dorsalward, throwing its fellows in opposite directions.

The two-hand single contact to release a lordotic key is accomplished by placing the ulnar aspect of both hands upon the body, in the transverse direction clasping the index fingers and the thumbs together so as to hold the two hands rigidly together. The ulnar aspects are applied on the musculatures headwardly and feetwardly, relative to the key, and the force is applied with divergence of the ulnar aspects, followed by immediate convergence with lifting suction, the purpose being to project force from the ulnar edge of each hand into the opponent curves of the lordosis, driving them thus apart so that the lordotic key can be thrown up by the muscular recoil which instantly follows.

The two-hand single contact to raise a lordosis is accomplished by placing the ulnar aspect of both hands upon the relative musculatures on each side of the vertebral column, clasping the thumbs and fingers in such manner as to make a bridge resting upon the ulnar edges of the hands. The operator crouches low over the patient, so that the elbows are bent at right angles. His traction is taken deeply with slightly headward impulsion, from the bottom of which he thrusts, at the same time approximating the ulnar edges of the hands, and instantaneously removing in such way as to cause the lines of force to cross ventral to the column, and recoil from the opposite musculatures to the area of the column that is to be raised dorsally.

When this application is made in the headward thoracic region, the instantaneous removal is with headward impulsion. If, in the feetward thoracic region, it is made with the operator facing the patient's head, his impulsive removal is toward himself. And the same is true when he stands facing the patient's feet, and makes this application over the base of the sacrum.

Gravity key release is accomplished by applying the hand around and over the gravity center in such way as to form an eliptical contact, the open end of which must look head laterally toward the base of the neck in such direction as will secure the release. The force must be applied in a superficial manner headwardly, and should never go deeper into the body than the dorsal somatic tissues, and should be applied with a lifting impulse headward with such laterality as is indicated by the center of resistance.

In applying the gravity key release to an area in which there is kyphosis, the thrust should be held at its termination until the tissues headwardly have come to rest. If it is being applied within a lordosis, or in such manner as to affect a lordosis, its application must be followed by instantaneous removal.

The knife thrust is a peculiar and valuable means for obtaining the release of certain constricted or fixed areas, such, for instance, as the sub-occipital area, from mastoid to mastoid.

The knife-edge application is from the end of the little finger, along the ulnar margin to the pisiform, any part or all of which may be applied in accomplishing the object of this thrust.

To apply the knife thrust the application hand must be made rigid, the fingers being placed parallel to each other. The other hand is used for a guide and reinforcement, making the knife edge rigid. The thrust is delivered with the elbow and shoulder rigid, by unit movement; the thrust always assuming two directions, definitely in the direction of correct relation, and always with slight impulsion toward the end of the little finger, just as one would whittle, shoving the knife edge away from himself, point first.

The knife thrust is delivered as described for the purpose of securing exactly the same effect upon the tissue that is secured by driving a knife from you slightly point first. It must, however, be remembered that in the use of the knife thrust the surface that is placed upon the skin of the subject must never be permitted to slide. To permit such conduct would be almost sure to produce a bruise.

The knife thrust is of great value in the sub-occipital region, relative to the ventral base of the neck, Scarpa's triangle, the dense tissue between the tuberosity of the ischium and trochanter, and to release occlusion, by muscles, of the sciatic nerve trunk, and many other places which will be pointed out later herein.

The thumb thrust is a means of release applied solely to viscera for the purpose of relaxing such rigid structures as the psoas magnus, which it has been shown by its constriction serves to occlude ten large and very important intervertebral trunks.

The thumb thrust to the right psoas muscle is accomplished by removing the viscera from between the thumb and the muscle itself about on a level with McBurney's point, anchoring the fingers of the application hand to the right ilium, and producing definite traction of the psoas, and then achoring the fingers of the other hand upon the other ilium, and applying the thumb upon the application thumb in such manner as to guide it. With both hands in this position it renders the application rigid and definite. When all is ready a short thrust dorsalward accomplishes the relaxation of the muscle which is the object desired.

The student is definitely cautioned that this is a most valuable thrust, but one which he must not attempt to apply until he has become very proficient in the art of relating. There are many areas to which the thumb thrust may and should be applied, but the one given will sufficiently demonstrate the thrust.

Many different characters of thrusts which have not been detailed here will be described as incident to adjusting in various areas. Sufficient has been said to illustrate the thrust and to explain what it is.

In concluding this chapter let the student remember that the three important things about the relating thrust are the shape and style of the application surface of the hand to the body, the method of holding the arms rigid and thrusting from a pose which secures unit conduct of the whole body. Upon these three things too much emphasis cannot be placed.

CHAPTER XL

INCIDENTS TO USE OF THRUST

There are several considerations that must be fully comprehended before finally entering upon the actual discussion of the art of relating, and the time for the discussion of those is at hand.

THE TABLE

The first thing to which the attention of the student of the traction-thrust system should be directed is to the table that he shall use in his work.

The traction-thrust system table is unique and distinctly different from any other table. It is a table carefully designed through long years of study and experimentation to meet with the necessities of the system that has been growing and developing during the same time.

In the first place the table should be of what is called the two-piece construction. That is to say, the top of the table must be in two parts; the front part is adjusted to a sliding frame that permits it to be moved away from the hind table top, leaving a gap which may be made any width to thirty-six inches, to meet the necessities of subjects of different lengths.

The front piece of the table should be two and one-half feet long over all, the front end should be about three inches higher than the hind end, which should be exactly on a level with the top of the hind piece of the table.

The hind piece of the table should be flat, and while upholstered it should nevertheless be solid, the upholstering simply being sufficient to render lying upon it unpainful to very thin patients.

The hind piece of the table should be three feet long, and fourteen inches wide over all.

The front piece of the table should be the same width and upholstered, the upholstering upon it should be thin, and similar to that described for the hind table, and there should be a thick level pillow that entirely covers the front piece of the table, which may be adjusted to meet the different positions of the patient upon the table. That is, toward the front or back end of table.

The table top as described should be flat, and it should have no opening for the face, nor pelvic opening. The table should have no abdominal supports, because all of these render the table top unrigid, and to secure traction it is necessary that the surface upon which the subject lies shall be rigid and immovable, in order that the anchorage shall also be rigid.

The base or supporting parts of these tops as described may be made in many ways. The most successful way is to put them upon a stationary base with sliding runners extending back under the hind piece, which runners lie in a smooth trough over the front base, in order that the front end of the table may slide easily out and back. However, it must be remembered that the top of the table is the important thing, which must be in two pieces as described, the hind one stationary, the front one on a rigid sliding frame.

The pillow for the front piece of the table has already been described leaving nothing further for description, except the rolls which should accompany each table.

These rolls are for pelvic use, and the pelvic rolls should be as nearly cylindrical as possible. They should have a solid, resistant interior, well cushioned around the outer surface, and two should go with each table, one four and the other seven inches thick.

In addition to the pelvic rolls there should be a solid resistant cushion ten inches wide and three inches thick, long enough to extend crosswise of the table; this cushion is to be used as an assistance to anchorage of various parts of the body.

GEOMETRIC TERMS

As has been stated in another part of this work, certain geometric terms apply in relation to the table top. The first of these is the horizontal plane, which is always basicly represented by the top of the table, and of course as many horizontal planes as are desired may be had parallel to the top of the table.

The next basic plane is the mesial, which extends through the body from the dorso-mesial line to the ventro-mesial line. Of course any appendal part may, for relating purposes, be considered as having a mesial plain, and as to the trunk aside from the mesial plane there may be as many sagittal planes parallel to the mesial as the occasion requires.

The third important plane is the transverse. This plane is at right angles with the mesial plane, and of course in a sense is at right angles with the horizontal plane, but the specific relation the transverse plane sustains to the horizontal is perpendicular.

From these basic planes the relator may establish any line along which he desires to project corrective force, and the lines used are the perpendicular, which should be conceived as being within the crossing of the transverse and mesial planes and directly toward the horizontal plane, and oblique, for of course all other lines along which force may be projected are oblique.

The oblique lines along which force is projected in vertebral relating are those that are directed toward the head and ventral surface whether in the mesial plane or not, and those directed toward the feet and ventral surface whether in the mesial plane or not.

No force is ever directed obliquely in the transverse plane, except where the thrust would be vertical except for the position of the tissues. There are only two areas in the traction-thrust system where this occurs, and that is at the gibbosity of the pelvis in certain cases, and upon the transverse processes of the atlas and axis in certain cases.

In all other respects oblique lines along which force should be projected are found somewhere between the transverse, and the mesial planes and also sustain oblique relation to the horizontal plane, and are always toward the head, the venter, and the lateral aspect of the body, or toward the feet, the venter, and lateral aspect of the body. These directions are given from the thought of the body being upon the venter.

With the subject upon the dorsum the lines will be toward the head, dorsum, and lateral parts of the body, or toward the feet, dorsum, and lateral parts of the body.

It will be seen that the number of oblique lines used in the application of the art of relating to the trunk, are legion; the actual number being inconceivable. Each of these lines must be determined, as has already been described, by traction preceding the thrust, and in exactness in ascertaining these lines in advance, lies the finesse of the relator's art.

POSES

In order to obtain unit procedure of the relator's body, it has been found that the three following positions are essential, and they have been classified as (a) the first position, (b) the second position, and (c) the third position.

First position—This position is used in applying the relator's art in the cervico-thoracic area.

The operator stands directly facing across the table with his full weight upon the foot toward the patient's head, anchoring the patellar tendon upon the edge of the table. His other foot is extended along the table with just the toe touching the floor. The body is bent at the hips with the back remaining straight. The neck is raised out from between the shoulders, which are rigidly fixed as is also the trunk and arms. The force is applied by throwing the whole body with unit impulse toward the hand of application.

Second position—This position is particularly used at the fifth thoracic area, but is incidentally used elsewhere. In this position the relator stands beside the table facing obliquely across the table with both toes obliquely toward the patient's head. The one nearest the head quite oblique, the other one nearly in the transverse with the toe under the edge of the table. The feet are about sixteen inches apart differing slightly with the height; thighs are opened, the body bent at the hips, the knees and ankles equally, the vertebral column remaining in the normal position, the trunk thrown well down between the shoulders. In other words, the shoulders rest dorsally. The chin must be brought in, and the neck and whole trunk are fixed.

The movement is primarily accomplished by an impulse of the thigh muscles toward the abdomen, but is really accomplished by a unit impulse of the whole body toward the application surface of the hand.

Third position—This is also called the crouch, and is used primarily in the imbricated area, but incidentally in the thoracico-lumbar, and may be used in any area where oblique force is to be applied, and whenever such oblique force is to be applied, it is most highly recommended, because in this position the body is stronger than in any other.

In this position the relator stands beside the table facing the way he desires to project force, with the leg away from the table flexed at the knee and ankle, so that the substantial weight of the body is borne thereon. The other leg is also flexed at the knee and ankle, but is thrown backward far enough to permit the operator to swing his body over the center of the patient.

In this position the body is bent back dorsally into a crouch, the shoulders being carried well out from the trunk so that the arms come close together, which are straight, and the chin must be brought forward and the neck, trunk, and arms rendered rigid.

The force is projected by a unit impulse which passes from the feet over the whole length of the body to the application surface of the hand.

This position is indeed most difficult to learn, because it is unusual to the adult. It is, however, the position that any child will take when told to push an object out of its way, and students are urged to master this position, for in all thrusts in which it is properly used, its correct use is essential as a protection against shocks to the viscera of the operator.

The reason so many relators are not well is that they do not protect their column or viscera by proper posing of their bodies, but permit shock-like effects to occur each time they project a thrust upon the body of a patient.

The student is urged to observe carefully all that is stated in this chapter, for each thing stated in this connection is essential to his work as a Chiropractor, and is especially necessary if he is to master the traction-thrust system.

CHAPTER XLI

THE DANGERS OF THE THRUST

THE conceptions of relating which have been induced from an examination of the osseous vertebral column have been very erroneous, and have placed a very heavy burden upon the Chiropractic profession which it should now be our pleasure and duty to eliminate in so far as the same is possible.

From the bare vertebrae, strung upon a string or wire, it has been erroneously conceived and taught that a single vertebra may be displaced by itself, and this conception has received the name, "a subluxated vertebra."

Of course, a student proficient in anatomy needs nothing more than the suggestion of this situation to know at once that a single vertebra cannot be displaced by itself, and that a vertebra cannot be subluxated.

Clearly, subluxation with respect to vertebrae must be of the articular area, and in each of such areas there are three joints, any one or all of which may be subluxated.

If a joint in the headward intervertebral area from a vertebra was subluxated, the articular surfaces of that vertebra could not be held in apposition, because in order that there shall be subluxation there must be either sprain, laceration, contusion, disintegration, or enlargement of the holding structures of the joint. With such a situation the joint area must be distorted, and the articular surfaces at the other end of the vertebra must be changed in their relation with the structures at that end, in a manner to exactly correspond with the headward end which would produce a similar distortion in that joint area, although the gravity might, or might not amount to a subluxation.

It will be seen that what those who speak of, "a subluxated vertebra," are definitely talking about, if they only knew it, is two definite joint areas in which there are six joints at the very least consideration, and they are talking about a displaced vertebra, which means that all of its surfaces and margins must have changed equally with any part, unless fracture has occurred, thus distorting all relative and attached cartilages, ligaments, and muscles.

The indulgence of the errors just discussed, and the further error of considering the bones as disassociated from the cartilages, ligaments, muscles and relative soft tissues, and therefore, failing to comprehend that vertebral displacement means body distortion, has caused the profession to fall into several very destructive phases of conduct, which have been intended to be corrective, but have actually been the reverse.

I wish at this place to take up in their successive phases these errors in "adjustment" procedure in the order of their gravity and danger.

(A) The first error to which I desire to revert is that of placing the patient upon the venter with the table closed or open, with the pelvis upon a roll or not, and thrusting vertically, which is ventrally or thrusting ventro-feetwardly, in the imbricated or thoracico-lumbar regions. Such procedure is sure to produce lordosis with all of its grave and permanent effects. As will hereinafter be emphasized, force in this region should always be applied ventro-headwardly or head-dorsally, depending upon the region.

