

# NUTRITION AND ALCOHOLISM

Help for the alcoholic through nutritional Supplements, an authoritative plan offering new hope for thousands of sufferers and their families

**ROGER J. WILLIAMS**

*Fourth Printing*

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*With a foreword by A. J. Carlson,  
physiologist of the University of  
Chicago and recently president of  
the Research Council on Alcoholism*

## **NUTRITION AND ALCOHOLISM**

Alcoholism presents an unusual problem to society. Many persons regard it not as a disease but as a sign of moral depravity. Rightfully considered a disease, it is the focus of widespread research and the testing of a multitude of "cures." In this new book on the subject, Roger J. Williams, a distinguished biochemist and world authority on vitamins, advances a revolutionary concept of alcoholism and a tested means of combating it.

The treatment advocated is essentially nutritional, utilizing highly potent food elements made available through the research of biochemists, which, in addition to benefits for alcoholism, will improve general health. The treatment is harmless since it requires only elements that every normal body needs—no foreign agent whatever is introduced.

Written for both the layman and the physician, this book explains simply and clearly how remarkable results have been obtained and why still more astounding ones can be expected from further trials. The point of view is new

*(continued on back flap)*

**FRANK L. SIEGEL**



NUTRITION  
A N D  
ALCOHOLISM



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AND  
ALCOHOLISM

ROGER J. WILLIAMS

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## Foreword

Over one hundred years ago, Dr. Benjamin Rush introduced a form of the "aversion therapy" for alcohol addiction; but the tradition that alcoholism is a "sin and a crime" prevailed both among physicians and laymen until very recent times. Very few if any general hospitals accepted alcoholic addicts as patients. In some cases, a special-care center for alcoholics was called "a home for the fallen." It is now evident that calling alcohol addiction a "sin and a crime" did not aid us in discovering the causes, the prevention and the most effective therapy of this affliction. If alcoholism is a *disease*, physical or mental (or both), the primary challenge of this affliction is to medicine and biology for research into its causes and consequences.

My interest in the problems of alcoholism is evidenced by my participation in the organization and operation of the Research Council on Problems of Alcohol, beginning in 1937, and my service in the present National Research Council Committee on Alcoholism. Some years ago, I spoke of the central "unknown" in the alcohol problem as residing in the fact that a few persons become alcoholic addicts, while the vast majority of men and women can consume alcohol with

moderation. Speaking of the vulnerable few, I asked: "What is peculiar or special in the personality make-up or in the social environment of these people that induces or permits this addiction?"

No therapy of alcoholism has, to date, been 100 per cent successful. The "will" of the individual alcoholic appears to be a very important factor in the success of any of the therapies so far given adequate trials. But the hereditary, the educational, the nutritional, and the social factors which contribute to the strength and direction of the "will" of the individual are still largely unknown.

Dr. Williams, a competent biochemist, by bringing into the picture advances in biochemistry and genetics which have been made in the last decade, has given for the first time a new and challenging, though tentative, answer to the question which I posed in 1942. In my opinion, he has opened a new and important gate to the solution of one of the serious problems of mankind. His ideas and recommendations should by all means be given adequate tests. Even if there are failures or partial failures, medical science and medical practice will be enriched and new ways may be opened for further advance. Dr. Williams' plea for more and more clinical research in nutrition is one that merits widest acceptance.

A partially successful therapy of alcoholism may merely disclose the *biologic consequences* of such prolonged addiction. But if Dr. Williams' working hypothesis, based on experiments on rats and on man, should prove basic as to the primary cause of alcoholism, the addicts on Dr. Williams' therapy should be able to return to alcohol consumption in moderation, a behavior control not revealed by any other therapy of this affliction.

A. J. CARLSON

*University of Chicago  
March, 1951*

## Acknowledgments

To the Clayton Foundation for Research and Mr. Benjamin Clayton, its president, I extend my thanks for the liberal support which has been given to the Biochemical Institute of the University of Texas over the past eleven years. It is this continued patient support which has made possible the practical fruition which we believe is about to be realized from our alcoholism investigations.

I wish also to extend my grateful appreciation to my colleagues, especially Drs. L. Joe Berry, Ernest Beerstecher, Jr., and Elwood H. LaBrosse, without whose participation the investigation described in this book could not have been accomplished. All other members of the Biochemical Institute staff, some of whom played indispensable and arduous roles, are also due my heartfelt thanks, not only for their help, moral support, and encouragement but also for being the kind of people that they are. If the alcoholism investigations turn out to be as helpful as we hope they will, credit should go to all those who have helped make the Biochemical Institute function as it does.

Finally, I wish to acknowledge with thanks the co-operation and help of the officers of Eli Lilly and Company, who

have generously furnished medication and other help, and  
of the officers of the Rockefeller Foundation who have shown  
substantial interest in our approach.

ROGER J. WILLIAMS

*Austin, Texas*

*March 10, 1951*

NUTRITION  
AND  
ALCOHOLISM



# 1

## The Problem of Alcoholism

THIS BOOK has been written to bring hope and help to thousands of alcoholics and their families. My colleagues and I believe that we have found a basic cause for alcoholism and that *by nutritional supplements* the essential difficulty can eventually be eliminated. We believe that many can be greatly helped now, and that when research has gone further, the nutritional treatment can be applied successfully to all alcoholics.

The regimen which we advocate is one that is almost sure to promote better all-around health and should be valuable, also, for the very large number of people whose drinking is not well controlled, regardless of whether or not they should be classed as alcoholics.

There is the additional possibility that by similar nu-

tritional means—using the same principle—various obscure diseases, even including mental troubles, can be benefited. Anyone for whom the present treatment offers any promise of help would indeed be foolish not to want a trial, because no harm can follow and great benefit may result. Moreover, the benefit is likely not to be limited in its scope; help may come in unsuspected ways, as our story will make clear.

As a matter of policy, the treatment of disease should be in the hands of physicians; and alcoholism—when its basic cause is known—should be no exception. As the general public—everybody—becomes more and more enlightened, there will be less and less self-treatment of disease. Physicians in turn must be able to demonstrate increasing expertness in treating a great variety of ills.

Alcoholism has presented an unusual problem to society. Many persons have regarded it not as a disease but as a sign of moral depravity. They would assign the primary concern for it to religious or penal authorities, not to physicians. The upshot is that alcoholism has remained in no-man's-land—the general practitioner has no treatment for chronic alcoholism which is even halfway successful, and most religious leaders admit their inability to deal effectively with it. When alcoholics go to physicians or to ministers, they are likely to get the same advice from both: "Join Alcoholics Anonymous."

Alcoholics Anonymous, a mutual-assistance organization, has my profound admiration because its program has helped many thousands of sufferers. The group's success with chronic alcoholism is greater, in a larger percentage of cases, than that achieved through any other method of control. They keep their members busy,

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cultivate the desire to help others, and develop a wholesome psychological attitude that is beneficial to anyone, whether or not he is an alcoholic. The members as a matter of course, largely fortuitously, tend to *eat* in a more satisfactory manner. This, as we shall see, is highly important.

But the Alcoholics Anonymous program, excellent as it is, does not succeed with all alcoholics, and even those who are "successfully treated" often remain on the ragged edge and cannot trust themselves in the company of ordinary men, who in increasing numbers are using alcoholic beverages. The assault upon the problem needs the physiological and medical means which we have developed. Important as psychological means are, they are not the only means, nor can they be expected to be uniformly successful.

Before proceeding with this discussion, I want to emphasize the importance of the different but complementary roles played by physicians (medical doctors) and research scientists in the treatment of disease. The primary task of the practicing physician is to care for people's ills according to the best available modern methods. Since the typical doctor in the United States looks after about 750 people on the average, including those who remain well and do not demand his services, he has little time to develop radically new methods of treatment, although he employs such methods after they have become established. In larger medical centers a physician may spend a substantial amount of time perfecting novel treatments and techniques. For the most part, however, the medical doctor is busy taking care of his patients and does not engage in basic research.

The main task of the research scientist, on the other hand, is to develop new tools for the use of the physician in treating the sick and to provide fresh insight into the problems of disease. Some research scientists have had medical training; most, however, have not. As a general rule, one must make a choice: If he is to practice medicine successfully, he cannot do more than dabble in research; if he is to specialize in research, he cannot practice medicine. There are, of course, notable exceptions—men who have successfully combined the two activities—but they are far from common.

Modern research scientists—not to be confused with medical men—have made tremendous contributions to the advancement of medical practice. As an example, there is the chemist who after twenty-five years of effort first isolated thiamine (vitamin B<sub>1</sub>) in sufficient amounts for study. A few years later he synthesized it and made it available for use. Thanks to this basic research, thiamine is now prescribed universally in medical practice and has proved a priceless boon to millions of people.

Another scientist—a biochemist, not a physician—first isolated the disease-producing agents called viruses and at this writing is the world's leading expert in this field. His work has benefited and will continue to benefit a large portion of the world's population, yet he remains in the background, and the physician, as is proper, applies his findings to alleviate the ills of man.

To go back further in history, Pasteur, although not a physician, introduced to the world the idea that germs cause disease and himself devised and first administered the Pasteur treatment for hydrophobia. And we must remember what a momentous contribution to medical

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practice was made by Roentgen—a physicist—when he discovered X rays in 1895.

These illustrations have been cited to bring the following discussion into proper perspective. The fact that the discoveries revealed in these pages—made in a non-clinical laboratory—may have far-reaching effects on medical practice as it concerns alcoholism and mental disease should not be considered bizarre or unprecedented. As far as medicine is concerned, this is in a sense an age of biochemistry, and it is the business of biochemists (and other scientists in similar fields) to make discoveries about the way our bodies work and to suggest new treatments for disease as a result of their findings. If they do not do so, they fail in their main purpose.

## 2 What Our Bodies Need

IT IS IMPORTANT both for physicians and for the lay public that our findings and the treatment we have devised be seen against their proper background, for then the inescapable logic and the reasonableness of the method become apparent. How closely alcoholism is tied to the broader problem of nutrition will be demonstrated, and how the failure to satisfy our bodily needs can lead to a perverted craving for alcohol will be explained.

All of us, of course, begin our existence as human individuals as single fertilized egg cells. The original cell divides and subdivides, on and on, until when the time is ripe for us to be born, our bodies contain billions of cells all co-ordinated in activity in a most remarkable fashion. The potentialities within that original fertilized egg cell are tremendous. In it reside all the heritable qualities of the individual-to-be—sex, size and shape of the body as a whole, and all the organs and their detailed structures. If this developing organism gets everything it needs

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from outside itself, both before and after birth, it develops to maturity and (barring accidents of various sorts) lives a long span of years.

What, specifically, does the body of this developing or mature organism need to receive from the outside world throughout its life span? Actually, we can list the needs under four headings: (1) oxygen (air), (2) water, (3) warmth (a suitable ambient temperature), and (4) food or nutrition. One can see more than a slight resemblance between these needs and the "elements" of the ancient Greeks: air, water, fire, and earth.

It is important to note that the bodily needs of organisms are completely met by these four items—*everything else* (including hormones, enzymes, and so on) is produced inside the organism from the raw materials (food) furnished. The potentialities for this production reside in the original fertilized egg cell.

With respect to the first three items listed, there is, relatively speaking, nothing particularly mysterious, debatable, or subject to interpretation. Oxygen is oxygen, water is water, and a suitable temperature (about 98 degrees Fahrenheit before birth and somewhat lower after birth) is something physically definite. The subject becomes complicated, however, when we consider the food that every organism (human or otherwise) needs. The nutritional elements are many and the requirements for them are not necessarily the same at all stages of development.

The nutritional needs themselves can be listed, broadly, under four headings: (1) fuel, (2) minerals, (3) amino acids (from proteins), and (4) vitamins. These needs are absolute. No animal organism has ever, in the

long history of life on earth, developed from a fertilized egg cell unless it has been supplied with all of these essentials.

We need not say much about the fuels that are required. Our bodies are not particularly finicky about the fuel they burn—they can burn sugars (carbohydrates), proteins, fats, or even alcohol. Gasoline won't work.

The necessary minerals include calcium, phosphorus, potassium, sodium, chlorine, magnesium, iron, copper, manganese, cobalt, zinc, fluorine, and perhaps a few others. Some of these are required only in minute amounts (probably for catalytic purposes as will be discussed later). No organism can live unless it is supplied with the essential minerals.

