ZEN MEDITATION THERAPY

By TOMIO HIRAI

Scientific Proof That Zen Meditation Brings Peace through Control of the Breath, the Posture, and the Mind.

Zen meditation does not promise to be a miraculous cure for all sicknesses. It has been scientifically proven, however, that it does train the mind and the body and, in this way, helps to build a more healthy total person able to withstand the extreme pressures in modern life. Zen meditation is not something for remote, mystical realms removed from ordinary experience. On the contrary, it can and ought to become a part of the daily life of everyone interested in mental and physical well-being. This book shows how Zen meditation can be advantageous to you and explains the scientific reasons for its effects. The author puts his twenty years of experience in dealing with mental health problems to good use in a book that shows how to prevent the stresses of every day from causing serious sickness.

Cover Design by Tatsundo Hayashi

$3.25

TOMIO HIRAI, M.D.

ZEN Meditation Therapy

JAPAN PUBLICATIONS, INC.

Original edition published in Japanese
by the Goma Shobo, Ltd., Tokyo, in 1974.

First edition: May 1975

ISBN 0–87040–348–6

Published by
JAPAN PUBLICATIONS, INC., TOKYO

Distributed by
JAPAN PUBLICATIONS TRADING COMPANY
200 Clearbrook Road, Elmsford, N. Y. 10523, U.S.A.
1255 Howard Street, San Francisco, Calif. 94103, U.S.A.
P. O. Box 5030 Tokyo International, Tokyo 101–31, Japan

Printed in Japan by Komiyama Printing Co.

Preface

In modern times the life of man has changed to an extent that would have been inconceivable in the past. From the economics point of view, our life might be called rich. But this condition is not happy and prosperous, because modern life offers much less for the health of our minds than for that of our bodies. The number of people who have the self-confidence to overcome the challenge of present competitve society is small, and all of us ought to try to find a system that will bring the whole man both physical and mental health.

Although the market is virtually flooded with books devoted to physical health regimens, almost none is available on the subject of cultivating and strengthening the mind. But the real human need is for a system that takes both into consideration, since man is a whole organism in which neither the mind nor the body can exist alone. Some of us who are psychiatrists are convinced that the ancient and traditional oriental *Zazen*—seated Zen meditaion—system fits this need better than anything we have ever encountered.

It may be that people in many countries have heard of Zazen, but perhaps the majority of those people find the word itself redolent of the temple and of incense. Or perhaps they associate it with mystical enlightenment. The ordinary person may regard Zazen as something remote because of its connections with a religion that is different from their cultural background. Undeniably Zazen has its religious aspects, but it has aspects related to physical and mental health as well. And it is these latter characteristics of Zazen that ordinary people can understand. Furthermore, its connections with physical and mental health are the essence that makes Zazen an interesting subject of study from the standpoint of medical science.

For over ten years, I have been performing research on Zazen from the standpoint of the study of brain waves. This course of study has endorsed the mind-strengthening power of Zazen. I have

proved that Zazen develops the ability to concentrate on the essentials and prevents the mind from being distracted by tiring things. In coordination with my investigation of Zazen, I have elucidated its physiological effects and have learned that it relieves stress and helps strengthen and rejuvenate both the mind and the body.

Since I began my work, the articles that I have published at home and abroad have done much to spread knowledge of Zazen and its effects in the scholarly world. This book is my attempt to present the results of my research on Zazen and brain waves in a new scientific light and in a fashion that the layman with no training in the field can readily understand. Furthermore, I have tried to explain how Zazen can play a meaningful part in the daily life of anyone and how in this way it can bring both mental and physical health. It is my hope that what I have written here will enable all people who read it to find relief from the stresses of the modern world.

Contents

Prologue

In the past twenty years, the number of patients in the psychiatric wards of the Tokyo University Hospital has increased tenfold. And the same tendency can be seen in many other university hospitals in Japan. This is alarming, but it is still more alarming to realize that probably ten times more people who are unaware of their mental condition manifest latent psychiatric difficulties. Though not yet experiencing anything that can be called a mental disorder, these are the people whose sufferings and stresses are more intense than those of normal people in earlier times. Still more numerous than these people are those who suffer from disorders of the autonomic nervous system or from nonspecific anxieties. The causes of both these conditions are only vaguely understood; but in both cases, the body as well as the mind is apparently out of order. As this brief sketch should make clear the numbers of people who are half-sick mentally or physically are appalling. This would lead one to believe that, whereas the people of times past were fortunate enough to be strong in mind and body, the people of today are weak on both counts.

Perhaps this is true. Still, many of the people who suffer from psychiatric symptoms today showed no signs of falling victim to such a condition a decade ago. This suggests that the number of psychiatric patients in our society is much higher than it ought to be.

A search for the reasons for this phenomenon soon leads one to the computer, which seems to have been introduced into society on a wide scale at just about the time when the number of mentally disturbed patients in hospitals began to increase noticeably. I am not criticizing the computer as such, but undeniably its introduction into business stimulated violent competition among enterprises and among individual human beings. The computer made possible rationalized treatment and transmission of information. This in turn emphasized the demand for work efficiency and intensified the

mental load on the worker to a degree unthinkable in the past. Greater demand for efficiency creates a cold war of nerves among people working together since competition inevitably grows severe. This generates tensions and pressures. The person who held up well under a pressure of ten—to assign an arbitrary figure—collapses or manifests psychiatric symptoms when the pressure increases to fifteen.

The condition shows no signs of improving. Competition in society is likely to increase, and the mental pressures under which we must live are likely to grow stronger, as our powers to resist them grow weaker. Unless something is done to prevent it, those who consider ourselves mentally sound today may find ourselves the psychiatric-ward patients of tomorrow.

Not only the office, but also the very urban environment in which many of us live contributes to the gravity of our plight. Twenty-four hours a day in the modern urban center upset the body's natural rhythms. For instance, there are too many things to disturb the natural repetition of sleeping and waking. Busy people are forced to lose sleep because of overtime or because of the long distances they must travel in daily commuting. The development of transportation facilities has made people too lazy to walk. Furthermore, most office workers remain at their desks all day and have little opportunity on the job or off duty to obtain the exercise the body and mind require. All of these things and more of an amazingly wide variety and a distressingly rapid growth destroy mental and physical balance in the adult. Nor is the modern child immune to the danger. It is not uncommon to hear of apparently healthy children who faint easily or whose bones are broken by no more than slight falls. In other words, the young and the old of today are being sacrificed to the monster of the modern urban way of life.

Is it impossible for modern man to survive under these pressures? Are sleeping pills and the whisky bottle the only ways left open to the man of today who suffers from insomnia, chronic stomach disorders, and unrelieved fatigue? Can modern science with all of its progress and sophistication find no way to enable man to over-

come his own weakness and defeat the psychological stresses of our time?

But before attempting to prescribe a way to cure it, I should like to examine the nature of the spiritual weakness of modern man in somewhat greater detail. In general, this condition can be described as a lack of will power, severe timidity, lack of endurance, and inability to persevere. Although this spiritual state of weakness can lead to psychological disturbance, once the person afflicted with it is aware of the nature of his weakness, the weakness itself tends to vanish. As long as it grips the person, however, such spiritual and mental debility can make it impossible for him to meet strangers, have satisfactory relations with the opposite sex, conduct business skillfully, or pass examinations or other tests. The person suffering from this kind of weakness will never stick with a training or work program long enough to complete it. Gradually he will come to despise himself for his weakness and will long for some way to develop spiritual strength; but in this, too, his weakness will prevent him from making progress.

In the past, especially in Japan, vigorous and difficult training regimens—like kendo fencing or judo—were believed to develop strength in the weak man because of the hardships involved in them. For a number of reasons, however, such regimens fail to meet the needs of modern man. First, most people today lack the free time to engage in lengthy, energy-demanding training programs. Second, these programs themselves demand the very kind of spiritual resilience and strength that modern man lacks. It is unreasonable, then, to expect him to succeed in programs for which he is unqualified. Finally, modern man, who tends to demand scientific explanations for the things he does, rejects the oriental martial arts as outmoded because of their Confucian or religious backgrounds. Perhaps some of my readers will criticize me as being excessively utilitarian or as demanding immediate effects from small efforts. But this is not true. I simply recognize in modern man the tendency to reject as outdated any kind of mental or spiritual training program that is not rationally convincing.

The kind of spiritual and physical training regimen needed by

man today must meet two important standards: it must be based on the latest scientific knowledge, and it must be proved effective through long practical application. Recently medical science has proved that the only satisfactory approach to human health is the psychosomatic one; that is, both the mind and the body must be cared for and trained if the human being is to remain in optimum condition. Many of the health programs found in much current literature on the subject fail to satisfy because they either overlook entirely or pay no more than lip service to this important truth. But it is inevitable that they should fail in this because the study of the human mind is still too little advanced for us to have evolved scientific systems for mental and spiritual training. It follows, then, that none of the systems so far developed in this field can have the background of long practical application that is needed if a regimen is to be convincing.

The reason for the lack of confidence in religious, educational, and spiritual programs of training can be traced to their emphasis on the feeling of the moment and their failure to withstand tests on the basis of psychology. Man today demands a training method that does more than provide temporary, subjective relief. He requires a system that is objectively verifiable, a system with values that are clear to all people. To meet these requirements, the optimum training method must regulate the brain functions, which operate on a level figuratively beneath the intellect, the emotions, and the will. Unless the system deals with the mind in terms of the functions and physiology of the brain, rational modern man will find it both unconvincing and ineffectual. I believe that the Zazen method of mental and physical health presented in this book meets the requirements for a modern training regimen for Western people.

I can substantiate my belief by briefly discussing the relation of Zazen to brain waves. (I shall go into greater detail on the scientific aspects of the Zazen method in the second part of the book.) Many years of study of the brain waves, the only indicator we have of the condition of the brain, have shown the following things. When the brain is in a state of relaxed calm, it emits waves called

Alpha waves. But when it is in a state of tension it emits either Beta waves or the still more intense Gamma waves. In all states of complete rest and repose—except the unconsciousness caused by attacks of epilepsy—the brain emits Theta or Delta waves (see the FIG. 1). In short, when a person is angry, irritated, or upset, his brain emits Beta waves; when his anger reaches fighting intensity, his brain begins to emit Gamma waves. During periods of prolonged tension, Beta waves predominate, and almost no Alpha waves appear. If, however, a way were devised to cause it to emit only Alpha waves, the brain would remain free of tension and upset.

In a search for a way to stimulate the constant emission of Alpha waves, I did a great deal of experimentation and tried to learn from the errors I committed. Finally, I discovered that Zazen meditation is a way to enable the human being to emit Alpha waves at will. As a system, my use of Zazen meets the two needs for a modern mental and physical health training regimen because it em-

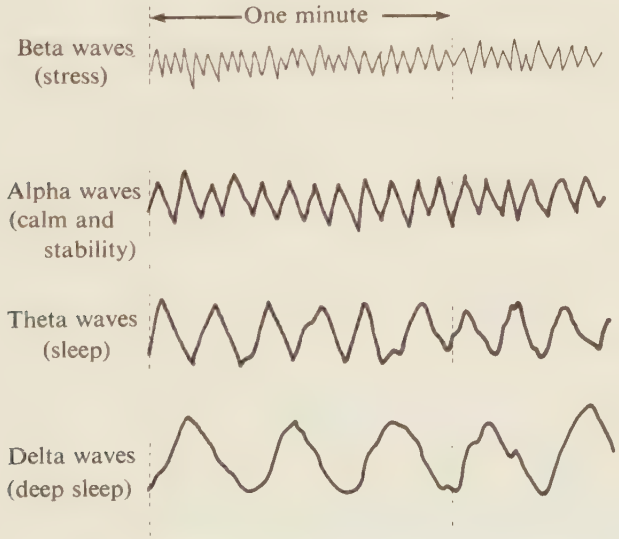


FIG. 1. Changes in mental state affect the kind of brain waves emitted.

ploys the latest knowledge of brain waves, the only external indication available of the condition of the brain, in conjunction with a meditation method that has been proved effective for thousands of years since it was perfected during the life of Sakyamuni, the historical Buddha.

This Zazen system is not as difficult as some of my readers might suspect. It consists of three major parts: breath control, posture control, and mind control. It does not demand retirement to a Zen temple, but can be used as an active part of everyday life. As I have already indicated, I have put the practical explanations of the Zazen method in the first part of the book and have reserved theoretical discussion of the method until the second part. People who wish to know theory before they make practical application ought to read part two first.

Part I

Control of the Body and Mind

Chapter One/Breath Control

1. Reducing Breath Frequency

As I have said in the prologue, modern man lives under permanent stress. Upon waking he dashes from bed to get ready for work. He must hurry to catch the train or drive along crowded highways to reach his office. Throughout the day he is under the strain of helping his own company keep up with or surpass its competitors while trying to see to it that he is not overtaken by any of his fellow workers. Often he must do overtime work until the late hours of the night and then plod a weary way home only to face the alarm clock and the same routine the following morning. Both the pace and the severe competition of life in the modern city act constantly and detrimentally on the nerves of the average person. Heart specialists tell us that the rate of deaths of heart disease is especially high among the middle level of administrative personnel and white-collar workers. But in a society subject to inflation, environmental pollution, excess traffic, and newspapers filled with nothing but gloom, all of us face similar strains and tensions that are enough to do permanent damage to heart and mind alike. Nor is the tension limited to adults. Children as well face serious stress-causing situations in school every day.

Of course, the heart and the nerves require suitable stimulus and moderate tension to function and develop, but excess tension and stimulus can make a mental and physical wreck of an individual. Modern man is subject to tensions and stresses of excess intensity, and unless he finds a way to divert himself from these strains he is likely to collapse. Many of the patients who come to our hospitals are mentally disturbed primarily because they cannot devise diversions for themselves.

Sometimes, these people try to face the tensions directly and force themselves to do something to relax, but this rarely has any effect. The only way to defeat tension is to apply guerrilla tactics. Do not approach the enemy head-on; instead, attack him from the

flank. In other words, counter a stress-causing stimulus by applying another stimulus from another direction. This stimulus can take the form of a friendly drink on the way home or a game of cards with office companions. Anything of this kind can relax the tensions of the daily grind, as office workers in all parts of the world are usually quick to discover.

But these diversions are only temporary and if indulged in to excess can do more harm than good. The kind of relief from stress that I shall explain next is one that contributes to the increase of health and well-being and that requires no special place and no additional people to perform. The relief I prescribe comes from breath control.

In Zen temples, breath control is taught first to beginners and novice priests. When the position of the body is correct and when the breathing has been regulated, the mind enters the calm state in which profound meditation is possible. I have performed experiments on the brain waves of meditating Zen priests that prove this to be true. For example, priests insist that when worldly thoughts interfere with their meditation, they may return their minds to the proper state by correcting their posture and regulating their breathing. I once measured the brain waves of a meditating priest. At one point, the calm, steady flow of Alpha waves stopped to be replaced by an outflow of Beta waves, indicating emotional and mental tension. Before long, the priest corrected his breathing; and, in a short time, the Beta waves stopped, and the Alpha waves reappeared. When the meditation session was over, I questioned the priest, who told me that at the time when I observed the change from Alpha to Beta waves, he had been distracted and that after he regained control of his breathing he once again entered profound meditation. It was at this time that the Beta waves gave way to a reappearance of Alpha waves.

That this ancient breathing control system has salutary effects on body and mind alike is proved by the use to which it is put in modern treatment of mental patients. In this chapter I shall examine the several ways to control the breath and shall relate them to daily life and to scientific research. I recommend that you

include one or many of them in your daily living. The first method is reducing breath frequency.

Under ordinary conditions, the human being breathes about eighteen times a minute. This frequency increases when the person engages in strenuous activity. The priest in Zazen meditation, however, breathes only four or five times each minute. Prolonging exhalation is one way to reduce the number of breaths. Zazen teachings say that one should exhale very slowly and so gently that the flow of air would not disturb a feather attached to the tip of the nose. At the end of exhalation, air will be inhaled naturally into the lungs. Exhale slowly through the nose and inhale quickly through the nose. This breathing method involves the abdominal as well as the thoracic muscles. You should practice doing this until you breathe only four or five times a minute.

One good place to practice breath control is on crowded commuter trains. Many people who work in cities must ride for hours every day to reach their places of work. If you are one of them, you can put this time to good use by doing breath-control exercises that require no special postures and that are not disturbing to people around you. No matter how much the train reels and no matter how your neighbor may crowd you, simply close your eyes to block out possible distractions and inhale quickly and exhale as slowly as possible. Not only will this help you to prepare youself to be calm to face whatever the day may hold, it will also contribute to better health if you do it every day. Many old people in Japan attribute their continued vigor to breath control and reduction of breathing frequency. Furthermore, breath control of this kind is the foundation of all the other breath-control systems and of mental and physical health systems in general.

But let us examine the physiology of breathing in an attempt to see why slow breathing is more efficient. As is obvious, breathing is divided into two stages each of which performs a special function. Inhalation carries a fresh supply of oxygen to the lungs. Exhalation removes from the body the carbon dioxide that is taken from the blood and stored in the lungs until it can be expelled. Unlike the operations of the heart and other internal organs,

breathing is partly subject to conscious control. For instance, women who dive for abalone and other shellfish in Japan train to hold their breath for a long time in order to enable themselves to remain underwater as long as possible. Breathing is not, however, entirely consciously controlled. Breath automatically resumes when it has been held for a dangerous length of time. Furthermore, during sleep, breathing is completely automatic. Indeed, throughout much of our waking time as well we breathe without being aware of it. The rate of breathing automatically changes in accordance with the body's needs. The autonomic nervous systems mediate this function. When a person has indulged in some sudden or violent activity that demands great energy output, the breathing rate increases.

It is unknown exactly how many times a minute the human being ought to breathe. The eighteen breaths a minute that are the average for people in a relaxed state is not necessary to life. But it is certain that the idea that rapid breathing affords the body a richer supply of oxygen is mistaken. Indeed, because it is shallow, rapid breathing fails to carry the needed oxygen to the lungs but allows it to escape in the bronchial tubes. Moreover, it does not remove all carbon dioxide and in this way reduces the amount of space in the lungs available to a supply of fresh oxygen. But if you exhale slowly and completely so that no carbon dioxide remains, a pressure differential will develop, and air will naturally rush in to fill the now empty lungs. Since much more oxygen is taken to the lungs with this kind of breathing, using it, one can comfortably reduce the breath rate to four or five breaths a minute.

As the middle-aged man who finds his heart pounding and his breathing rapid and irregular after climbing the same number of flights of steps that in his youth he bounded up with no ill effects knows, short breath is not a sign of good physical condition. Nor is it indicative of mental composure, since short breath accompanies fright, neurosis, and some more serious disturbances.

In the first place, slow, deep breathing lightens the load the heart must bear. As is well known, the heart pumps to all parts of the body the blood that carries the oxygen taken in by the lungs.

When breathing is fast, as it often is after physical exertion, the breathing rate increases, and the heart must beat faster to carry out its function. This means that under rapid breathing conditions, the heart must work harder than usual. On the other hand, when breathing is deep and slow, the heart can do its work with less effort. But in order to understand this better, one must know a little more about the functions of the heart itself.