(B) There has been a habit of placing the hand upon the unprepared body in order to give a movement which has been called an "arm thrust" or "recoil" in its tonic condition, and delivering great force with distance followed by instantaneous removal. This style of application always increases kyphosis and lordosis, for it must be remembered that at both ends of the kyphosis or lordosis there is a bow-like kick-back that will always be in the opposite direction from such a thrust.

The relator is cautioned to always take his traction slowly in order that he may very carefully approximate the distance necessary to move the part, and having made such approximation, carefully select the center of resistance and thrust toward it with instantaneous removal if there is a lordosis, but with a thrust held at its depth, if the area is kyphotic.

These points must be well remembered. There is never a time and never a place where the distance of thrust should exceed a quarter of an inch, and a very much better approximation is a thirty-second of an inch, and indeed, many times the slightest movement conceivable with great speed is all that is required.

To do more than is necessary; to carry tissues further than they should go is to produce excess friction, which produces cleavage or plus disintegration, and it must be remembered that cleavage or plus disintegration is always an injury, and may very easily be carried far enough, if applied to the holding elements of joints, to result in subluxation, which is permanent injury.

(C) *Produces rotations.* The student is cautioned in this connection that it is very easy to produce rotation, by an improper attempt to apply a relating procedure. That is, proceeding without correct diagnosis.

If the diagnostic conception of the one who would relate is wrong, his application will be wrong, his line of projecting force will be wrong, his distance will be wrong, and the result will be distortion, perhaps of the types already mentioned, or of the type now under discussion, rotation, and no graver injury can be done to the organism than by the production of rotation of vertebrae.

It has been conceived, growing out of inductions from the bare bones of the column that a vertebra may be lateral as an entirety, and hence a lateral movement to correct the position of a lateral vertebra is generally taught. Now, there are two errors here that cry out for correction. In the first place, laterality of a vertebra definitely as such does not occur, and if it did it would not be corrected by a lateral thrust in the way and manner that it has been taught.

However, there has grown out of the erroneous conception this dangerous procedure and grave result. Operators have been taught to place the application hand upon the spine of the supposedly lateral vertebra, and thrust laterally across the body toward the area supposed to be the correct place of the vertebra.

The anatomic student will immediately see that the result of the transaction described in the preceding paragraph will be to produce a rotated vertebra with rotary distortion of the articular areas both headward and feetward from it as the very least injury.

In order that the student will understand, it is necessary at this juncture to state, that there are three characters of rotation that must be definitely considered in this connection, and they are (1) rotation from the spine, (2) axial rotation, and (3) rotation from the ventral aspect of the vertebra.

Rotation from the spine—is that phase of distortion in which the mesial line of the spinous process remains in the mesial plane, while the remainder of the vertebra is displaced to the left or to the right.

Axial rotation—is that character of distortion in which the spinous process is displaced in one direction from the mesial plane, while the medial line of the ventral aspect of the body of the vertebra is displaced in the opposite direction.

Rotation from the ventral aspect—is that situation in which the mesial line of the ventral aspect of the body of the vertebra remains in the mesial plane, while the remainder of the vertebra is displaced to the right or to the left.

In addition to these three cardinal rotations another must be considered which occurs incident to scoliosis, and in that connection is called a scoliotic key. These are presented in two of the types already described. The rotation from the ventral aspect of the vertebra and an axial rotation occurring as incident to the gibbosity of the scoliosis generally, and sometimes incident to the end of the scoliosis.

It will be seen that the rotations referred to would be called lateral rotations if the mesial line of the body was alone considered, but they are not such when it is remembered that rotations are always determined from the mesial plane of the vertebral column, and from the standpoint of the vertebral column they fall within one of the three classes described.

The attempt to relate a supposedly lateral vertebra by the method referred to has the effect of producing an axial rotation. That is to say, of driving the spine to one side of the mesial plane, while the ventral aspect of the body of the vertebra is perforce driven to the other side. However, such application may produce a rotation from the ventral aspect of the body.

To put the whole matter in succinct form, to move the vertebra that is rotated from its ventral aspect, as though it were a lateral displacement, is to either project the whole vertebra in rotated attitude laterally to the medial plane of the column, or to convert it into an axial rotation.

To address force to an axial rotation, as though it were a lateral displacement, to the spinous process alone, is to gravely increase the axial rotation or to produce a rotated lateral displacement.

To move a vertebra rotated from the spine as though it were not rotated but "superior" or "inferior" (using old terminology), or as if it were "anterior" or "posterior" (using old terminology), is to produce axial rotation or lordosis with increased rotation from the spine.

With regard to the production of this last character of rotation the author feels it necessary to impress the student as deeply as he can with that danger and therefore states in this connection that more than seventy-five per cent. of rotary displacement met with in practice is of the last type discussed, or rotation from the spine.

Practically all scolioses are produced by rotations from the spine. All compensatory rotations are produced that way, and when the student stops to consider that the typical, complex, opposed, rotational scoliosis comprehends at least ninety per cent. of the human family, he will begin to have some appreciation of the importance of the caution which he is now receiving.

The caution is here definitely given that all rotated vertebrae must be addressed for correction in such manner that the entire vertebra will be controlled by the force, and definitely moved, each part of it passing through such distance as is deemed necessary to its correction.

The method, therefore, of application to rotated vertebrae is to apply the heel of the hand upon the transverse process, anchoring the anti-heel upon the spinous process, and, by securing the proper direction incident to the area and resistance, applying force in such manner as to reduce the rotation.

The student is cautioned that there is no such thing as a lateral displacement, and therefore, where he finds what he assumes to be a lateral displacement, he must remember that it is a rotated lateral, and as such sustains a key-like relation to a scoliosis, and its displaced position must be corrected by the two-point single contact just described.

Therefore, no relator who places his hand upon a spinous process only, and thrusts to any extent lateral from the mesial plane of the vertebral column, can hope to avoid producing injury to the extent of his error, frequently amounting to rotational subluxation.

There is never a place, and never a time when a relator is warranted in making a circumscribed application to the spinous process of one vertebra, and thrusting in any direction. It only requires a little anatomic thought, the basis for which has been given in this chapter, to make the reasons for this fact perfectly plain.

In his application the relator must always have in mind the cartilaginous, ligamentous, and muscular relationship to the vertebra which forms the center of his contact area, and the relationship the same sustains to the next vertebra headward and the next vertebra feetward from it. If he will well remember these things he will know that he is attempting to secure the reduction of a distorted area, and not specific replacement of a displaced vertebra.

These suggestions have been made by the author with a sense of pain that such admissions must be put down of record, but an analysis of any situation that fails to comprehend all of the facts involved, is not an analysis, and the author desires that this work shall comprehend all of the necessary facts, and shall analyze all of the necessary situations to the benefit of all members of the profession, but peculiarly and paramountly to the benefit of Chiropractic.

CHAPTER XLII

RELATING THE CERVICAL AREA

In the cervical area the corrective art takes on several complexities, and these must be analyzed and described in connection with each peculiar position.

LONGITUDINAL TRACTION

Longitudinal traction of the cervical area is performed with the patient either upon the venter or dorsum. The traction performed with the subject upon the venter is the one most met with in practice, but both are of value.

Subject on Venter—In this position the longitudinal traction is performed by the operator grasping the mandible in the hand of contact, and hooking the forearm down around and under the occiput, so that the wrist crosses the neck relative to the mastoid. In this attitude the head is firmly held by the whole surface of application.

With the hand of application as described in the preceding paragraph, the relator places the other hand upon the headward thoracic aspect of the patient. If he desires that the traction shall be straight, for the purpose of simply vacillating the cervical articulations and relaxing the longitudinal tissues, he holds the subject's chin in the normal position with the hand of application, while he places the other hand upon the trunk relative to the headward aspect of the scapula about halfway from the acromion process to the vertebral spines.

With the application just described, the relator projects his body ventrally, while at the same time he gives an impulse ventro-headwardly with the hand of application, and at the same instant he projects sudden force with the other hand toward the feet-ventral aspect of the patient, and the traction is accomplished.

If the relator desires to throw the atlas and axis dorsalward with the traction, he merely forces the chin out from the neck, holding the mandible as described, and with the forearm locked down around and under the occiput, while the other hand is placed relative to the acromion aspect of the shoulder, and with the same character of impulsive movement in the directions described, the dorsal projection of the atlas and axis is accomplished.

If the relator desires to raise the lordosis at the third, fourth, and fifth cervical vertebrae, he will draw the chin in toward the neck, grasp the mandible as described, and lock the forearm around and under the occiput, and apply the other hand over the rhomboideus at the side of the spines toward which the application is made, and with the impulsive traction in the directions described, that result is accomplished.

Subject on Dorsum—Longitudinal traction with the patient on the dorsum is performed by the relator standing at the subject's head facing his feet, and placing the ulnar aspect of each hand immediately in relation with the mastoid process, having his knees against the front end of the table, and be bent over the patient. Preparation for the result desired is made by slowly tractioning the neck until all the tissues are taut, being careful that the occiput rests upon the table, the arms are held rigidly, and when ready, a slight impulse from the deltoids, aided by the same character of impulse of the muscles of the forearm, secures the result desired.

Longitudinal traction of the cervical region can be performed with the subject standing erect in the same way as that described in the last paragraph, but this movement is not recommended, because in it there is neither opportunity for anchorage nor measurement of distance, and in conjunction with this statement, the author wishes to caution all students that longitudinal tractions must only be made when those parts of the body upon which force is to be projected are carefully anchored in such way as to permit of exact measurement of distance.

The author wishes in this connection to express a further caution with regard to longitudinal traction with the subject upon the venter; that the forearm must be well locked around and under the occiput, in each of the three characters of movement, otherwise the traction is converted into a rotation, and when so done, it is one of the most dangerous rotations that may be devised. Further, in attempting the longitudinal traction in these positions, always lock the forearm around and under the occiput, holding the elbow joint rigidly.

SUB-OCCIPITAL RELATING

The atlas and axis in this area are related as though they were a single vertebra, in all respects except simply that of rotation of the atlas, and rotation of the atlas only becomes necessary when its relative aponeurotic or muscular structures are constricted in some area, preventing it from performing its normal rotation; such correction is usually performed in conjunction with the correction of the axis.

It must be remembered also that the atlas and axis are never dorsal in their displacement, and hence they only present the necessity of correction in their dorso-ventral, lateral, and rotary aspects.

It must also be remembered that when the axis is rotated, the atlas is always rotated in the opposite direction. Remembering this fact will obviate many unnecessary applications to these structures that are now being taught and attempted.

If the axis is to the left, the atlas is also, and neither can be in this position except as the result of cervical rotation. To correct such displacement the relator stands at the left of the patient facing across the table and places his left hand upon the left transverse processes of both the axis and atlas. The application may be by the heel of the ulnar aspect of the palmar surface, or may be the ulno-palmar surface of the first segment of the little finger, depending upon the size and strength of the hand. In either event, application is made close to the mandible, the patient's head lying upon the right side. The traction must be rigid, and the thrust basicly vertical with impulsion head-dorsally; the application surface of the hand being instantly turned sufficiently at the thrust to the right to permit the dorsal movement of the transverse of the atlas and the slight ventral movement of the transverse of the axis.

This application may be made to the right transverse of the atlas and axis when the situation necessitates it, but in this connection it must be noted that the axis and atlas are very rarely displaced to the right. Indeed, in more than twenty years of experience I have never observed such a situation. If it should occur, however, it would be corrected in exactly the same manner except from the right side by use of the right hand.

When the atlas and axis are to the left, the body of the axis is rotated to the left, the spinous process is therefore to the right, and frequently much aid to the situation can be had by following the first thrust just described by turning the head upon the left side and applying the ulnar margin of the hand to the right lamina and spine of the axis, thrusting obliquely dorso-feetwardly. This serves to throw the body of the axis to the right, and carries the atlas by the odontoid relation to the right with it. When this thrust is used, it must be applied short and swift.

In the lateral applications described in the preceding paragraphs it sometimes occurs that the headward aspect of the third cervical, because of the scoliosis, acts as a key preventing the body of the axis from moving to the right. In such an event it is necessary to turn the head upon the left side and make application upon the right transverse of the third, anchored upon the spinous process of the axis, thrusting vertically, but with inclination head-dorsally, before applying force to the left transverses of the atlas and axis.

The methods so far described completes relating with application to vertebrae with the patient upon the venter, except knife-thrust applications around the cervical margins of the occiput from mastoid to mastoid. These are applied with the patient's head upon the right side, by sharpening the edge of the left hand under the edge of the occiput, and centering force to the tonicized area, thrusting vertical but with pronounced dorso-headward movement. With the head upon the left side the same application is made with the right hand, with the same character of movement.

SUBJECT ON DORSUM

With the patient in this position but one thing is sought to be attained in the sub-occipital area, and that is to move the atlas and axis dorsalward. This is accomplished by turning the subject's head so that the right side of the face is toward the table, placing the left hand by the heel aspect near the ulnar margin, upon the ventral aspect of the transverse processes of the atlas and axis, with the heel of the guide hand upon the neck and shoulder, the fingers applied in such way as to hold the hand of application in position. Then thrust basicly vertical, which means with the patient's head in the attitude described, dorsally with slightly headward impulsion. Then, turning the patient's head so that the left side of the face rests upon the table, making the same application to the ventral aspect of the right transverses of the atlas and axis, and thrusting in the same manner and direction.

The caution with respect to this thrust is that the patient's head should be definitely anchored, and the neck should rest upon the table. The thrust should be indeed very short and swift, with usually not much force. In kyphosed subjects place a solid cushion under the head.

In leaving this area the author wishes to say that much exploitation of "atlas moves" has obtained in the field of Chiropractic, much to the detriment of the profession and humanity. As a separate segment the atlas never needs address, but should always be related as a companion to, and as though a part of the axis.

There is no occasion nor excuse for any rotary movements being applied to this area of the vertebral column. The joint movement of the atlas in its relation with the axis is purely rotary, and rotary movements here are not only unnecessary, but are not anatomic and are unwise, injudicious, and positively harmful.