The amino acids which human bodies require are obtainable from good-quality proteins and include histidine, lysine, tryptophan, phenylalanine, leucine, isoleucine, threonine, methionine, and valine. To persons who are not biochemists or physicians, these are simply names. The substances are real, however, and our need for them is real. No human being has ever developed unless every single one was supplied.

The vitamins are substances which usually are needed in relatively small amounts, and their function is to speed up certain of the chemical reactions which take place regularly in the body. Many, in fact most, of these chemical reactions would occur too slowly to make life possible if it were not for catalysts or "hasteners" which speed them up. Since there are many reactions taking place, it is not surprising that a great variety of catalysts is needed. Vitamins, of which about sixteen distinct ones are known (with a few more to be discovered), and

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minerals together are often involved in the hasteners essential to life.

The need for vitamins is absolute, and no organism of any kind ever got along without them. Certain organisms manufacture their own vitamins, but animal organisms in general cannot. Vitamins are part of our indispensable food. Some poorly informed persons think of them as a recent fad. It is true that we have known about their existence for a few decades only, but nature had already made use of them for millions of years before man appeared on this planet. Vitamins constitute a phase of ancient history and prehistory about which we have learned only recently.

It may be self-evident, but it is worth emphasizing, that the quantities which we get of the various nutritional elements are important. We need enough of everything. "Enough" in some cases may be infinitesimal, but half of "enough" is too little. Consider iodine, for example. It has been estimated that we may need as little as one-thousandth of an ounce during an entire lifetime. This is a small amount, indeed, but we would die without it. One two-thousandth of an ounce would not be enough, and if this were all we got, we would suffer from iodine deficiency.

This brings us to another problem. We need enough. Can we get too much? This question is especially pertinent in connection with the food elements required in minute quantities. Our capacity for burning fuel is limited, and if we take on too much, dire results may ensue. Fortunately our natural appetite takes care of this problem to the extent that it prevents us from eating several times what we can use. Also, in the case of food elements,

"trace" minerals and vitamins especially, nature has provided a wide margin of safety between what we need and what will harm us. Usually we can take into our bodies many times the essential amount without damage. Almost anything—salt or even water—can produce bad effects if taken in excessive quantities, but ordinarily the margin of safety is our protection. A small amount of copper—a few milligrams a day—is required for continued life and health. A few grams of a copper salt (a thousand times what we need) will, however, cause vomiting and may even cause death. A few milligrams of zinc in our daily food is imperative; one or two grams, however, will cause vomiting. In both cases the margin between what we need and what it takes to damage us is so great that most of us do not need to give it a second thought.

A vitamin such as thiamine is needed by us at least to the extent of one to two milligrams a day. If given in sufficient quantity to a dog (of course, it has never been tried on a human being), it will cause death. But the amount required to kill a dog may be (depending on its size) about one hundred grams. This is at least 100,000 times as much as the dog's daily needs.

Other vitamins—calcium pantothenate ( $B_3$ ) and riboflavin ( $B_2$ ) are examples—have never been found to be toxic to animals in any amounts used. Monkeys which need approximately two milligrams of calcium pantothenate a day have been fed one thousand milligrams a day for six months with no noticeable bad effects.

The idea that "if a little is good, more is better" certainly does not hold through an indefinitely wide range of minerals and vitamins, and it is possible to take too

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much of the trace elements or vitamins. However, if one avoids eating a handful or more capsules at a sitting, the danger is negligible. Of course it is undesirable merely from the standpoint of economy to take a large quantity of expensive material when a small amount will suffice. Prescriptions or dosages set by competent individuals should always be followed.

# 3

## The Importance of Individuality

AT THE TIME the first atomic bomb was being dropped on Hiroshima, I was in the midst of writing a book entitled *The Human Frontier*, in which I developed the thesis that a substantial amount of money and scientific effort should be devoted to the problem of understanding people—*real people*, not the statistically average man—and that following such a policy would be of tremendous value in solving almost any problem in which human beings are involved.

In view of this conviction it seemed appropriate, since it is not feasible to learn everything about everybody all at once, for me to select some concrete problem to which the idea could be applied with hope of success. After discussion with colleagues and others, it was decided that the most promising immediate subject was *alcoholism*, and that a study of real people in connection with this problem—whether medical or moral—would probably be fruitful. As the research has developed, it

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has become apparent that alcoholism is tied up with *individuality in nutrition*.

As soon as we admit that there are differences between people and turn our attention to them, we are forced to recognize the fully established biological fact that some differences are inborn. There has been an almost universal neglect of the consideration of inborn differences, even in the medical profession. Currently there is a tendency to think of hereditary *differences* as being equivalent to hereditary *defects*—a point of view which is not sound. Because one was not born with the potentialities of a mathematical genius or the musical capabilities of a Mozart, it does not follow that he is *ipso facto* defective. It is by no means essential that we all be mathematicians or composers. Brunettes, blondes, and redheads can each be beautiful without forcing others not in their group into the limbo of “defectives.”

The medical profession has tended, understandably, to say, “If a disease is hereditary, we can do nothing about it—people cannot go back and choose their ancestors—hence we will assume a positive approach and do what we can on the assumption that the diseases have an environmental origin. *That* we can do something about.”

This line of thinking has led to an oversight, namely, of the fact that diseases which have a hereditary origin may nevertheless be affected by treatment, and that *knowledge regarding the inheritance may offer a key to the mode of treatment*. Knowledge of facts—no matter if at first blush they seem unpleasant facts—can pave the way to progress, and it is difficult to find a substitute for the truth.

So in our approach to the study of alcoholism we accepted at the outset the biological fact of inborn differences and sought to see in what way, if at all, they could be involved.

It is well known that people have inborn differences in their potentialities for growing big bodies, big feet, big hands, and so on, and that even the shapes of their heads, hands, legs, noses, ears, eyes, and other organs are determined by heredity. What is less obvious but probably more important is the existence of inborn differences with respect to the size, shape, and activity of their internal organs, including the hormone-producing glands such as thyroids, adrenals, and pituitaries. These endocrine glands actually do differ materially in size, shape, and make-up from one individual to another.

We were not concerned with the problem of how people *in general* become alcoholics—because they do not—but were at the outset interested in why certain individuals become alcoholics and other individuals do not. We suspected that the inheritance of a particular pattern of endocrine-gland activities, for example, could be responsible for alcoholic tendencies.

There are, however, other perhaps even more subtle ways in which inborn differences exhibit themselves, namely, in the fundamental body chemistry of the individuals concerned. It has long been known that certain rare individuals excrete in their urine a chemical which causes the urine to turn black on standing and that this characteristic is hereditary. Other relatively rare individuals have an inherited inability to produce hair, skin, and eye pigments and are known as albinos. Others excrete substantial amounts of certain amino

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acids and other specific chemicals in the urine because of inborn characteristics.

It has also been common knowledge for a long time that bloodhounds can tell one person from another by the smell of the chemicals each produces. Our laboratory studies have placed this ability of a bloodhound on a more scientific basis by demonstrating that individuals, as a rule, possess salivas and urines which are distinctive in their chemical content.

All of this means that the body chemistry of each person is distinctive, that we are not identical with each other in this respect. In recent years we have come to appreciate this unquestionable fact, and in addition we have learned something about how these differences are inherited.

It has been mentioned that, in order for us to live, many chemical reactions must be occurring continuously within the body. In order for them to take place rapidly enough to support life, there must be produced by the body (from its food, of course) many hasteners (enzymes) which promote specific reactions. Now, as has been pointed out, the potentiality for producing these hasteners resides in the fertilized egg cell. All human beings have the potentialities for producing the very same hasteners, and to that extent our body chemistries are alike. We must have, at least in the main, the same chemical reactions taking place in our bodies.

The body chemistry of other mammals may differ significantly from that of human beings. For example, the original fertilized egg cell of a rat has the potentiality of producing hasteners essential to the manufacture of ascorbic acid (vitamin C). Human fertilized egg cells

do not have this potentiality. As a result (since vitamin C is essential to both rats and humans) human beings must have throughout life a continuous supply of ready-made ascorbic acid in their food. If we fail to get it at any stage in our lives, we will surely die. Rats, on the other hand, can make their own ascorbic acid (it must be present in their bodies), and it does not matter at all to a rat whether its food contains ascorbic acid or not. Rats do not develop scurvy as a result of dietary ascorbic-acid deficiency; humans do.

If the body chemistry of human beings is broadly the same from individual to individual, with the same hasteners and the same chemical reactions, how can there be important individual differences? The answer to this question is crucial. Individual human beings differ one from another in the *degree of effectiveness* with which they carry out the various reactions. It was noted earlier that human bodies can use fat (as well as other things) as a fuel. Actually we differ considerably in the *extent* to which we can use fat. The nursery rhyme about Jack Spratt and his wife cites an extreme example which should not be taken literally; even Jack Spratt can eat some fat.

The potentialities for producing the characteristic and numerous hasteners are present in every fertilized egg cell of human origin, but the potentialities are not equal in degree. Some hasteners are produced more readily by one individual than by another, and each of us has a pattern of efficiencies which is distinctive. We all carry forward the same chemical reactions in our bodies, but the speeds (efficiencies) with which the individual reactions are promoted differ for each of us.

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Many observations fall completely in line with these conclusions. Whenever drugs or medicines are used by human beings, the required dosages are different for different individuals. In the use of anesthetics, for example, the anesthetist must watch each patient carefully to give enough, but not too much. The amount required by different individuals varies greatly. If anesthetics could be given in a cook-book fashion—the same for everyone—there would be no need for specialists in this field. As matters stand, however, if anesthetics were given to everyone alike, many patients would die because of too much, and many others would be ineffectively anesthetized because of too little.

Similar differences may be observed in connection with such commonly used substances as coffee and tobacco. Some individuals can drink black coffee and then go to bed for a good night's sleep; others are consistently kept awake by even a little. Of course, psychological suggestion may enter into the picture in certain cases, but the fact remains that some people are much more sensitive to caffeine than others. Caffeine is sold in drug-stores for the purpose of keeping people awake who want to drive long hours at night, but it is much less effective for some than for others. It is important to note that this variability with respect to caffeine is not unique. It is true of all other drugs, too.

Nicotine is notoriously variable in its effects on human beings, although actually it is not nicotine that is variable—it is the people who vary. Because of differences in body chemistry some persons can tolerate larger and larger quantities, while others are unable to adapt to its use at all. Some are poisoned by tobacco so that

they contract serious diseases of the blood vessels (Buerger's disease) and of the eyes (tobacco amblyopia), but others can use it, even heavily, and live to a ripe old age free from all such afflictions.

Much contention and ill will (and slowing down of progress) results from the tendency to judge others by ourselves, without knowledge of the differences that exist. In the medical field, progress has been greatly retarded through failure to recognize that in every segment of the population wide variability is the rule. This variability needs to be studied and made a basis for treatment.

The use of alcohol has occasioned great misunderstanding and bad feeling. Those who dislike and disapprove of alcoholic beverages cannot understand those who like them, and vice versa. Persons who drink alcoholic liquors moderately and pleasurabley can understand neither those who abstain nor those who drink to excess. Probably no one who is not an alcoholic himself can fully appreciate the terrific craving that alcoholics find impossible to resist.

Actually people react to alcohol, as they do to other drugs and chemicals, in a highly variable fashion. Some are naturally protected from drunkenness and alcoholic addiction by the fact that when a small amount gets into the stomach, pylorospasm and vomiting rid the body of it. Some require as little as 0.05 per cent alcohol in the blood to cause drunkenness, others can remain sober with as much as 0.40 per cent, almost if not quite enough to kill certain individuals.

Some people can burn alcohol much more rapidly than others, just as in the case of fats; and some can

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tolerate small quantities injected beneath the skin, whereas others cannot. Drunkenness causes some to be quarrelsome, others to get affectionate; some to become sad, others happy.

"Acute pathological intoxication" is a special condition which a few individuals experience. It should not be confused with ordinary intoxication. When it occurs, the individual may, even as the result of relatively small liquor consumption, go berserk and commit all sorts of violence until he is overpowered and brought under control. After the spell, he takes a long sleep—perhaps twenty-four hours or more—and wakes up not remembering a thing that happened during the attack.