The heart is controlled by the autonomic nervous system, composed of the sympathetic and the parasympathetic nerves, which work in opposition to each other. When the sympathetic nerves are excited, the heart beats more rapidly, and the pulse rate increases. The parasympathetic nerves have the opposite effect of slowing the heartbeat and the pulse rate. As long as balance is maintained between the operations of the two sets of nerves, no problems arise. But when the sympathetic nerves, in response to some kind of abnormal stress, remain in a state of excitement, they keep the heart working overtime and in this way increase the load it must bear. No matter how much we should like to be able to cause the heart to slow down when it is overworked, we cannot since it is controlled by the autonomic nervous system, which is not subject to conscious control.

Still, breath control has a pronounced effect on the operation of the heart. For example, Yoga breath-control exercises are said to bring the heart to a complete halt. In fact, however, this is only a great reduction in blood pressure and a lightening of the operation of the heart caused by very slow breathing. This effect can only be achieved by highly experienced Yogi. I mention it here because it reveals the kind of effect breath control can have and should show the reader how valuable he can make his commuting time by practicing breathing exercises on the train or bus. Neurotic people sometimes complain that, when afraid of being late, after punching their time card at the door and arriving at their desk, they are in a state of upset characterized by rapid, difficult breathing and increased pulse rate. No doubt they have allowed themselves to create this condition on the way to work. How much better their time would have been spent if they had used it to slow their

breathing and calm themselves.

The effect of reduced breathing rate is by no means limited to the body, but extends to the mind and the emotions as well. It is true that slow, calm breathing brings composure and a natural relaxation of emotional sufferings. By controlling and regulating the breath completely, one obtains control over one's entire self and therefore remains mentally calm in the face of emotional disturbances. For this reason, in Japan, it is traditionally believed that Zazen, in which breath control is important, is a way to self-regulation. Lack of self-regulation causes able people to fail to do as well as they are capable of doing in time of stress. When something important is at stake, people who have this emotional problem find that their muscles and their minds tense and prevent them from succeeding. No amount of consciously delivered advice can do anything about this, but breath control and reduced breath frequency can.

2. Rhythmical Breathing

Rhythm is as important to many aspects of daily life as it is to music. In sports, rhythm spells the difference between good and bad performance. For example, it is easy to tell the difference between skillful and poor swimmers by observing the rhythm of their actions. But the importance of rhythm is not limited to sports. In work, the man who establishes and adheres to his own rhythm of performance is likely to be more efficient and more successful than the man who works in a haphazard fashion. Our bodies themselves are governed by rhythmical cycles of actions; sleeping and waking are one of the most obvious. The functioning of the organs of the body—the heart, the lungs, and so on—is smoother and the body is in better physical and mental condition when an innate, proper rhythm is maintained.

The measured rhythm of the way Zen priests chant the sutras is an interesting illustration of breath control used to promote mental concentration. Of course, the texts themselves have deep meaning, but the rhythm of the chant plays an important part in this kind of

religious observance.

The first step in developing rhythmical breathing is to select some phrase, piece of poetry, song, or any other kind of short text that you can repeat over and over in a fixed pattern. Zen priests regulate their breathing and develop profound concentration by repeating the kind of rhythm found in the opening line of the Japanese-reading of the Chinese text of the *Prajnaparamita-hrdaya-sutra*: *Makahannya—hara—mitta*. Other Japanese prefer to use something with the most popular of all Japanese poetic meters, five syllables, seven syllables, and five syllables. This is the meter used in the *haiku* of poets like the famous Basho and in another traditional poetic form called the *tanka*. But it makes no difference what kind of rhythm one uses. It is important to select something that is pleasing. A favorite line from a poem or a song may serve this purpose. Language students might want to combine study with breath control by rhythmically chanting the conjugation of a verb. The key to success in this exercise is repetition. As you repeat aloud the words of the line or phrase you have chosen, in a rhythm that you find pleasing, your breath will gradually conform to that rhythm. Since you must repeat the phrase aloud slowly many times, this is not an exercise for the crowded commuter train. But you can find a few minutes a day, while walking along the street or while waiting for the train or the bus, to practice in a low voice that will not annoy the people around you. If you consciously concentrate on the rhythm of the thing you are repeating, your breathing will naturally fall in line with the rhythm.

As long as you concentrate on the rhythm of the words you are repeating, you do not need to worry about the length of exhalation and inhalation. These will take care of themselves; that is, as you say the words you will slowly exhale, and at the rhythmical pauses in the text, you will naturally inhale as the air flows freely to the deepest parts of your lungs. This will naturally decrease the number of breaths each minute. This same effect can be produced by concentrating on a phrase or line that you repeat silently to yourself as long as it is done in a rhythmical way.

The method of reducing the number of breaths taken each min-

ute and this rhythmical breathing method are similar in effects, though they differ in goals. Rhythmical breathing strives for concentration of thought; in addition, it is less concerned with great reduction in the number of breaths per minute than in the establishment of deep, regular, orderly breathing.

Everyone who has had to appear in a play or make a speech before an assembly has experienced stage fright: the cold sweats, irregular breathing, and rapid pulse that accompany the mild anxiety and the excitement preceding a performance. Some people, however, are unfortunate enough to suffer from this kind of condition in much severer degrees and much more often. Their pulse pounds, their breath becomes short, they break out in cold sweats, and feel as if they were near death. In examining patients suffering from this condition, I have noted that they invariably breath in a very shallow and irregular way when suffering an attack of what might be called an anxiety fit. Even when the fit has passed, however, shallow, irregular breathing persists; and one can never be certain that the tension the person is experiencing will not lead at once into another attack of severe suffering. People in this state of tension, manifest what I call unrhythmical breath.

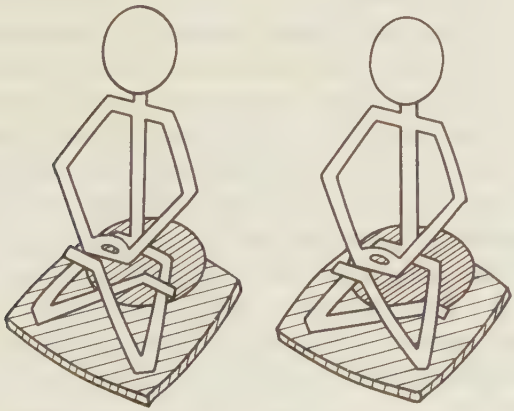
The restoration of rhythm to the breathing by means of the exercise described here will calm the mind, remove anxiety, and enable even the timid to face his audience, his boss, or his new girlfriend with composure. In time of tension, the breathing becomes irregular. When one becomes aware of this irregularity, the tension increases; and this in turn further disturbs the breathing. But repetition of a phrase or song in an established rhythmical way restores order to the breath and in this way calms the mind and eases tension.

For people who find the other breathing exercises—for example the preceding reduction of the number of breaths taken each minute—difficult to master, I recommend the rhythmical breathing exercise. Often in the other exercises, distracting thoughts enter the mind and make it impossible to concentrate on breathing alone. In the rhythmical breathing exercise, on the other hand, the mind concentrates on the words being repeated; and the breathing regu-

lates itself automatically. In this respect, it is the easiest of the exercises to master.

3. Zen Meditation While Walking (*Kinhin*)

Perhaps Zazen meditation while walking seems a contradiction in terms, especially since the kind of meditation I am dealing with in this book is generally done in a seated position. *Kinhin* is, however, an intermediate rest period in long sessions of seated meditation. Although the famous priest Dogen has said that Zazen is the easy way to attain the Buddha nature, as anyone who has tried can testify, it is far from easy, especially for the beginner. Long periods of sitting in the *Kekkafuza* (cross-legged) or *Hankafuza* (semi-cross-legged) positions tire the legs and the back. And a certain lowering of awareness inevitably leads to drowziness. Kinhin, or walking meditation, is a way that has been devised to rest the legs; restore sharp awareness; and thus make possible deeper, more meaningful seated meditation.



Kekkafuza (cross-legged) *Hankafuza* (semicross-legged)

FIG. 2. Zen meditation in sitting posture.

The characteristic of this system is that one conforms one's foot motions to one's breathing. The breathing method is the long exhalation and short inhalation mentioned in the section on reducing the number of breaths taken each minute. During one breath, move one foot one-half step forward; with the next breath move the other foot one-half step forward. Obviously this is a very slow way to walk.

Experiments that I conducted on Zen priests performing Kinhin (walking meditation) revealed remarkably reduced breath rates and high emission of Alpha waves. No matter how slow, Kinhin is a walking exercise. It might be expected then that the breathing rate would have to be faster for it than for ordinary seated Zen meditation and that the mind would cease emitting Alpha waves and would begin emitting Beta waves. But such was not the case in my experiments. The priests I tested still breathed at a rate of from four to five breaths a minute and continued to emit Alpha waves. Though seated Zazen and walking Kinhin are different, the physiological and mental states of the priest remain unaltered in both; in other words, Kinhin is a continuation of meditation in a somewhat altered form.

Because it calls for movement so slow that one almost remains standing in one place, the Kinhin walking Zen meditation system is virtually impossible to incorporate into the activities of daily life. The one-two-three breath and movement coordination system, on the other hand, can be used every day and is very effective. Counting silently to yourself, say one, two, three, as you adjust your breathing and walking to the rhythm. The number *one* gets one beat, the number *two* gets two beats, there is a pause between the last two numbers, and the number *three* gets one beat. In other words, the count for two is the longest of the series. You may begin walking on either foot, but for the sake of explanation, let us assume that you begin on the right. Exhaling as you say one, advance your right foot. Continue exhaling as you count two and advance your left foot; remember that the count of two gets two beats. At the pause between two and three, your breathing changes from exhalation to inhalation; and at this time, you advance your

right foot again. Inhale on the count of three as you exhale and advance your left foot. You exhale through two counts, leave a brief pause before the final count, then inhale on the count of three. The pause is of the greatest importance because it adds a sense of expansiveness to the exercise and causes the air to rush into your lungs at the inhalation stage. If you speed up the tempo of the count, you can use this system in running or going rapidly up stairs; but you must not forget the pause, for, if you do, you will only accelerate your breathing rate and in this way quicken your pulse and shorten your breath. Once you have mastered the use of the pause, you can employ this breathing system at very fast speeds without losing control of you breath.

Many kinds of training regimens involve applications and variations of the basic principle of coordinating the movement of the body with the breath. For example, priests of the Rinzai Zen sect use a one-two-three breath-motion coordination system in fast walking and running that amount to a Marathon of activity. The Ogasawara decorum school, follows a system of one exhalation one step, one inhalation one step. And many of the martial arts train their men to conform movements to breathing. Although in these variations, the number and size of the steps vary the Kinhin system—exhalation through two counts, pause, and inhalation on the final count—is the fundamental principle on which all the others are based.

One of the excellent applications of this breath-movement method is relieving mental and physical fatigue caused by long hours of seated work. Sitting in chairs is a posture that is not necessarily good for the body. When you are concentrating hard on work or study, your breathing shifts from the deep abdominal type to the shallow thoracic type and speeds up to a rate of about eighteen or twenty breaths a minute. If this condition continues for more than an hour or an hour and one-half, you become bored, yawn, and allow your mind to wander from your task. This happens because an upset in the balance between oxygen and carbon dioxide in the blood lowers the efficiency of the operation of the brain. The Kinhin system, which, as I have already mentioned, is

both a meditation method and a relaxation period in long sessions of seated Zen meditation, can enable you to concentrate again on study or work.

Rise from your chair, put your feet flat on the floor, then bend your knees slightly. Next, taking small steps, walk around the chair two or three times. When you are relaxed, practice exhaling as you put one foot forward. When you have exhaled completely, inhale as you advance the opposite foot. In this instance, the opposite foot is advanced a little faster than in the true Kinhin, but this does not matter. As you continue the exercise for from five to six minutes, your breathing will naturally shift from the thoracic to the abdominal type. Ideally you should continue for about fifteen minutes. After a period of about that length, your shoulders will no longer feel stiff, and you will be prepared to concentrate on your work. A break of this kind will ensure efficient work, whereas simply sitting for three or four hours at the desk often means that the work being accomplished is either small in quantity or inferior in quality.

Any part of the human body becomes weak and useless if it is not put into action regularly. People who ride in automobiles all of the time or people who, because of long illness, are forced to remain in bed for extended periods find that their legs grow weak and thin and that walking is difficult. This is especially bad from the health standpoint since the action involved in walking helps stimulate the motor areas of the cerebral cortex and in this way prevents weakening of that most vital organ. It is for this reason that walking combined with breath-control exercises is of such great health value: it not only helps control the breathing and allows the body to take advantage of the benefits of this regimen, it also provides exercise for the leg muscles and stimulates the brain. Deep, regulated breathing releases tensions and brings relief from fatigue. In this way, it helps people to overcome the situation T.S. Elliot describes in the following lines from *The Waste Land*;

> A crowd flowed over London Bridge, so many,
> I had not thought death had undone so many.
> Sighs, short and infrequent, were exhaled,
> And each man fixed his eyes before his feet.

4. Abdominal Breathing

As should be clear by this time, breath control contributes to improved physical strength and mental stability. But there are many more methods for achieving this control than I have discussed yet. For instance, abdominal breath control is a system devised by the great Rinzai Zen priest Hakuin (1685–1768) on the basis of his own personal experiences. The characteristics of the system are these: the mind concentrates on the navel, the abdomen is tensed, and breathing is regulated. The method employed to achieve concentration in the navel is somewhat roundabout. If one sets out to concentrate one's attention on a certain place, like the navel, the result is likely to be the development of sensations in that part that prevent the person from becoming as calm as he must. To prevent this, the Hakuin adominal breathing method first requires that you imagine a burning pain on the top of your head—the kind of unpleasant sensation you would experience if moxa were being burned on your scalp. The mind can concentrate on this imaginary sensation, and then this same concentration can be shifted to the navel or the abdominal region. Abdominal breathing counters the sensation of burning on the head. The theory on which this system is based is called concentration dispersal by physicians and is related to the idea that excess concentration on one thing produces tension and is therefore negative in effect. Hakuin's theory, which is founded in modern scientific fact, has been of great value to medicine.

To master this method, first sit cross-legged on the floor with your hips pulled down to retract your abdomen. You head must fall slightly so that your face is directed toward your navel. Your trunk leans forward slightly. It may be helpful to put a cushion under your buttocks. Imagine a burning sensation on the top of your head and breathe deeply and strongly to counter this unpleasantness. Once you have become accustomed to the method, simply assuming the cross-legged seated position will be sufficient to cause you to breathe slowly and deeply from the abdomen.

In order to discuss the reasons for the effectiveness of abdominal breathing, I must first mention the importance of the navel zone to

proper functioning of the internal organs. Behind the stomach and below the navel is a network of autonomic nerves called the solar plexus, which controls the actions of blood vessels and capillaries that enable the liver, kidneys, and large intestine to remove waste products efficiently from the body and in this way to contribute to recovery from fatigue and to the creation of physical and mental strength to help the person withstand hardships.

People who are totally devoted to the rational Western approach to all things may be difficult to convince, but it is undeniably true that the abdominal breathing method, widely practiced by people who do not otherwise engage in Zazen, has been helpful in curing gastric ulcers, chronic constipation, and intercostal neuralgia in cases in which preliminary treatment and medication have proved futile. Falstaff in Shakspeare's *Henry IV* is an immense drinker and a glutton, but he is a man of humor and, above all, composure. Though it is not a good idea to copy Falstaff's bad traits, his better characteristics deserve emulation. And abdominal breathing can help generate calm and good humor in the face of irritations and difficulties.

Some simple animal experiments reveal the efficacy of tensing the abdomen in order to calm the brain and the body. For example, tapping a frog lightly two or three times on the abdomen will calm the flailing that the creature usually demonstrates as a result of fright at being captured. In my childhood, we often practiced hypnotizing chickens in this way. We would lay the bird on its back and would tap its abdomen two or three times. For a short while, the bird would seem to fall asleep.

The parasympathetic nerves, which form a network in the lower part of body, are responsible for the constriction of the eye, the slowing of the heartbeat, and certain digestive functions. Stimulating these nerves—as it is possible to do by tapping a frog or a chicken on the abdomen—results in a condition resembling sleep. After-lunch drowziness and total body relaxation are results of the stimulation of the central part of the parasympathetic nervous system.

Tensing the abdomen, as one does in abdominal breathing, re-

presses the sympathetic nervous system, which, acting in opposition to the parasympathetic system, stimulates response to alarm by speeding the heart rate, raising the blood pressure, and so on. In other words, tensing the abdomen makes it possible to control the effects of the excitement-causing sympathetic nerves and to channel their effects indirectly toward the goal you have set for yourself. This enables you to remain calm in the face of danger and trouble. And this is the reason why abdominal breathing generates mental composure and enables you to make maximum use of your energies.

5. Counting Breaths

The breath-counting system is recommended to all Zazen beginners. It not only helps regulate the breath, but also provides spiritual unification. In other words, it is an excellent example of the Zen way of controlling the mind by regulating the outward forms and actions of the body. The simple system consists in counting silently from one to ten and inhaling deeply and exhaling slowly on each count. If it is done in the traditional Japanese cross-legged position, it is wise to use a cushion to prevent weariness of the legs. Sit with your back straight, your chin pulled in, and your tongue held against the roof of your mouth. (This position, called the *Kekkafuza*, will be discussed in further detail later.) Lightly close your eyes.

It is possible to practice this method of breath control while seated in a chair. With your back straight, sit so that your legs are moderately spread. Hold your hands, palms down, on your thighs. The fingers should be spread about equal distances. Direct your gaze to a position about one meter in front of you. When seen from the side, you will seem to have closed your eyes. This way of sitting— part of the Zazen body control method—will help you to maintain mental stability as you breathe to the count of from one to ten.

In the stress of modern living, mastering this exercise may be difficult because it calls for attention to be directed toward breath-

ing, a part of our physical functioning that we ordinarily do not have to think about. This in turn may develop another kind of tension that must be overcome if breathing is to be controlled successfully. The Zen priests of the past always bathed or poured water over their bodies before beginning Zazen meditation, and we today would do well to take this hint from our forebears. In addition to its cleanliness aspects, bathing raises the body temperature, relieves muscular fatigue, removes stresses, and in general puts the mind and the body in good condition for breathing control. Four or five minutes of breath-control exercise after the bath is not too much time to take for the sake of the mastery of this important exercise.

My colleague and friend, Doctor Nobuo Takemura, of the Nihon University Hospital, has proven the effectiveness of the breath-counting system in treating patients with neurotic symptoms. Of course, the breath-counting exercises cannot be used in initial stages of treatments. Before they can play their part in the cure, the patient's condition must improve to the state at which he no longer feels anxiety or emotional upset and at which his brain no longer emits predominantly active or tense Beta waves. In other words, the patient must be at the stage of an ordinary person under moderate stress. At this time, however, the breath-counting system can contribute remarkably to further improvement in his condition.

Doctor Takemura measured the brain waves of neurotic patients undergoing breath-counting treatment and made the interesting discovery that their electroencephalograms display Alpha waves at about the level of a person in the first stage of Zazen meditation, though the patients' eyes are open throughout the exercise. Further, he discovered that they breathe at the rate of from six to nine breaths a minute, or about half the rate (eighteen breaths) for normal static conditions. Breath-counting exercises are the final stage preparatory to sending neurotic patients out into ordinary society again, free of unnecessary psychological stresses and ready to face life as a ship that has been in dock for repairs is ready to face the sea in completely seaworthy condition.