THE AREA PROPER

The cervical area is one in which many complexities occur, and requires the subject to be in several different positions to illustrate the various corrective procedures. These will be described with the patient upon the venter; with the patient upon the dorsum; and with the patient sitting.

Subject upon the Venter—In this position any direct application to a specific vertebra is made. Formerly there were many movements applied to the cervical area, with the patient in this position, but there is only one taught now, and that is, for instance, with the patient's face upon the right side toward the relator, who places his hand upon the lateral mass of the vertebra extending across the lamina and spine of the same vertebra with the fingers toward the dorsum of the neck, and thrusts basicly vertical, but with pronounced dorso-feetward impulse. This application is now very seldom employed. If used, with the face turned the other way, it would be accomplished by a reversal of the conduct.

To correct cervical rotation, the radial aspect of the hand of application is placed in relation with the lateral masses of at least three vertebrae in juxtaposition with the transverse processes. The other hand is placed under the head with the ear resting in the palm of the hand, while the thumb is up toward the dorsum of the squamous temporal, the fingers extending toward the frontal aspect above the zygoma. The subject's face is turned away from the relator. The chin of the subject is brought in toward the neck, and the head carried around toward the shoulder of the side opposite to the relator. When the tonicity of the neck is taken out, the hand on the head becomes the anchorage to hold steady resistance, while with the application hand, a sudden short impulse is given toward the ventral and opposite side of the neck, rotating the three or more vertebrae of application toward the opposite side, each in the ratio of its displacement.

Of course, the relating just described would be made in the same manner no matter which way the region is rotated, but it must be cautioned that in ninety per cent. of cases the cervical area under discussion is ventrally rotated to the left.

When attempting to apply this correction, the face of the patient must look away from the side of the table upon which the relator stands, with the head thrown forward so as to separate the spines at the back of the neck. In other words the cervical region must never be bent dorsally.

It must be stated that the base of the neck should frequently be released as if it were rotated to the right to prepare for the reduction of the left scoliosis as just described.

Subject on Dorsum—To reduce cervical rotation with the subject in this position, if, for instance, the rotation is ventrally to the left, the right transverses will then be ventral to the left, and therefore the patient's face will be turned to the left, while application will be made by the relator standing on the left side of the patient, facing his head and applying his left hand over the ventral aspects of the transverse processes of the rotated vertebrae, while with the right hand applied to the left side of the patient's head, he picks it up with the ear in the palm of the hand and tractions ventro-laterally toward the right shoulder. When the traction is complete the thrust is made with the left hand dorso-mesially, with headward impulsion; the force will be vertical except for the headward impulse, but will carry the tissues dorso-medially.

The application just described is for the correction of left rotations, although, of course, right rotations would be corrected in the same manner, reversally applied, and key-like vertebrae may be corrected from either side in a similar manner.

Subject Sitting—In the sitting posture the application is made exactly in the same manner as it would be if the subject was upon the venter. That is to say, the operator stands behind the patient and makes the same application to the areas as have been described with the patient upon the venter. However, there are some incidental things that must be described.

Presuming the rotation to be, ventral aspect to the left, the relator places his left foot on the table at the left side of the patient, supporting the patient's body against his leg, using the left knee as an anchorage for the arm. He places the left hand upon the left side of the head with the ear in the palm of the hand, while the thumb extends toward the occiput, and the fingers toward the fronto-temporal aspect. At the same time he places the right hand at the right base of the neck with the thumb end against the sides of the spines of the seventh and first; bringing the head over to the right he tractions the tonicized muscles at the left base of the neck relative to the shoulder.

The relator then places the right foot beside the patient on the table, anchoring the body against the right leg, and places the radial aspect of the first segment of the index finger of the left hand in relation with the lateral mass of the rotated vertebrae in relation with, but dorsal to, the transverse processes, while with the right hand applied to the right side of the head, the ear in the palm of the hand, the thumb toward occiput and fingers toward fronto-temporal region, he brings the patient's head to the left, turning the face toward the left shoulder and converting this attitude into an anchorage, he thrusts with the left hand ventro-right-laterally, rotating each vertebra in the ratio of its displacement. Make sure that there is no converging force between the hands.

The application last described is intended for the reduction of scolioses only, but it may be applied to the reduction of key-like conditions in the same way as described, except that for such a purpose the contact is but to one vertebra definitely and the two contiguous vertebrae incidentally.

In either of these corrections, care must always be observed to bring the chin of the patient in, bending the head ventrally so as to open the spinous aspect of the neck, in order to get the benefit of the flexuousness of the intervertebral cartilages, and the vacillability of the articular processes.

It will be seen that the relatings for the cervical region are very few, and very simple, but the student must not make the mistake of thinking that they are not difficult, and may be performed carelessly, for to accomplish these with the nicety of exactness requires consummate art, that can only be attained by the closest observation, and long and careful practice.

One that would master cervical correction, must first master every detail of the anatomy of this region and a perfect knowledge of its physiology.

CHAPTER XLIII

RELATING THE THORACIC AREA

The thoracic area, as will be recalled by reviewing Chapter XXXVIII consists of the cervico-thoracic, the mid-thoracic, and the imbricated areas. These do not include all of the thoracic vertebrae for reasons stated in the chapter referred to, but do include some of the cervical vertebrae for reasons herein stated.

CERVICO-THORACIC

Relating in this area again introduces some complexities which will be resolved first. These it will be seen resemble somewhat relating in the cervical area, and that is true because some of the vertebrae are cervical, and because of the similarity of others to the cervical vertebrae.

These corrections are applied with the subject on the venter, with the subject on the dorsum, and with the subject sitting, and these will be described before the regular relating of the area.

On the venter—In this position rotations of the vertebrae will be corrected in the same manner as described in the cervical region with the patient in the same position, and nothing further need be said except the place of application may be at either the lateral aspect of the sixth and seventh cervicals, or the first thoracic. The hand of application may be used as a thrust hand, or as an anchorage hand, depending upon whether vertebral movement, or muscular relaxation is desired. Care must be taken not to converge force.

If muscular relaxation is desired the application hand becomes the hand of anchorage, and traction of the muscles are made over it by moving the head toward the side of application with the chin turned toward that shoulder.

If osseous movement is desired the hand upon the head becomes the anchorage hand, while the hand relative to the osseous structures becomes the thrust hand, and the thrust is performed as the same character of thrust is described in the cervical region.

On the dorsum—In this position rotation may be corrected by the knife-thrust application over the ventral aspect of the transverse processes of the side from which rotation is turned. That is to say, if the rotation is to the left, the application will be over the right transverses of the sixth and seventh cervicals. The force being applied dorso-mesially with headward impulsion.

In making this application, care must be taken not to impinge the large nerve trunks and blood vessels within this immediate area. The application, therefore, must be carefully made, and preparatory traction carefully taken. With correct application this is an unusually valuable relating procedure. It is to be used in such conditions as goitre, and with all forms of strangulation at the inlet of the thorax.

Subject sitting—In this situation the relating process is applied precisely as described with the patient on the venter, except here again the thigh, leg, and foot should support the subject's body as has already been described.

There was an old movement performed in a manner to look somewhat like this, that was called the "T. M." The student must understand that this is not the "T. M.," but that it is applied precisely as has been herein described with the patient on the venter.

In applying this relating procedure to the patient sitting, great care must be taken not to compress the carotid arteries either in anchorage or thrust, for to do so often induces sleep or prostration on the part of the subject. Operators will understand this when they recall that carotid means sleepy, and remember the large aggregation of nerve trunks that extend into the thorax in juxtaposition with these areas.

Subject on venter—Assuming the venter again, the analysis proceeds to the regular application to vertebral areas.

Broad thoracic contact—This is applied to the headward thorax generally for relaxing purposes. In this the operator places his hand across the spines of the column in such manner as to direct force through the immediate resistants into the center of opponent resistance, feet-ventrally, thus securing vertebral vacillation and muscular relaxation of that whole area.

This application may be made by placing one hand upon the body with the guide placed upon it in the usual way, or it may be applied from the third position with the operator's face towards the subject's feet by the two-hand single contact.

This correction is highly recommended for all children and very young people, and in all acute conditions. This application has been known to overcome la grippe and croup without any other.

If the headward thoracic column is gibbous, application should be made to the most dorsal vertebra particularly, and the vertebrae headward and feetwardly incidentally. The relator has the primary vertebra in the heart of the application hand with the guide hand placed upon it in the usual manner.

By traction the center of resistance is ascertained, and then the line along which force is to be projected is moved headward or feetward from that center to meet with the phases of muscular recoil that are desired, and then the thrust is delivered either from the first position or the third as best suits the convenience of the operator. Sometimes a combination position pose is better.

What is meant by reference to muscular recoil in the last paragraph is, that if there is a lordosis compensatory to the gibbosity that is being reduced, the line of thrust must be so directed relative to the center of resistance that the muscular recoil will raise that lordosis.

Supposing the lordosis to include the sixth, seventh, and eighth thoracic vertebrae, the line of thrust must be so selected that the muscular recoil will strike under that vertebral area, throwing these vertebrae dorsally. For this purpose, and also for the purpose of reducing the gibbosity, the thrust must be held at its depth until the muscular recoil is complete and the tissues are again at rest.

Aside from the compensatory influences that may be obtained by the broad thoracic contact, it is the safest means of reducing acute kyphoses, such as occur in young subjects, and for such is all that is necessary.

The student is here definitely cautioned that application to a single vertebra should never be made for any purpose, but that it is extremely dangerous to attempt application to a single vertebra in young subjects. Of course if it were necessary, the fact that it is dangerous should not deter, but it is never necessary, and to make such a thrust is negligence approaching the criminal type.

Application may be made to a single vertebra in this area, as has already been indicated if the vertebra of application is simply made the principal center, and if force is directed to the contiguous vertebrae, to move such vertebrae in ratio with the primary movement of the principal vertebra.

This relating procedure would never be applied except to kyphotic areas, and limited kyphotic areas, it must be understood, are what other writers have called "posterior," or "superior displacements," incorrectly termed "posterior subluxations."

The statement in the last paragraph is as much as saying, that there is no such thing as a single vertebral displacement. That is what the author wishes definitely understood. Therefore, all relating procedures are applied to kyphoses, lordoses, or scolioses.

Lordosis of the area is corrected by the following methods: the saddle-back, and the two-hand single contact.

It must be kept in mind that lordosis in the area under consideration usually extends out of the area, or in other words includes the fifth thoracic and sometimes even the sixth and seventh, but this fact does not change the style of application further than to elongate the area of contact, and in long areas the two-hand single contact must be used instead of the saddle-back.

No matter which of the applications designated are used, their use is intended to secure such recoil from the musculatures of opponent resistance, centered beneath the area as to raise it up, and in such relating application instantaneous removal must be practiced following the thrust.

The saddle-back is accomplished by placing the palmar aspect of the base of the hand of application relative to the transverse processes on one side of the medial line, while the fingers rest, palms down, relative to the transverses of the opposite side. The guide hand is placed upon the application hand so that the ulnar aspect reinforces the fingers. The application hand is pressed upon the tissues and held rigidly by the guide hand so that the application is similar to a saddle upon a horse's back.

When the traction has been taken, the thrust is delivered, and concomitant with the thrust the fingers and base of the hand are approximated by the relative assistance of the guide hand, so that force is thrown down through the body from each point of application, so as to strike the opponent musculatures of the opposite side, the recoil from which is directed into the ventral aspect of the lordosed area raising it dorsalward.

It will be seen that the saddle-back as described can only be applied where the lordosed area involves definitely one vertebra with the extremities of one contiguous vertebra in each direction.

The two-hand single contact is applied by placing the two hands, by their ulnar aspects over the area immediately related to the transverse processes and the necks of the ribs, the front fingers and thumbs being interlaced together so as to convert the two hands into one. The operator stands bent at the hips with both elbows bent, but with the elbows, shoulders, and trunk rigid. When the traction is complete, the thrust is delivered by approximating the ulnar aspects of the hands with a lifting impulse headward so as to project force from each hand into the opposite, opponent musculature in such manner that the bilateral muscular rebound, centering force under the lordosed area, throws it dorsally.

The two procedures last described require the utmost art and skill of the operator, but when they are mastered are his most valuable auxiliaries in accomplishing reduction of lordoses.

The discussion so far has comprehended all of the relating procedures to this area except that of osseous keys, which must here be definitely described.

The student must understand that there are two osseous keys that peculiarly affect the area under consideration. These are the scoliotic key and the lordotic key.

The scoliotic key is one or two vertebra, (in a great majority of cases only one), that has failed to rotate in harmony with the other vertebrae of a scoliosis. That is to say, for instance, the second, third, fourth, fifth, and sixth thoracic vertebrae describe a scoliosis by being rotated by their ventral aspects to the right, but the fourth thoracic fails to rotate in ratio with its fellows, with the result that its body is to the left of both the third and fifth, while its spine is to the right of the spines of those vertebrae, and its right transverse process is more ventral than those of the third and fifth, and its left transverse more dorsal than those of the third and fifth.

In the situation described in the preceding paragraph the fourth thoracic vertebra acts as a keystone in an arch to the scoliosis, preventing reduction of the scoliosis, and before general application can be made to the scoliosis for its reduction the key must be reduced, which is accomplished in the manner described in the next paragraph.

The heel of the hand is placed upon the left transverse of the fourth thoracic, while the anti-heel is placed upon its spine. The heel is the relating application, while the anti-heel is the anchorage application. To secure this position the hand must be turned out of the axis of the arm sufficiently to bring the heel far enough headward to secure the application described.

When the application is taken as described the operator holds the spine with the anti-heel, while he projects force upon the transverse process, thus throwing the body of the vertebra in the case of illustration to the right, breaking the key-like relationship to its fellows, and thus preparing the way for general reduction of the scoliosis.

The student must observe this definite caution. To reduce a scoliotic key no force is permitted to go deeply into the body. The application is short, sharp, and quick, and one which does not project weight upon the body, for it must be remembered that the thrust is being accomplished in a scoliosis, and the only object is to secure the release of a key-like effect by opening a gap, which only requires that the body of the vertebra shall move definitely a short distance to the right.