Liking or disliking the taste of alcohol is also a matter of great variability. It was found in experiments at Johns Hopkins University that an appreciable percentage of young children (about 8 per cent) liked alcohol even in concentrations up to 50 per cent the first time they tasted it. Others disliked it even at low concentrations. The ability of people to adapt themselves in such matters has been greatly exaggerated. The mere liking of the taste of alcohol is not of itself the basis for alcoholism, because some alcoholics even after many years of drinking still do not like the taste.

The drinking tendencies of people differ enormously. Superimposed on the psychological differences are associations, religious training, economic status, and other factors. Some who abstain from liquor do so for physiological reasons—they like neither it nor the effect that it has on them. Some drink moderately for physiological reasons—they tolerate some but not much alcohol, and their appetite for it does not increase materially with

continued use. Some drink heavily without becoming incapacitated. One case is recorded of a man who lived and conducted his business until he was ninety-three, all of the time during the last sixty years of his life drinking a quart of whiskey every day! Certain individuals are periodic or spasmodic drinkers—they imbibe freely for a time, then “lay off” and remain sober for weeks or months. For some unknown reason the craving for liquor develops periodically.

The most serious cases of alcoholism are those in which the individuals are wholly unable to curb their appetites; they continually drink to excess (or do so periodically) and are incapacitated for any gainful occupation. If they become alcoholics at an early age—say before twenty-eight—there has been up until quite recently no hope for them. The urge is so strong that they cannot resist, and they drink themselves to death. Until our work was done, the alcoholic had two choices: to abstain entirely or to drink himself to death. Only those who have become alcoholics later in life have usually been able (often through the help of Alcoholics Anonymous) to abstain continuously.

When we attempt to classify alcoholics, we find that they do not fall into clear-cut, distinct pigeonholes. There are many varieties and all gradations in between. Certainly one of the serious problems concerns the person who has alcoholic tendencies; he drinks too much and too often with too little control, yet he does not regard himself an alcoholic and would not think of consulting either a minister or a physician. Such individuals may be greatly helped by the treatment which is outlined in a later chapter.

# 4 Specific Hungers and Cravings

IT WILL HELP us to understand alcoholism better if we consider some of the physiological appetites and cravings that have been demonstrated and about which we have more specific information.

The hunger for food itself is interesting in that it serves as an automatic controlling mechanism in persons who, fortunately, have little tendency to lose or gain weight. These individuals do not need to weigh themselves periodically or pay any attention to how much or what they eat; their physiological response to food is satisfactory for perfect regulation. Indeed, they would have great difficulty in deviating from their usual food consumption.

There is much that is automatic about our drinking of water. When we exercise freely, we perspire (some persons a great deal more than others) and lose water from our bodies. This causes our tissues to become somewhat dehydrated. We do not have to go to a physician and have tests made to prove this to us. The sensation of

dehydration is most pronounced in our lips and mouth, through which we become acutely aware of thirst and develop a desire to quench it. Automatically we drink enough water to keep our tissues from being deficient in this essential.

The appetite for salt is an interesting one. There are regions in Africa, I have been told, where salt is scarce and children would be more pleased with a gift of rock salt than of rock candy. Salt hunger is most commonly observed in cattle and other herbivorous animals. Their diet is such as to create a shortage of salt in their tissues and their blood. This shortage is transmitted to their mouths and tongues, and as a result they become acutely aware of it. Their sensitivity to the taste of salt is increased, and they begin wandering in search of a "salt lick" or an artificial source.

Salt hunger can be induced in rats experimentally by injuring the adrenal glands, which control salt excretion. Their appetite for salt increases; the ability to detect salt (in dilute solution) increases vastly. Anything that will restore the activity of the adrenal glands or furnish the regulatory hormone that they produce will abolish the salt hunger and bring back the sensitivity to salt to its former level.

Calcium hunger and phosphate hunger can likewise be induced in animals by stepping up or down the activity of the small parathyroid glands located close to the larynx. Calcium renders phosphate insoluble (and not usable), and vice versa. Calcium hunger (induced by eliminating parathyroid activity) is accompanied by an aversion to phosphate. The "wisdom of the body" knows that increasing phosphate consumption would lessen the

## SPECIFIC HUNGRERS AND CRAVINGS

already deficient calcium, so in the mouth a dislike for phosphate develops.

Animals can be made to develop certain specific "vitamin hungers" when a deficiency is induced. At the present time this subject has not been investigated as fully as it should be. It has by no means been demonstrated that animals develop a special taste for any and every vitamin—this has been shown in only a limited number of cases and under special conditions.

The observations with respect to desire for water, salt, calcium, phosphate, and certain vitamins all seem to be parallel. In each case the tissues become depleted in the substance involved, the mouth tissues become sensitive to the lack, and a craving for the substance develops—a specific craving to have the substance introduced into the mouth, not to be applied to some other part of the body.

If these special appetite mechanisms worked perfectly for humans and applied to everything necessary in our diet, the whole need for studying nutrition (or alcoholism) would cease, because we would automatically seek exactly what we must have. Some individuals undoubtedly have better-developed appetite mechanisms than others, but in no case can appetite or craving be regarded as a safe criterion for need. Some children will, if the opportunity offers, eat candy (a most incomplete food) until they are ill, thus depriving themselves of essential food elements. Experimental animals (rats) in laboratory experiments have been known to become highly deficient in certain minerals when the very things they needed were available to them all the time. They did not possess the necessary special appetite.

The need for studying nutrition is actually crucial, because special appetites do not always exist and our automatic processes cannot be counted on to prevent us from making serious mistakes. Automatic processes do keep us from making certain blunders, but the application of intelligence in the choice of food is still necessary.

Special appetites can be beneficial, but they may be perverted and harmful, as for example in the opium eater and in the occasional diabetic who has an intense craving for sugar, the very thing he cannot utilize. The craving of the alcoholic for alcohol may be regarded in the same way. It very likely has a physiological basis just as all the other cravings that we know about, but it is a perversion. Physiologically, alcohol is not what the alcoholic really needs.

# 5

## Animal Experiments

IT WOULD BE DIFFICULT to exaggerate, especially in fields related to nutrition, the importance of animal experiments in the quest for a better understanding of human beings. The results of animal experimentation cannot always be interpreted directly in human terms, but they are always suggestive and often are fully corroborated later by human experience. Most of what we know about scientific human nutrition was learned from studying first the nutrition of rats, guinea pigs, dogs, and other animals.

Our experiments dealing with alcohol consumption by laboratory rats and mice have been extraordinarily suggestive as well as clear cut. For this study, animals were placed in individual cages and provided with two drinking bottles, one containing water, the other 10 per cent alcohol. The animals had free access to both bottles, the positions of which were switched daily so as to make

a deliberate choice necessary, and a record was kept of the amount consumed from each bottle.

The animals used at first were ordinary white rats—not closely inbred—and were kept on commercial stock diets. An innovation in our experiments was the fact that we were interested in the behavior of the individual rats and were not particularly concerned with average behavior.

Rather unexpectedly we found that the rats showed a high degree of individuality and variation. Some drank the alcohol solution freely from the first time it was offered and continued to do so as long as the experiment continued. At the other extreme was one rat (out of a rather small group) which was a teetotaler. In spite of the fact that the alcohol was in front of his nose every day, he deliberately shunned it and chose water. Another rat in the group drank very moderately—just enough that we could be sure he was drinking—without increasing his consumption.

Other rats drank very little at first, but after a month or two began to take more and more alcohol. Others drank little at first, but within two or three weeks began to drink more heavily. Some rats drank spasmodically—heavily for a day or two, not at all for a while, and then heavily again.

That these variations in reaction toward alcohol were due to inborn differences was strongly indicated by the fact that closely inbred strains of mice and rats were found to drink relatively uniformly (the inheritance within such a strain is closely similar), whereas rats and mice not closely inbred (possessing wider differences in inheritances) showed wide variation. Also, each group

## ANIMAL EXPERIMENTS

of animals tested (from different colonies) showed characteristic differences which must have been due to genetic differences.

When animals from the original colony were placed on marginal diets—lacking adequate amounts of various B vitamins—the differences tended to disappear, and within a short time all the animals were consuming alcohol at a fairly high level. When animals from the same colony were placed on abundant diets—diets containing plenty of all the nutrient elements needed by rats—and were given a choice between water and 10 per cent alcohol as before, none of them drank appreciably.

A follow-up of these experiments consisted in placing rats on marginal diets, thus inducing them to drink alcohol at a high level, and then dosing them with the vitamins which they lacked. When the right combination of vitamins was given, the alcohol consumption dropped overnight and the animals ceased to drink as long as the missing elements were supplied.

A highly important observation was that *different animals do not respond to the same vitamins*. A mixture of ten B vitamins given by mouth was completely effective for some of the animals and permanently abolished their appetite for alcohol. But a considerable number still drank after this mixture was administered. When vitamin B<sub>12</sub> (anti-pernicious-anemia vitamin), which began to be available in our laboratory at this time, was administered in addition to the other B vitamins, about two-thirds of the rats which had not previously responded ceased to drink. When other additions were made to the diet, one after another, more rats were "cured." The most elaborate mixtures cured the most rats.

The only reasonable conclusions to be drawn from our findings are these:

(1) Mild nutritional deficiencies induce alcohol consumption in rats, and elimination of the deficiencies causes the appetite for alcohol to be abolished.

(2) Different individual rats (in an ordinary colony), all eating a stock diet, may be deficient to different degrees and in different food elements. Some, indeed (the teetotalers), are not deficient at all. Different deficiencies contribute to the production of an appetite for alcohol.

Subsequent experimentation has corroborated these findings, and the results emphasize the importance of eliminating *all* deficiencies if the appetite for alcohol is to be permanently abolished. In rats deficiencies of one or more of several vitamins, thiamine ( $B_1$ ), riboflavin ( $B_2$ ), calcium pantothenate ( $B_3$ ), pyridoxin ( $B_6$ ), and vitamin  $B_{12}$  are important factors in the production of alcohol appetite, but other vitamins and nutritional factors (including some unknowns) play a part, too. In treating animals on marginal diets, we have found abbreviated mixtures (containing few nutritional elements) *not* to be effective in abolishing the appetite; the more complex mixtures are unquestionably effective for more animals.

# 6

## The Genetrophic Concept

"GENETOTROPHIC" may seem a formidable word. It carries the combination of two ideas—"geneto" refers to genetics or heredity, "trophic" to feeding or nutrition. It is our conclusion, based in part on findings to be reported in later chapters, that alcoholism is at least in large part a genetrophic disease, that is, one which stems from *both* an inborn or hereditary trait *and* nutritional deficiency.

The hereditary trait which predisposes toward the disease is the possession of unusually high requirements for certain food elements. These make the individual vulnerable; food as ordinarily chosen is liable not to supply enough, especially when alcohol is consumed; deficiencies result and a craving for alcohol is developed. But if the individual with this hereditary trait is able to get—by any available means—plenty of all nutritional elements he needs, then the disease does not appear, and the hereditary trait which otherwise would be damaging is completely overcome. It is as simple as that.

Let us go back to the consideration of the fertilized single cell which is the starting point of each of us. In it are genes, the carriers of heredity, some of them carrying the potentiality for producing specific hasteners or enzymes essential for life. In some cases one gene appears to be concerned with the production of one enzyme.

As human beings, we have all the genes necessary to carry out the reactions which are characteristic of our species. But conclusive evidence shows that "partial genetic blocks" commonly exist. The potentialities for producing certain enzymes are not lacking, but are partially blocked, with the result that these particular enzymes are produced slowly and with difficulty—in other words, ineffectively.

Genes cannot furnish raw materials out of which enzymes are built; these materials must come from nutrition. Specifically, what raw materials are needed? Among the most characteristic constituents of enzymes are vitamins and minerals. If plenty of the raw materials out of which enzymes are built is furnished by nutrition, the process is speeded up and the effect of a partial genetic block, if present, is completely overcome.

A person who is subject to genetrophic disease is one who has, by heredity, certain partial genetic blocks (or something that works in an equivalent fashion) which makes it necessary for him to have larger amounts than usual of certain nutritional elements. He is more prone to have deficiencies than would otherwise be the case, and nutrition for him is a far more exacting problem than for most of his neighbors who ordinarily remain well. If such an individual is given plenty of all

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the nutritional elements he needs, however, he may be just as healthy as anyone else.

That unusually high requirements for specific vitamins exist among individuals in the general population is amply borne out by many observations. A recent study of the thiamine (vitamin B<sub>1</sub>) requirements of fifteen individuals indicated that while three appeared to require about 0.5 milligram per day, eight required about 0.8 milligram, two about 1.1 milligrams per day, one about 1.3 milligrams and one about 1.5 milligrams. Here we see even in a small group of fifteen people a threefold range in requirements. If the groups had been larger, the range undoubtedly would likewise have been wider.