Chapter Two/Posture Control

1. Zen Meditation in Sitting Postures

This chapter deals with the Zazen principle that the posture of the body affects the mind and attempts to examine the positions used for Zazen meditation and to explain their effects and the best ways to take advantages of them. The influence of posture on mental attitudes is apparent in many aspects of daily life. When we are about to come into contact with some great danger, we stand up straight. When we have something important to say, we sit straight in our chairs. Healthy and cheerful people more often stand with chest out and shoulders back than with back bent. The ancient oriental codes of courtesy and martial arts invariably begin by teaching proper posture. But it is Zazen that has taught the relation between the posture (and breathing) and the condition of the mind. In the writings of such great Zen priests as Dogen (1200–53) there are passages explaining that the mind and the body are one and that each influences the other. To regulate the mind, it is necessary to regulate the body—the breathing and the posture. In this way it is possible to store up physical energy and unite it with mental energy.

Of course, other schools of philosophy and religion have insisted on the oneness of mind and body. Jean-Paul Sartre and Martin Heideggar among the Existentialists are only two of the noted advocates of the basic concept that the body and the mind cannot be separated. The psychoanalyst Wilhelm Reich interprets human beings in terms of organic processes and attempts to find common energies and factors underlying both the mind and the body. He describes as chronic muscle contraction such conditions as stiff neck and chin, unusually full chest or breast, and tightly pinched waists and says that they are characteristic of people who are mentally constricted and unable to express themselves freely. Cerebral physiology offers adequate substantiation of the idea of the unity of the mind and the body. The cerebral cortex controls con-

sciousness; and the central autonomic nervous system controls the unconsciously regulated functions of the body, which sustain life. These two important organs operation in opposition; that is, when the cerebral cortex is stimulated to great activity, the central autonomic nervous system is repressed and vice versa. Brain-wave patterns and observations of breathing and pulse rate prove that this is true, but I should like to go into the theoretical reasons for the phenomenon in somewhat greater detail.

Many people have experienced first stomach disorders and then actual pain as a consequence of emotional or psychological stress that has lasted for several days. Zazen can prevent this kind of situation from occurring. The reason for this is related to the effect Zazen has on the autonomous nervous system, irregularity and dullness in which cause stomach disorders and the pain. Zazen regulates the operation of the autonomic system and relaxes tensions that affect the cerebral cortex. In this way it brings stability to the spirit and returns health to the body. In other words, by maintaining balance between the operations of the cerebral cortex and the central autonomic nervous system, Zazen helps create a smooth, well-ordered state of mind. This is the scientific corroboration for the Zen teaching that the mind and the body are one.

Operating on the belief that the movement of the body itself reflects the stability of the mental state of the person, we performed an experiment involving nine Zen priests highly experienced in Zazen meditation and nine people ranging in age from twenty-five to sixty-two who were totally without experience in this kind of mental and physical discipline. We had these people go through thirty minutes of Zazen in any position—kneeling, sitting cross legged, or in the formal Kekkafuzu or the semiformal Hankafuzu positions. Using a devise involving a suspended lead weight with an inked tip and white drawing paper, we recorded the amounts and directions of sway in the upper body of each meditating person. Reconstructions of averages taken from the actual recorded charts are shown in the FIG. 3. No matter what position the people assumed, the bodies of the experienced Zen priests moved much less and much less erratically than those of the inexperienced

FIG. 3. The lines leading outward from the central dot indicate body movements.

people. Later we plotted charts of the body movement of people simply sitting and relaxing without any thought of Zen meditation. The results of these tests showed that body movement in such people under such circumstances is frequent and extensive. We then felt that we had come close to showing that mental and physical stability are intimately related, but we decided to make another test to substantiate this theory further.

We conducted the same body movement test on nine patients known to be suffering from neuroses; the experiment took place in the same place as the one conducted on the priests and the inexperienced Zen meditators and lasted for the same amount of time: thirty minutes. The results were startling. As can be seen from the reconstructed average movement patterns of these patients, the movements of the body of a person suffering extreme mental instability are more erratic and wider than those of a normal person without Zazen experience. In short, the mentally stable person can remain physically stable for a fixed period of time. The smaller the range of his body movement in that period of time, the more stable his mind is likely to be.

But now I must turn to the question of posture that is of great

importance in Zazen meditation. The two major reasons for controlling the body position in meditation are to correct posture and improve the functioning of the internal organs, particularly, the stomach and the intestines. Though these purposes are listed separately here, they are in fact inseparable.

The teachings of Zen argue that there is no difference between the active and the static conditions and that the two are one. And this is the meaning of the Zen meditation posture. Though the meditator strives for complete immobility, he must not sleep. On the contrary, though he appears static, he is actually filled with abundant vitality. In short, though not moving, he is in a dynamically active state, as can be proved by checks of his brain waves. I shall deal with this problem in detail later, but for the present, it is important to remember that the Zen body-control method is intended to develop calm with action and action with calm. This is true no matter whether the person is sitting perfectly still or is engaged in violent physical action. But what is the best posture to assume in order to maintain calm in action and action in calm?

First of all the position one assumes must be stable. Second it must cause very little discomfort and no bodily strain since to develop the bodily and mental controls that are the major aim of Zazen requires that one hold this position for from fifteen to twenty minutes. On the other hand, the position must stimulate sufficient tension to enable one to concentrate. A very comfortable position is fine for sleeping, but not very good for Zen meditation. Over many years, the masters of Zen have devised positions that meet these three standards—stability, relative comfort, and tension—exactly.

Modern medical science has proved that, though they may have been unaware of it, in devising the Zazen postures, the priests of old developed positions that are excellent in that they do not apply undue pressure on the vertebrae and therefore do not constrict or dull the autonomous nerves in the vicinity of the vertebrae. I shall now discuss the three positions used in the Zazen body-control system: sitting, standing, and lying down.

The correct way to engage in Zazen meditation is described in

the *Fukanzazengi*, a work written by the famous Zen priest Dogen. The text says that for Zazen it is necessary to choose a quiet room. Food must be taken in moderation. Although the posture may be either sitting or reclining, in general one sits with a cushion spread on a thick mat. The sitting positions may be either the full Kekkafuza or the semi-cross legged Hankafuza. In the Kekkafuza, the right foot is placed on the left thigh and the left foot on the right thigh. In the Hankafuza, the left foot is placed on the right thigh. The clothing must be loose. The right hand is placed on the left foot and in the palm of the left hand. The thumbs are brought together. The body must lean neither to the left or the right nor to the front or the rear. You must have the feeling that the bottoms of your ears are pointing to the tops of your shoulders and that the underside of the tip of your nose is pointing toward your navel. The teeth and lips are lightly closed, and the tip of the tongue lightly touches the roof of the mouth. Under all circumstances, the eyes must be open. Breathing is quiet and through the nose.

For the sake of the beginner in Zazen, I should like to add a few more explanatory remarks. Although, once the person has become accustomed to regular Zen meditation, it makes no difference where it is performed, at the start, it is wise to choose a quiet place. Always carry out the meditation exercise at the same time each day. In this way, Zazen will become a part of everyday life; and you will find that persevering in it is easier. It is a good idea to meditate in the morning immediately upon awaking or in the evening just before going to bed. At first, five or ten minutes is long enough, but the meditation sessions ought to be increased gradually to from twenty to thirty minutes. The following points too are of importance. Do not attempt to meditate when you have had insufficient sleep or are overtired. Do not meditate immediately after meals or when you are very hungry. Dress lightly but stay warm. Before meditating, refresh yourself by washing your hands and face.

The cushion you use should be folded and placed below your buttocks so that your anus is in the middle of the cushion. (One of the square, flat cushions that the Japanese call *zabuton* is ideal for

this purpose.) As the text by Dogen states, either the Kekkafuza or the Hankafuza position is acceptable. The Kekkafuza, which calls for placing the right foot on the left thigh and the left foot on the right thigh (see illustration on p. 25), is difficult for some people, especially the overweight. It is unnecessary to attempt to force the body into this position, because the Hankafuza, with the left foot on the right thigh (see illustration on p. 25) is satisfactory. Although these positions may cause some strain at first, it will become apparent as time goes by that they are the best postures for this purpose because they are dynamically and physiologically perfectly stable. They are dynamically stable because the legs, held in either of the two postures, form an equilateral triangle that supports the spinal column and the bulk of the body weight. Physiologically, the positions cause no concentration of weight on the lumbar vertebrae and consequently apply no undue pressure on the nerves of the vertebrae.

The Kekkafuza and the Hankafuza are the standard Zazen seated meditation positions, but it is also possible to meditate seated in a chair. Notice that the knees are spread and the heels are together. This position too creates a triangle—either equilateral or isosceles—on which the weight of the upper body can rest.

Before going on to the other two major categories of Zazen positions, I should like to explain how the principles of seated meditation can be applied to daily-life situations to help you have a clearer head and greater concentration when you must attend meetings or conferences or face situations in which lucidity and attention are of paramount importance. The method I prescribe is very simple: assume the relaxed seated position. Three hand positions are satisfactory: folded and placed over the navel, palms down on each knee, on each thigh with fingers spread and palms down. Of the three, the last is best because it causes the shoulders to relax and to fall into a natural position. Seated in this position, the body is in a state of calm in action and action in calm. It is possible to give complete attention to each word the other person is saying and to be ready to react promptly and to give concise, direct answers to all questions as long as suitable balance between

relaxation and tension is maintained.

From personal experience I can say that this position enables one to act with alertness and accuracy even when sleepy from a long night of study or perhaps poker. Indeed, I think this position proves so helpful in daily affairs, that I shall enumerate the steps involved in assuming it once again in list form.

1. Sit well back in the chair.
2. Spread your legs comfortably; your thighs will form an angle of from thirty to ninety degrees.
3. Bring your heels together and spread your feet to form an angle of about ninety degrees.
4. Rest your hands, palms down, lightly on your thighs. The palms of the hands should not come in contact with the thighs.

As in the other seated positions, the relaxed seated posture unifies the spirit by regulating the body and helps the brain to function better.

2. Meditation in a Reclining Posture

As has already been said in the discussion of the *Fukanzazengi*, the reclining posture is one of the positions in which Zen meditation is possible. Some years ago, when I and my colleagues at Tokyo University were conducting brain-wave tests on a group of Zen priests in a temple in Tokyo, it became necessary for us to live, eat, and sleep at the temple for a limited period. During that time, I observed the curious fact that all of the priests slept on their sides. In ordinary circumstances, when a person is resting after a days's work, he lies flat on his back. Was it possible that even in sleep the Zen priests did not rest? To answer this question I discussed the matter with some of the priests and learned the following. Sleeping as well as waking, these men conduct Zen disciplines, and while asleep they must make use of the general principles of the Zazen seated position. I have called this kind of meditation, sleeping Zen.

Interestingly, in recent years, the Belgian neurophysiologist E. Bremer, the Americans W. Magoun and R. French, and the

Japanese Toshihiko Tokizane have been showing that in physiological terms the human brain is designed to function when the body is reclining. Sleeping Zen, which makes use of this innate characteristic of the brain in a discipline continued during slumber, is not limited to priests who have made special studies of the topic. Anyone can practice sleeping Zen.

The posture adopted for sleep by Zen priests is very much like the one seen in representations of the entry of the the Buddha into Nirvana. The Buddha is lying on his side with his head pillowed on one arm. Physiologically, this position is good for the body. Seen from the front or the back, the vertebrae are virtually straight, with only a slight S-curve deviation to right and left. Seen from the lateral view, however, the vertebrae swell forward in a pronounced curve at the chest and back in again in a curve in the hip region. Lying on the side, therefore, puts much less stress on the vertebrae and the nerves of the spinal chord than lying on the back. Zen priests sleep in this position. In the winter they use only a thin pallet-style mattress; in the summer they sleep on a still thinner mat of straw. This rigid discipline is too severe for the beginner in Zazen. Nor is there any need to change from a comfortable bed to a hard pallet. Sleeping Zen can be performed with whatever bedding you are accustomed to using, but the following experiment conducted on Zen priests will show the kind of effect in their system of sleeping Zen can have.

Measurement of the brain waves of sleeping ordinary people has shown that most of us follow a pattern in going to sleep. At first, when the person becomes drowsy, the brain emits stable Alpha waves. As sleep gains the upper hand, the brain stops emitting these and begins emitting low-cycle Theta waves, characteristic of sleep. Gradually, these give way to still lower-cycle Delta waves, characteristic of deep sleep. At first, when a bystander calls out to the sleeper, the brain will respond by emitting higher-cycle waves. The procedure by which this is accomplished is called the K complex of waves. Gradually, however, sleep deepens still further; and the brain gives off a preponderance of very low-cycle waves. When this state is reached, noises and slight shakings fail

to arouse response in the sleeper.

Measurements of the brain waves of sleeping Zen priests produce the same results with one important difference. No matter how deep the priest's sleep, he is always ready to respond to outside stimuli. This is true even when the brain is emitting only very low-cycle waves. Of course, the daily discipline of the Zen priesthood to an extent accounts for this ability, but the importance of the sleeping position—on the side—must not be overlooked.

Earlier I said that sleeping Zen consists in sleeping on one's side and that there is no need to change from a comfortable bed to the pallets of Zen priests. This is true because, when placed on the side, the body forms an almost completely horizontal line from head to feet, with a slight S-curve in the spine. This means that the perfectly horizontal posture is natural for the body in this position, no matter what kind of material it is resting on. Consequently, traveling and having to sleep on strange beds, two of the frequently mentioned causes of occasional insomnia, do not affect a person who rests in the sleeping Zen position. Furthermore, the habitual insomniac can find relief from his complaint by adopting this sleeping position. Indeed, people who come to the Tokyo University Hospital complaining of insomnia in light to moderate stages of intensity may be cured by no more than a change to this position.

Sleeping in this natural position, which puts no pressures on the spinal chord, promotes the health and vigorous functioning of the autonomous nervous system, which controls the heart, lungs, stomach, intestines, and other internal organs. This means that sleeping Zen can contribute to the cure of chills, high-blood pressure, constipation, diarrhea, loss of appetite and other similar minor, but distressing, conditions. The way it can bring about a cure of the chills of hands and feet of women—especially middle-aged women—who suffer in winter or whenever the temperature drops sharply is only one illustration of my meaning.

These chills of the hands and feet are caused by constriction of the capillaries in these extremities. The autonomous nervous system controls the functioning and the health of the capillaries;

therefore, when a natural sleeping position is adopted to stimulate the more vigorous functioning of that system, the capillaries perform their roles more effectively, and chills cease.

As a consequence of urbanization, environmental pollution, and many other stress-causing factors in daily life, modern mankind is subject to many new kinds of half-sickness and sicknesses. The healthful regimen of Zazen effectively relieves stresses by restoring balance to the mind and the body and by easing tension in the central nervous systems. In this way it can make healthy again the countless people who are now half-ill.

3. Standing Body Control

Standing is clearly a more active mode than the sitting and reclining postures that have been the subject of the preceding discussions. Indeed there may be some people among my readers who doubt that bodily control of this kind is applicable to the standing position. Yet in modern life, we all stand—and suffer from prolonged standing—to such an extent that anyone would welcome a way to make positive use of this posture in a kind of bodily control that transforms the pain of standing into profit. For example, who would not be happy to know a body-control method that makes use of the time wasted waiting for the bus or for a date who is habitually late?

The way a person stands reveals much about his mental and physical condition. The man who is waiting in line to buy a ticket for the next race at the racetrack manifests his impatience by shifting from foot to foot and fidgeting. The person who feels unwell leans on something or bends forward. The member of the national assembly who disagrees with the motion being passed leaps to his feet, cranes his neck, and waves his arms angrily until the president of the organization recognizes him. Emotional and physical stability too find expression in a stable standing position.

My way of developing bodily stability in the standing position that enables you to remain on your feet without tiring for long periods involves two points: plane equilibrium and the ability to

use the flexibility of your knees to counter any movement that might occur in the plane on which you are standing. It is essential to develop a consciousness of this plane and to be constantly aware that it might tremble or tilt. Standing is the best way to cultivate this awareness; when one is seated on an airplane or train, one is much less conscious of the plane on which one rests than when one stands. Once you are aware of the plane and are prepared for its motion, when it does tilt or tremble, you can adjust the positions of your legs and your vertebrae to ensure that your body weight falls on a line that is always perpendicular to the plane. For instance, if you are on a vehicle, bend the right or left knee as is required by its motion. No matter how crowded the vehicle, no matter how the people around you may lean or fall, you will remain stable because your body will maintain the correct relation with the plane on which it rests. And this is the key to stability in all standing positions. It is correct relation to the plane on which the body stands and the ability to be able to conform to possible changes in it that enable the famous guards at Buckingham Palace to stand for hours without tiring or flinching.

Now I shall explain how to cultivate this sense in somewhat more concrete terms. Think of your legs as springs and of the soles of your feet as being made of sponge. Your arms should hang relaxed at your sides like the weights of an old-fashioned wall clock. Your fingers should barely graze the sides of your thighs. As a natural result of this position, your shoulders will fall into a comfortable position, and your head and neck will remain stable and unaffected by the contractions of your knees. Your gaze should fall about two meters in front of you. Thinking of your legs as springs may give you some difficulty, but the technique can be mastered if you follow these simple steps. Bend your knees slightly to relax them. Spread your legs slightly apart; thrust your hips slightly forward and downward. This will allow your legs to act as springs which can be balanced by the slight movement of your arms, which, as I have said, must be hanging at your sides like the weights of a clock. The lightness and flexibility of stance that you will develop if you follow these directions will give you balance in

moving vehicles and will allow you to remain on your feet untired for long times. It is interesting that this same kind of stance is used in many of the Japanese martial arts including kendo fencing and judo.

Patients of melancholia often develop distressing symptoms because they lose their awareness of the plane on which they stand and consequently fail to make the effort to keep their bodies perpendicular to that plane. I recall a patient suffering from this condition who told me that going to work in the morning was terrifying because the pavements and halls he had to travel seemed to be twisting and slanting. The walkways seemed to pitch, and his own feet seemed to float instead of treading firmly on the ground. But later this man came to realize what I meant by being prepared to conform to the movement of the plane on which he stands. Furthermore, he was able to apply this purely physical advice to the world of emotional life and to see that flexibility is needed to face the unforeseeable changes that take place in daily life. When he saw that my advice was true, he began to recover from the neurosis that had plagued him.

The same standing body stability method once helped a patient of mine overcome severe motion sickness from which she had suffered from childhood. Her condition was so bad that she was forced to forgo the pleasure of a honeymoon trip because she knew she would become ill and vomit if she rode a vehicle, no matter what it was. I taught her the basics of stability in standing—awareness of the plane and preparedness to conform to motion—and measured her brain waves, respiration, and pulse. Some while later, upon receiving a telegram from her mother to the effect that her father had fallen ill, she resolved to return to her rural home by train, even if it might mean motion sickness. When she returned to Tokyo after her father's recovery, she called on me to explain delightedly that the standing body stability system had enabled her to ride all the way home on a train without the slightest discomfort. And this marked the end of her long suffering from motion sickness. At the time of this visit, I once again measured her brain waves, pulse, and respiration to find that they were all much more steady than they had been on the earlier occasion.