The lordotic key is found where in a lordosis the most ventral vertebra forms the bottom of a curve so definite as by approximation of the contiguous vertebrae it forms a keystone, as it were, to the lordotic arch, preventing elevation of the lordosis.

The student will understand that the complexity in this relation occurs from the fact that no force can be applied to a lordotic area, except in such way as to secure a muscular opponent recoil that has the effect of raising the lordosis.

It will be plainly seen that a lordosis in the region under discussion presents to the operator a situation not dissimilar to a bow definitely strung. His office is to release the string, not that the two ends of the bow may fly back leaving the bow straight, but that the middle of the bow may be brought dorsally into proper relationship with its two ends.

The relator's force, therefore, must be applied so that it will go into the opponent musculatures headwardly and feetwardly in such definite way as to result in an instantaneous recoil from both, centering dorsalward under the ventral aspect of the keyed vertebra.

It will be seen that to apply force as described in the preceding paragraph will require first the projection that will go both headwardly and feetwardly from the point of contact, thus opening a sufficient gap, that when the recoil comes from the opponent musculatures, it will be able to raise the keyed vertebra dorsally.

The proper method for the application to raise a lordotic key is the two-hand single contact as heretofore described, but with the distance of the application shortened, and with no force projected into the body. The longitudinal application of the two-hand single contact is generally sufficient to raise the keyed situation.

It sometimes occurs, however, that a lordosis is so rigid that its key cannot be raised by the two-hand single contact placed longitudinally, and in such cases the two-hand single contact must be applied in the transverse, and when it is greater force must be applied on the hand in relation to the head than the other hand, for the purpose of securing arthrodial vacillation between the articular processes. By this means sufficient longitudinal movement can be secured to release the most rigid key unless there is ankylosis, in which event the key cannot be released.

Having by the means described made the necessary preparation for the reduction of a scoliosis in the case as illustrated, the operator is now ready to reduce the general scoliosis, which is accomplished by placing the left hand by its ulnar aspect on the right side of the spine row, medial to the transverse processes of the second, third, fourth, and fifth thoracic vertebrae, and thrusting ventro-mesial with slight impulsion headward, placing more force upon the most dorsal aspect of the rotation, and relative force upon the contiguous vertebrae, thus reducing the scoliosis in the ratio of its rotation.

It will of course be seen that with the application of the hand in the manner described there will be an anchorage upon the joint relationships of the transverse processes and necks of the ribs out almost to the primary angles of the ribs. This anchorage must be definitely made, and these tissues must be drawn by the anchorage in ratio with the movement of the column to the left at the time the thrust is given.

The student should remember that if two contiguous vertebrae are scoliotic keys the address will be as described, except that the heel of the hand will be applied to the transverse processes of both, and the anti-heel to their spines, and if two vertebrae are lordotic keys the application will be as described, except the address will be to the area of the two instead of centering particularly to one vertebra.

CHAPTER XLIV

MID-THORACIC AND IMBRICATED AREAS

The areas to be discussed in this chapter are those in which the relator applies his art more frequently than in any other, unless perhaps, the sub-occipital region. It is, therefore, of the utmost importance that the student shall make himself master of all that is herein stated.

THE MID-THORACIC AREA

This area in its corrective aspects is apparently simple, and when the fifth thoracic spine forms the gibbosity of the thoracic curve, relating in this area is indeed very simple, and consists in placing the hand upon the area which would be definitely the fifth thoracic with the contiguous aspects of the fourth and sixth, and after taking proper traction, thrusting vertically.

The complexities, however, arise when the area is kyphosed or lordosed, and these must be here analyzed.

If the mid-thoracic area is kyphosed, but still remains the gibbosity, application must be made so that force radiates definitely headward and feetward from the area of contact, and sufficiently more headward to secure articular vacillation with intermediate vertical force from the center of contact, and at the depth of traction force along the lines indicated must be projected, and the tissues must be held at the depth of thrust until recoil from the opponent musculatures, both headwardly and feetwardly, have thrown the two ends of the column dorsally, as it were, past their habit areas.

If there is kyphosis but the gibbosity has gone headward, then the force from the ulnar and radial side of the application hand must be projected as already described to meet with the curvature, but the intermediate force from the center of application must not be vertical, but must be slightly feet-ventral.

If the gibbosity has gone feetward, then the relative force from the ulnar and radial sides of the hand will be projected relatively to meet the necessities of the curve, but the intermediate force from the center of application will be directed slightly head-ventral.

If the area is lordosed, relating procedure will be either the saddle-back or two-hand single contact, and since this area is never lordosed by itself, the application will be such as to properly relate to a headward thoracic lordosis, or an imbricated lordosis.

THE IMBRICATED AREA

The student is definitely cautioned that the imbricated area of the thoracic column is the most difficult to which to apply relating force of any area requiring the exercise of his art, and he is therefore cautioned to proceed with great care and particularity.

To the end that the student may not make mistakes as to his relating procedure in this area, it is here definitely laid down that all force applied in the imbricated area must be head-ventral, sufficiently so that the line of force shall not touch any portion of the ventral aspect of the trunk.

To make the statement in the preceding paragraph still more profoundly impressive, the further statement is made that there is never a situation or condition in which corrective force should be applied vertically or feet-ventrally in the imbricated area.

To still further impress the student with the cautions already made, the author feels it necessary to make this statement: that no force can be applied to the imbricated region directed into the body along a line that strikes the ventral aspect thereof without some degree of injury resulting therefrom, the injury of course being in ratio with the depth of such force, and with its speed, amount, and distance.

This, of course, applying to thrusts that would be directed too deeply, although head-ventrally until they become vertical, and then the injury would increase over that already stated in ratio as the line went feet-ventrally.

The author has found that the error of Chiropractors has been to adjust the imbricated area with too much ventrality of force, and has seen very much and very grave injury as the result of such conduct, and here sounds a definite warning against any such procedure for the reasons already stated, and those to be stated in the succeeding paragraphs.

The imbricated spines lie one upon another, and are very close together. If the hand is placed over the spine area and force applied too deeply, that is to say, too nearly vertical, the spine of contact impinges upon the immediately subjacent spine causing marked friction, superheat, and disintegration as the least injury that can occur.

With the application described in the preceding paragraph, if the force of application is great enough, the spine of contact locks upon the subjacent spine, converting the area into a fulcrum over which the column is bent, putting definite strain upon the intervertebral relationship of the immediately related centra which are the two vertebrae feetward from that of application.

To illustrate the situation outlined in the preceding paragraph, if the spine of the sixth thoracic is the spine of contact, the center of strain will be between the seventh and eighth thoracic vertebrae, and if there is sufficient momentum and distance of thrust, the strain will be a sprain with consequent subluxation of the joint area of those two vertebrae.

The author has seen hundreds of lordoses that had been produced slowly by the character of application just described, and it is peculiarly to avert danger from such inanatomic procedure that he has so carefully stated the cautions in the several preceding paragraphs.

If the cautions already stated are well remembered, the corrective procedure in the imbricated area is indeed very simple. Distortions here are always of a compensatory nature, and of course must be addressed from that standpoint.

The imbricated area is seldom subject to ossific keys, but it is in a great majority of cases the area of gravity keys.

It must be remembered, however, that when the imbricated area is the subject of an osseous key, such key is always the center of great complexity and requires the nicest art of the relator to release it. An illustration of this will not be amiss here.

In a complex, opposed, rotational scoliosis where the feetward thoracic aspect is ventrally rotated to the left, and yet notwithstanding that fact the whole column is carried to the right in a grand scoliosis, it not infrequently occurs that the eighth or ninth thoracic is a scoliotic key, and is preventing the whole scoliosis from doing two things, coming back to the left as an entirety, and at the same time rotating by its headward part to the left, and by its feetward part to the right which is of first importance in securing correction.

In such an event, it will be found that by the increase of the angles of the ribs dorsally, the right side of the thorax is high dorsally, while the left side is low. This will be especially true at the key; yet, notwithstanding that fact, the heel of the hand will have to be placed upon the left transverse process with the anti-heel upon the spine, projecting the body of the key vertebra directly to the right, while the general area around the key is lifted definitely headward and to the right.

Following each key release, reduction of the scoliosis can be accomplished in this area according to the procedure described in the cervico-thoracic region.

The imbricated region is the home of the gravity key in all cases where there is the typical scoliosis.

A gravity key is a muscular constriction and fixation that occurs as a result of rotation by the pull of the muscles in the feetward aspect of the left thoracic area to carry the trunk to the left and dorsally, resisted by the headward thoracic musculature of the right side of the trunk to carry the top of the trunk to the right and dorsally.

This center of fixation may occur in relation with the left transverse of the sixth, seventh, or eighth thoracic, but is usually found relative to the seventh thoracic and distant from the mesial line all the way from a quarter of an inch to an inch and a half.

It is essential that the gravity key situation shall be reduced before any other corrective measures in this area are attempted, which is accomplished by placing the base of the hand over the area in a horseshoe application, the open end of which is directed toward the shoulder immediately to the right side of the base of the neck, the exact point varying somewhat with the distance of the key from the medial line.

When the traction has been taken along the lines suggested the thrust should be applied, which is a lifting impulse towards the point indicated, which, if successful, releases the muscles of the area and renders the immediately adjacent joints vacillable.

Returning to general considerations, if the imbricated region is kyphosed, force is applied to it as already described, head-ventrally with lifting impulse, holding the tissues at the depth of the thrust until the termination of the muscular recoil.

If the imbricated region is lordosed, application is by the means already described, except that the method of application is the two-hand single contact, the force always being applied head-ventrally with lifting impulse. The depth of thrust should be only enough to get recoil response from the intercostal areas and from the diaphragm centering under the area sufficiently to throw it dorsally.

The peculiar directions of thrust necessitated by the imbricated spine region makes it advisable to analyze another proposition in this connection, and that is the inequality of strength, tonicis, or fixation of the bilateral musculatures acting relative to the column.

It frequently happens that muscles are stronger on one side of the body than they are on the corresponding aspect. Such a situation makes it necessary in passing a line of force through the body from either the ventral or dorsal aspect to take any such muscular difference into account and provide for it.

If, for instance, the muscles of the right dorsum are stronger than those of the left dorsum, application in any area must be made in such a way as to meet with such muscular situation. This is accomplished by what may be designated as a half saddle-back application.

A half saddle-back, in the situation mentioned, would be accomplished by carrying the hand sufficiently to the right in its application to bring enough more force to bear on the right musculature than the left to balance them in resistance and movement, so that the effect of the thrust would operate equally upon the body.

If the difference in strength of musculature on the right and left side should occur only upon the dorsum or venter, the situation presented is simple.

It is when the muscles of the dorsum and venter both present differences in resistance that the subject becomes complex, and yet in this situation the complexity is not great if, for instance, the dorsal and ventral muscles on the right side are more resistant than those on the left, whether they are stronger or more tonicized.

However, the chief complexity arises where, for instance, the musculature of the right side in the dorsal aspect is more resistant than that of the left, while on the ventral aspect the left musculature is more resistant than that on the right. But the differences in resistance are not equal dorsally nor ventrally.

The student is definitely instructed that the only way that he can resolve the complexities states in the preceding paragraph, or in the several preceding paragraphs, is by traction, which if carefully taken, will reveal to him definitely all of these differences, and will indicate the exact obliquity of the line along which his force must be directed to balance such unequal musculatures against each other.

While the foregoing illustrations have been given from the standpoint of different resistances of muscles, it must be remembered that the same rules apply where the differences are those of constriction, hypertonicis or fixation, and equally apply in any of the vertebral areas, and must be harmonized with the rules laid down for relating in each of such areas.

Lordotic keys do not occur in this area except in the complex situation that has already been described. There the key may, and frequently does, partake of the scoliotic and lordotic nature, but will release by the scoliotic key application.

It seems hardly necessary to state that all corrective force applied to the imbricated area must be applied with the situations in relative areas always in mind.

CHAPTER XLV

RELATING THE LUMBAR AREA

By analysis the lumbar area in a sense includes all of the vertebrae from the imbricated region to the sacrum, and because of the peculiar construction of these vertebrae, the whole region is divided into the thoracico-lumbar, and the lumbar-sacral areas. These will be considered separately.

THORACICO-LUMBAR AREA

At the outset in discussing the relating in this area, the student is definitely cautioned, that while the vertebrae here are not imbricated in the true sense of the word, still in many respects this area is related like the imbricated area.

It will be recalled that this area is precisely at the base of the diaphragm, which through its tendon and crura, definitely influences relating. Attention has already been called definitely to the fact that the diaphragm acting as a bridge within the cavity of the trunk is peculiarly accessory to immediate resistance in this area as well as to opponent resistance.

All force projected from the dorsum through this area must be directed into some part of the diaphragm in such a manner, that the line of force shall act as a string to the diaphragmatic bow.

The student is, therefore, definitely cautioned that in this area he must never project force from the dorsal aspect, from the beginning to the ending of this area, that will go through the body sufficiently vertical or oblique to strike the venter, feetward or headward to the diaphragm.

In view of the statement in the last paragraph, the student is cautioned that to project force from any part of this area feetward to the diaphragm is to throw the entire resistance upon the dorsal muscles, and to definitely put a strain upon the intervertebral cartilages of the immediate vertebrae involved, for in this area below the diaphragm there is no opponent resistance operative until the crests of the innominates are reached.

This is the area, it must be remembered, immediately relative feetwardly to the crossing in the typical, complex, opposed, rotational scoliosis, for in that character of distortion, usually the first vertebra of the ventral, compensatory, left scoliosis is the second lumbar, and of course, this scoliosis usually ends at the ninth or eighth thoracic.

It is true that sometimes in the complex, opposed, rotational scoliosis the crossing occurs a little more feetward, but in any event the ventral aspect of the third turns to the left, and it must also be remembered that sometimes the crossing takes place at the second lumbar vertebra in which event it is not rotated, but the first lumbar is ventrally rotated to the left; in such cases it is usual for the scoliosis to end with the ventral left rotation of the eighth thoracic.