Among my acquaintances is a scientist who has an extraordinarily high thiamine requirement. Subject to cruelly severe headaches and other difficulties, he found that currently available capsules containing a mixture of B vitamins gave him great relief. Not content merely with relief, however, he investigated further to discover what specific ingredient or ingredients were responsible. He had doses of the separate components of the capsules compounded individually and took them one at a time without knowing at the time what he was getting, so as to avoid the power of suggestion. By this means he was able to identify thiamine as the effective substance. Every time he took a capsule containing it, he was relieved, whether he knew the capsule contained thiamine or not. The other substances did not help. He found it necessary to take large amounts of thiamine daily—many times what is commonly considered adequate—in order to correct the difficulty.

Another friend of mine discovered somewhat by ac-

cident an unusually high requirement for calcium pantothenate. This person had been a lifelong sufferer from constipation. As soon as calcium pantothenate was supplied in abundant amounts (for another reason), the constipation disappeared completely, but returned when calcium pantothenate was not taken regularly.

In view of the fact that various vitamins (the B vitamins particularly) are needed by every cell and tissue in the body, it is not surprising that a deficiency can cause trouble of almost any type anywhere in the body.

The range of individual requirements in human beings has not been investigated except for thiamin, and this is only a limited way as indicated above. But numerous observations in animal experiments show that animals from an ordinary colony have widely different individual requirements. In fact, special strains of rats and chickens have been bred which have on the one hand *high*, and on the other hand *low*, requirements for certain common vitamins. Individual chickens (about 2 per cent of the flock studied) have developed a deficiency disease (perosis) even when their diets contained plenty of everything needed by other chickens in the flock.

Unusually high individual requirements are not limited to vitamins. It is found that when cattle are allowed to graze on wheat, a certain few develop "wheat disease" (a paralytic condition) and that these particular animals are not getting enough calcium. When calcium is administered, they recover. The other animals evidently get enough calcium from the very same diet; their requirements are not so high. A similar condition exhibited by a few animals under different circumstances is known

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as "grass disease" and is due apparently to a high requirement for magnesium.

It should be noted that this genetotrophic concept has far-reaching implications. If, as is probably often the case, individuals are vulnerable and susceptible to disease because of heredity, that fact need not condemn them to disease. The proper adjustment of their nutritional intake may completely obviate the difficulty.

This idea places more importance than ever upon nutrition. When it is realized that nutrition includes everything we take into our bodies (except water, oxygen, and some light and heat energy), it is not surprising that it should be the key to health. In order to be an effective key, however, it must be studied and applied on an individual basis. We must not neglect inborn differences and assume that we are dealing with the hypothetical average person.

There is reason to believe, on the basis of this genetotrophic concept, that whenever a new individual comes into being (in the form of a fertilized egg cell) he brings with him a nutritional problem which is somewhat unique. Of course, like all other human beings, he needs calcium, iron histidine, tryptophan, thiamine, pantothenic acid, ascorbic acid, and all the other necessary substances. But the *amounts* needed of each are distinctive for him as an individual. If he has no need that is unusually large, he may remain well and resistant to disease all his life without much attention to his food. If, however, his requirements for one or more specific vitamins, minerals, or other food elements is higher than usual, he may have difficulty feeding himself in an adequate manner. If this augmented need is for some sub-

stance which is still undiscovered or something not yet recognized as being important, then the individual had better pray for the success of biochemists who are trying to unravel such secrets.

The day will come when physicians will be able to test their patients to determine their specific needs and prescribe accordingly. But the tools for doing so are not well developed yet and the job at present would be very expensive. Fortunately, in the case of some alcoholics it is not necessary to wait until they can be handled on an individual basis. Probably all cases can be treated more successfully when individualized attention to peculiar needs is possible, but in the meantime we shall describe in the following chapter a treatment which will benefit many of them.

# 7

## Treatment of Alcoholism As a Genetotrophic Disease

IN OUR ANIMAL EXPERIMENTS it was found that preventing deficiencies prevented alcohol consumption. In carrying over the principle to human beings, the ideal treatment would be one which would prevent deficiencies in the individual treated. But as pointed out in the previous chapter, it would be a most difficult and expensive task to determine the peculiar needs of each person. What, then, can be done practically and at the present time?

Fortunately, we can take advantage of the fact that excessive amounts of the necessary food elements are not likely to do harm and can give to every individual treated a wide assortment of nutritional elements, some of which will be likely to fill his special needs. Although at the same time he will receive a slight excess of other things, they will produce no bad effects.

The *amounts* to be given are highly important, as previous discussions have emphasized. To give "some" of

this or that, if the amount is too small, is substantially equivalent to giving none. It seems wise to assume in the case of vitamins that certain individuals have requirements of at least four or five times what is considered the average need. This assumption has been used as a general basis for determining dosage.

The question immediately arises, Why not encourage alcoholics to choose foods that are rich in vitamins and thus avoid the necessity of buying special preparations? The answer is simple. Especially in the case of B vitamins, *there is no food source rich enough to supply generous amounts of all*. For that matter, the only way to get a superabundance of any of them in food is to eat, for example, a great quantity of liver (or brewers' yeast), and even this would not supply a superabundance of all. The quantity of liver referred to above is not measured in terms of thimblefuls, but in terms of several ounces at least, every day. Eating liver, or any other food, day in and day out would soon pall (and would not supply everything needed anyway), and if the practice were widely adopted, the price of liver would reach astronomical figures. The plain truth is that there simply is not any natural food that will supply B vitamins in the amounts required by alcoholics. And even if there were, it is doubtful that they could be persuaded to eat it. Alcoholics, along with everyone else, owe a debt of gratitude to the chemists and manufacturers who have made vitamins abundantly available in pure concentrated form. It would not be practical to supply alcoholics, or anyone else undergoing treatment, every food element in superabundant amounts. There are too many food elements, and, what is more important, some of them

## TREATMENT OF ALCOHOLISM

are known to be needed in relatively large quantities. If an attempt were made to supply a superabundance of all, the treatment would constitute the whole food supply of the patients. This is not practical for many reasons, including expense.

In the treatment outlined below we have included those items which animal experimentation has indicated might be important for alcoholism and which can be given in capsule form, or otherwise, without inconvenience.

In the first place, the alcoholic is advised to eat good, nourishing foods, including high-quality proteins (meats), dairy products, vegetables, and fruits in accordance with the best nutritional knowledge. The diet ideally should also include one tablespoonful of corn oil (Mazola oil) daily in salad dressing or other form.

In addition, we advise, through the co-operation of physicians, that special capsules be taken daily with meals. The composition of each capsule is as follows:

Thiamine	3.3	mg.
Riboflavin	2.67	mg.
Nicotinamide	10	mg.
Calcium pantothenate	10	mg.
Pyridoxin	3.3	mg.
Biotin	0.05	mg.
Folic acid	1.1	mg.
<i>p</i> -Aminobenzoic acid	11	mg.
Inositol	53	mg.
Choline	53	mg.
Vitamin B <sub>12</sub>	5	μg.
Vitamin A	6,667	units

Vitamin C	33.3 mg.*
$\alpha$ -Tocopherol	6.67 mg.
Viosterol	333 units

It is advised that three capsules be taken daily for the first week. If there are no contraindications, six capsules daily (two with each meal) should be taken the next week, and if there are still no contraindications, nine capsules daily (taken with meals) the third week and as long thereafter as may be indicated.

The composition of the capsules used has been dictated on the basis of (1) supposed needs, (2) indications with respect to importance in alcoholism, and (3) the practicality of including the items in capsules not too large to be readily swallowed.<sup>†</sup> Two items, calcium pantothenate and pyridoxin, have been introduced in larger relative amounts than is usual because in our experimental work they have been demonstrated to be of unquestionable importance. Furthermore, calcium pantothenate is a vitamin in which human bodies, in contrast to other species, are unusually rich, and for this reason a relatively high requirement may be anticipated.

Because of inborn differences between people, it is not possible to outline precisely what regimen each individual should follow. A few persons may experience

\* One of our medical collaborators has suggested that additional vitamin C up to a total of about one gram a day may well be taken. How valuable this suggestion is cannot be immediately determined, but the reasons for it are plausible.

† The capsules for use in clinical trials have been supplied gratis by Eli Lilly and Company of Indianapolis, whose aid we gratefully acknowledge.

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slight gastrointestinal disturbances as a result of taking the medication—which may call for a modification of the treatment or the dosage. Some of the patients whom we have observed are able to judge on the basis of their own reactions approximately how much they should take in order to bring about the best results. Such co-operation between patients and physicians is highly desirable.

When the matter of expense is important, it is suggested that limiting the treatment to the first eleven items listed on page 39 may appropriately be tried. Several individuals have responded satisfactorily to such a mixture.

It is obviously necessary for the person being treated to *avoid deficiency continuously throughout life*. It will do no good to recover temporarily from the tendency toward alcoholism and then slip back to the deficient state. How many capsules need to be taken daily in order to maintain a satisfactory condition after it has been achieved is something which must be determined individually on the basis of experience. For some persons, one or two capsules a day may suffice, but in our experience (which is obviously limited) three to six a day would be a more likely figure for a relatively severe case. This is where a sympathetic physician can be helpful, inasmuch as he can observe individual cases.

It is interesting to note that in New York beneficial treatment of alcoholics (abolishment of craving) has been reported to have resulted from the injection of adrenal cortical hormones. Although we have had no experience with this treatment, it seems likely that any effectiveness it may have would depend upon the same principle as our treatment, but through a different route,

for if nutritional needs are fully met, the production of hormones takes care of itself—it is a definite function of the body to produce hormones. It may be that by periodic and continued injection of the proper hormones, alcoholism can be kept in abeyance. However, a hormone treatment of this sort is fraught with difficulties: one is the rarity, cost, and general unavailability of the needed hormones; the other is the need of periodic injections. On the other hand, the materials needed in the nutritional treatment are completely available, relatively inexpensive, and are taken by mouth without discomfort. The needed hormones are then produced *within the body* in normal fashion. It seems probable at this writing that hormonal treatment will be found more valuable for acute alcoholism than for abolishing appetite for alcohol.

A large number of afflicted individuals will be benefited by the nutritional treatment outlined, but obviously it cannot be the complete answer in all cases. Individualized study may have to be carried further than it has been to date before even the majority can be treated with perfect satisfaction.

Possibly certain minerals enter into the picture in a manner not recognized at present. It seems certain that additional vitamin-like substances (which are not yet recognized or available) are factors of some importance. We have evidence of this fact in our laboratories, and scientific friends in Santiago, Chile, believe there is an unknown vitamin which acts rather specifically to counteract the appetite for alcohol.

Another possibility is that as individualized study proceeds, it will be found that balances between the various nutritional elements are important. In other

words, it may be found that the proportions listed on pages 39-40 are suitable for some individuals but not for all, and that some of the nutritional elements listed should, for certain patients, be diminished. Let us hope that this factor is not crucially important—if it is, the task will be much more difficult.

If judgments are based solely on our rat experiments, there can be no question that the treatment suggested is short of the ideal. In our original colony of rats we were able to "cure" 100 per cent by adding successively the various items listed. When we shifted to the study of rats from other colonies (with different sets of inheritances), we found that extending the number of supplements effected "cures" in more and more animals, but in one colony about 40 per cent were not cured by the supplements that did cure all of our original colony. As research proceeds in the months and years to come, we will have additional nutritional supplements to add to our list. Eventually, especially if individualized study progresses, we feel confident that the genetotrophic treatment of alcoholism will be successful in all cases.

The question may arise in some people's minds whether, in view of their nutritional value, vitamins should be classed as *medicines*. This, of course, depends somewhat on the definition. When we take quinine, it is definitely a medicine; it is bad for us, but it is worse for the malarial parasites which we harbor. We can endure its use; the parasites cannot. Vitamins are not medicines in the same sense; vitamin therapy consists of giving *more* of something for which we already have an absolute need. Of all the chemical substances which we can take into our bodies, the vitamins, minerals, and

other needed materials hold a unique place—they are nature's medicines and they are liable to be good for whatever ails us. If there is a deficiency anywhere in our bodies, nutritional elements will correct it.