Chapter Three/Stability of the Mind

1. Concentration

In the preceding sections I have discussed ways to achieve stability by ordering the breathing and the body position. The use of control of the body to generate calm in the mind is a characteristic of Zen. In fact, Zen meditation is not considered truly effective unless it includes all three of these elements—breathing, posture, and mind—but all three are dealt with as an inseparable entity. Since this book is not striving to develop masters of Zen meditation or even to assist the reader in arriving at Zen enlightenment, I deal with ordering the spirit as a separate topic of discussion. I have shown how control of the breath and the position can have effects on the kinds of brain waves. But both of these phases of Zazen are only external. They are comparable to building fine hospitals and filling them with therapeutic equipment, all of which is helpful, but none of which can bring about a cure if the curative powers originating in the body itself are not stimulated. These inner powers are comparable to the strength to be derived from Zazen control over the mind.

Like control of breathing and body position, control of the mind can introduce much that is of value into daily life. The three practices together are of incomparable benefit, but even if you have not mastered control of the breath and the body position, control of the mind can give you much wisdom that is of great value in daily activities.

The point of the mental stability system is devising a way to control one's thoughts. From the viewpoint of neurophysiology, this means devising a way to convert tense Beta brain waves into the Alpha or Theta waves that are emitted by a priest in Zazen meditation. The great priest Dogen in his *Fukanzazengi*, which I have already mentioned, called the state of mental control *Hishiryo*. This somewhat difficult term means ultimate Zen enlightenment in some cases, but it also means the ability to con-

centrate the mind on one thing to the exclusion of all distractions. One must be able to concentrate in this way at any time and in any place. It is impossible for the human mind to remain completely without thought for long times. On the other hand, too many small, unimportant thoughts can fill the mind to the extent that no meaningful thought takes place. Hishiryo is neither non-thought nor thought. It is both at the same time without being either. To think is to follow the proud notion that the thinking individual is the central being in the universe. The reverse of this is to feel inferior to all things. Neither of these approaches is consonant with the teachings of Buddhism. The state of Hishiryo is thinking of nothing, not even of humility or virtue.

Although this might sound to abstruse to be related to our daily lives, such is not the case. People who are very good at some task, can accomplish large amounts of work efficiently and quickly while seemingly paying attention to everything else that goes on around them. These people are not so entirely lost in their work that they lose sight of all other things. On the other hand, they are certainly giving their work thought. In fact they are concentrating on it while being aware of their surroundings. Their work apparently causes them little effort, though in fact it probably can be accomplished only at the cost of great diligence and perhaps suffering. This is true of great Zen priests, who remain silent on the subject of the intense introspective efforts they must make to achieve advanced mental states. Their brain waves, however, tell the full story, as I shall relate later in the book.

The history of Japanese martial arts abounds in episodes of the superior awareness of people with developed abilities to concentrate while remaining sensitive to things taking place around them, but I shall content myself with telling only one. The famous swordsman Miyamoto Musashi once called at the home of a noted teacher of combat with the lance. At first there was some thought of the two men's engaging in a bout with the lance, but both soon realized that their would be no sense in such a thing. The lance teacher asked Miyamoto into his home and went out of the room on the pretext of preparing a special dish of food as a sign of his hospi-

tality to the famous man. During the father's absence, Miyamoto played a game of Japanese-style chess with the son of the household. Engrossed in the game, Miyamoto suddenly slapped a chess-piece on the board with a loud noise and shouted out angrily, "No you don't!" The young boy who was his partner was startled at the outburst, but the game went on. It later turned out that at the moment when he shouted, Miyamoto, though apparently paying attention to nothing but the moves on the chess board, was aware that the head of the house was about to deliver a blow to his body from the neighboring room with a practice lance.

Before going on to the specific ways to develop this power of concentration-awareness, I must clarify one point. Zazen concentration is not a way of foreseeing the future, though apparently miraculous tales like this one about Miyamoto Musashi seem to hint at supernatural powers. Because this concentration enables the person to be fully aware of his setting and of the actions happening in it, it seems to confer magical abilities on him; but this is not true.

Achieving the balanced state that is not thinking and not non-thinking but a balanced combination of the two is not easy; still, the Zen masters of the past have left the following method which helps generate a free and generous spirit. In modern psychological terms, the method may be analyzed into two stages: concentration and contemplation. These are not two distinct states, but are instead the early and later stages of the same method of spiritual control. Between the two are the transition and the association stages.

By *concentration*, I mean mental concentration. The kinds of concentration in which people generally engage may be classified as conscious or unconscious. Most intellectual activities, work, tests, or reading are examples of the conscious activity in which the individual deliberately turns all of his attention to one thing to the exclusion of all others. Willy-nilly, modern man is forced to do much concentration of this kind. Unconscious concentration or passive concentration, is a state into which the mind falls quickly because of long experience or training. In other words, the indi-

vidual trains himself to concentrate his attention when he encounters a given set of circumstances. Ordinarily a person lives his life on no more than twenty percent of the memory and thought power he has built up during his past. In the state of unconscious concentration, however, it is possible to make use of from fifty to seventy percent of that memory and thought.

Concentration is simultaneously an end and a means. In the early stages, conscious concentration is a goal, but it later leads to a higher state of Hishiryo and of generosity of mind. I shall begin my discussion with a method for achieving conscious concentration of the attention.

The state of Hishiryo, or of concentration without thinking, is ideal; it is what is meant by Zen enlightenment. And from the standpoint of the modern psychologist, it is the state into which many of the neurotic patients who visit him must be led. In this state the individual is not obsessed with things; his mind is strong, free, and generous. And the strength of this state is what neurotic patients require to free them from obsessions with things and circumstances.

To concentrate, it would seem necessary to have something to concentrate on. On the other hand, I have said that one of the most important aspects of Zazen meditation is that it does not involve obsession with things. This would seem to be a contradictory set of requirements, but it is not. As I have mentioned before, the desired state of concentration is one in which the individual is concentrating on something but is nonetheless aware of what is going on around him. To call again on the experiences of a famous swordsman, I might mention Yagyu Munenori, who was once told something very important about concentration by the Zen priest Takuan Soho, who influenced both Yagyu and Miyamoto Musashi. In reply to the question of Yagyu about where one ought to concentrate when engaged in sword combat, the priest said that one must not concentrate one's spirit in any one place for, if it is in no place, it can be in all places. Realizing that beginners in Zazen cannot be expected to have sophisticated powers of concentration of this kind, priests have written many words of guidance

on the subject. For instance, in one work by a priest who belonged to the Soto sect of Zen Buddhism it is said that, as a rule, during meditation, one concentrates on the hands. When one's mind sinks, it becomes necessary to concentrate on the top of the head or on the space between the eyebrows. When the thoughts ramble, one must concentrate on the abdomen; and when the mind seems to float unattached, one must concentrate on the feet.

But for the purposes of this book it makes no difference what you concentrate on. Select a crack in the wall in front of you. Or if one foot begins to hurt, concentrate on the other to relieve the pain. At first, your objects of concentration will change rapidly, but this does not matter.

It would be a grave mistake to assume, as some people do, that Zen and Zazen meditation demand that one must never be sceptical or suffer. On the contrary, though the fixed, unwavering, unclouded mind is the ultimate goal of Zazen, it cannot be reached without much perplexity and pain. Indeed Zen teaches that freedom from doubt is a sickness and that great enlightenment is born of great doubt. The way to overcome scepticism and suffering is to concentrate on them. To find the way out of the problem, Zen requires that one be thoroughly perplexed and that one suffer much.

The experiences of a noted Japanese author named Hyakuzo Kurata illustrate this principle. He was once much troubled with insomnia. He was unable to sleep for so long that the idea of being unable to sleep frightened him and aggravated his already sad condition. He found his way out of his suffering by requiring that he suffer more and by delving deeply into his own misery. Another case of a similar kind occurred when an executive in a certain company called on me to complain of being frightened by riding in automobiles that were descending a slope. His fear was so great that he had thought of resigning from his job, which entailed considerable travel to visit clients. After a number of psychiatric interviews with him, I learned that it was not automobiles or even slopes that disturbed him; it was the fear of moving from one place to another, the fear of seeing new locales and meeting new

people. But I did not tell him this, for I realized that instead of pointing out to him the subconscious fear that was the true source of his trouble, I ought to encourage him to concentrate on his problem and in this way overcome it. My advice was that he never dawdle over work, that he immediately clean up any task he might have to do, and that he answer all correspondence at once. This would force him to face new things and to make new contacts through mail and other means of correspondence much more frequently than before. This would, I felt sure, bring the true nature of his problem to light and would relieve his suffering. I was right; in three or four months after he began following my advice, he started losing his fear of automobiles and slopes.

Although boldly facing perplexity and suffering, as my two patients did, is a way out of sorrow, the same method can be used under other circumstances. Zen teaches that one must not become obsessed with any one thing, but it also teaches another mental method in which one devotes all of one's attention to one thing. This method is called *Sammai* in Japanese and *Samadhi* in Sanskrit. This teaching is especially important for people who develop chronic instability and the inability to do any piece of work well because they can never resolve to devote themselves entirely to one thing. In an office, only a very skillful and experienced man can answer the telephone and do one or two other tasks at the same time. Answering the phone is a job that requires attention. Each of the other jobs that the skillful, trained man can do simultaneously requires complete attention of the less experienced personnel. Similarly, each kind of work demands the concentration of the people engaged in it. In other words, each job has its Samadhi, or whole concentration. There is a Samadhi for the technician, a Samadhi for the office worker, and a Samadhi for the housewife.

The former president of a famous Japanese newspaper tells how the advice of a kendo fencing teacher helped him improve his skill in this traditional Japanese martial art. It seems that this man, who had trained in kendo for years, made little progress because every time he began an attack to one part of his opponent's body he

found himself hampered by the fear that he was leaving himself open to attack. When he consulted a kendo teacher who was also a practitioner of Zen meditation, he was told not to worry about being attacked but to concentrate on his own technique. He did this, and before long he found that he was doing much better. In other words, he concentrated on one thing at a time; he applied the rule of a Samadhi for each action. This kind of Zen meditation enabled him to convert a fault into a merit. When a person is dissatisfied with a flaw and allows himself to neglect it and to be destracted by other things, the fault is likely to remain uncorrected. If, as the former newspaper company president did, that person concentrates on whatever is wrong with him, he will soon make progress toward improvement. This kind of concentration has certain defects. First, it tends to make a workhorse of the individual, who plods on concentrating first on one thing then on another. Second, it prevents the individual from being aware of everything occurring around him as he concentrates. In spite of these drawbacks, however, this kind of concentration is one stage through which everyone who practices Zen must pass.

And I have found that it is useful in psychotherapy. For instance, I have been called on for advice and help by housewives who complained that, once they were alone in the house in the morning, they could not seem to settle down to housework. These women were not especially busy; indeed they generally had more time on their hands than they could use effectively. By way of mild therapy, I first asked them if there was not something of great importance that they knew they had to do. They usually replied that they did not know what that thing could be. I then told them that it was all right not to know but that they ought to give serious thought to their reason for not knowing. Most of these women, after thinking a few moments, came to the realization that they were not merely scatterbrained and unable to settle down to work but were bored because all of their daily activities had become stereotyped. I then suggested that they try buying some new curtains or rearranging the furniture in the living room. Once they thought of some way to introduce variety into their lives, they usually found

that their problem was solved. The Rinzai sect of Zen long ago evolved a device for perfecting concentration in the priest and in the Zen practitioner. This device, known as the *Koan*, consists in statements given to student priests by their spiritual guide. These statements, or questions as is most often the case, cannot be answered by means of rational thought. They may involve knowledge that the student can have no way of obtaining. For instance, the Koan may be, "What did your mother and father look like before you were born?" or "What will the world be like after you are dead?" or "If you clap your hands together, which hand strikes the other first?" Apparently unanswerable, the Koan are issued by guiding priests to younger priests who are then instructed to meditate on them until they have arrived at an answer. The meditating priests are called one by one into the room of the guiding priest, who listens to the answers they have evolved through meditation. If the answer is satisfactory, the guiding priest says, "Good." If it is unsatisfactory, he says "No good," and the younger priest is instructed to return to the place of meditation and ponder the question further. This process may be repeated until the guiding priest is convinced that the younger man has a good answer or that he has been enlightened. When the meditating priests are inexperienced, they may be told "No good," many times indeed.

Obviously Koan like the ones I gave as examples cannot be in any sense answered by means of rational thought or the theories with which we are accustomed to solve problems in daily life. But because they demand concentration, for mental control, they are immensely superior to the system in which one chooses anything at hand for a topic of concentration and allows the mind to move from one subject to another. At the first stages of concentration on a Koan, it is necessary to employ conscious concentration of the attention. From this stage, one moves into a deeper state of concentration and hopefully to enlightenment.

Koan, however, are difficult to use in ordinary life because they require the guidance of a priest who is experienced in Zen meditation and who can select the right Koan for the person and can understand whether that person's meditation is leading to enlight-

enment. But ordinary people can nonetheless take advantage of the benefits of the Koan system. There are many kinds of topics that might be suitable as subjects for meditation: among the most psychologically useful are one's own weakness and faults. Ask yourself some of these questions as if they were Zen Koan to be pondered and answered in the most significant way possible: "How can I overcome my frailties and faults?" "Why am I weak?" "Why am I frightened when I must appear in front of people?" Everyone has some kind of weakness or fear, though there are people who seem so assured and confident that they are disturbed by nothing. Even such people may be afraid of lightning, of black cats, or of other things that, while insignificant in themselves, are sources of suffering for the person afraid of them. These matters involve emotions of embarrassment and shame that can make life gloomy and negative. By approaching them directly and meditating on them as if they were Koan, however, it is possible to solve the difficulties and bring light and activity into the life that was formerly made dark by weakness or fear.

The German psychiatrist A. Frankel gave the name "paradox intention" to a therapeutic system that resembles dealing with one's weaknesses by facing them frankly and meditating on them. The therapy consists of instructing people who have a fear to put themselves in a situation in which they must directly encounter the frightening thing or person. For instance, a person who is afraid of crowds will be requested to go to crowded places frequently. In this way, the person, after a period of feeling abandoned by the doctor giving the advice, comes to realize that he alone can solve his problem. And this is as good as being cured. Concentrating over and over on a thing—or coming into repeated contact with something, as in the case of this therapy—brings about unexpected developments in the human mind. Therefore, I insist that meditating on one's weakness and faults is an excellent way to strengthen one's personality. Furthermore, it is a method that can be used anywhere and at any time. Instead of fidgeting while waiting or dozing while riding the train, practice this kind of concentration for the mental benefits it will bring.

As should be apparent, the Koan is given to the trainee by the priest to enable him to reach mental state of Samadhi, which, as you will recall, requires the person to concentrate fully and to suffer fully in order to overcome suffering. Zen does not teach concentration, so much as it teaches you how to give yourself perplexity as a way of controlling your mind. It teaches that you must inevitably experience the complexities and sorrows of human life. Obviously, knowing perplexity and suffering need not take the form of Zazen meditation or the Koan; there are plenty of things in daily life that will provide chances to have this kind of Zen experience.

A simple matter like making a purchase can show the advantages of being thoroughly perplexed and of confronting and overcoming the perplexing thing as one must in the case of the Koan. For example, imagine that you are trying to decide which of two articles to buy and you are utterly unable to come to a decision. Face the perplexity, wrestle with the decision, spend whatever amount of time is needed to come to your decision and you will always be satisfied with the purchase you make. If, on the other hand, you make a quick decision because the issue is too perplexing, you will always experience nagging doubts. You will never be convinced that you made the right choice. This is why I urge everyone, especially the impatient young, to be willing to confront perplexity in order to spare yourself later regret.

As one repeats these conscious methods for concentrating the attention and the mind, suddenly one becomes able to move unconsciously into a state of mental unification and concentration. This is what I have called unconscious concentration in another section of the book. The most important element in reaching this state is interest in everything around you and mental flexibility that makes all of the stimuli from the outside world clear and fresh. People who are deeply experienced in Zen meditation are rarely solemn or saintly in the conventional way. On the contrary, they are people who are filled with bright interest in their surroundings. They are easily surprised. They laugh easily. And even people who have much less Zazen experience than advanced priests

say that, after a session of meditation, they hear and see everything with greater clarity and vividness. The green of the trees is greener and more beautiful; the songs of the birds are sweeter. During Zazen meditation, as well, the sensory organs are extremely keen. An old Zen saying has it that the man in Zen meditation can hear the ashes fall in the nearby incense burner.

I have already said that unconscious concentration is the best kind. It cannot be summoned, for it would then ceases to be unconscious. The only way for the person to have unconscious concentration is for him to be interested and receptive to the object of that concentration. It is not unconscious when a person forces himself to concentrate on a distasteful piece of work or a difficult study assignment. On the other hand, the same person can concentrate completely unconsciously on some activity that he enjoys or is interested in. The way to develop control of the mind and to cultivate the power to concentrate unconsciously is to be interested in many things and to be receptive to many different kinds of stimuli. It is difficult to say whether the interest stimulates the sensitivity or whether the sensitivity produces the interest.

For the sake of learning how to develop a mind interested in many things it is helpful to try to find out why some things are uninteresting. Generally the causes of lack of interest are of one of the two following kinds. Either the thing in question fails to captivate, or it has become so familiar that it no longer awakens interest. There are two ways to overcome either of these failings in the object of your attention. Concentrate thoroughly and consciously in the way that I have described as being useful in overcoming troubles and difficulties. Or, if this does not produce the desired result, concentrate on the object with the intention of finding in it something, no matter how small, that is new and interesting. Looking for the interest or the beauty in something initially unattractive is by no means contrary to human nature. Ever one has heard stories of people who have fallen passionately in love with persons who are far from physically lovely. The old saying that there is no accounting for tastes illustrates the complexity of human emotional responses and makes it clear that the

human mind, if it concentrates, can find interest and charm in almost anything. Looking for the something new in a thing or person that has become too familiar and is therefore taken for granted is a somewhat different process. An experience related to me by a friend illustrates what I mean. On one occasion it was necessary for him to take a very early train from Nagoya in order to be on time for an important conference in Tokyo. Unfortunately, however, the train he was riding was delayed because of a malfunction. Unable to do anything to occupy himself and fretting because he would now miss the conference entirely, my friend sat gloomily staring out the window. Suddenly, however, something brilliantly and startlingly yellow flashed on his eye. It was a field of rape plants in blossom. Fields of this kind are not unusual on the route between Nagoya and Tokyo, and my friend had seen them so many times that he had virtually stopped seeing them. But on this occasion, the color of the flowers seemed to be entirely new, fresher than he had ever seen it before. This newness in an old sight captivated him entirely. Engrossed in the scenery that he could enjoy as if for the first time, he barely noticed the passage of time. Before he realized it, the train was pulling into Tokyo station.

This man was not practicing any of the concentration methods I have outlined as part of the Zazen regimen for mental control. He had merely been surprised by something new in a familiar landscape, and this apparent novelty caused him to concentrate unconsciously on the scenery. It is true, however, that this particular person has the ability to discover interest where it might not ordinarily be expected. This ability has served him well in personal relations because he can find merit and value in most people. Unconscious concentration inspired by the ability to see the interesting in the things around you will help you live and work better with your fellow human beings.