Since the complex, opposed, rotational scoliosis exists in fully ninety per cent. of civilized humanity, as a result of having been right handed since the night of time, all relating in this area must be accomplished with due regard and in consonance with this scoliosis.

Generally there are no keys in the lumbar region. Sometimes, however, the twelfth thoracic, the eleventh, or the first lumbar may stand in the relation of a scoliotic key, in which event they are reduced precisely as the keys illustrated in the headward thoracic aspect, except of course by the right hand, the heel of which is placed upon the right transverse with the anti-heel upon the spine, the thrust being made as already described.

If the scoliotic key exists, it must be released, and then the rotation in the area is addressed, by placing the left hand by its palmar aspect upon the body at the beginning of the scoliosis, with the ulnar margin far enough to the left of the mesial line to control the lumbar muscles of the left side, converging toward the medial line to the headward end of the scoliosis sufficiently to balance the difference in the musculatures, and to contact with the feetward aspect of the thorax sufficiently near the column to equalize resistance; the radial side of the hand should be anchored on the row of spines, the guide hand placed lengthwise on top of the application hand with the thumb around wrist, after traction to ascertain the exact line of thrust, the force is projected, head-ventrally and to the right.

In the application just described the hand is turned sufficiently out of the axis of the arm to carry the transverse processes ventral and to the right, while the right side of the hand gauges the movement of the spines. The force must be applied in such way as to carry the whole column to the right instantly with the rotation of the ventral aspect of the vertebrae.

Generally the rotation in this region includes five vertebrae. It may only pronouncedly include three, and may extend to seven. In any event the scoliosis and rotation must be reduced in ratio of displacement, each vertebra being moved by its ventral aspect to the right a distance proportioned to its displacement; those, therefore, at the ends of the scoliosis being moved slightly, while those toward the middle are moved more definitely, while the middle vertebra of the scoliosis is moved the furthest of any.

Application should never be made to a single vertebra in this area any more than elsewhere, and the general line of force from the spine areas of the eleventh and twelfth thoracic, and the tenth when it is included, is generally toward the headward end of the gladiolus, the exact line depending upon the size and form of the subject, and the musculatures of resistance.

The general line of direction of force from the spine areas of the first and second lumbar vertebrae is relative to the ventral attachment of the tendon of the diaphragm. And again the exact line is determined by the musculature and attitude of the diaphragm incident to the situation of the headward muscles of the abdomen, especially the rectus abdominis.

THE LUMBAR-SACRAL AREA

Generally relating in this area is very simple in the ordinary sense of the word. The thing paramountly to be kept in mind is that opponent resistance to this area is feet-ventral, and is basicly composed of what has been called the pelvic girdle. Therefore, the line of force must always be feet-ventral, and must never pass through the body so as to strike headward to the pubis.

There are never any keys in this region in typical conditions. Of course it is possible by traumatic injury to produce a key-like situation in any area.

This area, however, is the place of right ventral rotation in the typical scoliosis, and this is true, because the sacrum in such conditions is ventrally turned to the right, and turns the ventral aspect of the fifth and fourth lumbar vertebrae with it.

In the typical, opposed, rotational scoliosis this area is also the place of the first crossing of the gravity line across the mesial plane, occurring at the third lumbar vertebra, which is not rotated.

The attitude of the vertebrae of this region is the attitude compelled by the position of the sacrum, and the influence of the muscles acting to secure the erect posture of the body, and, therefore, all relating in this area must be accomplished with these two features in mind.

Relating in this area, then, is always accomplished as incident to correcting the position of the sacrum, and can only be accomplished in ratio with the correction of the position of the sacrum.

To attempt to correct the rotation of the fifth and fourth lumbar vertebrae, without having released and in ratio corrected the sacrum, would be to strain or sprain the intervertebral cartilages attached to these vertebrae, and the one connecting the fifth and sacrum.

One method is to place the pelvis of the patient upon the roll, opening the table so that the trunk is supported upon the manubrium, which occupies a position on the hind end of the front table, and then standing with the face toward the head of the patient, placing the left hand by the ulno-palmar aspect upon the right wing of the sacrum, and over the right transverse processes of the fifth and fourth lumbar vertebrae, and then thrust definitely feet-ventrally; this from the first position.

The much better way, because much stronger, to accomplish the same result is to place the patient as indicated in the preceding paragraph, and standing face toward the feet of the patient, place the ulno-palmar aspect of the right hand upon the right transverse processes of the fourth and fifth lumbars and the right wing of the sacrum, and after tractioning for direction, thrust feet-ventrally so that the force passes through the pubic and upper thigh area. The radio-palmar aspect of the left hand may be as correctly used in the thrust just described, and in many cases with better effect.

In concluding this chapter the author feels it necessary to call attention to the fact that the lumbar column is definitely a suspension bridge between the osseous pelvis and the osseous thorax. Its distortions, therefore, generally speaking, are purely compensatory, and all relating must be applied to it from that standpoint; definite correction being made in the weight-carrying base, and corresponding corrections in the weight-carrying osseous thorax, incidentally relating the lumbar suspension to both changes.

CHAPTER XLVI

RELATING THE PELVIC GIRDLE AREA

The pelvic girdle area includes the sacro-iliac articulations, the sacro-tuberoso-ischial areas directly, and incidentally the innominate relationships to each other, as well as to the sacrum, and finally the relationship between the innominates and the femurs, with all of the muscular, fascial, and aponeurotic relationships incident to these bones and articulations.

THE SACRO-ILIAC AREA

Relating in this area is always complex, and requires the most definite skill of the Chiropractor. By turning to Chapter XXIX, under the same subdivision as this subtitle, and Chapter XXX, as it relates to the same subject, he will find himself in a position to more easily grasp the facts here about to be discussed.

It will be readily understood that distortions of the sacro-iliac area, in which the sacrum is moved in one direction while the articular aspect of the innominate is moved in another, must necessarily result in subluxation, and in such an event, the address must be for the purpose of reducing the subluxation.

It must also be kept in mind that distortion of the pelvic girdle may occur in such manner as to distort the sacro-iliac area without subluxation, in which event, of course, correcting the attitude of the pelvic girdle, in such manner as to restore relationship of the sacro-iliac joints, would be sufficient.

To discuss the situation comprehensively requires that we shall go from the gravest to the least distortion, and that will be the method herein followed.

If the sacrum is ventral as an entirety, which is the gravest subluxation that occurs in human arthrodiality, the relating must be directed to raising the sacrum dorsalward. To accomplish this purpose the pelvis of the patient is placed upon a roll, the operator standing beside his patient: may assume one of two positions: obliquely facing the patient's head, or obliquely facing the patient's feet.

If he shall adopt the position facing the patient's head, he will use the right hand with which to address the left innominate, and will apply the left hand to the right innominate.

These thrusts will be made immediately succeeding each other, and must be made latero-feetward, the line of traction usually passing through the headward aspect of the great trochanter.

The purpose of these two thrusts is to release the sacro-iliac joints, at the conclusion of which the operator will use the two-hand single contact, standing with his face toward the feet of the patient, with the ulnar aspects of the hands anchored upon the iliac margins sufficiently wide to inclose the tuberosities of the crests. The thrust is made in such way as to cause the line of force from each hand to cross into the musculatures of the opposite thighs, and the feetward aspect of the trunk, resulting in a central muscular recoil under the sacrum in such way as to make it move dorsally between the innominates.

If the apex of the sacrum should be more ventral than the base, the style of application, as described in the preceding paragraph, should be more feetward, but if the base of the sacrum is more ventral than the apex, the application should be nearer to the base of the sacrum or headward, with direction of force to meet the situation, and also the length and shape of the bones.

The only completely successful method of handling a patient, who presents a ventral sacrum, is to put him in the recumbent position and keep him off his feet for a period varying from thirty days to several months.

The next phase to consider is the sacrum that is dorsal as an entirety. The remarkable thing about this kind of distortion is that it may, and quite frequently does, occur as the result of motor reactive conditions in the pelvic region incident to irritating pathology and anomaly.

To reduce a sacrum dorsal as an entirety with all parts of the sacrum equally dorsal, application is made by placing the hand over the gibbosity of the sacrum with the radial and ulnar aspects of the hand converged so as to make it cuplike. The guide hand is placed upon it, and traction taken with the pelvis anchored upon the roll, the line of force being vertical. The thrust is delivered and held at its depth. At the instant of delivery, the radial and ulnar aspects of the hand are diverged so that the greatest force ultimates upon the very gibbosity of the sacrum. When the muscular recoil has ceased, the application hand should be removed.

It should be observed that if the sacrum is dorsal as an entirety, but if the base is not so much dorsal as the apex, then the center of application will be a little nearer the apex, and the force will be slightly ventro-headward: but if the base is more dorsal than the apex, then the application is made nearer to the base and the force is slightly feet-ventral.

If the sacrum should be rotated, the innominates sustaining comparative relation, application will be to the sacro-iliac articulation in which the margin of the sacrum is ventral in the manner already described. While to the other sacro-iliac articulation, where the margin of the sacrum is dorsal to its position, application will be made directly to the iliac margin of the sacrum, anchoring upon the margin of the ilium: the force being ventro-medial with impulsion feetward.

If, in such rotation, the base of the sacrum on one side is markedly ventral, and the apex on the other side markedly dorsal, application will be made over that side of the base of the sacrum, that is ventral, by the saddle-back, thrusting ventro-feetward: while at the dorsal apex the application will be upon the apex margin, anchored upon the relative ilium: the direction being ventro-medial with headward impulsion, and the thrust must be held at its depth to secure muscular recoil, influencing the opposite base of the sacrum to rise dorsally.

If the iliac portion of an innominate is dorsal in its relationship to the sacrum, it is corrected by making application on its margin anchored upon the sacrum so placed as to direct relating force to the right portion of the distorted articulation, and, when ready, the thrust must be delivered ventro-lateral; the line of force being parallel with the beveled articular margin of the sacrum.

If it is the right innominate, for instance, the application may be made with the relator standing with the face toward the patient's head, in which event he will apply the left hand to the right innominate. Or the relator may stand facing the patient's feet, in which event he assumes the third position with the right hand anchored upon the sacral margin of the ilium, and directs the force as already described. In such a movement it must always be remembered that while the application is to the margin of the ilium, anchorage must be upon the same side of the sacrum in order to be advised of the distance and force of the thrust.

If the tuberosity of the ischium is dorsal, with distortion in the headward part of the sacro-iliac articulation, then the roll should be placed under the pelvis so as to apply immediately feetward from the ventro-headward spines of the ilia. The application should be made by placing the fingers between the fold of the nates with the ulno-palmar aspect of the hand anchored upon the sciatic ligaments. The thrust should be ventral or vertical with slight impulsion headward.

If the tuberosity is dorsal, while the crest of the innominate is ventral, then the patient should be placed upon the roll so that the iliac spine is in the middle of the roll. The force should be applied as described in the preceding paragraph, but should have marked impulsion headward, thus producing muscular recoil that will throw the crest of the innominate dorsalward.

In the displacement described the patient may be then turned upon the dorsum and force applied to the iliac spine by placing it in the heart of the palmar surface of the application hand, while the heel rests upon the ilio-pectineal margin of the pelvis, relative to the ascetabulum. After traction the force is applied dorso-medial with headward impulsion.

If the innominate is displaced headwardly, application should be made, with the pelvis on the roll, the operator standing face toward the patient's feet in the third position, applying either hand as before described, to the tuberosity of the crest of the ilium. The force will be directed through the acetabulum. Or the patient may be placed on the side, dorsum to the relator who stands facing the feet, in which event he contacts the left hand to the right innominate, or the right hand to the left innominate. The thrust will be directly feetward, and a little dorsal to the center of the acetabulum.

To accomplish the same result, the patient is placed upon the dorsum, the relator facing his feet, applying the left hand to the crest of the right innominate, or the right hand to the crest of the left innominate. In this position the line of force will be feet-dorsal.

If an innominate is feetward in its displacement, the patient should be placed upon the venter, with the roll under the pelvis, application being made to the tuberosity, the relator facing the patient's head, applying the right hand to the left innominate, and the left hand to the right innominate. The thrust will be directly headward with very slight laterality.

If the tuberosity is ventral, while the headward aspect of the sacro-iliac articulation is not distorted, such displacement will be corrected by placing the patient upon the dorsum with a small, solid cushion about two inches thick lying upon the table beneath the sacrum, thus sustaining the sacro-iliac articulation proper. Contact is made on the ventral aspect of the innominate directly relative to the acetabulum; the thrust being vertical with headward impulsion, which means dorso-headward.

If an innominate is rotated, the spine lateral and the tuberosity mesial, correction will be made by placing the subject upon the side opposite to the rotation, flexing the leg next to the table nearly to a right angle with the trunk, and then flexing the other leg a little more than a right angle anchoring it upon the leg next to the table. Application is made by flat-hand contact immediately relative to the spine with the guide hand acting as an auxiliary anchorage; this to increase broad application to guard against possible fracture of the margin of a very thin ilium. The relator stands against the dorsum of patient and thrusts directly vertical, which, because of the position of the patient, will be ventro-medial.

If an innominate is rotated by a medial approximation of the tuberosity encroaching upon the pelvic outlet, application is made by placing the patient upon the side where the rotation has occurred. Standing near to the table on his ventral aspect, the operator should flex the superior thigh, or the one nearest to him, so as to bring the leg around his body above the ischial tuberosity. A solid cushion about two inches thick should be placed beneath the innominate relative to the trochanter upon the table. The operator should then place the hand upon the medial surface of the tuberosity, anchoring it there with the guide hand, and should project force latero-headward.

If the left tuberosity is the one rotated the operator will apply the right hand. If the right is rotated he will apply the left hand, and if both were rotated he would make both applications described alternately, applying force to the gravest rotation first, if there was a difference in distortion.

It is the thought of the author that this sufficiently covers the relating in which that classified as vertebral is paramount.

As to the last area discussed, in several instances only the distortion of one innominate is given. Of course, the student will understand that when such is the case, the other innominate will be corrected in precisely the same manner, only with complete reverse of procedure.