It should be made clear to the layman that a specific chemical is definite and that an amount obtained from one source is *indistinguishable* from that obtained from any other source. Salt is salt whether it comes from the ocean, from a salt mine, or is made by neutralizing gastric juice and crystallizing the product. Thiamine is thiamine whether it comes from brewers' yeast, from rice polishings, or from a chemical factory. Ascorbic acid is ascorbic acid whether it comes from lemon juice, cabbage, green peppers, pine needles, or is made artificially from sugars.

It is not wholly unreasonable to think of human beings as a part of nature. If so, then whatever they make is in a sense *natural*. So far as a specific pure vitamin is concerned, there is no possible way of distinguishing one which is made by green plants, for example, from one made by human ingenuity in a factory.

# 8

## Results of Treatment

PHYSICIANS in about eight different localities from the Pacific coast to the Atlantic have to date participated in clinical trials involving the treatment outlined above. These separate trials have for the most part been limited in scope, and the respective clinicians will publish their own reports when the studies have been completed. Although I have received irregular and informal reports from them, I am, of course, not at liberty to publish their findings for them and can register here only my general comments on the basis of what I know.

However, a number of alcoholics have also been treated under the direct observation of my associates or myself. From these trials I am convinced of the essential soundness of the treatment and of its success in its present form for many alcoholics. For some, success seems complete; for others, incomplete.

There are many obstacles in the way of treating al-

coholics; they often do not recognize their plight, nor do they always want to be "cured." Alcoholics, even though there is nothing disagreeable about the treatment (except for the daily swallowing of fair-sized capsules), are liable to discontinue treatment after a week or so unless there is someone who has faith in the treatment to encourage them continuously. Of course, the treatment cannot help them unless they follow it for a reasonable period, or have the capsules administered to them surreptitiously in their food and/or drink. In the sense that a number of alcoholics have failed for one reason or another (mostly unknown) to take the treatment for a reasonable period, there have been a substantial number of failures. It is my belief that when the treatment has had time to become established and what it will accomplish becomes generally known, there will be less difficulty in inducing alcoholics to follow through. Of course, there are derelicts and "drunks" who apparently have no substantial desire to be anything else, and the only hope for curing them would be through some form of compulsory medication.

One of the factors which enter into the problem of treating alcoholics is that oftentimes, in spite of its devastating effect, the drinking of liquor is one of their main sources of pleasure. For them to eliminate this enjoyment from their lives would be like surrendering an arm or an eye. Each persons gains satisfaction in accordance with different patterns: music, poetry, eating, sex, and so on are important in different degrees to each individual. For some alcoholics (but not all) drinking is a prime pleasure, regardless of any compulsion. As soon as it is recognized that moderate drinking may not be out of

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the question—not for all alcoholics at least—then some who would otherwise reject the treatment will gladly accept it.

The treatment has been given to alcoholics with the hope that it would abolish the craving for liquor, or at least lessen it to such a degree that it could be brought under control. Continued application has in all cases resulted in either partial or complete success. Some of the successes have been so dramatic and conclusive that even failures could not cancel out the benefits—especially as some of the successfully treated patients are outstanding members of society.

The time which must elapse between the start of the treatment and the lessening or the abolishment of the compulsion differs with individuals. In some, the effect may be almost immediate—in a week or two—in others, two or three months may be required for marked effects to be observed. Certainly if I were an alcoholic undergoing treatment, I would give it a six months' trial at least before drawing negative conclusions. The chances are, however, that favorable results will be observed much sooner.

The first patient to undergo our treatment was a man in his middle forties who had been an alcoholic for ten years and a heavy drinker for twenty. He had tried to get help from psychiatry and from Alcoholics Anonymous without success, had been forced out of his home, and was desperate when I first interviewed him. His craving for alcohol was accompanied by such definite symptoms that he assured me that he could tell *without the slightest doubt* if his craving were abolished or materially abated.

He was given no sales talk about what could be done for him (we didn't know) and no suggestion as to what changes he might conceivably expect. He took the treatment and reported back to us periodically any changes *he* observed. In one month he reported that he could now go to bed earlier and sleep better and he could tolerate coffee without previously having had an alcoholic drink (which he could not do before). The improvement in sleeping we regarded as a favorable sign (though we had not anticipated it) because alcoholics frequently suffer from insomnia, and the boredom of wakefulness contributes to their desire for drink. About this time he began to feel sure that he was being benefited.

After four months of abstinence accompanying the treatment, he came to us, told us that he *knew* the compulsion was gone, and that he intended to demonstrate it by going to a beer parlor, drinking several bottles of beer, and returning to us sober. Beer was his favorite drink, but one bottle—always followed by another and another—had in the past been enough to send him off on a long and devastating spree.

We regarded his experiment as dangerous—we had thought total abstinence the best goal for an alcoholic—but he insisted that he knew what he was doing and that the compulsion was gone. So he carried out the experiment, after telling us in advance when it was to be performed, and came back to us the next day perfectly sober, ready to relate his experience. He said that after the first two or three bottles he deliberately forced himself to drink more—he did not crave or desire more, but wanted to put himself to a severe trial. Having passed this initial test with such marked success, he continued to

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drink two or three bottles of beer daily, overjoyed that he could drink as he had always wanted to—moderately.

This continued for three months' time; he began to be sure of himself, and when he ran out of the capsules we were furnishing, he did not ask for more. He regretted it later, however, when the compulsion returned and he went on a spree. After this episode, he applied for more treatment, which again abolished his compulsion, and he continued to drink beer moderately as before. At Christmastime a former drinking associate came to town, and he with his companion *deliberately* got drunk. He assured me that there was no compulsion whatever about it, that it lasted only a day, and that it bore no resemblance to one of his typical experiences of times past. After a period of many months since he began the treatment, he is still drinking beer moderately and has lost his compulsion. This individual probably constitutes the first case on record in which an alcoholic has become a moderate drinker.

Another example of which I have personal knowledge is a prominent lawyer in one of our larger cities. Although he is not a typical alcoholic (if there is such), his case is strikingly interesting for other reasons. He is about the same age as the first man, and his drinking had begun twelve years before when he was rejected for life insurance because of high blood pressure. He sought advice for this condition at a prominent clinic and was advised to have an operation (sympathectomy) to correct his condition, but he declined to do so. In lieu of this, he was advised to take sedatives (barbiturates) as needed to quiet his nerves. As time passed, he found himself more and more dependent on them. Then he

began to drink heavily, and on top of his other trouble he became an alcoholic—he imbibed every day, became intoxicated more than once a week, and had no control over his drinking. In addition to alcohol, he had taken one hundred one-and-one-half-grain capsules of seconal weekly (fourteen a day) for many weeks, and as a result was in extremely bad shape.

In a surprisingly short time after the nutritional treatment was instituted, his condition vastly improved, and in a few weeks he left the hospital a transformed individual both in general health and in loss of craving for alcohol and for sedative. His blood pressure most surprisingly had dropped from 180/120 to 130/90. He returned to his work, has enjoyed excellent health during the ten months since he left the hospital, and has been so free from symptoms that he has not even consulted a physician or had a blood-pressure reading taken. He still uses the nutritional supplements, and he drinks socially on occasion, but has lost all craving for alcohol and has gained twenty pounds, bringing his weight up to a little less than average for his height.

A case in which the effects of the treatment were very prompt in appearing was that of a young married student who came to me for help. Since the war he had come to the point where he could not leave liquor alone. He tried moving to an entirely new environment, hoping that he might be able to control himself there, but in a short time he was as bad off as before. He was put under treatment, and in the short space of two weeks or less the compulsion was gone and he was able, *following his own inclination*, to spend an hour or more with one bottle of beer and then leave the beer parlor

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without wanting more. His condition has remained unchanged for several months.

Another young man was such a confirmed and consistent alcoholic that he could not be trusted out of the sight of a friend with whom he lived. Two weeks after the treatment started, his progress was remarkable. He lived in a household where highballs were often served before meals and continued his practice of drinking with members of the family, but there was none of that awful craving for just one more, and none of that terrible urge to "go out on the town." A week later without any urging or pressure (except that originating in his internal physiology) he twice served guests rye and ginger ale and took for himself only ginger ale.

An interesting by-product of the treatment was a marked improvement in his muscular co-ordination and sense of balance. Previously whenever he had drunk even a couple of cocktails, he had had great difficulty in bringing his knife and fork together to cut his meat. He had often stumbled over furniture and on various occasions he had fallen down, skinned himself, ruined his clothes, and knocked out two teeth. Since taking the treatment, he has had a normal sense of balance and has been able to handle himself without mishaps.

Unfortunately this is a case in which success has not been complete. While the individual has shown a continued improved condition, after a few months he began to have lapses, and his alcoholism cannot be regarded as cured. His condition is complicated by epilepsy, and it is apparent that while he has received some of the nutrients in which he was deficient, elements which need to be supplied are still missing.

A spasmodic drinker is among the cases treated. Of this case, unlike the other instances cited, I have only secondhand knowledge. Before each of his periodic sprees the subject always got nervous and jittery, so that his wife could tell when he was due for a disappearance and a siege in a hospital. Subsequent to taking the treatment, however, the jitters did not appear; he continued to be well; he has been able to drink socially, but has had no compulsion to become intoxicated.

When an alcoholic merely ceases to drink as a result of treatment (and this has happened in some of the cases), questions always occur: "How long will he quit?" "Hasn't he ever quit before?" "Isn't the effect due to suggestion?" Because these pertinent questions cannot be answered in a conclusive manner, we have not placed much reliance on the mere cessation of drinking, though doubtless for many alcoholics this is the end result most to be desired. The abolishment of craving and the ability to drink moderately without going on a "binge" are such unusual results—wholly without precedent in the field of alcoholism—that we do place great importance on them.

The total number of alcoholics who have so far taken the treatment for a reasonable period of time (about two months) is something over twenty. Actually some of the co-operating physicians are experimenting in an unsystematic manner, and because the patients are alcoholics and often undependable, their records are not completely satisfactory. Hence it is not possible to give highly accurate figures. Of the approximately twenty who have been treated for a significant period of time, we know of no one who has not derived benefit, or at

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least has not seemed to do so. In some few cases patients have lapsed after a few months, but we do not know whether they continued to take treatment or whether the lapses were due to careless omission of treatment, as in one of our own cases. Because of the incompleteness of our information—and the fact that the treatment is relatively new—I am unable to state positively in exactly how many of the cases the treatment appears to be completely successful. My estimate is that the partial successes and the complete successes are about equal in number.

The difficulties of making a statistical evaluation of the results are illustrated by one of our own cases. The patient is a man of unusual ability who became absolutely convinced—on this point he was most emphatic—that his compulsion was completely gone. He felt so sure of it that he anticipated no danger whatever and drank as much or as little as he desired on all occasions. His financial situation was such that he did not need to work, his business ran itself except for minor attention on his part, and he had no regular duties. When time hung heavily on his hands, drinking was a way out of boredom, and he used it. As a result the net benefit to him has been dubious. We might classify his case as a complete failure—certainly not more than a partial success—and yet we believe that the treatment did for him practically everything we can hope for it to do—it abolished his compulsion. Its failure to do more was based upon his lack of diligence in taking the capsules and upon his not making the most of the freedom which he enjoyed.

The moral of this instance is that supplying nutritional needs (especially somewhat spasmodically) is

certainly not a means of eliminating all human problems. An unfortunate mode of life, bad habits, and mentally unhygienic surroundings may cripple an alcoholic to such an extent that abolition of craving is not enough to insure his leading a productive life. No alcoholic should minimize his own plight or the seriousness of his condition. Diabetics do not reach the point where they can forget about insulin or neglect to administer it. Many alcoholics will doubtless need to maintain the same attitude of alertness and caution throughout life.

The fact which gives us such great encouragement in connection with the human trials made so far is that the results parallel closely the clear-cut and unequivocal findings obtained with experimental animals. Some of the animals were "cured" with ten B vitamins given by mouth alone (the first ten items listed on page 39). Some of the alcoholics gained complete relief when only these items were used. Some animals temporarily shunned alcohol when given an incomplete assortment of supplements but drank again shortly thereafter. Some of the patients (unfortunately for them) have received temporary relief only, and this we think must be due to the lack of some needed item in the supplements.

People have developed an unfortunate tendency to think that a particular treatment will either alleviate a disease or fail to do so. If our basic findings are valid, our treatment of alcoholism in its present form is as certain to fail in particular cases as it is to succeed in others. If the results were different, if they were uniform in one direction or the other, our basic ideas would be seriously in question.