2. Attention Transferal

Everything that I have been saying about the spiritual and psychological benefits of the state of concentration—especially un-

conscious concentration on an object—is true, but there is a point on which one must be very cautious. As the Chinese neo-Confucian philosopher Wang Yang-ming (1472–1529) said, being obsessed by a thing—love, money, or whatever else it may be—is to be a slave to that thing, to lose one's self. And this is not what is meant by the Zen state of meditative concentration called Samadhi. This kind of obsession, or total concentration on one thing, causes the person to lose sight of all else. This is of course a kind of Samadhi; furthermore it is something so entirely human as to preclude consideration of such value judgments as good or bad. But it is not the ideal Zen state because, as Wang Yang-ming noted, it is tantamount to slavery to the thing that is the object of concentration. If this is bad, what can be done about it?

It would seem that perhaps one way out of the situation is to keep a part of the self always awake and detached from the concentration process. But the tragedy of people who try to remain conscious and aware with one part of their self in order not to fall into irrational behavior is the condition called in modern terms splitting of the self. And one of the reasons for the popularity of Zen philosophy in the West is the power it has to cure the split in the self that prevails today in many Western nations. The ideal Zen realm of thoughtlessness (Hishiryo) has nothing to do with splitting the self.

Zen teaches the human heart as it is in its naturalness and in its wholeness. The concept of innate good and innate evil is Western; it is unrelated to Zen teachings, which profess the presence of the Buddha nature in all hearts. The object of Zen concentration is to manifest this Buddha nature by first training the mind to concentrate unconsciously on a fixed object and gradually training it to concentrate on no fixed object. In modern cerebral physiological terms this means stimulating the brain to emit Alpha waves in the meditation phase and then to continue emitting them after meditation has ceased.

To prevent the concentration of the mind and spirit in one direction and on one thing until a state of obsession develops, Zen teaches a method for changing the direction of concentration. This

method is called the system for attention transferal.

The human mind is rarely as calm as an untroubled body of water. At almost all times, ripples or waves of pleasant or unpleasant emotion are disturbing its tranquility. Sometimes, the frequency of these disturbances reaches such a peak that the mind resembles a raging sea in which there is never an ebb tide to bring calm. The attention-transferal system can lower the frequency of disturbance and bring peace and a new emotional stability to the troubled mind.

The scholar or the novelist sometimes finds that his work has bogged down; he has concentrated so hard on his study or on his creative task that his mind no longer functions as it ought to do. A change is as good as a rest, as the proverb has it. And this is true. Getting away from a job that is no longer moving smoothly to think about something different for a while is an excellent way to restore stability to the mind and bring freshness to one's work. I am certain that this is too obvious to need explanation. The problem that remains to be solved is how to bring about this attention transferal. Probably every person has his own way of achieving the desired effect, but Zazen has a built-in attention-transferal system that can be of help to everyone.

There are many verified—if sometimes slightly exaggerated—stories of the good effects a change of activity or scene has had on the creative activities of inventors, mathematicians, and other specialists. But before these men have taken the pause that has brought them refreshment and a second wind, they have always thought out their problems until there seemed to be nothing left to think about. In other words, constant reliance on the change of activity or scene is no more than escapism. Before the change can take effect, much thought must have been devoted to the issue at hand.

Nonetheless, when thought has been devoted to the issue, the Zazen system for transferring attention proves of great benefit. This method is divided into two phases: first, discovering what the thing that obsesses you is and, second, either performing a mental experiment to replace that thing with another or initiating a course

of some kind of action at once. There may be people who object that there is no need to find out what the obsessing factor is. It obsesses; therefore, its nature is obvious. But this is not necessarily true since the human mind often deceives itself by lying to try to cover up something that it does not want to recognize or to escape from something unpleasant. A simple example of the kind that we psychiatrists often encounter illustrates this point. There are neurotic people who complain that they do not like to go out on official errands or they do not like to attend conferences. But put into positions in which neither of these apparently painful tasks is necessary, such people still do not lose their neuroses. The reason is that neither going out on errands nor attending conferences is the true cause of the trouble. The man who does not like to make trips out of the office is not afraid of the outdoors, he is shy of meeting other people. The person who does not like to attend conferences would love to be able to make brilliant suggestions at such meetings so that his talents could be recognized, but he is afraid that if he opens his mouth he will make a fool of himself. There are many people who think they are displeased, disturbed, or obsessed by one thing, when the trouble actually lies elsewhere. Some of these people turn to physicians, like me, for assistance when they could help themselves if they would only use their mind in the concentrated way prescribed by Zazen mental control.

The basic nature of Zazen meditation is a dialogue with the self: it provides a time of calm, undisturbed or distracted by thoughts, in which the individual can listen to the voice that is within. Immediately plunging into the bottom of one's spirit, however is impossible; it is essential to sink gradually into the state of self-examination, constantly being aware of one's own mental and spiritual state. The Zazen systems for controlling the breath and the posture are of great help in reaching deep levels of meditation. Humility and calm too assist in the descent into self-examination. Sometimes the mental sight of the true self and of the true state of affairs relating to the self is accompanied by intense pain. This is why the human mind often sets up self-defense systems or cheats in order to avoid inner scrutiny and thus spare itself suffering. But

facing the truth and realizing one's true nature bring peace and calm to the mind. Running away from the truth cannot do this.

Once the truth has been seen and accepted, the person must not react in a negative way. The man who was afraid of conferences but who realized that it was fear of mistakes, not of meetings, that upset him will do himself no good if he simply allows matters to remain unchanged and sinks into despondency over his ineptness. He must adopt a course of action to correct the failing that has been causing him trouble. He must transfer his attention away from his supposed inferiority.

Zen teachings say that one must always be the king of the situation. I think this means that one must always be able to view the situation, including oneself, from the standpoint of the third person. This way of looking at things could very well help the man frightened of conferences to cure himself of his fears. He might do something like this. After setting up in his mind a kind of stage setting for a conference and determining who will be present and what topics they will discuss, he might run through a mental version of the entire meeting, question by question, remark by remark. He would try to find out not only what each person says, but also why. If one member of the group is the kind of person who attempts to silence opposition with sharp invective, he would try to discover the reason. Such a mental exercise will teach the man to see things from many different viewpoints. This in itself will prevent his mind from orientations in one direction and from obsessions. Repeated often enough, excercises in seeing things from various standpoints develops a mind that is able to switch easily from one thing to another. This in turn heightens work efficiency. For instance, people often claim that they cannot accomplish a task because too many unrelated thoughts distract them. The mind that is controlled can easily switch from a temporary distraction back to the job at hand.

To summarize the Zazen method for mental control, I can employ the following list of major points. (1) First master the technique for concentration. (2) Then increase your concentration powers by moving from conscious concentration to unconscious

concentration, thus learning to experience what is called Samadhi. (3) To prevent being obsessed by one object of mental concentration to the exclusion of all other things, train to be able to switch your attention from one object to another.

The second of the phases of the system for transferring attention and relieving oneself of obsession involves a course of deliberate action: face and overcome the thing that is frightening or obsessing by performing it. The man who is afraid of meeting people and conferences ought to make as many new acquaintances as possible and attend as many meetings as he can. I once knew of a young man who was terrified of meeting people because he felt his manner of speech was awkward. He decided to overcome his handicap in the way I have described. Fond of collecting stamps, he often waited in long lines at the post office for the issue of special memorial issues. During the time he spent waiting, he made a habit of talking to the people around him. Gradually, he found that people were not appalled by his manner of speech; indeed no one seemed to pay any attention to it. This gave him courage to continue the conversations. And, with each new encounter, he became surer of himself. He learned that not all people think his way and that most of the strangers he met were too occupied with their own affairs to be upset by his social awkwardness. By challenging his problem, he became king of the situation.

No matter whether it is achieved by means of the kind of mental experiment I described in the case of the man afraid of conferences or by means of challenge and direct action, the freedom to direct your attention and your mind as you wish will enable you to give fuller manifestation to your powers, to develop a more generous spirit, and to act freely and creatively.

3. Associational Method

Many people mistakenly think that in Zazen meditation it is necessary to suppress the irrelevant thoughts that inevitably rise in the mind. This is by no means true. Drowziness or slovenly posture are strictly forbidden, but irrelevant thoughts cannot be stopped;

and the Zazen method is to allow them to enter the mind as they will and to try to control them. Zen priests who have cooperated with men in brain-wave measurements have admitted that irrelevant thought occur to them and have insisted that they make no efforts to drive them from their minds. These thoughts usually form an associational series, which, when exhausted, fades, leaving the mind free to return to its concentration and meditation. For instance, one priest whom I interviewed related this series of thoughts. During meditation he heard the sound of someone's slippers in the corridor outside the room. This reminded him that his Zen master had said that quiet walking is essential in buildings where meditation is taking place. Lamenting that young priests no longer seem to take this kind of thing into consideration, the meditating priest decided that he must discipline his young charges. But this idea brought to mind a young priest who had been skillful at ringing the bell to call people to meditation. Next he returned in his mind to the problem of discipline, which he thought ought to be strict. The way in which one scolds, however, is important. Reflecting that discipline of young priests was his own responsiblity, he remarked to himself that today people prefer gentle scolding. And, with this, the train of association faded.

A priest who cooperated with me in some of my experiments said that when distracting thoughts occurred to him during meditation, he made no deliberate attempts to drive them from his mind but waited until they left him on their own. He insists that the true meaning of Zazen is the spiritual unification that comes about as distracting outside thoughts depart, without the person's having been aware of their departure. Although there is always the danger that one will find oneself at the mercy of random thoughts, the characteristic of this phase of Zazen spiritual and mental control is allowing the distracting thoughts to appear in the mind as they will and to establish the trains of associations that ultimately lead to the elimination of the distractions.

According to this discipline, one does not try to break the train of associations. Instead, one allows it to follow its own course until it ceases. If, for instance, something is on your mind and

interrupts your thinking on another topic and in this way interferes with your work, you will probably only make matters worse by deliberately trying to forget the troublesome topic. The Zazen way to deal with it is to think simultaneously about the topic and about your work or whatever activities you are engaged in at the moment. In this way you will set up trains of associations that lead to liberation from the thing obsessing you. Undeniably, thinking about outside things can have negative effects on your work and may cause you suffering, but Zen teaches that you must pass through the stage of distracting thoughts and trains of mental associations before you can hope to enter the realm of tranquility and no-thought that is one of the goals of Zen and before you can devote your whole mind to one thing. Furthermore, miscellaneous and distracting trains of associations can led to solutions of problems. In other words, the distractions cease to be mere distractions and become one aspect of the situation requiring thought. The train-of-associations method, in short, is one in which you must concentrate on one thing while giving thoughts to associative patterns about something else.

4. Meditative Contemplation

It is difficult to make a division between mere distracting, random thoughts and trains of association about them; both kinds of thought patterns manifest themselves at the same time, and one can be transformed into the other at the slightest stimulus. As I have said, Zen teaches that one must make no deliberate attempts to rid oneself of these thoughts and trains of associations but must allow them to flow freely. This leads to the fourth characteristic method of Zen spiritual control: meditative contemplation.

At the very mention of meditation and contemplation, modern people sometimes react by saying that they are too busy for such time-consuming activities, which are at any rate the proper province of religious seers and philosophers. From the scientific Zen standpoint, however, meditation and contemplation are not limited to certain intellectual types, nor are they the pasttimes of the idle.

They can be as important to health and well-being as sound sleep. I know that this is true because I have examined and tested experienced Zen priests in a state of contemplative meditation that allowed them to remain awake with open eyes and have found that at such times their brains emit the Alpha waves that reveal a condition of mental calm and stability. Those of us who are not priests and who do not conduct regular sessions of Zazen must nonetheless emit Alpha waves if we are to remain in good mental and physical condition.

Undeniably the modern way of living is busier and more frantic than the ways of life of the past. Even children must study, practice the piano, and do numerous other things that greatly reduce the amount of free time they have for play. The competitive nature of work in the adult world demands more and more time and energy output, and the pace of this way of life is affecting the lives of the young. It is frightening to think what kind of adults will result from a generation of children who have not known the free happiness of carefree play, of catching ball in a small garden, of laughing and talking in front of the television set, or of making model planes and boats.

Although adults constantly complain of the press of business, they seem to have ample time for leisure activities. Famous scenic zones are crowded throughout the year. And when the famous Japanese cherry trees bloom in the spring, they are almost overwhelmed by the long lines of automobiles of the tourists out to enjoy the sight. Indeed, such conditions create the illusion that the cherries must flower solely to satisfy the demands of the tourists. This kind of illusion has come to be accepted as a reality, whereas the true reality is being forgotten and lost. Captured by the very idea of being busy, modern people fail to see the truth of the amount of time that is at their disposal. Parents who have lost sight of this truth force their children to live in the same frantic patterns of illusive busy-ness that they themselves follow. There are even those who attempt to deceive themselves and others about the true nature of free play and the role it plays by saying that leisure is part of work and that it is an extension of the tertiary

industries. People who refuse to be deluded by the illusory reality proffered by such would-be deceivers are fortunate because they understand the meaning and value of play as play, not as a part of work.

What I have been saying about leisure and play makes it apparent that the individual ought to try to know the true reality within his heart. At the beginning of the novel *Die Aufzeichnungen des Malte Laurids Brigge* by the Austrian poet Rainer Maria Rilke, the hero makes a remark to the effect that although the people around him seem to have come to live in the city, in fact they have come there to die. Whether *Malte's* interpretation of the urban way of living is correct or not, it tells us one important thing: we must not forget the reality that lies behind all illusions.

In order to survive in the modern world, the individual must take into consideration social common sense, the ideas that are current at the time, and the needs of social intercourse; but these things change rapidly. The consequence of the violent current of alteration in such issues causes each person to divide and vary his sense of values to meet the exegeses of the times. This in turn leads to a situation in which the individual loses sight of his own true inner values. Often awakening to loss of stable values occurs only late in life when the person, like Rip Van Winkle, opens his eyes to find everything and everyone around him aged and changed. When this kind of unfortunate person realizes that he no longer has values of his own, it is often too late for him to do anything about it. The contemplative meditation method used in Zazen helps the person find his inner reality and, in spite of the turbulence and variety of daily life, enables him always to know what his self is.

Some scholars say that Zen is popular in Europe and the United States because it is difficult to attain mental stability and tranquility in the American or European way of life. Establishing the validity of this interpretation is a task beyond the scope of this book; but it is certainly true that people everywhere must not wait until economic, social, and other outside demands have blinded them to the nature of the inner reality. Since contemplative meditation helps the individual see this reality, I insist that it is for all persons

and not for the philosopher and religious thinker alone.

Although contemplative meditation is one of the goals of Zazen, one need not assume the traditional Zazen meditation positions or conduct a course in Zen practices and training to engage in it. Since this, like all the other Zazen methods I have explained, is based on the scientific truth of the teachings of Zen, it can become a part of the daily life of anyone.

The English word *meditate* is related to the word *reflect*, in the sense of reflecting on something. And all of the experienced Zen priests with whom I have discussed the matter agree that a state of reflection—even in the physical sense of reflecting light— immediately precedes the state of enlightenment. Enlightenment may be compared to a smooth, unruffled, round basin of water reflecting outside things and occurrences with the clarity of a mirror. But should even a small thing—as small for instance as a tiny piece of ash from a stick of incense—fall into the water, a circular pattern of concentric-circular ripples expanding from the point of entry of the object, reaching the rim of the vessel, and returning to their center is set up. This pattern of waves crosses the water, strikes the wall of the basin, and returns, as if reflected, to the center. Without it, enlightenment in the true sense is impossible. In other words, though enlightenment is calm and static, it must be preceded by an active phase of reflection. Light striking the surface of a body of water disturbed by ripples is reflected in a highly complicated way from the horizontal, slanting, and vertical areas into which the action of the ripples divides it. Comparing the mind to this body of water, I can say that the ripples set up in the glassy surface correspond to the associational patterns of thinking, lead to a state of meditation that reveals inner truths, and in this way bring to the mind enlightenment on the subject of the meditation. Reflections from the many surfaces of the mind create a small universe.

Taking a concrete example based on the image of the mind as mirrorlike water in a container, I shall show how this works in contemplative meditation. Some stimulus disturbs the water. For instance, an attractive person passes by. The attractiveness of the person becomes a stimulus that interrupts the placidity of the

water/mind and sets up outward moving ripples of thought: that is a good-looking person, I should take another look; but I did not. By this time, the thoughts have returned to the center to become another stimulus for a new series of thoughts beginning with something like this: why did I fail to take another look at that attractive person? These ripples will continue flowing outward and returning until the person is enlightened on his relation to attractive people, or perhaps on some other larger issue. This kind of meditation leads to the discovery of inner truths and to the placid, mirror state of enlightenment, which is, however, usually only temporary for some other stimulus is certain to disturb the calm almost at once. In other words, contemplative meditation is first the development of a mental idea about a certain stimulus. Then, the idea and the stimulus together give rise to another idea which demands comment or examination. As a result of the series of self-imposed questions and self-given answers on these ideas, the mind reaches a convincing conclusion on the issue at hand. Although this is relatively easy to explain verbally, it is much less easy to do. But if you persevere in examining your responses to stimuli in the fashion of the ripples moving from the center to the rim of the vessel of water and returning from the rim to the center again, you will gradually be able to employ the contemplative-meditation method whenever you like. The important thing is to use this method on every possible occasion.

None of us can see his physical form entirely at any given time. Similarly, though some people attain greater self-knowledge than others, few people ever attain entire enlightenment about themselves. When Hamlet says that there are more things in this world than are in Horatio's philosophy, possibly he is revealing his own intense self-knowledge. Though there are other people who, without fame or greatness, achieve the difficult goal of understanding what they are about, all too often, modern mankind fails to attempt intropsective examinations, probably, because we have all become too clever and too absorbed in superficial information. In spite of all the intellectual theories advanced today about the nature of the future, at no time in history has the future been more

uncertain. To human beings who have lost the ability to examine their inner beings, I suggest the application of this method of contemplative meditation. Not only will it restore mental health and stimulate mental and spiritual growth in the person engaged in it, contemplative meditation will also help create a brighter future for humanity, since the human heart and its wholesome state are among the greatest treasures in the heritage of mankind.

Part II

The Scientific Basis of the Zazen Method

Chapter Four/Why Zazen is Effective

When I say that Zazen strengthens the heart I mean that it gives the individual greater mental and spiritual powers. But the word *heart* has long been used to designate these powers, since in the distant past it was believed that they are located in that organ of the circulatory system, when in fact human abilities to think, perceive, appreciate, dislike, and make judgments about good and evil and pleasure and pain depend on the brain. With the exception of Hippocrates, who realized and stated these things, the ancients did not realize that the brain, which weighs only on an average a little more than one and one-half kilograms, controls much of human action and thought. Even Aristotle thought that the brain was no more than a cooler of the blood. The brain is of course, essential to all human research, but it is the last of the frontiers of that research as well. The first man to attempt to deal with this frontier was the English physician J.H. Jackson (1835–1911) who believed—quite rightly as later science proved—that the brain is the center of all human consciousness. Many theories have been advanced to explain which part of the brain controls which human abilities, but at present it is believed that the forebrain is the seat of creative abilities.