CHAPTER XLVII

SOMATIC AND SKELETAL RELATING

At the outset it must be explained that this chapter is devoted to a discussion of somatic and skeletal relating aside from the vertebral column, for of course it is understood that the column is a part of both the skeletal and somatic tissues: this classification being made for the purpose of fixing upon areas aside from the vertebral column.

The relating to be discussed in this chapter may be considered from the standpoint of auxiliary or accessory correction.

THE HEAD

In hydrocephalus it frequently becomes necessary to relate the skull bones. This also becomes necessary in certain active phases of syphilis, and other abnormality.

Any relating procedure applied to the segments of the skull must always be executed with the greatest skill, and with the highest degree of caution. The application must never be made to one segment alone, but must always be made to the segment with anchorage application to the adjoining segments.

In order that such measures may be properly taken, a careful estimate must be made of the distortion, the application must be governed by the distortion, and force must be applied in consonance with the direction of distortion governed by the distance of displacement, but must be paramountly governed by the character and gravity of pathology.

For illustration: in a case of hydrocephalus where the segments of the skull are widely separated, very slight force with very short movement would be all that the situation would permit, being governed at all times by the symptoms; while in a case of active syphilis considerable force with necessary distance is usually indicated and should be applied.

In any application of force to the head, for the purpose of relating the skull bones, it must be carefully anchored upon the table in order that the distance of corrective movement may be exactly measured and controlled, by the definite approximation of thrust.

The nose is frequently distorted, and should have corrective attention. Here the force can only be applied by use of the thumbs and fingers, and it is sometimes necessary to use such auxiliaries as flattened hard rubber levers, which may be placed within the nostrils against the wing cartilages in order that gentle pressure may be directed upon these structures, as well as the nasal bones, and the septum.

It is not well known among Chiropractors, but it is true that distortions of the nose are frequently responsible for many adverse situations of the throat and eyes, and in such conditions it is very essential that the nose shall be corrected.

Frequently the nose bones are distorted. By careful, intelligent, and frequent application to these, their relation to each other and to the frontal process may generally be secured. Nothing can really be described in connection with this technique that could be of assistance to the student. However, this caution must be added: that any relating procedure directed to the nose must be executed with the utmost skill and caution.

The temporal region is frequently an area of the intensest congestion. This is true in all such phases as colds, fevers, etc., in which phases it is very essential that the area shall be released.

The student will recall that this area covers the region of the Wormian bones of the skull, and the delicate and quite open sutures which extends through them. Nerves in these sutures and relative to these bones are frequently occluded as are also the vasomotor nerves to the whole area.

Relating in this region is accomplished by placing the subject upon the dorsum and turning the head directly to the side, so as to anchor that side of the head directly upon the table. The operator stands facing the patient's face, and places the hand in an elliptical way over the temporal area congested. He takes his traction mesodorsally, and thrusts with slight headward impulsion, which movement must be short and quick.

The distance of such a thrust is always short: the force being in ratio with congestion, other things being equal; but the thrust is always accomplished with great speed. The relator should always have in mind the caution that the area is a delicate one, and therefore, distance should be well controlled. This corrective procedure is very valuable in cases of colds, headache, eye troubles, etc.

The mandible may be displaced dorsally, medially, or laterally upon one or both sides. A great deal of temporary difficulty in hearing is incident to the mandible being dorsal in the glenoid cavity, pressing upon the ventral aspect of the cartilaginous, external meatus.

Facial neuralgia is also often caused by a medial or lateral displacement of the mandible, which serves to impinge nerves that extend medial to the mandible or those that extend over it.

If the mandible on one side is displaced laterally the patient is placed upon the dorsum with the head turned upon the opposite side, which is anchored upon the table. The operator stands with his face toward the face of the subject and his head, and places the hand, that meets the situation best, over the mandible in relation with the glenoid fossa, and thrusts head-mesial, with dorsal or ventral impulsion depending upon whether the head of the mandible is displaced dorsally or ventrally. In this correction the fingers may be toward the temple, toward the dorsum or toward the face, depending on what is to be accomplished.

Frequently, when one aspect of the mandible is lateral it is also slightly headward, in which event the patient is placed as described in the preceding paragraph; but the relator stands at the head looking toward the subject's feet. If the patient's head lies upon the left side he will place the left hand over the head of the mandible, thrusting meso-feetward with much more direction mesial than feetward, while if the patient's head is upon the right side he will use the right hand, executing the movement in the way already described.

If the head of the mandible is displaced dorsally, the patient's head is placed upon the side and the operator stands at his dorsum and places the heel of the hand over the dorsal aspect of the head of the mandible thrusting as superficially as possible ventro-headward.

In cases where the mandible is displaced ventrally the operator stands with the patient's face turned toward him, and placing the hand relative to the ventral aspect of the head of the mandible, thrusts dorsally with slightly headward impulsion.

In the event that the head of the mandible on one side is mesial, the patient's head is turned upon that side, while a thrust is delivered to the head of the mandible on the opposite side, and then with the patient lying in the same position the operator bends over his patient from the dorsal aspect, places his thumb in the mouth, separating the teeth sufficiently to contact the thumb upon the spine of the mandible, anchoring the knuckles upon the table, and thrusts laterally which will be vertical with dorso-headward impulsion. It is necessary to say that this must be done with great caution, and that the distance of movement should be very short, and force should never be sufficient to bruise the tissue of application.

Submalar relating is frequently necessary to release occlusion of nerves in the semi-aponeurotic tissues that lie beneath the zygoma and the malar clear across the face to the nose.

Occlusion of nerves in this area frequently cause blotches and pimples upon the face, and specifically interfere, by motor reaction, with nerves to the eyes and nose. It is, therefore, very necessary that such occlusion shall be removed.

Relating in this region is accomplished by the use of the ends of the thumbs, or two fingers may be substituted for a thumb. Relating consists in breaking down fixation of tissue, and any crystals, or solids that may have formed in the area by precipitation. It is impossible to describe the technique any more in detail than these few suggestions reveal it, and caution is also given that the procedure here should be accomplished with great care and exactness.

The author has corrected some very grave cases, such as acne vulgaris, painful condition of the eye and difficulties with the nose by this means, and heartily recommends the corrective procedure to the profession.

Mental relating is frequently very necessary. This becomes a very prominent phase of relating in such processes as so-called croup, influenza, la grippe, laryngeal abnormality, especially catarrh, and in goitre and all congestive conditions directly affecting this region.

In such cases as those referred to in the preceding paragraph, the tissues between the rami of the mandible become greatly congested, tonicized and frequently fixed, including the submaxillary and sublingual glands, in which there is marked occlusion in the hypoglossal, glosso-pharyngeal, vertebral accessory, cervical, visceral and somatic nerves ramifying this area.

In such situations it is very essential that the tonicis and fixation of these tissues shall be reduced. This is accomplished by placing the patient upon the dorsum, the relator facing his head which he throws back dorsally, lifting the chin, and placing one hand upon each side of the mandible so that the thumbs apply to the tissues in question. With this anchorage, force may be applied head-dorsally, or head-ventrally as the occasion requires.

This corrective procedure is very useful in laryngitis, pharyngitis, and all characters of throat difficulties, as well as difficulties in the use of the tongue, etc.

THE NECK

The neck or cervical region presents a number of important relating areas. The principal ones may be stated as follows:

The larynx is one of the most important organs of the neck. It is largely formed of yellow cartilage which is very subject to calcification. The larynx is also richly supplied with nerves, and is, therefore, frequently a subject of intra-occlusion of nerves. That is to say, occlusion produced by distortion of the larynx itself, incident to vertebral occlusion.

On account of the situation last referred to we have such remarkable phases of abnormality as aphonia, and laryngeal spasms that sometimes render swallowing impossible, so that reduction of occlusion here becomes a very important matter. Relating the larynx may be accomplished in several ways. One of the beginning measures always is tractioning the larynx by stretching the neck and at the same time raising the mandible headward until all parts of the larynx are put upon the stretch.

Gentle thrusts may be applied to the sides of the larynx by placing the patient upon the dorsum, anchoring the hands upon the sides of the neck and table, and making gentle thrusts with the thumbs against the sides of the larynx. The larynx may also be related with the patient on the dorsum by placing the ulnar aspect of the hand against the so-called Adam's Apple, and feetward to it, and delivering gentle thrusts upon it head-dorsally. These thrusts should be short and rapidly applied.

The operator may also stand over the patient while upon the dorsum, and extending the fingers into the neck at the sides of the larynx, grasp it and gently draw it feetward or toward him, at the same time delivering slight medial impulsion.

The author has been able to remove aphonia incident to releasing fourth thoracic nerve trunks in one week, and has never failed to produce beneficial results by the use of these means.

The trachea is frequently subjected to compression by the relative soft structures and muscles of the thoracic inlet, in which event it becomes necessary to release this area. Sometimes hypertonicity with fixation becomes so intense, producing such pressure upon the esophagus, as to render the passage of food through it impossible. Relating in this area is very essential. It is primarily accomplished by application of the knife-thrusts as were described in the cervico-thoracic area.

Immediate relating in this area may be accomplished by the relator standing at the patient's head, who is on the dorsum, anchoring the hands upon the sides of the neck and table, and extending the thumbs feetwardly into the thoracic inlet, pressing them dorsalward and drawing them gently headward, repeating these means until relaxation in the area becomes apparent.

Or the relator may stand with his head toward the head of the patient who is lying upon the dorsum, placing the thumbs close to the thoracic inlet, gently pressing downward with slight feetward impulsion, and then thrusting gently headward, continuing the work until relaxation has occurred.

In cases of esophageal strangulation and laryngeal spasm, these corrective measures are of paramount importance.

CHAPTER XLVIII

TRUNK—SOMATIC AND SKELETAL

Continuing the discussion of somatic and skeletal tissue relating we now approach that department which is definitely co-ordinated with vertebral relating *per se.*

The student is reminded at this juncture that it is of the utmost importance, since a vertebra is always connected headwardly and feetwardly by intervertebral cartilages, and laterally and dorsally with ligaments and muscles, that all of the parts thus definitely related somatically must be moved in ratio with vertebral movement, in order that there shall not be unusual or unnecessary strain placed upon any relationship.

The trunk will be considered in several departments, because of their definite relationships to the vertebral column.

THORACIC

Subject on Venter—With the subject in the position stated the first corrections to be considered is that which peculiarly relates to the scapula.

At the headward vertebral angle of the scapula, on account of the tenseness of the musculature and ligaments, and the rigidity caused by tonicis, hindering, not only vertebral movement, but movement of the thorax, it is frequently of great importance that these structures should be released, so that the bones and other tissues may assume their relative positions.

To secure the release indicated in the preceding paragraph, the application is made with the knife or ulnar edge of the hand bent around the scapular area indicated, the fingers extending toward the venter, which means that the relator stands with his face toward the head of the patient, the patient's face usually turned away from him. The thrust may be delivered in one of two locations: near to the scapula, the force being directed ventro-laterally with slightly feetward impulsion, or with the application near to the vertebral column, the thrust being ventro-mesial with slightly headward impulsion.

At the feetward angle of the scapula the application is made with the relator standing with the face toward the head of the patient, assuming the third position, turning the patient's face away from him, for instance, to the left side, in which position the patient's right arm is bent and laid upon his dorsum with the back of the hand toward him which serves to slightly raise the apex of the scapula. The ulnar edge of the right hand, with finger ends directed toward the column is placed under the scapula, and directing force toward the acromion process the thrust is delivered. This not only serves to release the tissues connecting the scapula to the column, but tends to release all of the musculature under the scapula, including the intercostal areas.

The vertebral border of the scapula, being attached to the column by the rhomboideus and other structures, which are frequently subject to tonicis and fixation, is frequently in need of corrective attention. To release this area the subject may be put in the position indicated in the last paragraph, the knife edge being placed under the vertebral border throughout its length, thrusting head-laterally.

Subject on Dorsum—In this position, to release the scapula the arms may be elevated above the head which protrudes the scapula laterally. The relator who stands facing the patient's feet, brings the arms between his knees and holding them, bends over and places the metacarpals of the thumbs upon the scapula and thrusts dorso-mesial with slightly headward impulsion.

The relator may accomplish the same result by standing face toward the patient's head, assuming the third position and making the same application, thrusting in the same way already described. The position the relator must assume here, renders this pose not quite so good. However, if the relator stands astride of the patient the application is as good, if not better, than that before outlined.

If the relator stands beside the patient looking toward his head, with the subject's arm elevated straight headward, he may make application with the ulnar aspect of the hand, using the left hand if upon the patient's right, and the right hand if upon the patient's left side, thrusting dorso-headward with slightly mesial impulsion.

Subject on Venter—It frequently occurs that there is an irregularity in the angles of the ribs, and these affect the body in rings entirely around the thorax. Of course these are induced by distortions of the vertebrae affecting the positions of the heads and necks of the ribs. It is, therefore, very essential that the rib rings shall be corrected in consonance with corrective procedures addressed to the vertebral areas.

If the angularity of the ribs in the headward thoracic region are increased dorsally, for instance, on the right side, application may be made upon the primary angles of the ribs, exposing them by tractioning the right hand ventral and headward, thus carrying the scapula to its full extent latero-headward.

If the application suggested in the preceding paragraph is to be made upon the right side, the relator stands with his face toward the patient's head and places the ulnar half of the right hand upon the scapula, while the radial part rests upon the primary angles of the ribs. He will then thrust meso-headward along the shafts toward the heads of the ribs, and instantly toward the sternal ends, thus causing the greatest spring to occur at the primary angles, and still to transmit no force against the bodies of the vertebrae or the vertebral column.

Of course, to accomplish the same relating described in the preceding paragraph, if the operator stood upon the left side he would use the left hand. At least, that is the better method. However, in either of these positions, he may use either hand if he exercises sufficient care; the definite caution being that he must not project force that will tend to increase the dorsal angularity of the primary angles of the ribs, feetward from the scapula.

In reducing the angularity of the ribs, the relator stands with his face to the head of the patient, using the right hand on the right side, and the left hand upon the left; placing the hand over the angles of the several ribs to which he desires to address force, with the fingers anchored upon the column of spines. He applies the hand in a cup-like attitude, which, by suddenly flattening, sends definite force upon the angles of the ribs particularly toward the mesial plane of the body, but also sufficiently lateral to bring the greatest force upon the angles of the ribs, and yet not to move the vertebral column or strain the costal cartilages, which in this region are much longer, and, therefore, more easily injured.