We cannot say that we have fully demonstrated in

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a scientific manner the efficiency of nutritional treatment and that there is no room for doubt or questioning. We can say that in view of the animal experiments, which are clear cut, the inescapable logic of the genetrophic concept, and the striking results obtained with many of the alcoholics who have taken the treatment, we are convinced of its essential soundness and efficacy. We hold the opinion that any alcoholic wanting help will do well to arrange with his physician for a trial—a trial which at worst can do no damage.

# 9

## Alcoholism Reinterpreted

PROBLEMS related to the consumption of alcoholic beverages are many but the central problem of alcoholism concerns the craving, periodic or otherwise, which *some people* experience. When this craving makes it impossible for them to control themselves, undermines their health, and leaves them unable to carry on the duties involved in a gainful occupation, then it is most serious.

We recognize that there are various reasons, psychological and otherwise, why people drink alcoholic beverages. Some like the taste, some like the effects, many drink because it seems the thing to do (social pressure), and many are driven to drink by domestic or other troubles, frustrations, and boredom. Such may find that alcohol serves as an anesthetic and gives them the illusion of a good time.

But the person who as the result of taking one drink

*must* take another and another, on and on, having no control over his own actions in the matter, is in our opinion in a different boat and is afflicted with a physiological urge which can receive really effective help only by physiological means. I have had such people tell me in times of sobriety—I remember one woman particularly—that home life was perfectly happy and that the only black spot was this terrible craving.

It has been known for some years that alcoholic excesses are liable to undermine health, for one reason because the person who imbibes much alcohol does not eat properly and fails to get enough of the proteins, minerals, and vitamins needed. Thus the fact that the excessive consumption of alcohol gives rise to body deficiencies has been recognized previously. Our work, however, indicates that the whole story has not been revealed. Not only does alcoholic consumption give rise to body deficiencies, but conversely *body deficiencies give rise to alcoholic consumption*. Typical alcoholics are the ones who are caught in the vicious cycle.

Distributed throughout the various peoples of the world are certain individuals who are vulnerable to alcoholism—and all degrees of vulnerability exist—by having unusually high requirements for certain nutritional elements and thus being subject to the corresponding deficiencies. These individuals are not equally distributed in various ethnic or cultural groups; they seem to be relatively rare among the Jews and relatively numerous among the Irish and Swedish.

Anyone who is vulnerable will escape alcoholism if for social, cultural, or religious reasons alcohol drinking is consistently avoided or held at a low level. A poten-

tial alcoholic does not become an alcoholic until he has been drinking rather heavily for a considerable period of time, usually several years. The drinking he does crowds out of his diet the nutritional elements he needs, and he becomes more and more deficient until finally the deficiencies make the craving so strong that he cannot resist it. There is something about alcohol that acts like pulling a trigger—when a person is in a deficient condition with only a mild incipient craving, the first drink sets off the craving and makes it more intense. This type of phenomenon is probably not uncommon: give salt-hungry animals a little taste of salt and they become ravenous for more.

If an individual is highly vulnerable, that is, if he has a very high requirement for some crucial element, then he may become an alcoholic very early in his drinking career. Some persons, in fact, because of ready availability and other conditions which favor alcoholic consumption, tend to drink excessively almost from the first. Age is a factor of great importance, as has been noted earlier. Thus the individual who has become an alcoholic before he is twenty-eight years of age probably has such a high degree of vulnerability that there is slight chance of his overcoming the deficiency with any food that he may eat. However, a treatment such as the one we have developed may furnish the deficient element in such quantities that the deficiency and the craving alike will disappear.

When an alcoholic goes on the "wagon" for a period of time, he begins to eat more food, and if he eats wisely enough or if his deficiency is mild enough, he may be able to overcome the craving or hold it down to a man-

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ageable level. Developing the right kind of psychological attitudes and keeping busy—both of which incidentally probably help him to eat more and more effectively—are important regardless of what ailments he has or whether he has any ailment at all. These are, as I have pointed out, significant elements in the Alcoholics Anonymous program. Of course what one eats is important. Refined foods, including sugar (like alcohol itself), tend to crowd out of one's diet the things that are essential. If an alcoholic is insistent upon boycotting the drug trade, he should make a thorough study (and application) of the science of nutrition. *Perhaps* by choosing the right foods in the right amounts he may be able to correct the deficiencies that are at the bottom of the trouble. However, individuals who become alcoholics early in life or who go to extremes in drinking, in any sense, probably will not be able to cure their condition without taking concentrated preparations compounded pharmaceutically.

Human beings have extremely complicated minds and personalities, and their reasons for doing what they do are never simple. Superimposed upon alcoholic craving (which we believe to be essentially physiological) are all sorts of psychological factors which need further exploration. However, we believe that in attacking the physiological craving, we are striking at the heart of the most distressing problem connected with the use of alcoholic beverages.

Since it is a matter of common concern, the question may be raised how morality enters into the problem of alcoholism. It is my opinion that alcoholics are responsible members of the human family and that they are

quite capable of immoral behavior. In many cases alcoholism may grow out of a devil-may-care attitude toward life and its responsibilities. Persons who never become afflicted with alcoholism, however, may have precisely the same attitude, and we would do better to follow the injunction, "Judge not . . . ."

I think that after an alcoholic has reached the point where he cannot resist liquor, his condition is better described as a *disease* rather than as a moral lapse, but I do not think we can absolve him from all responsibility for his actions from that point on. I think that alcoholics, at least the ones most worth saving, want to be regarded as responsible members of society. When and if there are alcoholics who know that there is help for them, yet prefer to remain confirmed drunks and not to accept the help, they are drags on society and are definitely culpable in their unwillingness to assume human responsibility.

Some persons would emphasize the *disease* aspect of alcoholism and exclude all consideration of morals, but it seems to me that in alcoholism, as in every situation involving the actions of human beings, morality is definitely concerned.

It would be unfortunate if the effectiveness of our treatment should cause anyone to abandon the principles and ideals of Alcoholics Anonymous. The need for some degree of humility and for the spirit of helpfulness persists even if one is fortunate enough to have alcoholic craving alleviated. Many factors enter into the conduct of an individual (alcoholic or otherwise) besides those concerned directly with his possession (or lack of possession) of alcoholic craving. Quite aside from their crav-

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ing, alcoholics are human beings and as such are amenable to the same sort of influences as other human beings. Religion, ideals, and principles may be potent forces in the lives of alcoholics just as they may be in the lives of non-alcoholics.

# 10 Other Genetotrophic Diseases

THE GENETOTROPHIC CONCEPT which we have outlined briefly in an earlier chapter may have just as important bearing on other diseases as it does on alcoholism.

There are many diseases for which the causes are relatively well known, particularly those for which some infective organism is definitely responsible. Even in these cases, however, the picture is not clear when one considers the variable susceptibility which people show. In the days when typhoid fever was common there were typhoid carriers—people who remained fairly well but carried the disease germs wherever they went (“Typhoid Mary” was a notorious example). There was something distinctive about the body chemistry of these individuals which made it possible for them to remain well and yet carry disease germs at the same time.

Many people have poliomelitis (“infantile paralysis”) who never notice it. There is something about the

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body chemistry of others, however, which makes them so susceptible that when they contract the disease they are liable to die or become crippled for life. Then there are still others whose reaction to it is intermediate between these two extremes.

Scarlet fever is a disease which may cause the deaths of children—one after another—in one family, but during the same epidemic children in other families may be only slightly ill. Negroes are not likely to get scarlet fever at all.

There can be little doubt that genetic factors are involved in the severity of such diseases. Are nutritional factors also involved? Nobody knows, but it seems an idea worth investigation. Possibly the person who is vulnerable to polio or to scarlet fever or to typhoid could be rendered invulnerable or less vulnerable if the nutrition, both prenatal and post natal, were modified to take care of special needs.

More interesting from this point of view are such diseases as arthritis, multiple sclerosis, rheumatic fever, gout, hypertension, insomnia, and rare diseases of obscure origin, literally too numerous to mention. Cancer is interesting from this standpoint, also, but the complications and technical aspects cannot be discussed here. Mental disease will be considered in the succeeding chapter.

It is a suggestive fact that in the case of several persons treated for alcoholism some other condition not specifically under treatment was markedly relieved. Take, for example, the case of the alcoholic whose sleep was much improved. Since that time a number of individuals have, for one reason or another, been given a

treatment similar to that recommended for alcoholics. In a number of instances it was found that without previous suggestion on our part, the patients' sleeping had been vastly improved. This result has been so consistent in some individuals that we cannot ignore its significance. We have formed the opinion (which, however, will have to be verified by actual trial) that many people who suffer from insomnia (but probably not all) would be benefited by the treatment which we have advised for alcoholics.

Hypertension merits special comment because it is a more serious condition. The one individual cited has gained remarkable benefit—to him it is most real and important. This does not mean that one hypertension patient after another will be completely cured by the simple nutritional means we have employed. No one knows definitely what the result will be until the method is tried, but I suspect that some few, at least, will find relief. As our knowledge in this field increases, more individuals will probably respond to modified treatments. If I were a sufferer from hypertension, I would certainly persuade my physician to prescribe nutritional treatment—just on the chance that I might get the same relief my lawyer friend experienced.

The genetotrophic approach to the so-called degenerative diseases—the kind that are more often associated with age than with youth—is especially promising. It seems probable that the machinery of the various parts of our bodies wears out as a result of poor cellular nutrition, and that our individual patterns of resistance to this wearing-out process are based upon our genetically controlled nutritional needs. Nutrition at different age

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levels is not necessarily the same, and for different organs at different ages there may be changes. If our organs and tissues could be continuously nourished equally well, we might approach the condition described in Oliver Wendell Holmes' "Wonderful One Hoss Shay."

The experimental nutritional treatment of certain diseases, particularly arthritis and multiple sclerosis, should be carried forward and developed at once. For these ailments the selection of nutritional elements would not necessarily be the same as for alcoholism. Mineral nutrition, for example, might receive more attention in the case of arthritis. Even if only a fraction of the sufferers were benefited, the results would still be worth while; they might pave the way for more complete success later. It will probably be some time before a substantial number of diseases will be conquered through making use of the genetotrophic concept. The idea is relatively new to physicians, and there is generally a natural and human resistance to anything new.

It would be unscientific in the extreme to claim that many diseases are curable by the nutritional means which we recommend. It is not unscientific, however, to make trials and find out. The genetotrophic concept compels acceptance on the part of experts. I have discussed it with many of the outstanding authorities in the world and have yet to find one who is inclined to doubt its general validity.

The only path to progress in the medical field is experimentation and trial. It seems clear that this new approach (to almost any disease whose origin is obscure) merits the widest use *and development*. In time we may find that substances which we do not now regard as

nutritional elements perform that function for certain individuals because of partial genetic blocks or their equivalent. Consequently the possibilities of the nutritional approach are almost limitless and altogether intriguing. There is and will be a growing emphasis on the constructive use in medicine of substances that nature uses.

# 11 Nutrition and Mental Disease

MENTAL DISEASE is certainly a major problem in this country, and common sense and decency demand that we seek every means to lessen its ravages as much as is humanly possible.

The genetotrophic concept offers great hope in this connection. There can be no serious doubt, on the basis of recent studies, that genetic factors (inheritance) are important. Trouble and frustrations may doubtless be precipitating influences, but some people can endure a great deal and retain their sanity while others crack up with comparatively little provocation. Do nutritional factors enter into the problem of mental disease also?

In searching for the roots of mental disease, a favorite hunting ground has been the early youth of the person involved. This type of search has been based consciously or unconsciously on the assumption that individual babies (that is, "normal" ones) arrive in about

the same condition and that if they later develop mental disease, it *must be* due to some events of early life that affect their minds.

This is no place to enter into a lengthy discussion of the merits or demerits of psychoanalysis with or without its various modifications. It is worth while, however, to call attention to certain undeniable *facts* which have a bearing on the problem. Sigmund Freud laid the foundations of psychoanalysis long years ago, before modern medicine as we know it had developed—before hormones, vitamins, X rays, genes, and viruses entered into medical thought. Consequently, whatever virtues psychoanalysis may have, it has not developed characteristically out of modern scientific medicine.