Much still remains unknown about the brain but in the roughly one hundred years since Jackson did his pioneering work, science and especially molecular physiology and cerebral physiology have made great forward strides. For instance, H. Hiden, a molecular physiologist at the University of Göteborg in Sweden has uncovered a relationship between proteins and mental activities. He conducted a number of experiments on rats in training programs. At given stages in the program, he would sacrifice the rats and dissect out their brains to examine the nervous tissues. He found that in the cells of animals engaged in a new program of training, proteins were produced in large amounts. When he injected a substance called S–100, which inhibits the production of proteins, into the rats' veins he found that the animals were much less apt at learning.

Some observers claim that children of poor families who eat little food containing proteins are less talented at intellectual work than children whose diets are richer in proteins. But the true relation of proteins to brain activity has not yet been clarified since, to this point, the research has been limited to rats.

The human psychology is unlikely to be understood fully on the basis of such simple approaches as this. Much remains unknown, as I have said. We are certain that thoughts arise in the brain, but we have not clarified the relations of what we call reactions of the heart—emotions and so on—and the thought process as such. This frontier of knowledge is one with which many people, including me, are currently coming to grips.

If we who are engaged in this work were to hide behind words like *unknown* and *impenetrable riddle*, no progress could be made in this field. We have decided, however, that what we need to know is how the brain reacts under certain conditions because we feel that, armed with this knowledge, we can devise ways to lead the brain out of unfavorable states and into favorable ones. With the present level of technical skill, the only thing that enables us to interpret brain reactions—in other words, the only thing that acts as a kind of brain barometer—is the electroencephalogram, which measures brain waves and gives visual representations of the things taking place inside the brain. The brain is composed of millions of brain cells called neurons. Each of these cells consists of a cell body plus projections for carrying impulses toward the cell body (dendrites) and other projections for carrying impulses away from the cell body (axons). The points of connections among neurons are called synapses. Along these nerves and the bundles and systems they create occur differences of electrical potential energy caused by the actions in the nerves. Attaching electrodes to the brain and connecting them with movable pens, we are able to trace the fluctuations in this electrical energy in the brain and in this way analyze mental conditions. The German scientist Hans Berger was the first person to become aware of the generation of electrical waves by the brain. In 1924, he made recordings of the wave patterns and, five years later, published a written study substantiating

his theories. According to Berger, the human being, like many other animals, is mentally more active when the eyes are open. In other words, the human being is a visually oriented creature. When the eyes are closed, the brain emits wide, regularly-spaced waves that produce an even, smooth pattern on the electroencephalogram.

These waves, Berger called Alpha waves. When the eyes are open and the mind is prepared for active work, the brain emits no more Alpha waves but begins to emit waves with a much smaller amplitude. These Berger called Beta waves. Alpha waves, then, are emitted when the brain is oriented toward stability and tranquility; Beta waves are emitted when the brain is oriented toward activity. The discovery of these two kinds of waves and the recognition that they are a reflection of the mental state were the starting line of the study of encephalography, but more detailed information was not forthcoming for a number of years.

In Japan, study of brain waves began during the period between 1944 and 1948, and in the early stages it was used almost exclusively for the diagnosis of brain sicknesses and for the detection of epilepsy. When epilepsy attacks a person, his brain immediately ceases to emit Alpha waves and begins emitting Delta or Theta waves, which have much greater amplitudes. Consequently, even when the attack has been mild or has produced no other recognizable symptoms, an encephalogram can detect it at once. Furthermore, the encephalograph can determine whether a person is epileptic even when he has suffered no attacks since the epileptic brain characteristically gives off either a mixture of so-called spike and wave patterns or at any rate spike patterns. In the light of the help it offers in this field, development of equipment for measuring brain waves was naturally stimulated by research in epilepsy. But any other kind of brain disorder or disease—for instance, hemorrhage or tumors—cause alterations in brain-wave patterns. For this reason, today almost all large hospitals are equipped with encephalographic machinery.

Still, as one famous scientist in this field has said, we are like the Spanish explorers who stood on the American shores and looked out over the vast Pacific unable to know or even suspect what lay

beyond. If we could see into the still hidden realms of the mind, we too would discover a whole new world. We cannot yet do this, but we can shed some light on the field: and for that reason, it is important to explain what we have uncovered in this fascinating realm of research in the short period that has passed since the first discoveries of the earliest pioneers.

As Berger's early work suggested, brain waves do more than reveal sicknesses: they also provide a reliable chart to the emotional and mental changes that take place in almost every second of daily life. The most dramatic change in the kinds of waves emitted by the brain take place between the waking and sleeping states. When a person closes his eyes and remains quiet, the brain emits Alpha waves. When he falls asleep, the brain first emits slower waves with wider amplitude; these are called Theta waves; later as sleep becomes more sound, the brain emits the still slower, wider Delta waves. Alpha waves are ten-cycle waves; that is they occur ten per second in regular, orderly patterns. Theta waves have cycles of from four to seven per second and Delta waves of from 0.5 to 3 per second.

During sleep, even though the person may be unaware of the change in his mental activity, alterations from one kind of wave to another can take place. For example. if the person is having an especially dramatic dream involving murder or violence, the brain will suddenly begin emitting Beta waves with high cycles of from twenty to thirty waves per second. This kind of brain wave emission is ususally accompanied by rapid eye movements behind the closed eyelids. As the person wakens, the process is the reverse of the one experienced while falling asleep and during slumber. At first, the mind changes from Delta to Theta waves and then from Theta to Alpha waves. By the time the person is completely awake and is reading the morning paper, the mind is already emitting the normal Beta waves of active mental processes. Such famous research specialists as J. Davis and W. Harvey have shown that the kind of brain waves being emitted at any given time accurately represents the mental state of the person and that examinations of the brain waves of a person sleeping reveal the depth of his

slumber. Furthermore in times of excitement, when one is watching an exciting boxing match or struggling with a difficult problem, the brain emits Gamma waves, which have cycles of from thirty to fifty waves a second. In other words, as excitement and tension grow, the brain emits waves of higher frequencies.

Although the science-fiction approach to changing the waves emitted by brains and in this way allowing beings from outer space to control the human race is still somewhat farfetched, there are some several ways of influencing brains waves. Specialists in the United States are now studying the relations between brain waves in a living human being and brain waves fed into computers. But on a more personal level, the use of drugs can seriously affect brain wave emissions. For example the LSD that was popular among the Hippies a few years ago stimulates the brain to emit large quantities of high-cycle Gamma waves even when the person's eyes are closed. Stimulants of various kinds have similar effects. Of course, the dangers of addiction associated with these drugs are so great that their use is scarcely warranted. Although at the present time mind control through chemical means is within the range of the scientists' powers, the drugs available can do no more than bring a mind that has lapsed into a minus condition through sickness to about the zero level; and this is scarcely sufficient.

In spite of progress in cerebral science and research in the effects of brain waves on psychological activities, no effective scientific training regimen for brain control has yet been found. As a psychologist, I too have been interested in this kind of study, and at one point in my work I became fascinated with the possibilities of Zazen meditation in this connection.

As is by now well known, Zazen meditation is the central training method of the Buddhist sect most famous by its Japanese name of Zen. The origin of the name Zen is the Sanskrit word *Dhyana*, which means meditation. This name, translated first into Chinese as *Ch'an* became Zen in Japanese. The practice of meditation, especially in a seated posture under a large tree, was recognized in ancient India as leading to enlightenment. Sakyamuni, the historical Buddha, attained the state of freedom from the bonds of the

phenomenal world—in short, entered Nirvana—as a consequence of enlightenment attained after a long period of seated meditation. And it is the meditation of Sakyamuni that became the pattern on which Zen meditation was based.

According to tradition, the priest Bodhidharma traveled to China in the sixth century and there established what was to become the Zen, or meditation, school of Buddhism. He is said to have sat meditating in the cross-legged position facing a wall for nine years. At the end of this time, his legs are said to have been entirely withered. Among the Japanese who traveled to China later to study the teachings of Zen was the famous Dogen, whom I have already mentioned as the author of the *Fukanzazengi*. It is Dogen who said that Zazen is the way to attain calm and freedom of mind.

The reader might wonder why, as a scientist, I should choose as a subject of research a meditation method that is inseparably bound with religion and is therefore fundamentally irrational. My reasons stem from things that many people who have practiced Zazen have said about its effects on their physical and mental well-being. A famous Japanese priest named Keizan (1267–1325) said that Zazen creates the true person, opens the spiritual eyes, and enables the person to live in peace and tranquility. Similar statements are to be found in the writings of many other experienced Zen priests who all insist that Zazen relieves suffering of the mind and frees the person from worry by giving him the courage to overcome fate. This in turn enables him to live in tranquility. But the people who have made comments about the benefits of Zazen are not limited to men of religion. The noted Katsu Kaishu, a leader in the nineteenth-century movement to modernize Japan, remarked that it was training in Japanese fencing and Zazen that made him successful. Other important Japanese leaders in history have concurred in the opinion that Zazen is of the greatest importance as a psychological training regimen. And many ordinary people who have never reached eminence in any special field agree that Zazen brings spiritual calm and strength.

If Zazen were no more than a religious exercise, it would lack the scientific substantiation and the universal applicability to make

it useful to the general population. The average man might then be justified in believing that the state of thoughtlessness and deep meditation that is one of the goals of Zazen amounts to no more than somnolence. But, after studying the writings and experiences of many people who practice Zazen, I became convinced that there must be something more involved than religious issues alone. This led me to the suspicion that brain waves may have a role to play in the success of Zazen and that if Zazen's effects could be convincingly explained in terms of cerebral physiology, this method of meditation might well be a spiritual training system of unparalleled scientific applicability.

Two specific things led me to begin research on the effects of Zazen on brain waves. The first was a passage I read in a book by Kanae Sakuma, a professor emeritus of Tokyo University. Professor Sakuma said that it is clear that Zazen has an effect on the functioning of the brain, and he went on to ask whether that effect could be clarified by modern medical scientific research methods. The second direct cause was a doubt that entered my mind in the course of studying mentally ill patients and the changes in their brain waves caused by the abnormal state of their conditions of awareness. I knew that the brain-wave patterns of a sleeping person were entirely different from those of the same person awake. I wondered if the brain patterns produced by sleep could not be induced in the brain of a waking person. This caused me to suspect that the thoughtless state of Zazen meditation must reveal itself in the brain waves of the person meditating.

In 1954, as I was walking through a part of Tokyo where used books are sold, I happened to come upon a copy of a work by Professor Sakuma. The book had been written during the hard times of the period immediately after World War II; it was on very cheap paper, but its contents proved to be the key to the study method I had been seeking. *Mokusho Taiken—Zen no Kagaku ni Yosete* (The experience of meditation without thought—about the science of Zen), as the book was entitled, contains a passage in which Professor Sakuma suggests the possibility of proving the scientifically valid nature of Zen meditation in terms of modern

medical knowledge of brain waves. The term *Mokusho* refers to a deep meditation in which the thinking person and the object of thought are merged into one and in which the spirit is entirely unified. It is comparable to the state that is described as a mind as calm as a shining body of undisturbed water or a mirror wiped clean of all dust in which the possibility of change into dynamic action is always present.

As was in my twenties at the time and since 1952 had been studying brain waves. Professor Sakuma's words excited me and made me extremely happy because I saw that if records could be made of the brain-wave patterns of people in Zazen meditation, it would be possible to remove the mystical veil that has surrounding this practice for centuries. Further, it would be possible to prove beyond doubt that Zazen can be of help in establishing and maintaining mental health.

I set to work making preparations at once. With the assistance of my teacher Professor Akira Kasamatsu of the medical faculty of Tokyo University, I obtained research funds and was able to obtain the promises of a number of outstanding priests to help in the experiments. With the cooperation of many people, I launched on a course of research that lasted from 1954 until 1959. I encountered many obstacles along the way. For one thing, devices for measuring brain waves were at that time imperfect, and I remember that at one point I had to make my own. But finally, when the investigations were finished, I was the first person in the world ever to prove that Zazen brings about changes in brain waves; in short, that it alters consciousness. I published the results of my study in a paper entitled "An Electroencephalography Study on Zen Meditation (Zazen)," for which Tokyo University awarded me the highest title given to people in the field of medical science in Japan.

Since then, study of the brain has made rapid advances. I too have continued my study and have attempted to ascertain the scientific value of Zazen in strengthening the mind and the spirit.

With the assistance of leaders of the Soto sect of Zen and of other organizations I obtained the cooperation of fourteen outstanding priests. To provide a suitably quiet environment for Zazen

meditation, I selected a temple in Tokyo. But this was not enough, for measuring brain waves is an extremely delicate task that can be hindered by apparently unimportant things. The major difficulty is the very low power of the electrical current produced in brain waves (Alpha waves are only 50 microvolts in power). In order to make this current strong enough to move the recording pen, amplifiers are necessary. In the early stages of my work, amplifiers were rather primitive. After the electrodes were attached to their heads, it was necessary to surround the priests with protective shields to prevent interference from the ordinary domestic alternating current wired into the temple. (This current is one of the major enemies of brain-wave recording with unsophisticated amplifiers.) Later in my investigation, better amplifiers were developed, and it was no longer necessary to use the elaborate shielding devices. An aluminum plate, grounded and placed on a rubber mat, was all that was needed to eliminate interference from the domestic current. Aside from this plate, on which they sat, and the electrodes, the priests conducted Zazen exactly as they would have done if I had not been making tests.

To be frank, I must say that I was very restless about the advisability of trying to relate modern Western technology and an ancient oriental religious practice. I knew that Western medicine has never been able to discover scientific reasons for the indubitably effective Eastern medical treatments with moxa and acupuncture. Perhaps my attempts to apply modern technical science to an oriental practice of indisputed value would meet with no greater success.

As an example of the kind of results my tests produce, I show the FIG. 4, which is the reading for a thirty-minute Zazen session by a priest age fifty-two, who had over thirty years of Zen experience. The electrodes were attached to the parietal region at the top of the head and to the occipital region at the back of the head. The locations of the electrodes are represented by the letters P and O on the chart. Zazen meditation began at the ringing of a bell and ended, thirty minutes later, at the second ringing of the same bell. The horizontal, unbroken lines in the chart indicate the

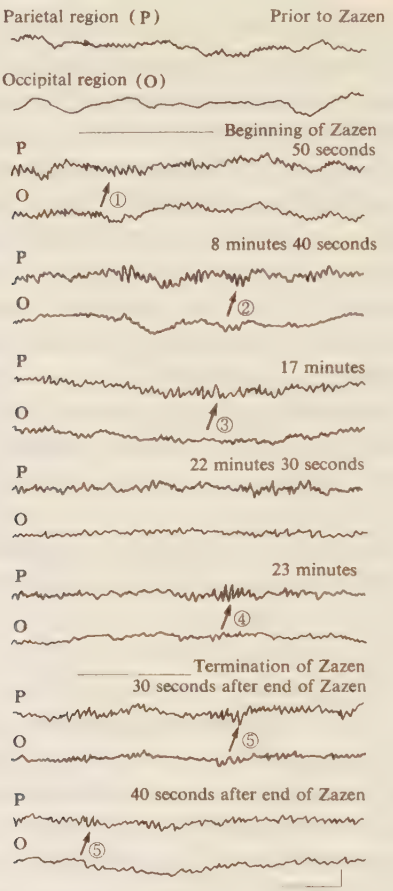


FIG. 4. Alpha waves emitted during Zazen. Before the beginning of Zazen, the brain emits Beta waves; but fifty seconds after the beginning of Zazen, even though the eyes are open, the brain begins to emit Alpha waves. (The arrows in the chart point to places at which Alpha waves are especially prominent.) The vertical part of the ⌐ mark at the bottom of the chart indicates a power of 50 microvolts. The horizontal bars in the chart represent a time duration of one second.

period in which meditation was taking place. Recordings were made somewhat before Zazen began and were continued for a few minutes after it ended. The chart shown here is, of course, abbreviated.

Since Zazen is conducted with eyes open, I had assumed that the meditating priest would emit Beta brain waves, but my assumption proved completely incorrect. In only fifty seconds after the beginning of Zazen, the priest's brain was emitting a small amount of steady Alpha waves (arrow one in the chart). Berger has discovered Alpha waves emitted most noticeably in the area of the occipital region, but the priest I tested in this case emitted them from the parietal region as well. Later investigations showed that Alpha waves are first manifested in the area of the frontal bone over the forebrain. Although the priest's eyes were open, his environment had no controlling influence on him: his brain continued to maintain a state of stability, which was achieved in about one minute after the beginning of the meditation session. The amplitude of the Alpha waves increased and the frequency decreased as the meditation deepened. At the outset, the waves had a strength of about fifty microvolts. After about eight or nine minutes of meditation, this strength had increased to seventy microvolts (arrow two on the chart). After seventeen minutes, the strength increased to one hundred microvolts (arrow three). At this time, the frequency of the waves changed from about eleven or twelve cycles to nine cycles a second. After twenty-three minutes of meditation, the cycles had decreased to seven or eight a second; and the strength remained one hundred microvolts. In other words, the waves had dropped almost to the Theta level (arrow four). For thirty or forty seconds following the conclusion of the Zazen session, the priest whose chart appears on FIG. 4 revealed an after effect in which Alpha waves were emitted in considerable quantity (arrow five). In some of the priests tested, the aftereffect continued for as long as five minutes.

I was amazed at these results, not only because they proved that I was incorrect in assuming that, when the eyes are open, the brain waves are mostly of the Beta category, but also because they

showed that the effects produced by Zazen linger even after Zazen itself has ended. I felt that I was on the verge of an important discovery, but I knew I must do one thing at once. I must test the brain waves of people who had no experience at all in Zen to show that what trained priests' brains do is different from what the brains of untrained people can do. I selected a student from the medical school of Tokyo University as my subject. He was twenty-six years old and had no experience with Zen whatsoever. He was taken to the same room in the same temple and asked to do nothing but sit cross-legged on the floor for specified periods. He was given no other instructions; and, as I suspected, the brain waves he emitted were all Beta. Furthermore, he demonstrated the arch effect, which never occurs from brain waves alone. The pain and discomfort engendered by twenty minutes' sitting on the floor caused him, as it would most people, to twitch, move his knees, twist his neck, or alter his position in one way or another. This never happened with people trained in Zazen. This experiment showed the futility of trying to produce the effects of Zazen by merely copying the Zazen techniques without being trained in the fruitful way to execute them. (FIG. 5)

My next experiment was to determine how much good even a little knowledge of Zen mental control could produce. I selected another subject from Tokyo University, a student who was twenty-nine and who had no Zen experience, and, before measuring waves, instructed him briefly in the breath-count breathing control method. Although the majority of the waves his brain emitted were Beta, for periods of two or three seconds, he did emit Alpha waves (underlined parts of the chart on FIG. 5). Of course, I am not underrating the long cultivation and intense effort needed to train a person to be a mature master of Zen meditation, but it is extremely important that even a little instruction can produce this kind of effect, because it suggests the effects the Zazen method can have in the daily lives of ordinary people.