In applying the relating procedure just described, great caution must be taken that the force shall follow the shaft of the ribs in order that strain or sprain shall not occur in the joints involved or the intercostal muscles.

It sometimes occurs that the floating ribs by reason of tight lacing or othewise are distorted, with their apices quite definitely feetward, thus holding the eleventh and twelfth thoracic vertebrae in rigid position. To correct this situation, the pelvis of the subject should be placed upon a high roll, the front table pushed out so that the two headward segments of the sternum rest upon its hind end. The relator stands at the side of the patient facing his head. He applies the hands broadly over the distorted ribs, covering as nearly as possible the whole area of them with the thumbs locked in the mid-line, and thrusts directly headward along a sagittal line from each hand parallel to the mesial plane. The force must be applied very superficially, the distance of the thrust being very short. There should be very little force applied with great speed.

Patient on the Dorsum—The first thing coming to the relator's attention with the patient in this position is the attitude of the clavicles. He may address relating procedure to these either at the acromion or sternal extremities.

If the relator desires to apply corrective force at the acromion end of the clavicle, standing with his head obliquely toward the patient's head, he should use his left hand if directed to the left side of the patient, and his right hand if applied to the patient's right side. The contact is with the flat hand using the palmo-ulnar surface; the thrust being generally toward the acromion, but may vary a little as the distortion indicates.

The relator's position being the same as that described in the preceding paragraph, he uses the hand in the same way in making application to the sternal end of the clavicle, except that he uses the right hand for the left and the left hand for the right clavicle. Thus of course, when the extremity is displaced ventrally, ventro-headward, or ventro-feetward, force is applied toward the acromion, varied to meet the displacements indicated.

Care must be taken in applying the procedures outlined, not to direct force deeply into the body, the force being always applied superficially. Distance of movement is short, with slight force applied with great speed.

If the sternal end of the clavicle is displaced dorsally, correction may be made by laying a narrow, flat cushion between the shoulders, and applying the broad-hand contact over the scapular aspect of the clavicle, directed dorso-headward with slightly lateral impulsion. In attempting this procedure the relator must remember that the distance of thrust is short, with little force and much speed.

The sternum is frequently kyphosed. In the event that the gibbosity of the column has gone headward, the manubrium will be the most ventral aspect of the kyphosis, in which event to secure reduction the relator stands at the side of the patient facing his head. If on the right side of the table he applies the right hand, and if on the other side of the table, the left hand. If the sternum is not rotated the manubrium is thrust head-dorsally along a line just the reverse of its distortion; if there is rotation the line of force must be varied laterally to agree with the distortion.

The contact described in the preceding paragraph applies, if the costal aspects of the ribs are not distorted; if they are, the application must be made by the two-hand single contact, with sufficient breadth to apply properly to the whole manubrio-costal area.

If there is general, sternal gibbosity then the contact as last described will be applied to both the manubrium and clavicles, the thrust will be directed in the same manner, and if the costal cartilages are involved the application will be extended to cover them.

Sometimes, because of continued tonicis of the tendon of the diaphragm, the ensiform cartilage is deeply lordosed. In which event application is made with the relator standing facing the patient's head, by the use of the saddle-back, or the two-hand single contact, directing the force head-dorsally with instantaneous removal, so as to get recoil from the diaphragm, intercostal muscles and rectus abdominis centering behind the ensiform to throw it ventrally.

The procedure here described will receive further elucidation in connection with visceral adjusting.

In the event of rotation of the sternum so that the costo-chrondal area is protruded ventrally on one side, corrective application is made by the relator standing face toward the patient's head, and if upon the right side of the table using the left hand; anchoring the ulno-palmar aspect upon the costal margin of the sternum and the chrondal articular ridge, with the radial aspect upon the ribs, the thrust being made dorso-mesial with slightly headward impulsion.

In the relating procedure outlined in the preceding paragraph great care must be taken, for if the patient is old, or if because of abnormality there is limy sediment or calcification, dislocation or fracture in this area very easily occurs. The advice is to proceed very slowly, and with the utmost caution in every case.

It frequently happens that the walls of the axilla are hypertonicized, and in many cases fixed, thus distorting the shoulder joint, and producing marked occlusion over the trunks extending to the brachial plexus, in which event it is of the utmost importance that these tissues shall be relaxed, resulting in the release of occlusion in these trunks.

To accomplish the release of the axillary walls the patient may be placed in four positions which will be described, pursuing now the present one.

Patient on Dorsum—The relator stands with his face toward the patient's head and grasps the forearm near the elbow, bringing it out away from the body, head laterally; placing the ulnar knife edge upon the ventral axillary wall, he thrusts head mesial with dorsal impulsion. He uses the hand next to the patient on either side he may stand.

The relator may stand with his face toward the patient's feet in which event he grasps the arm just above the elbow drawing it head laterally, holding it against his thigh, while applying the ulnar knife aspect of his free hand to the ventral axillary structures, and thrusting head-mesial with slightly dorsal impulsion.

Patient on Side—In this position the operator may stand on the ventral side of the patient near the head grasping the patient's hand with the hand relative to the patient's head, drawing the arm up over the occiput while with the free hand he applies the ulnar knife aspect to the axillary tissues thrusting head mesial with dorsal impulsion.

With the patient in the same position he may stand at his dorsum, taking his arm up in the same manner described in the preceding paragraph, and applying the force to the ventral structures of the axilla, the dorsal wall, or both as the case may indicate.

The Patient on the Venter—In this position the relator may stand facing the patient's head, grasping the forearm just below the elbow; he may bring it directly lateral, placing the ulnar aspect of the free hand against the dorsal axillary structures and thrusting head-mesial with slightly ventral impulsion. Or he may place the patient's hand upon the table close to the body, and wedging the ulnar aspect of the hand next to the patient between the arm and the body, project direct head-ventral force upon the dorsal axillary structures.

With the Patient Sitting—In this position the axillary walls may be relaxed by standing behind the patient, placing the hand next to the patient upon the clavico-acromion aspect, while with the free hand catching the patient's arm at the elbow, bending it to a right angle, and holding it that way while making release. Holding the shoulder with the hand of anchorage, the relator may thrust the arm directly headward releasing both axillary walls at once, or by bringing it dorsal and headward releasing the ventral axillary wall, or by bringing it ventral and headward he may release the dorsal axillary wall.

It sometimes happens that the ribs, by virtue of rotations of the column and other influences, have so completely lost their angularity at the sides of the body that instead of the surface of the thorax being convex it is concave. In such an event the patient must be laid upon the table, on the side, and the two-hand single contact applied to the area in such way as to cause the diaphragm, in its recoil from the thrust, to throw the concave rib area out.

In attempting the procedure suggested in the preceding paragraph the relator must be very cautious. It is suggested that this relating while quickly stated is a very comprehensive and complex work. So much so that it cannot be described in print nor yet in illustrations. It is strongly urged that before the student attempts this correction, that he have the whole subject carefully pointed out to him, and completely demonstrated in clinic.

CHAPTER XLIX

TRUNK—LUMBO-PELVIC TISSUES

GENERALLY there is not much to say as to somatic or skeletal adjusting aside from the vertebral column in the lumbar region. However, what is indicated is of the utmost importance.

It frequently occurs that there is marked tonicis of the relative muscles of the vertebral column in the lumbar area. When these are equal in their bilateral aspects they may be released by the two-hand single contact, the direction of force being as indicated in the relating of the lumbar area.

It is when the bilateral lumbar musculatures are unequally tonicized that the difficulty enters, to release which the patient is placed upon his venter with a roll under the pelvis. The front table is opened far enough that just the manubrium rests upon its hind end. The application is made with the half saddle-back, and the thrust must be preceded by careful traction. Thrusts for this purpose, and including the second lumbar spine area, will be head-ventral, while those feetward from that point will be feet-ventral. This is the only accessory adjusting usually indicated in the lumbar region.

ACCESSORY PELVIC RELATING

In this department of the work, the object is always to secure such release of tonicis as will permit the nerves, which extend within, or relative to the tissues of the pelvis, to be free throughout their length.

It frequently happens that the gluteus medius and minimus are tonicized to the extent of occluding the many nerves that extend to and ramify the lateral iliac fossa and gluteal areas.

In such a situation the patient is placed upon the venter with the pelvis upon a roll, the headward iliac spines being anchored in the middle of the roll. The relator stands beside the patient, facing his head, if upon the right side he uses the left hand, and if upon the left side uses the right hand. The application is the knife-thrust, which is addressed to the iliac aspect, slightly feetward from the crest, as though to shave the tissues out of the fossa. The center of the greatest force will always be directed to the area or greatest tonicis or fixation. The thrust is directly vertical, which will be ventral, with medial impulsion.

Sometimes the area of the medius, directly headward from the great trochanter is the area of constriction and fixation, in which event the patient is placed upon the opposite side, the knife-edge or ulnar margin of the hand is placed over the tonicized area, which may be anywhere from the crest of the ilium to the acetabulum, and the thrust made directly toward the great trochanter.

Frequently the gluteus maximus is heavily constricted and tonicized or fixed, over the region of the lateral aspect of the tuberosity, in which event the sciatic nerve trunk is gravely impinged, and also the pudendal nerve trunk.

To release the sciatic nerve trunk the pelvis is placed on the roll, the knife-edge is applied lateral to the great sacro-sciatic foramen, with the edge curved to shear those tissues. The relator standing facing toward the patient's head, anchoring the knife with the guide hand, traction is taken, and the thrust is vertical with medial impulsion, and is to relax not only the gluteus maximus, but the piriformis and gemelli muscles.

To release occlusion of the pudic and other nerve trunks that enter the lesser sciatic foramen, the application is the knife-thrust along the side of the ischium relative to the spine and tuberosity. The direction is ventro-headward; the relator standing facing toward the patient's head with the pelvis on a roll as before described.

The sciatic nerve trunk where it extends down between the trochanter and tuberosity is frequently subject to occlusion from tonicity or fixation of the ligaments and muscles that form a bridge-like covering dorsal to it. To release these the pelvis is placed upon the roll, which is carried well back feetward to the spines of the ilia. The relator stands facing the head of the patient, using the left hand if on the right side, and the right hand if upon the left. The thrust is the knife-edge deeply between the tuberosity and trochanter, particularly shaving the lateral margin of the tuberosity.

To release the hamstring area the roll is brought well back under the pelvis, and the knife-edge placed upon the structures below and lateral to the tuberosity with the fingers out. The thrust is made from the third position, directly headward with lateral impulsion. Or the fingers may be directed between the thigh with the knife-edge placed medial to the tuberosity, the thrust being headward with impulsion laterally.

Patient on Dorsum—Frequently the muscles and ligaments attached to the headward spine of the ilium, and extending down to the thigh are constructed or fixed occluding the nerve trunks that extend under them into the hip. To release these the relator stands facing the patient's head, applying the ulnar aspect of the left hand if addressed to the left innominate, and the ulnar aspect of the right hand if addressed to the right innominate; transversely across these tissues slightly headward to the acetabulum, traction is rigidly taken, and the thrust applied head dorsally with lateral impulsion.

The tissues forming the mesial wall of Scarpa's triangle are sometimes hypertonicized and fixed, in which event to release them, the patient remaining in the same position, the relator facing his head, will place the right hand on the medial aspect of the right thigh relative to the ramus of the pubis, and thrust head laterally toward the acetabulum. Of course, if applying this thrust to the left thigh the relator would use the left hand.

The tissues in Scarpa's triangle are sometimes tonicized and fixed including the tendon of the psoas magnus muscle, in which event the relator facing the head of his patient will place his hand with the heel of it over the psoas tendon, anchoring the fingers upon the brim of the pelvis, tractioning deeply and thrusting dorso-headwardly, driving the force against the psoas tendons thus relaxing the muscle. Or the relator may obliquely face the patient's feet, and for the right thigh, use the left hand, with the ulnar edge just below the brim of the pelvis, anchoring deeply toward the acetabulum, and thrusting dorso-head-latterly, shaving close to the obturator foramen to definitely reduce occlusion of the obturator nerve trunk, and incidentally those nerves ramifying the area of the acetabulum.

In addition to the release of the psoas, already indicated, it is sometimes necessary to go headward of the brim of the pelvis and release this muscle at that area, because when it is hypertonicized, it frequently occludes six pairs of intervertebral nerve trunks, as well as seriously interfering with the visceral system throughout the whole lumbar and pelvic area, in which event the relator stands facing the patient's head, bending well over the abdomen and carefully vibrating the viscera out from between his decending thumb and the psoas muscle, until the thumb comes to rest against the psoas muscle, using the left thumb on the right psoas and the right thumb on the left. When this application is made he anchors the fingers of that hand on the ilium of that side, and then anchors the fingers of the other hand on the ilium on the other side, placing that thumb on the nail of the application thumb, then carefully taking traction for direction and distance; when all ready he makes a short, sharp, and very speedy thrust with the thumbs, thus forcing relaxation of the muscle, and releasing the nerve trunks.

The relating just outlined is of paramount importance in dysmenorrhea, in suppression of the menses, in uterine spasum, in all painful bladder conditions, in prostatitis, etc.

Incident to the relating just outlined, it sometimes happens that the iliacus muscle is also constricted or fixed, in which event the particular area of fixation or construction is ascertained by palpation, and application made in the same way as just described, the thrust in both cases being directly dorsally.

These are chiefly the accessory means for securing the release of nerve occlusion in pelvic somatic structures. Of course in practice there are a good many things that may be done, that cannot be described in a work of this character, and can only be demonstrated in clinic.

CHAPTER L

VISCERAL RELATING

Correcting the relation of the viscera is of the first importance and this more particularly as to those organs contained in the splanchnic cavities of the body. However, there are some structures that, because of their situations, come within the same meaning. These have been incidentally referred to in that department of the preceding chapter called "mental adjusting." The subject will be taken up, then, here first under the title

THE LARYNX

In those phases of abnormality usually referred to as croup, influenza, la grippe, laryngitis, and laryngeal spasm, visceral relating specifically applies.