Although psychoanalysis is the basis of much that is done for mental patients, its successes have been largely in connection with relatively mild disorders, "neuroses." Treatment of severe mental disease generally involves the use of far more heroic measures: shock therapy, using insulin, metrazole, or electricity, or combinations, and brain operations such as lobotomies.

In the search for the roots of mental disease one hunting ground has been all but overlooked—the inborn differences that people have when they come into the world. It is our *conviction* that in this area are to be found the most important roots of mental disease. It is our *hope* that nutritional factors will be found to play an important part, because *if this hope is justified, it will to a degree be possible to control and prevent mental disease.*

It may well be that potential schizophrenics have in-born requirements for certain nutritional elements (per-

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haps even substances that remain obscure at present) and that as difficulties accumulate, these needs are accentuated to the point where the deficiency becomes severe and mental disease results.

There are several facts which bolster up this hypothesis: (1) It fits in with the genetotrophic concept which in its wider aspects makes sense; (2) brain metabolism, which inescapably involves minerals, vitamins, enzymes, and back of these the genes, is extremely active and crucial; and (3) violent mental disease has inadvertently been produced in people by nutritional deficiency *and has been completely cured by supplying the missing food element.*

The genetotrophic concept as applied to mental disease has never been tested for its validity. No one has assumed that the condition, at any stage, is genetotrophic in nature. No one has therefore proceeded to give to mental patients adequate amounts of a wide assortment of nutritional elements to see if improvement occurs. This remains to be done. It is a must.

In our Biochemical Institute laboratories at the University of Texas we are beginning to collect evidence which indicates that mental patients have inborn metabolic peculiarities that may be linked with their disease. Metabolism—in the workings of the combination chemical factory and combustion furnace that is within us—is unquestionably not taking place in our brains without a purpose. The metabolism in the brain, measured in the amount of oxygen used, is about one-fourth of the total metabolism of the body in an adult, and about one-half in a young child. Metabolically, the brain is the “hot spot” of the body, and any derangement of enzymes or

their constituent minerals and vitamins obviously would be expected to cause havoc.

The case for the importance of genetotrophic factors in mental disease is greatly strengthened by the fact that we know, without a shadow of a doubt, that *mental disease can be caused by a nutritional deficiency.*

Pellagra, which in the United States has been endemic in the South, is caused by a vitamin deficiency, primarily niacin deficiency, and is cured by supplying the vitamin. Simultaneously other nutritional deficiencies exist in pellagrins, and the victims usually are not completely healthy until these other deficiencies are also corrected. Accompanying pellagra there are hallucinations and other distressing symptoms which often must be classed as insanity or dementia. When a woman, for example, imagines that all her neighbors are conspiring to kill her, when she continually has encounters with imaginary animals of all sorts—not only *sees* but *feels* them—when she is violent and unmanageable and it is impossible to get her to pay attention to ordinary conversation or to follow any of the doctor's instructions, it does not take an expert to know that she is insane—suffering from a serious mental disease.

Such people have, according to medical records, been completely cured of the insanity within forty-eight hours by administration of niacin—the missing food element. After such treatment, the woman mentioned above is able to talk and act rationally; she can remember that she was crazy and is greatly relieved to know that now it is in the past; she knows what is being said to her, she acts accordingly, and in a few days will be

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in condition to return to her home and perform the duties of a housewife.

What more compelling evidence could one cite to prove that there is a connection between nutrition and mental disease?

Now, of course, the inmates of our mental institutions are probably not suffering from a simple niacin deficiency or from an ordinary deficiency in an easily recognized and familiar food element, otherwise they would be cured and returned to their homes. But it may be that they are suffering (because of an inborn high demand) from a combination of deficiencies or from a deficiency in a food element that is unfamiliar and untried. Their needs may be so great that no food will supply enough, and the necessary element in concentrated form has never been tried.

It should be obvious that since there are different types of insanity, no one lack will be responsible in all cases and many different nutritional elements may be involved—even ones that are now obscure. As mental diseases are extremely diverse in nature, nothing could be more reasonable than that they are linked up with distinctive metabolic patterns—these are characteristic for each of us.

Not only is a nutritional attack called for in the case of what is popularly called insanity, but it holds some promise even in the case of mental defectives—those whose mental development is retarded in some way. It has been known for about fifteen years that feeble-minded children of a certain type excrete a characteristic chemical (phenyl pyruvic acid) in their urine, a demonstration that there is a connection (in these cases

at least) between metabolism and mental defectiveness.

The possibility that nutrition of mentally defective individuals could be deficient somewhere along the line is a real one. This possibility has been enhanced by the fact that in recent years some success has accompanied the use of glutamic acid (one of the amino acids from proteins) in the treatment of mental defectives. While the results of feeding this chemical have not been phenomenal or spectacular, they have been definite. The intelligence level of many defective children has been raised materially through the use of this substance.

No one in a position to carry out the necessary clinical experiments has chosen to treat feeble-mindedness as a genetotrophic disease. No one has given afflicted children an abundant assortment of the common nutritional elements *plus glutamic acid*, which by itself has shown promise. In nutritional studies it has been demonstrated over and over again that a diet which is incomplete in only one respect is substantially as ineffective as one which is incomplete in a half-dozen ways. Perhaps an intelligent dosage with an assortment of vitamins together with glutamic acid would do a great deal for feeble-minded children. Who knows until it is tried?

It is interesting to note that glutamic acid is not one of those amino acids commonly regarded as essential in the diet of human beings. For some individuals, mental defectives for example, this substance may, however, be crucially important because of peculiarities in their metabolic machinery. The nutritional approach to disease is not limited to the use of dietary principles which are recognized as being essential for everyone.

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The tendency to think that all human beings, regardless of their inborn characteristics, should be "normal"—that is, fall into a common pattern of life—is probably an important contributory factor in precipitating mental disease, and a greater recognition of individuality would undoubtedly help them to avoid it. When people with quite diverse inborn traits are expected to eat alike, at the same times and the same food, sleep the same number of hours, and only once a day whether they like it or not, dress alike and go to the same schools to get the same kind of education, whether they like it or not; and fit into the social pattern that is set for them—when all these things happen the psychological friction often becomes too great and severe difficulties arise. One of these difficulties is mental disease. For the majority of the human population (those whose patterns of abilities and aptitudes are more usual) the regime may cause no serious trouble, but for those with unusual patterns, the effects may be disastrous.

Whatever the precipitating causes, there is ample reason to explore the physiological basis of mental trouble. Many observations point in the same direction. Not only is the metabolic rate in brain tissue many times as high as in most other tissues, but mental activities are greatly affected by physiological means. When a woman during menopause becomes almost insane (or quite insane) with depression, the right kind of hormone—the one she needs—may change the world from the color of indigo to rosy brightness. The hormone—a physiological agent—may make all the difference between a life worth living and a life which it seems appropriate to end—perhaps by jumping into the lake.

Recent studies at the Worcester Institute of Biology have strongly indicated that in schizophrenia—the most common type of insanity—the activity of the adrenal cortex (a hormone-producing gland) is impaired. This highly significant finding again points to the importance of physiological approaches to mental disease.

When anatomists and others in the past have looked (post mortem) at the brains of insane people and pronounced them free from defects, they revealed only their inability to see what was wrong. Actually, whenever a person is deranged mentally, *there is something wrong with the metabolic machinery*. It may take physiological or biochemical means to find out what is wrong, but the defect is bound to be there. More and more in recent years, all over the scientific world, biochemists and physiologists are beginning to get clues as to what the defects are and to appreciate that mental disease has a biochemical basis.

If mental disease has biochemical bases, it needs to be attacked biochemically. Hormone treatment when we have gained sufficient expertise may be an important factor. A nutritional attack is simpler and may bring about the same effects—a hormonal lack signifies the inability of a gland to produce enough hormone. What could seem more likely than that the gland fails to produce enough hormone on account of a shortage in the supply of some nutritional element—something for which, because of inborn characteristics, there is an unusually high demand?

A nutritional attack, as well as all other physiological attacks, needs desperately to be made on mental disease.

# 12 A Plea for Clinical Research

IT IS UNFORTUNATE that there is a great dearth of *clinical research along nutritional lines*, of which there is a striking need. This is the kind of research which, for legal as well as other reasons, only physicians can undertake.

In *The Human Frontier*, I called attention to the fact that for thirteen years, 1932-45, one pharmaceutical manufacturing firm offered a \$15,000 prize for the best clinical research designed to find out something about the vitamin A requirements of human beings and whether or not extra amounts introduced into food would be of benefit in specific diseases or in promoting better general health. At the end of this thirteen year period the answers were as far from known as they had been at the outset, and since no one had even made a serious attempt to fulfill the conditions for winning the prize, the donors withdrew the money and used it for some other humanitarian purpose.

The extreme sluggishness of clinical investigation has

been obvious in my own personal experience. Nearly twenty years ago in my laboratory pantothenic acid, one of the B vitamins, was discovered. After nearly ten years of diligent effort on the part of my coworkers and myself, aided by grants from the Rockefeller Foundation and finally by co-operation with Merck and Company, this vitamin in the form of its calcium salt became available at relatively low cost and in unlimited quantities.

In the intervening ten years it has become established beyond doubt that this vitamin is essential to all life, that it must be furnished all birds and mammals in their diet, and that its lack may cause disease (in animals) in practically any and every tissue. All young animals and birds fail to thrive and die if it is lacking. In rats the vital adrenal glands are affected most profoundly, in chickens nerve degeneration has been manifest, in hogs the entire gastrointestinal tract becomes ulcerated. Dogs appear to be outwardly relatively well up to within a few hours of their death. In every animal and bird the skin becomes unhealthy as a result of deficiency, and the hair or feathers turn gray prematurely.

But what do we know about its effects on human beings? Virtually nothing! The amount of clinical research performed in order to find out its value in combating human disease has been negligible, and the Food and Drug Administration still requires this statement to be stamped on the bottles containing the vitamin: "The need for Calcium Pantothenate in human nutrition has not been established." It is not a little disconcerting to an investigator to know that scientific contributions potentially significant for human health are allowed to remain practically untouched by the medical profession.

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Why does this sluggishness in clinical research exist? Dr. Allan Gregg, director of the Medical Division of the Rockefeller Foundation, in his book, *The Furtherance of Medical Research*, puts his finger on two sore spots. He notes that in some medical schools the research attitude on the part of students is discouraged if not killed by the clinical teachers, who are often interested only in turning out practicing physicians—an objective which in itself is most laudable. The other highly important factor is an economic one. As Dr. Gregg points out, five or six years after graduation those who go into medical practice are receiving an income three to four times as great as those who go into research. For men who have the aptitude and the interest research is a fascinating work. But society is exacting a terrific penalty from the prospective researcher when in effect it says to him, "Do medical research if you must, but don't expect an adequate income."

There is still another factor which is highly important—possibly even more so than the economic return—in determining whether a man with an M. D. degree will be attracted to the field of research. This is the matter of prestige. If physicians doing important clinical research were looked up to by the community and regarded as fully the equal of the best surgeon, it would help. But, as a matter of fact, the public in general is hardly aware of the existence of research scientists as a group, much less the smaller number of physicians whose main business is to make systematic clinical trials.

The lack of man power and facilities for clinical research has showed itself strikingly in connection with our proposed treatment for alcoholism. If one were naive, he might suppose that it would be easy to get the

treatment tried—there are plenty of alcoholics. Actually we were forced to make clinical trials ourselves (for which we are not equipped) and to obtain some positive results before we could hope to interest physicians. Strange as it may seem, usually there are no physicians and hospitals ready and waiting to try out promising leads, whether the disease is alcoholism or something else. The contrast which exists between discoveries in the field of medicine and those in the field of electronics is very great. Discoveries in electronics do not lie dormant for years or decades.

The dearth of clinical research exists in the field of mental disease. Most sanitaria and hospitals for the insane are understaffed to begin with, and most of the staffs are underpaid and are engaged primarily to give care to the patients—not to study or develop new ways and means of curing or preventing their illnesses.

It would not be beyond the realm of logic or good sense for every country and state to provide 10 to 20 per cent as much money for research on mental disease as it does for care of the insane, but it is too much to expect on a realistic basis. It is not too much to hope that here and there states, countries, private institutions, and foundations will see the light and realize that such research can, and in this case will, pay handsome dividends—economic as well as human. Public opinion must be educated to see the importance of medical research and to make increasing provision for it, both with respect to its basic phases and with respect to clinical trials following important leads.