Another point troubled me in this connection. If there are personal differences in degree to which the individual can emit Alpha waves in meditation, the Zazen system is not applicable to all

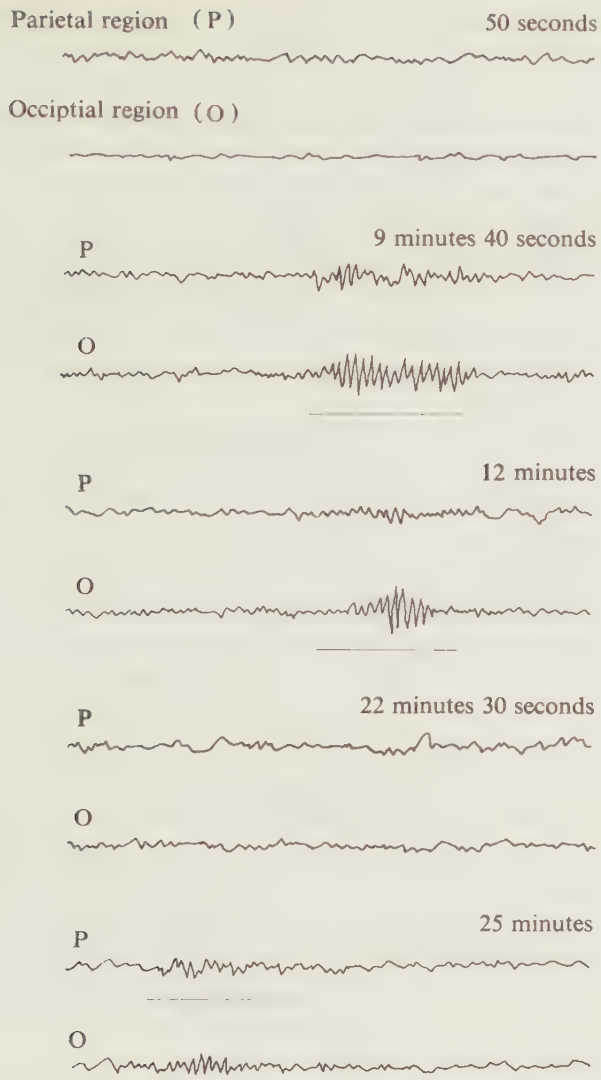


FIG. 5. Brain waves of a person without Zazen experience who counted his breaths. Although Beta waves are predominant, from time to time Alpha waves are emitted for one or two seconds.

people. In other words, if some people can emit better or more Alpha waves because of innate characteristics, others with less talent in this direction can never hope to develop beyond their natural limitations. To investigate this possibility, I gathered together a group of eighteen veteran Zen priests from various parts of Japan and tested their brain waves during a meditation session held in 1965 in a temple in Tokyo. In addition to the ordinary equipment I employed a belt wave analyzer that breaks down the waves for closer component examination. Aside from minor differences in brain wave pattern, all of the priests tested emitted the same kinds of Alpha waves, which are of a type that I call an indicator of mental relaxation.

FIG. 6 shows an analysis of the Alpha waves of a priest aged fifty-five. The top line of the chart shows the Alpha waves as recorded from the amplified charges received from the electrode attached to the priest's parietal region. The lines beneath the top one are a breakdown of the waves. Alpha waves have been divided into a fast (Alpha f, ten cycles) type and a slow (Alpha S, eight or nine cycles or near the cycling of Theta waves) type. At about fifteen minutes after the beginning of meditation, Alpha S and Alpha f are being emitted in large and virtually equal quantities. Although other waves are being emitted at the same time, they are present in such small quantities as to be insignificant. On the far right of the chart are small vertical lines representing an amplitude of fifty microvolts. The amplitudes of the brain waves charged may be gauged against these lines. For five minutes after the bell signaling the conclusion of the session, the priest's brain continued to emit large quantities of Alpha f and Alpha S waves. This experiment showed that, with the proper amount of training, the brain of any person can emit Alpha f and Alpha S waves and that there is no innate difference in ability to do so.

Theta waves (FIG. 6) are low-cycle (six or seven cycles a second) waves that occur in the first stages of sleep, when they are often mixed with slow Alpha waves. But one veteran Zen priest with forty years of Zazen experience proved to be able to emit Theta brain waves sixteen or seventeen minutes after the beginning of a

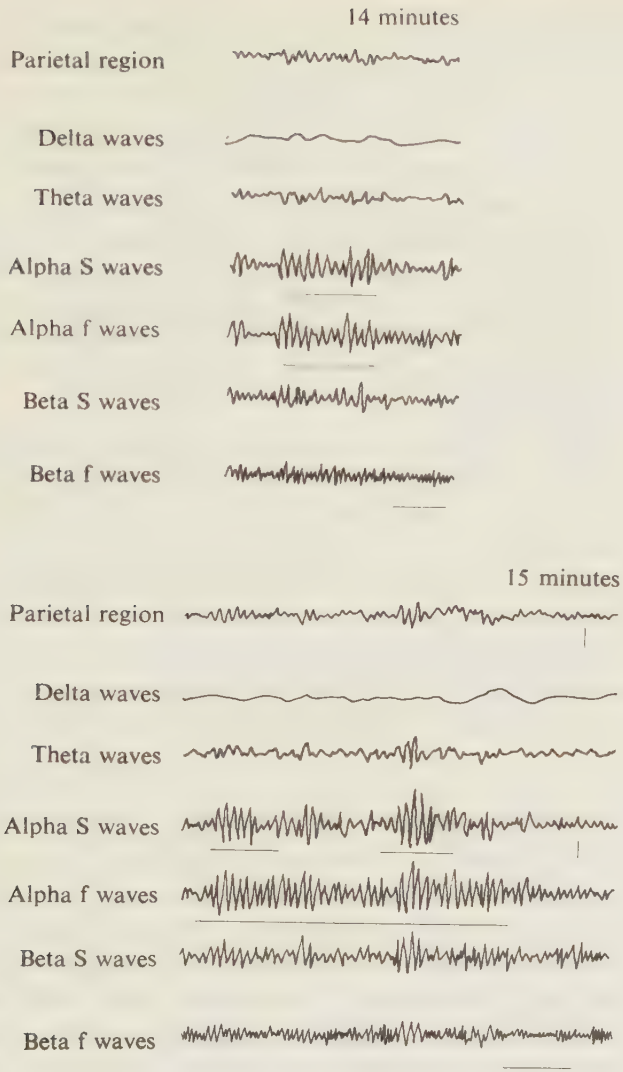


FIG. 6. Analysis of brain waves of a Zen priest in Zazen. The analysis is of the fourteenth and fifteenth minutes of the Zazen session; Alpha waves are predominant.

meditation session. This man seemed to be sleeping with his eyes open. As is well known, sleep, one of the most pernicious enemies of good Zazen, is carefully guarded against. When a person in meditation is seen to have fallen asleep, the person in charge of the session raps him sharply on the shoulders with a special paddle-shaped instrument called a *kyosaku*. With his many years of Zen training, this experienced priest is not likely to have fallen asleep. Furthermore, I made clinical tests to prove that he was awake. The Theta waves his brain emitted were the consequence of the elimination of distracting miscellaneous thoughts, the conversion of the mental state into one of no-thought, and the establishment of complete tranquility.

To verify the presence of Theta waves, I used a frequency analyzer. Since, in terms of brain waves, profound Zazen and sleep are similar, for the sake of determining the difference between the states of consciousness of the individual in the two conditions, something more than a comparison of brain waves is needed. Some other method of identification must be used to advance the scientific clarification of Zazen and its effects on the brain.

Electrical resistance in the skin of the human being is affected by agitation and excitement. This is the principle on which is based the polygraph, or lie detector, used to examine suspected criminals. No matter how cool the person and no matter how skillful at concealing his emotions, he cannot alter the changes in electrical resistance in his skin that occur when he is asked a question or confronted with material that excites him. By measuring responses to these changes (called the galvanic skin response or GSR) it is said to be possible to tell whether or not a person is lying. GSR do not occur during sleep. Consequently, I decided that to determine whether the states of Zazen meditation and sleep are different, I could make use of the polygraph to detect possible GSR in experienced priests during meditation. FIG. 7 shows the direct recording of the brain waves of the priest, a frequency-analyzer breakdown of those waves, and the results of a GSR recording. The waves were recorded from an electrode attached to the priest's parietal region. At nine minutes and twenty seconds after the begin-

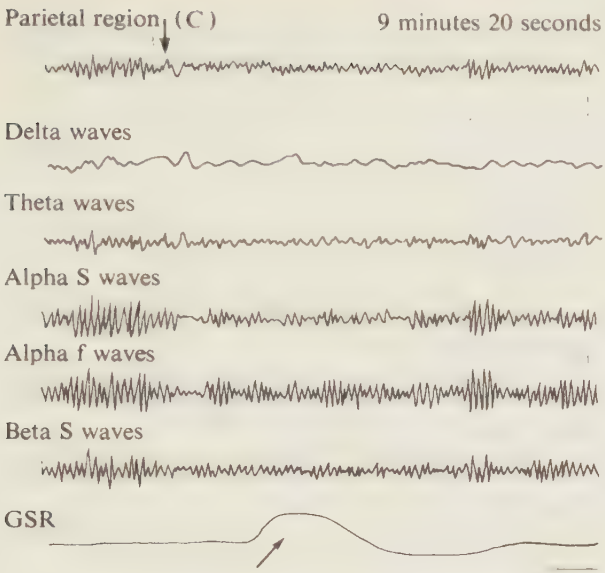


FIG. 7. Chart showing receptivity to exterior stimuli. A sound stimulus (C) causes a suppression of Alpha waves and the emergence of a GSR. The horizontal line below the line of the GSR indicates a power of one millivolt.

ning of meditation, when Alpha waves were predominating, a sharp sound was made (point C on the chart). The priest responded to the sound by becoming agitated. His excitement is recorded in the form of the hill-shaped GSR response (arrow). But I later learned that the priest was so sensitive to his surroundings that GSR occurred even when no sound had been made to stimulate them. FIG. 8, representing a stage in meditation when slow and fast Alpha waves were being steadily emitted, shows low GSR caused by no stimulus deliberately administered by us. FIG. 9, taken toward the end of the meditation session, illustrates a still more surprising phenomenon. A sound was made to elicit the first GSR, but the other two, occuring in very fast succession, were spontaneous. A person who is not engaged in Zazen but who is sitting

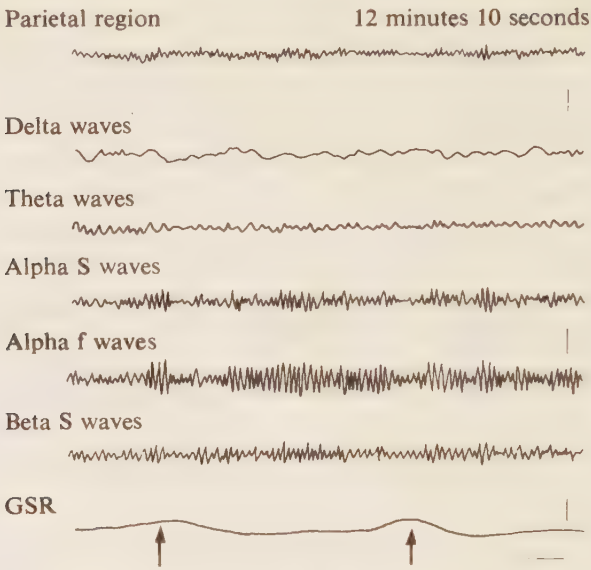


FIG. 8. GSR shows the difference between Zazen and sleep. When the external stimulus is not repeated, Alpha waves continue to be emitted, but the GSR repeats. This does not occur during sleep.

quietly with eyes closed and is therefore emitting Alpha brain waves ordinarily experiences no more than one GSR in a ten-second period. The succession was much faster in the mind of the meditating priest. In addition, ordinarily, the person who is not meditating grows so accustomed to sounds that he no longer shows a GSR when they are repeated. This is not the case with people in Zazen, who remain sensitive to everything happening around them. With these experiments I was able to prove that sleep and the state experienced in Zazen meditation are entirely different.

When my long course of experiments was over and I began assembling and analyzing the results for final preparation in written form, I was amazed at the depths of the tradition of Zen meditation, which began with Sakyamuni, who experienced enlighten-

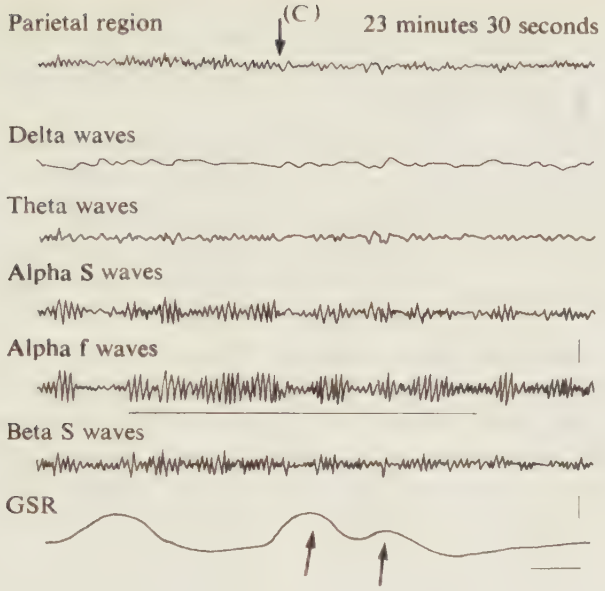


FIG. 9. Repetitive GSR in a short period. In addition to the natural GSR response to sound stimulus, a pair of GSR occur.

ment by the pale light of the morning start as he sat under the Bodhi tree in India long ago, and which has been developed over many centuries by Zen masters in several parts of the Orient. In addition, I was once again impressed with the fearful and wonderful things to be learned in my own field of cerebral physiology. The brain contains things that we cannot know or foretell If man were able to understand the mind completely, he might become godlike in wisdom. He has not reached this stage, for science has only begun exploring the dark places of the mind. But even before science made its first faltering steps, experienced practitioners of Zazen already had learned much from experience in meditation. In my work, I have cast a scientific light on Zazen and in this way have shown that it is not the exclusive property of experienced priests and specialists but that it can be of immense value in the

daily lives of ordinary people. Combining the results of experiments with brain waves and with electrical resistance, I can make the following points about the nature of the scientific characteristics of the state attained in Zazen.

1. Ordinarily when a person is in a quiet state with eyes closed, the brain emits Alpha waves. These waves are emitted in large numbers by meditating people, even though their eyes are still open. Inexperienced Zen beginners can emit some Alpha waves if they follow the Zazen method. Experienced veteran priests attain a state in which Alpha waves predominate in about fifty seconds after the beginning of the meditation session.

2. Theta waves are emitted during Zazen, but only by experienced priests. These men have been shown to be awake at the time when Theta waves are emitted, and the Theta waves themselves have been shown to be different from Theta waves emitted by the brains of sleeping persons.

3. Even when Zazen meditation has concluded, there is an after-effect period during which Alpha waves still appear. In some cases the effects of Zazen persist for as long as five minutes after the conclusion of the meditation session.

4. Unlike people who are asleep, people in Zazen meditation are receptive to exterior stimuli. Indeed they are more sensitive to such stimuli than waking people under ordinary circumstances.

5. Repetition of exterior stimuli does not produce a state of familiarity in which response is deadened. On the contrary, the fresh sensitivity of the brain waves of a person in Zazen remains undimmed for long periods.

These results seem to indicate a highly contradictory set of circumstances. Though the person in a state of meditation emits the calm, stable brain waves of a person sleeping, he remains intensely sensitive to everything taking place around him. In other words, he seems to be reposeful and active at the same time. The hypnotic trance in some respects resembles the Zazen meditation condition but is very different from it in an important respect. At the suggestion of the hypnotist, the subject, in a manner of speaking, falls asleep. But while in the trance, he demonstrates

absolutely no response to external stimulus, whereas, as I have said, the person in Zazen meditation remains consistently sensitive to such stimulation. But the apparently contradictory nature of the Zazen condition is immensely beneficial to the human spirit.

After my investigations of the effects produced on the brain by Zazen, I tried to find a way to create the same effects in the mental state without Zazen. One of the methods that I employed was Alpha feedback training. While recording the brain waves of a person in Zazen meditation, whose brain was steadily emitting Alpha waves, we transposed the brain waves in such a way as to produce a pulsating sound. This sound was then played for the subject in the hope of creating a conditioned response. Dr. J. Kamiya of the Langley Porter Psychiatric Research Center, announced satisfactory results from such experiments. Dr. Kamiya, who is an old friend of mine, explained his method in a meeting of the International Psychology Association held in Tokyo in 1972. Later I had an opportunity to discuss it at leisure with him, and two years earlier when I visited the United States I watched similar experiments in his laboratory. At one juncture, I myself became the subject of one of these conditioned-response tests. After a while, however, a lovely blond laboratory assistant announced that I seemed to be trying so hard to emit Alpha waves in response to the sound stimulus that I had established a kind of prohibitive tension. After repeated discussions, we both arrived at the conclusion that the conditioned-response system produced only negative results probably because it relies on a conscious effort to emit Alpha waves. Though some people did emit Alpha waves upon hearing the sound associated with it, the method seems ill suited to tense people or to people who, in their eagerness to cooperate, make strong intellectual effort to achieve mental stability and calm. As I have indicated in the preceding part of this book, in Zazen, no attempt is made to use the intellect to put the spirit in a state of calm. Instead, one begins by controlling the breathing and the posture. Since Zazen arises from the self and directly faces the selfish consciousness which, if left unconfronted, might become an obstacle to tranquility, it is a method suited to the needs of all

people.

There are many things about Zazen that deserve reappraisal in the light of the research that has been conducted in this field. First, although the way we scientists express them and the traditional ancient Zen way of expressing the effects of Zazen are entirely different, the experiences of priests of the past and of modern practitioners of Zazen agree in many cases with our scientific findings. This means that Zazen, which has heretofore been considered a complacent and unscientific matter, has been shown to have universal applicability on scientific grounds. By saying that one must reappraise Zazen, I do not mean that everything in the Zen teaching about meditation ought to be unquestionably accepted. Science teaches what is worthwhile and deserving of preservation in Zazen; it also teaches what can be omitted from Zazen without loss. On the other hand, an examination of scientific bases reveals new meanings in Zazen.

Experienced Zen priests have sometimes insisted that Zazen is not something to be investigated, since it transcends the world of theories. This attitude, carried slightly further, makes of Zen something inaccessible to the ordinary person. But my scientific research in the realm of the mind has produced results that in many points agree with the highly sensitive state attained by Zen priests. For instance, the state of oneness of the active and the static found in people meditating in the Zazen way is not something that can only be understood in a mystical, nonrational way. Examinations of the brain waves of meditating people show that the human mind is completely capable of being calm and static while remaining tensely aware of and receptive to its surroundings. When the mind is emitting calm Alpha waves and encounters an exterior stimulus it reacts in an active way. In terms of brain waves, this phenomenon consists of Alpha blocking—temporary cessation of Alpha-wave emission—and of the emission of active Beta waves. Furthermore, in the Zazen state of meditation, Alpha blocking always occurs at repeated encounters with external stimuli; that is, the brain never becomes so accustomed to a given stimulus that it ceases to respond to it. In the Zazen meditation

state, the mind always manifests both the active and the static condition. This is the scientific explanation for the Zen condition that is described as the oneness of the active and the static.