It will be remembered that the larynx is composed of yellow elastic and hyaline cartilage and membrane, together with an interspersement of muscle structure.

The tissues of the larynx are peculiarly subject to calcification, hypertonicis, and fixation.

When the structures of the larynx are affected by any of the phases of abnormality just referred to, it becomes essential that they shall be related to overcome the same.

The tissues of the larynx are incidentally related by that procedure described under "mental adjusting" already referred to, but in addition to the stretching of the structures as there described, the patient should be placed upon the dorsum, the relator placing one hand upon each side of the neck with the thumbs against the ala of the thyroid cartilage near the dorsal aspect, and gentle force applied head-dorsally with mesial impulsion. The ulno-palmar surface may then be applied by either hand to the "Adam's Apple" with short thrusts applied with much speed dorso-headwardly. This work may be accessorily assisted by concussion over "Adam's Apple" and the wings of the cartilage.

Usually longitudinal traction incident to mental relating, and to correcting the trachea, greatly aids in the reduction of tonicis or fixation of the tissues of the larynx.

THE TRACHEA

The trachea is capable of great longitudinal constriction, hypertonicis, and fixation. Primarily, then, the best means of relating it is by longitudinal traction.

The longitudinal traction of the trachea in the first instance is accomplished by the vertebral longitudinal traction, following which the patient should be placed upon the dorsum, while the relator stands at his head facing the feet, catching the mandible in both hands and lifting it headward so as to elongate the trachea.

The relator should then place the thumbs upon the inlet of the thorax, and carry one down on each side of the trachea as deeply into the thorax as practicable; then approximate the thumbs, guiding them by the fingers upon the sides of the neck, and bring them headward with gentle vibratory motion, allowing them to slide over the trachea, up to the larynx, which should be lifted each time with a little more distance till relaxation occurs.

The relator may then turn with his face toward the patient's head, and relax with the thumbs all of the tissues relative to the thoracic inlet. This is accomplished by anchoring the fingers upon the shoulders close to the neck, placing the thumbs upon the tissues as desired, and giving sudden, short, swift, relating application.

GOITRE

It will be recalled that goitre is of two kinds: congestive and fibrous. Congestive goitre is a liquid infusion into the glandular and fibrous structure of the thyroid gland. Fibrous goitre is a giant-cell enlargement of the thyroid gland, or glands, and cannot be wholly removed. Always a certain amount of scar tissue remains.

The corrective address to goitre differs a little in the different kinds. In congestive goitre the object to be attained is to aid the weakened, liquid transportation structures to remove the accumulation.

It will be found that the veins relative to this drainage area extend headward from the headward aspect of the glands and isthmus, and feetward from the remaining portions. Drainage force is, therefore, applied in such way as to induce the liquids in these two areas to go in the directions of the channels. This is accomplished by gentle pressure applied in a vibratory manner over the areas and in the directions described; it of course being understood that vertebral relating to release the nerve trunks of the area has first been made.

In fibrous goitre, in addition to the procedures already mentioned, the enlarged gland must be caught between the thumbs, or the fingers and thumb of one hand, in such way as to begin the process of slowly breaking down the enlarged structures, of course beginning at the periphery, and continuing, at each relating period, to go deeper into the affected area.

The correction outlined may be done with the patient lying upon the dorsum, but a more successful means is to allow the patient to sit upon the table with the feet in one direction, while the relator sits by the patient on the table with his feet in the opposite direction, crossing the leg opposite over the one next to the patient and throwing him dorsalward, so that his body rests against the knee while the neck rests across the forearm. In this position he can easily hold and control the head, while with the free hand he may make excellent application to the goitre structures directly.

If the goitre is a fibrous one, and is closed tightly around the artery and vein, it must be loosened from these early in the correction. This is accomplished by placing the patient in the position as last described, and applying the thumb mesial to the mastoid, while the fingers (especially the front finger) press in, behind and under the mastoid muscle, thus getting the thyroid gland between the thumb and fingers, when it must be lifted ventro-laterally and carefully and slowly separated from the carotid artery and jugular vein.

The last correction is one of extreme importance, but also is one of considerable danger, and the student should not attempt to accomplish it, without having been carefully and fully instructed in the complete technique.

EPIGASTRIC AREA

In all intestinal disturbances of the constrictive type, this area is peculiarly involved. The first important thing necessary in this area is opening the pyloris of the stomach. This is accomplished with the patient lying on the dorsum, by placing one hand under the body behind the pyloric area, with the fingers of the other hand under the costal arch relative to the pyloris in such way, that force directed from the fingers goes directly through the body to the fingers on the dorsum. With the hands in this position the force should be applied in a rotary movement from both hands, the hands rotating in opposite direction, while the hand on the epigastric area, should at short intervals, deliver short thrusts toward the other hand, all the time continuing the rotary, vibratory force.

The next relating feature is to reduce supracolic, duodenal congestion. This is accomplished by applying the hand with the fingers flat along the right aspect of the chrondal arch, while the other hand is upon the dorsum over the same region; force should be directed, by the application hand, toward the hand on the dorsum, toward the right hypochondriac region, and incidentally headward. When the tissues constricted begin to relax, then the fingers should be changed in their direction, and brought slowly down so as to direct force obliquely dorsolaterally under the transverse colon.

Congestions in this area are usually gaseous, and, if so, will quickly subside. Colic in children will usually be quickly allayed by releasing the pyloris and supracolic areas as described.

The next relating attention should be directed to release of aponeuroses of the abdominal parieties relative to the costal cartilages of the ninth rib on each side. These areas are always slightly hypertonicized in acute indigestion, in abdominal inflammation, incipient appendicitis, and so forth. But the address is most definitely necessary in all impacted conditions of the small intestines.

The relating suggested is accomplished by placing the patient upon the dorsum with one hand under the body, and headward to the place of contact, while the other hand is placed upon the area described, with the palmar aspect of the fingers laid flat upon the abdomen. Traction must be taken by pressing deeply and head-laterally. Force should be applied steadily until an indication of relaxation appears, when the application may be terminated by two or three short, swift, thrust movements. These may be repeated until relaxation has been secured.

JEJUNAL IMPACTION

Jejunal impaction usually occurs in the second or third coil of the jejunum. Therefore, usually immediately to the left and slightly headward from the umbilicus, or about three inches below the umbilicus and two inches to the left. This region is a little headward for it, but in the female, is usually diagnosed, by the medical profession, as ovarian inflammation.

Impactions usually occur as a result of hypertonicis of the walls of the intestines together with the mesentery, incident to accumulations of a toxic character within the bowel. Two things are essential. One, that the tissues shall be relaxed, and the other that the impacted substance shall be pased on.

It is primarily essential that the relator shall find out which way the gut extends at the point of impaction, and address force to the structures in that direction. In accomplishing this work the patient is placed upon the dorsum, and the relator stands with his face toward the feet at the patient's left. He places the right hand under the right lumbar structures, close to the crest of the ilium, and draws them toward him forcibly, which serves to relax those at the left of the umbilicus. He then carefully palpates that area until he finds which way the gut and obstructing constriction extends, and applies the palmar aspect of his hand to that area, directing force in such way as to relax the tissues along the gut; also forcing the contents through the impacted area.

This force should never be applied steadily, but always with a vibratory movement, the vibration being longitudinal, and directly from the deltoid muscle of the left arm. The technique of this movement is indeed difficult, but it must be learned, because application without vibration causes the patient much pain, and does not give opportunity for the substances to move ahead of the force, which is the prime object to be attained.

All other impactions, constrictions, and fixations in the abdominal region are discussed under the general title of appendicitis, and will be given in that connection, and need not be discussed here.

APPENDICITIS

Without going into detail as to the pathology of appendicitis, it should be explained that in that phase of pathology, there is extreme hypertonicis of the psoas-magnus and iliac muscles, and also the muscles of the abdomen, together with the relative aspects of the diaphragm.

It will, of course, be understood that there is paramount, vertebral occlusion to the area, which is the cecum and appendix, but that incidentally there is profound and widespread occlusion as a result of motor reaction, and the address to be taught here is to overcome that phase of the difficulty, presupposing that vertebral relating has been accomplished.

With patient upon dorsum, the relator begins the abdominal address, standing on the left side of the patient, with his face toward his feet, applying the left hand to the feetward aspect of the left abdomen along the inguinal margin, while with the right hand the lumbar tissues relative to the crest of the right ilium will be gently grasped, and drawn meso-feetwardly while with the left hand, tipped so that the ulnar edge will press dorsally relative to Poupart's ligament, sending vibratory force feet-mesial. At the same time tractioning the right abdomen with the right hand also with the vibratory movement.

When relaxation begins to be apparent at the area of the left hand, it should be moved headward to the position of the second coil of the jejunum to the left and opposite the umbilicus, continuing the same conduct with both hands. When relaxation is apparent at this area, the relator takes his position at the other side of the patient, facing the patient's head. In this position he bends across the patient, placing the right hand upon the dorsum behind the spleenic flexure of the large intestine, while with the left hand he directs force with vibration along the transverse colon dorso-laterally with headward impulsion, and at the same time gives to the right hand vibratory movement feet-mesially.

When relaxation becomes manifest at this point, he moves the left hand back to the mesial line of the body, and slowly vibrates it back to the original position, manipulating the right hand as already described. He then moves the left hand back relative to the hepatic flexure, and applying gentle force in a vibratory manner carries it across the body to the original position again, still continuing the same movements with the right hand.

He then assumes the position on the left side as before described, performing the same work as before described, and finally coming back and performing the last work first described all over again. Then with the right hand behind it, he applies the left hand just below the hepatic flexure, and performs the vibratory, undulating movement calculated to carry the contents of the hepatic flexure around that bend and start it across the body. When that is accomplished he may need to follow it clear around the bowel as already described. When conditions are favorable the left hand is brought down near to the cecum, and gentle vibratory force carried up the bowel, and around the hepatic flexure. This may need to be repeated several times, and should be repeated until there is relaxation and freedom of the tissues of the gut and those of the parieties over them.

At this juncture the right hand should be carried down near the crest of the left ilium, grasping the lumbar muscles of the left side so as to be able to bring them to the right. The left hand should be placed over the feetward aspect of the cecum, with the ulnar margin along the right inguinal area, and the thumb spread out reaching over nearly to the umbilicus. These margins should be pressed upon the abdomen so as to make a v-shaped application, when gentle vibratory force should be directed toward the hepatic flexure. The thumb should be pressed deeply upon the abdomen, and the pull of the right hand should be sufficient that no force can go toward the left side of the body, but must go up the bowel from the cecum toward the hepatic flexure.

This force should be applied usually for several minutes before any depth of movement is permitted, and from this point on the correction must be determined by conditions entirely. If relaxation continues to take place under the work, finally the heel of the hand may be dropped deeply in the right inguinal region to the mesial aspect of the cecum, and pressure placed against the feetward end of the cecum, at the same time bringing strong pressure to bear with the right aspect of the hand toward the right side of the body. If relaxation has been properly accomplished, presently the cecum, together with the appendix, will empty into the colon, and the visceral relating phase of appendicitis has been completed. Of course the relator will understand that there are precautions to be taken, but they will be discussed in Symptomology, and cannot be pursued here.

RELATING THE LIVER

It sometimes happens that the left lobe of the liver by shock is displaced meso-feetwardly, in which event there is great danger of the liver becoming ruptured and the patient bleeding to death. To relate the liver, let the patient lie upon a bed, the relator sitting on a chair at the side thereof; places the patient crosswise of the bed on his dorsum, and slides him out over the lap until the trunk hangs down, so that the head touches the floor. Holding the patient in this position, gentle vibratory force is applied from the umbilicus upward in such direction as to reach the ventral aspect of the left dome of the diaphragm. The liver being thus released, will gently gravitate into relation.

RELATING THE KIDNEY

It frequently happens that a kidney is movable or floating, and in either event should be placed in relation. This is accomplished by finding the displaced organ, and from its position noting carefully its seat, and determining the line of its descent to its present place. Then, with the patient on the dorsum, the general abdominal tissues should be carefully relaxed by the methods described in appendicitis, after which the hand should be placed around the area of the kidney with the heel down in the tissue, the ulnar aspect and thumb making a triangle. The hand should follow the kidney with a vibratory movement, in the general direction of its seat, while the other hand is placed under the body, directly behind the seat of the kidney, holding the tissues firmly.

When the kidney is quite into its seat a deep correction of the area of its descent should be accomplished, which will tend to prevent descending over that area again, by destroying the pathway and changing the tissue habit.

Great care should be taken not to move the kidney too rapidly. This especially applies to relating a floating kidney. For sometimes a floating kidney will be found adhered in its abnormal position, in which event great care must be taken in dislodging it, not to cause hemorrhage, and not to expose the patient to too much excitement, for application of force to a kidney always produces a sense of great weakness in the patient and sometimes a sense of exhaustion.

There are other phases of visceral relating that might be taken up, but the principles have been so thoroughly gone over and applied, that the author feels assured that no student will fail to grasp the situation, especially when he has had proper explanations and demonstration of the technique in clinic, and it is not the intention of this work to give such instruction as will aid the student to master these methods without definite and detailed instruction in clinic.

The several chapters given on the art of relating should be sufficient to carry the student into the very midst of this fascinating procedure. It is not expected that the facts laid down are exhaustive of the subject, but they are sufficient as an outline, and the remainder must be left to the careful development and resource of the student.

N.B. • BIBLIOCLAST • N.B. • BIBLIOSNITCH • N.B.

THIS BOOK IS LOANED YOU, READER, TO AMUSE,
TO READ, TO TEACH, TO STUDY, NOT ABUSE.
DON'T DOG ITS EARS, DON'T PENCIL ITS INSIDE,
DON'T TURN IT DOWN NOR OPEN IT TOO WIDE.
WHY SPOIL ITS LOOKS AND GIVE ITS BACK THE "BENDS"?
READ PROMPTLY AND RETURN, IT MAY HAVE OTHER FRIENDS.

AF HPdeF CS