Perfection of methods of treating alcoholism will come as a result of research and experimentation. The

#### A PLEA FOR CLINICAL RESEARCH

sooner our proposed treatment is given thorough trial, the more quickly it will be improved and made adaptable to more people. As a result of actual trials, there will come an increased conviction of the importance of individuality and the need for studying human beings after the manner suggested in *The Human Frontier*. Alcoholism is but one of a host of problems—many of them nonmedical—in which individuality must be taken seriously into account. It is hoped that our lead may be followed up expeditiously and that its success may lead to significant attempts in the solution of various types of human problems.

# 13

## Prevention Rather Than Cure

SO FAR IN THIS DISCUSSION the treatment and cure of alcoholism has been stressed, as well as the possibilities of applying the same principle to developing treatments for mental and other diseases. However, everyone agrees that it would be far better to prevent alcoholism from occurring than to allow it to occur and then cure it. Likewise, the prevention of mental disease is vastly more to be desired than the ability to cure it.

So far as preventing alcoholism is concerned, we believe that the outlook is bright, particularly for those who will give intelligent care to the nutrition of their children and recognize that special needs may exist in individual cases.

There seems to be little question on the basis of our experience that the extensive use of refined foods—sugar, white flour, white rice, and alcohol—contributes to poorer nutrition. In the case of those with unusually high requirements for particular items (the potential alco-

## PREVENTION RATHER THAN CURE

holics) the extensive use of any of these items—not alcohol alone—would help create a deficiency and intensify the craving for alcohol. Our recommendation for the prevention of alcoholism is, therefore, as follows: Give growing children the most nutritious food—follow the best nutritional knowledge—plenty of fresh vegetables, milk, and meat. Avoid extensive use of refined foods; otherwise, give them wide choice.

If and when alcoholic beverages are indulged in, moderation and self-discipline should be practiced and encouraged. Fortunately, from the standpoint of prevention, a considerable period (usually several years) of heavy drinking intervenes before an individual becomes an alcoholic, and it is during this time that special preventive measures can be instituted. Whenever there are signs that a young person is inclined toward alcoholic excess, special attention should be paid to his or her nutrition. The prudent and intelligent parent or the young person himself (if he is otherwise well and his interests wholesome) will at this time bolster the quality of his food with suitable nutritional supplements such as we have recommended for the treatment of alcoholism. As research in this field develops, we will know more and more about what food elements are most important, and it should be possible, on the basis of present knowledge and that which is sure to develop within a few years, to prevent alcoholism in the oncoming generation.

It seems to me that it is highly desirable that the public be educated—alcoholism or no alcoholism—in the desirability of moderation. It is a nutritional perversion for people to take into their bodies a large number of calories a day in the form of alcohol, just as it would be a

perversion to eat a pocketful of cube sugar. Alcohol in more than minor amounts is an enemy of good nutrition, and good nutrition, we believe, is an enemy of excessive alcohol consumption.

There are undoubtedly people who can tolerate relatively large amounts of alcohol. Their nutritional needs are not exacting, and they can take extreme liberties with their bodies and survive. If such people insist on their freedom to neglect their nutrition and be intemperate, society can do little about it in an effective way. High-minded people will always recognize the advantages of moderation and will take special nutritional means if necessary to keep their desires for alcoholic beverages within reasonable bounds. Furthermore, if they are enlightened, they will use moderation in the vicious custom of "treating"—they will realize that some people should take fewer drinks than others and that *urging* a friend to have another drink may not appear to be, but actually is, bad manners!

This volume warns emphatically against the dangers of malnutrition and thereby gives young people a means of avoiding the curse of alcoholism. If it is effective in saving even a few, it will have justified its existence.

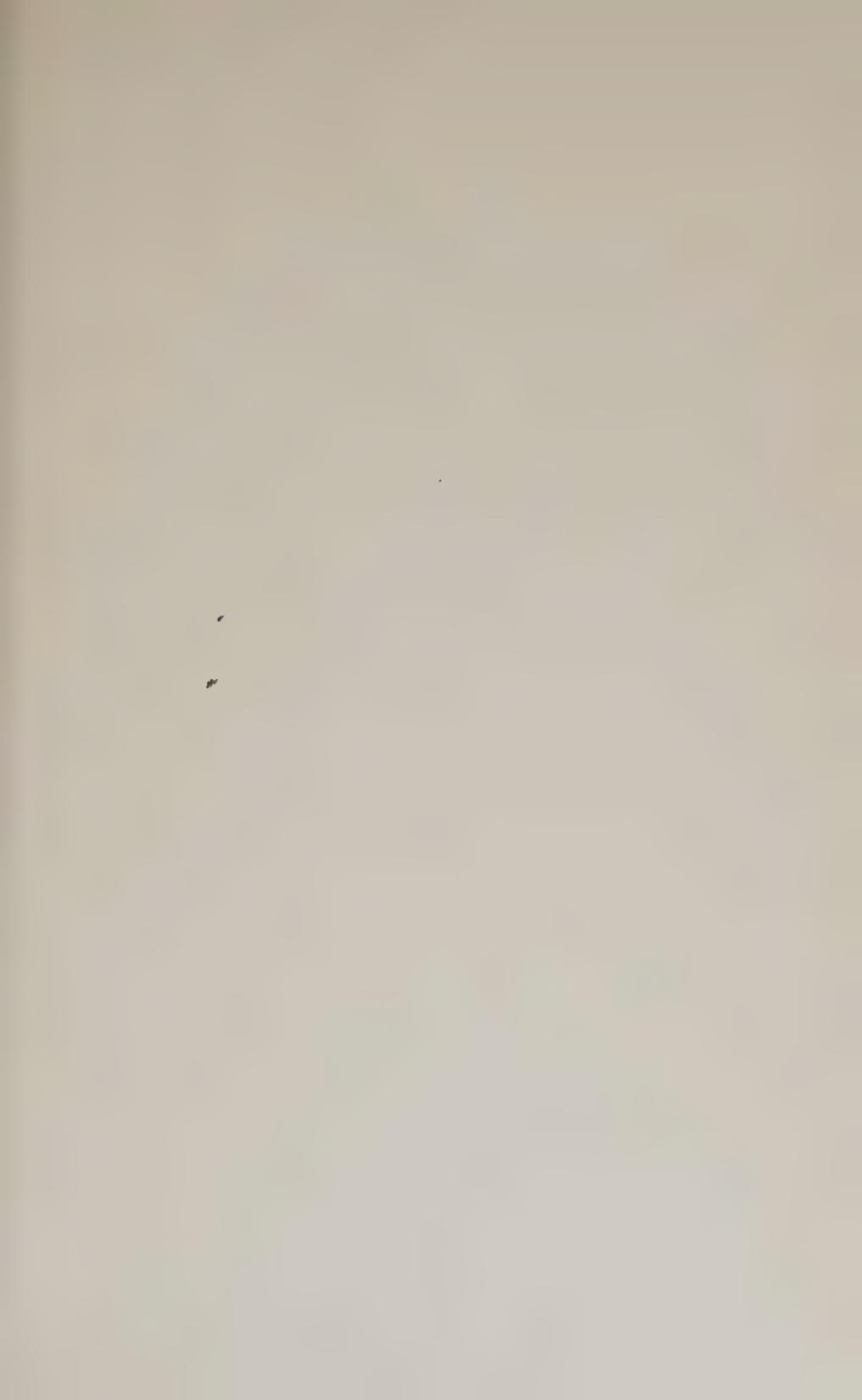


## Nutrition and Alcoholism

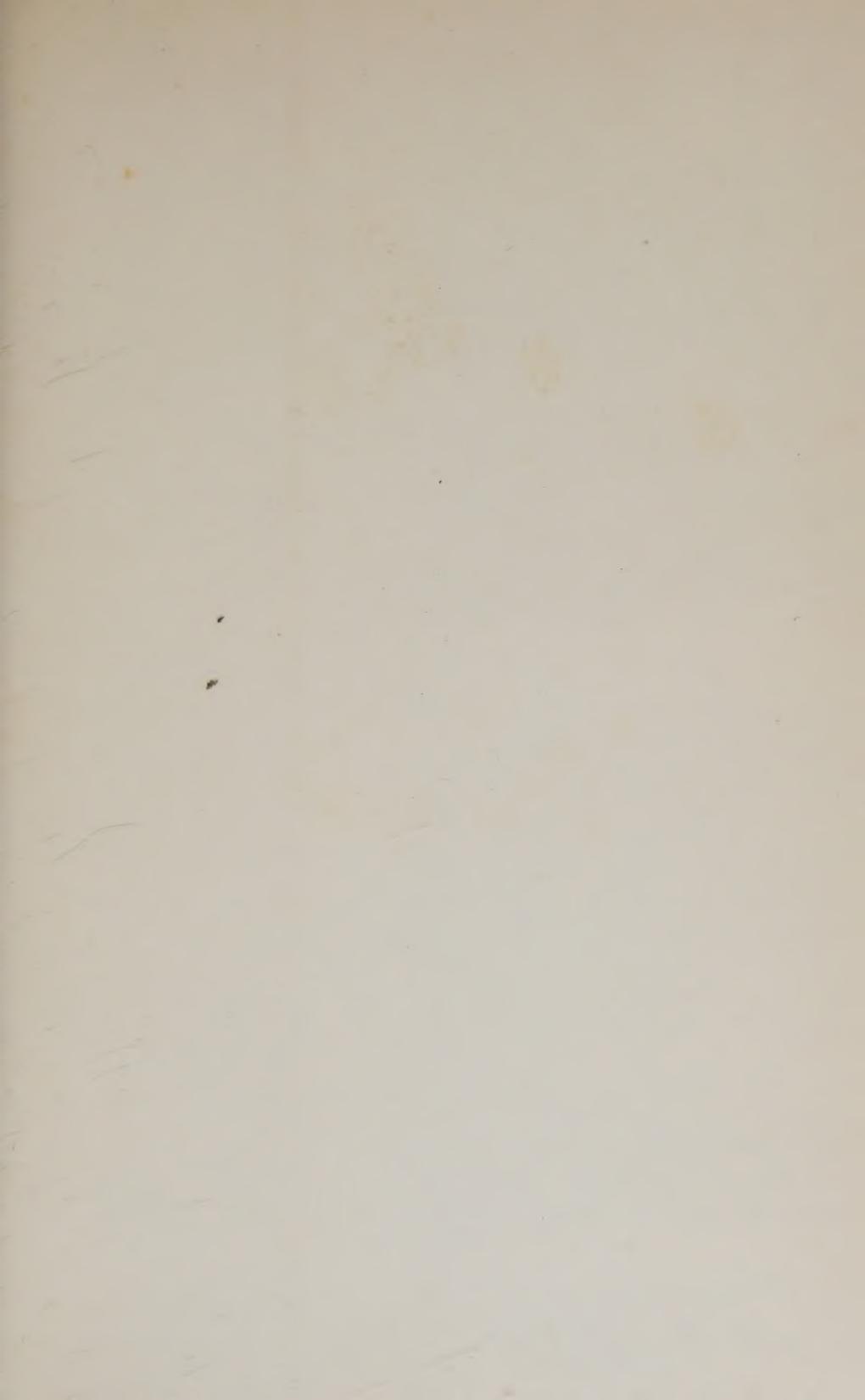
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ELEVEN POINT SIZE OF CALEDONIA WITH  
TWO POINTS OF LEADING BETWEEN LINES  
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and fresh, and the author displays optimism in the use of his treatment not only for alcoholism, but also for obscure mental ills.

"The system which we advocate," writes the author, "is one that is almost sure to promote better all-round health and should be valuable, also, for the very large number of people whose drinking is not well controlled, regardless of whether or not they should be classed as alcoholics. Anyone for whom the present treatment offers any promise of help would indeed be foolish not to want a trial, because no harm can follow and great benefit may result. Moreover, the benefit is likely not to be limited in its scope; help may come in unsuspected ways, as the story makes clear."

**Roger J. Williams**, director of the Biochemical Institute of the University of Texas, discovered and named pantothenic acid and contributed to the discovery of folic acid, both B vitamins. He has been awarded honorary doctorates in science by both Redlands and Columbia, and he holds the Mead-Johnson Award of the American Institute of Nutrition and the Chandler Medal of Columbia University.

Dr. Williams is also the author of *What to Do About Vitamins* (Norman, 1945) and *The Human Frontier* (New York, 1947), in addition to technical books and hundreds of journal publications.

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