Chapter Five/Why Zazen Strengthens the Body

In addition to its effects on the mind, Zazen has an influence on bodily health. Though I am a psychiatrist and am therefore not directly concerned with medicine and surgery, like many people today who are aware of the psychosomatic nature of the human organism, I believe that mental health to an extent determines physical health. The relationship between stress and physical illness is well known. Some years ago when jet aircraft began landing for the first time at an American air force base in a suburban part of Tokyo, the local pig breeders found themselves in an extremely unpleasant situation. The noise of the aircraft was upsetting their animals, causing them to suffer from stress, and robbing them of their appetites. The pigs refused to eat and, as a consequence, lost their commercial value as food. Human beings too suffer from mental stress caused by various things in the environment. Duodenal ulcers are familiar case of stress-related diseases: but there are such others as diarrhea, loss of appetite, heart palpitations, and increased blood pressure. Some people explain these illnesses as an outcome of upsets in the body balance caused by repression of the autonomic nervous system, which regulates the functioning of the blood vessels. This upset is said to arise as an outcome of excitment of the cerebral membrane brought on by stress. In daily experience, we encounter few people who represent the extremes of mental outlook; that is, we know only a small number of constantly gloomy people and an equally small number of constantly rubicond and jolly persons. Most of our acquaintances are likely to be of the nervous kind that suffers from stomach upset and poor appetite. People who overwork are rarely healthy. All of these kinds of persons overstrain their brains and thus develop disorders in the autonomic nervous system. The autonomic nervous system, unlike the motor and sensory nervous systems is tertiary in nature and does not respond to conscious training. The motor nerves, if stimulated sufficiently in the correct way can be trained to respond in certain patterns. The same is true of such

sensory nerves as those controlling aural and olfactory responses. But the autonomic system, which must control those aspects of the functioning of the body that are absolutely responsible for the preservation of life, cannot be trained. As I have explained earlier, the sympathetic and parasympathetic subsystems of the autonomic system control stimulation and repression of the activities of the heart and the respiratory organs. Ideally, perfect balance is maintained between the sympathetic and the parasympathetic systems so that the heart operates smoothly and the contraction and expansion of the blood vessels are managed in such a way that the blood circulation proceeds at a regular, even pace. Controlling these nerves is extremely difficult. The famous female divers of Japan—called *ama*—have trained themselves to remain underwater for long periods, but this control of the breathing is very rare. I have never heard of anyone who was quickly cured of high blood pressure by tricks directed toward the autonomic nervous system. Yet calm and tranquility of mind can, as the psychosomatic physicians explain, promote rapid healing of illness by improving the operation of the autonomic nervous system, which regulates the functioning of the internal organs.

Under normal conditions, the sympathetic system works at maximum pace during the daytime. At night, the parasympathetic system takes over and, until the person wakes the following morning, actively removes fatigue-causing lactic acid, nourishes the body for the following day, speeds up the circulation and thus accelerates the elimination of poisons from the blood.

But people who do not get enough sleep deprive their parasympathetic nervous system of the opportunity to go to work. As a result, the sympathetic nervous system is overworked, and the balance of the parasympathetic nervous system is completely destroyed. The Harvard profesor W. B. Canon calls this the breakdown of the defensive response.

But plenty of sleep does not necessarily guarantee the restoration or maintenance of this balance. An American association for cancer research clarified this point by conducting intensive investigations of 792,622 healthy American men and women who were

between the ages of 40 and 70. The tests lasted for six years beginning in 1959. The physical conditions of these people were examined, and reports on illness and causes of death were taken for people who died. At the conclusion of the examination period, about 20,000 of the people had died; and it was found that there was a definite relation between the amounts of sleep each person had each night and the cause of that person's death. In the group that died in the age bracket between fifty and fifty-nine, the number of people who had slept ten hours a night was four times as great as the number who had slept seven hours a night. Of people who died in the age bracket between sixty and sixty-nine, death from heart attacks occurred in twice as many cases among people who slept ten hours a night, and atherosclerosis (the figures are available for women only) occurred in twice as many cases. Although such, other factors as diet and smoking influenced these deaths, too much sleep, poor switchover from the repressive to the active phase of the autonomic nervous system, sluggish body movement, and consequent accumulation of fat must be counted among the contributory causes. In other words, either too much or too little sleep can upset the balance between the sympathetic and parasympathetic nervous subsystems. In this age, when so many things in the environment contribute to the upset of this balance, the situation is especially serious in the light of the impossibility of controlling the autonomic nerves. In my research, I have been deeply concerned with the Galvanie Skin Response (GSR), which has been proven by cerebral physiology to have an intimate relation with the autonomic nervous system as well as with emotional and mental changes. As I have said, persons in Zazen meditation demonstrate an intensification of the GSR concurrent with stability of brain waves; this indicates a heightened functioning of the autonomic nervous system. From this discovery, I believed I saw a possibility of controlling—at least to an extent—this nervous system that has heretofore eluded all artificial controls. (Indeed, it proved possible to establish such control by means of the abdominal breathing method discussed earlier.)

But to approach the problem from a different angle, I decided to

conduct tests on the pulse and breath rate of priests in Zazen meditation. Although it is impossible to make direct examinations of some of the internal organs controlled by the autonomic nervous systems, both the pulse and the respiration lend themselves to tests that are not difficult to carry out. I was afraid that the priests who agreed to cooperate with me in these tests would draw the line at the electrodes around the waist for respiration measurement and the electrodes on wrists and ankles for pulse measurement. But, as I might have expected, they consented to these devices with good grace.

When the priests had reached the degree of deep meditation—Samadhi—where their brains emitted Theta waves and their GSR was intensified, their breathing rate had slowed to four or five breaths a minute. As I have said elsewhere, the normal activating breathing rate is eighteen breaths a minute. The FIG. 10 shows a

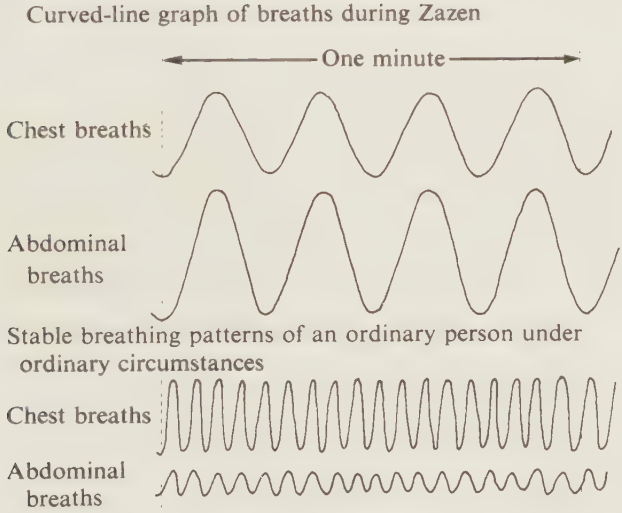


FIG. 10. During Zazen, the number of breaths per minute decreases. Abdominal breathing is deeper, and the number of breaths is significantly reduced.

comparison between the breathing rates of meditating priests and ordinary waking persons. The pulse rate, however, had greatly accelerated. In contrast with the normal average value of about seventy-two heart beats a minute, the pulse of these priests was from eighty to one hundred beats a minute. The rise in pulse and drop in breath rate indicates that the autonomic nervous system has been forced by Zazen conditions to make adjustments and to maintain balance between the sympathetic and parasympathetic subsystems. As I have noted, balance between these two is the ideal state for the preservation of health. That this state of balance is achieved during Zazen suggests that this kind of meditation can control the autonomic nervous system. The ability to achieve this without resort to drugs or other artificial means reinforces the belief of Hippocrates that nature is the best doctor.

In his book *The Wisdom of the Body*, Harvard professor W.B. Canon has said that the sympathetic nervous subsystem exercises what he calls a defensive response. This subsystem gives various parts of the organism orders to work. At external stimuli, the sympathetic subsystem sets up a defensive response that increases the blood pressure, causes irregular pulse, increases muscular tension, intensifies the consumption of oxygen by the blood, and increases the amount of harmful lactic acid in the bloodstream. In order to determine which of the two subsystems was in ascendancy during Zazen, I prevailed on some of the meditating priests to allow me to extract a few milliliters of blood for tests. As a consequence of this experiment I discovered that during Zazen there was no noticeable increase of oxygen consumption in the blood and that the amount of lactic acid in the blood had decreased. In other words, the parasympathetic nervous subsystem is clearly in control of the body during Zazen meditation. This proves that, though at these times the body is sensitive to stimuli from the outside, it does not resist them by means of Canon's defensive response but maintains its own balance instead, as it exercises repressive functions to bring nourishment and rest. This is the keynote of the Zazen therapy system. During Zazen, the autonomic nervous system causes the body to neutralize and absorb

unwholesome things. Thirty minutes of Zazen meditation makes possible smooth transmission from the period of control by the parasympathetic to that of control by the sympathetic subsystem and thus harmonizes the total action of the autonomic system. This is of great importance to health in these times when many things happen to upset the normal sleeping pattern.

Another important physical process affected by Zazen is energy metabolism. If energy is used too rapidly by the body, the person suffers from what is called Basedow's disease; he has an overly strong pulse, sweats easily, and experiences trembling in the fingers. If the energy metabolism is poor, the person may suffer from mucous edema and be mentally and physically sluggish. It is not necessarily true that the person who eats large quantities of food is the most robust or that the person who eats little is incapable of considerable activity. The important thing is not how much one eats but the efficiency with which one puts to use the energy derived from food. My tests have shown that Zazen helps increase this efficiency.

In the body, the oxygen taken in through breathing unites with dextrose to give off energy and carbon dioxide. Measuring the carbon dioxide in the exhaled breath gives an index of the amount of energy produced in the body and helps determine the energy metabolism of the person. The device used to make these measurements involves a mask into which the person exhales. The exhalation passes into a bag; its component elements can then be analyzed. The basic energy metabolism of a human being is taken to be the amount of energy required to maintain life under conditions that prevail in the morning when the person has awakened but has not yet risen from bed and has not yet eaten breakfast. This value varies with the individual.

Once again, in the interests of clarifying the scientific nature of Zazen, I prevailed on priests to allow me to analyze their energy metabolism during meditation. The results appear in FIG. 11. The basic metabolism of each person is taken to be one. As can be readily seen, under Zazen meditation conditions, the priests required less energy expenditure than their basic energy metabolism.

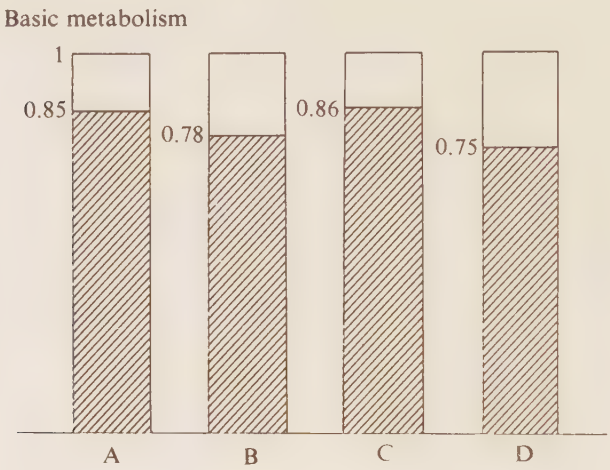


Fig. 11. Reduction of energy metabolism during Zazen. The measurements of energy consumption of four priests (A, B, C, D) during Zazen show reductions of roughly 20 percent less than normal. (Sugi et al.)

The differences vary but average roughly twenty percent.

The energy economy of Zazen is explained by the nature of the brain. In a manner of speaking, the brain is the greediest of all the body organs; that is, it requires a maximum amount of energy and nourishment. Autopsies performed on people who died of hunger have shown that, even in advanced stages of starvation, when the other organs of the body are considerably shrunken, the brain retains its original weight. During Zazen meditation, the brain is in a state of maximum stability in which it does a minimum of work and therefore requires less energy. As the GSR tests showed, the brain in this condition responds quickly to external stimuli but immediately returns to the tranquil state. This is probably the reason for the low expenditure of energy in Zazen.

The research I and my colleagues have done on Zazen has interested people in other countries and has led some—especially research workers in the United States—to attempt to develop ways

to cure mental and physical illnesses by artificially checking the autonomic actions of the brain. Some of these attempts have led to the development of a method called biofeedback. This method is based on the psychology concept of conditioned responsive learning. The conditioned-response system consists in training animals to associate a given action—pressing a lever, for instance—with a reward, which is usually in the form of food. Formerly it was believed that only the mammals—especially the apes—could be trained in this way because it was thought that the conditioned response depended on the cerebrum, which is highly developed in these animals. But in 1960, Dr. Neal E. Miller of the Rockefeller University proved that conditioned-response learning is possible in the autonomic nervous system of rats as well. Professor Miller, an old friend and counselor of mine, has succeeded in bringing about conditioned responses in the heart beat, intestinal motion, and urination patterns of rats. In one instance he planted an electrode in the region of the subthalamus of a rat. When the animal's heart beat dropped to a given level, an electric current was run through the electrode. Using this method, he succeeded in conditioning the rat's heart to a beat 20 percent lower than normal. One rat, that was apparently especially talented at this kind of response learning, is said to have been trained to have one red ear. After developing his equipment further, Miller used it on human beings. In an experiment to condition subjects to lower the temperature of their hands, he attached electrodes to both index fingers. He then put a thermometer in front of these subjects and had them consciously attempt to influence their autonomic nerves by reducing their hand temperatures.

At a gerontology center in the state of Maryland in the United States, professor E. Bernard has put this kind of autonomic-system, conditioned-response learning to use in the treatment of heart patients. After selecting eight patients whose hearts were apparently dangerously weak, he trained them to speed up their pulse rates when they saw a green light and to slow it when they saw a red light. Finally he trained them to maintain normal pulse at the sight of a yellow light. When three of these people had their first

heart attacks, the response they had learned to make to a yellow light restored their heartbeat to normal.

Changing the kind of brain wave being emitted at a given time has been used successfully by professor M. Chase of the University of California. In treating insomnia patients, he takes the brain waves of the people when they are asleep and conditions them to emit the same kind of brain waves when awake. This enables him to lead them into the initial sleep stage. Then by working with their autonomic nervous system he is able to cure their insomnia by reducing both their pulse rate and the resistance to electricity of their skin. It might be possible to employ conditioned-response learning of the autonomic nerves to enhance children's abilities in scholastic work. But this could lead to the mistaken idea that the brain is no more than an advanced computer. The brain differs from sophisticated computer equipment in a number of ways, but perhaps most important is its flexibility. Each cell of billions of nerve cells in the brain is alive and, under certain conditions, can be trained to take over the function of another cell if something goes wrong. For instance, children who have lost the ability to speak because of damage to the left lobe of the brain, where the speech control centers are located, have been trained in such a way that the right lobe learned to take over the functions of the left. Some of the ability to talk was returned to the child in this way. (It is difficult to train the brain of an adult to produce a similar effect.) This achievement shows the amazingly flexible powers of the brain. But those of us who work with brain waves and the autonomic nerves, regions, into which mankind has not probed in the past, must be cautious not to give the impression that we are trying to inspire human beings to achieve the kind of mechanical perfection that might be expected of the computer.

The people of the distant past, who developed the Zazen meditation method, seem to have been aware of the existence of the autonomic nervous system for they identified as very important the points known in Japanese as the *Kikai* and the *Tanden*. The Zen priest Hakuin identified the Kikai as located at the second or third lumbar vertebrae and the Tanden as located in the lower abdo-

men. In fact, these two places are the locations of nodes of the autonomic nervous system. Many Zen teachings emphasize the importance of these two spots in maintaining good health; they insist that one must calm one's spirit, not with the intellect, by means of the Kikai and the Tanden. This is of course a reflection of the deep wisdom of these men who perceived the importance of the operation of the autonomic nervous system to health and well-being. In modern eyes, understanding of the changes created by brain waves in breathing, energy metabolism, pulse, and electrical resistance in the skin are desirable to a further understanding of Zen. But in addition, such knowledge agrees with the teachings of Dogen and other emininent Zen priests of past and present. In the words of space exploration, with the uncovering of this agreement, the ancient wisdom of Zen has docked with modern science and in this way has enabled us to observe the cosmos of the mind with wonder and inspiration.

About the author:
Tomio Hirai, who was born in Tokyo in 1927, graduated from the Medical School of the University of Tokyo in 1950. He is an outstanding authority in psychiatry and the leading Japanese research specialist in psychophysiology. His reports on the subject of seated Zen (Zazen) meditation in connection with brain waves attracted the attention of specialists in many countries. Several of these men have come to Japan to study with him, and a large number of them have applied Zen methods to the treatment of neuroses. At present, doctor Hirai is an assistant professor of the faculty of medicine, department of psychiatry, the Tokyo University Hospital, president of the Japanese Society of Psychiatry and Neurology, and a director of the Japan Mental Health Association. His written works include *Jiko Saiminjutsu* (Self-hypnotism) and *Seishin-ka Chiryo Gaku* (Psychiatric Treatment) in Japanese and *Psychophysiology of Zen* in English.

ISBN 0–87040–348–6

Printed in Japan

Garlic Therapy

By TADASHI WATANABE, D. Sc.

66 pp. 26 line drawings and 1 diagram, 6 1/4 × 8 1/2 in. paperback,
ISBN 0-87040-272-2

■ There is probably no food better known yet less understood than garlic. Although everyone says that garlic is good for the health, nobody seems to know exactly why. In a superstitious way, people vaguely believe that garlic is beneficial without knowing scientific reasons. But the wholesome effects of garlic are neither superstition nor blind faith: scientifically garlic is a superb health food because it makes essential improvements in one's general physical condition. In addition, it is an excellent remedy that works from within to strengthen the entire body instead of providing relief from symptoms only. Modern Western-style medical therapy is generally concerned with relieving immediate symptoms of illness. Such treatment often brings only local or temporary improvement. Oriental medicine, which originated with Chinese herbal medicine, treats the entire body, not merely specific parts. One Chinese herbal remedy used for centuries is garlic.

■ In the first chapter, the author explains the effective properties of garlic and how to use it as a medicine. He discusses everything he know about the disagreeable garlic smell and offer ways to eliminate it. The second chapter describes how garlic invigorates the body and increases stamina and tells how garlic is used to cure physical ailments and relieve their symptoms. The third chapter describes appetizing ways to prepare garlic without destroying its effectiveness. In addition to dishes using it raw, this chapter introduces tasty, different ways of steaming, deep-frying, sautéeing, roasting, and broiling garlic.

■ Put to practical use according to the directions in this book, garlic will generate strength from within the human body. In this way it can bring relief to sufferers from such ailments as chronic fatigue, susceptibility to colds, and general sluggishness. In addition to curing illnesses, it can be of immense value to people who are not sick but who want to improve their health and general condition. With the vigor to be had from the correct use of garlic, you will find that you no longer tire easily, even in extremely hot or extremely cold weather. Moreover, should you fall ill, you will find that garlic has given you the strength to recover quickly. This book will be of value to you and that you will become a great admirer of the virtues and powers of garlic.

JAPAN PUBLICATIONS, INC.