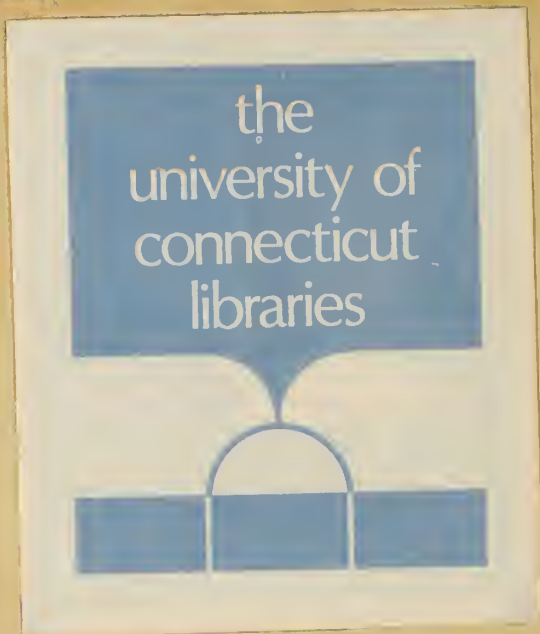


HONEY AND HEALTH

BODOG F. BECK, M.D.



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HONEY AND HEALTH



ARISTAEUS, INVENTOR OF HONEY
(Frans Floris 1515-1570)

HONEY AND HEALTH

*A NUTRIMENTAL, MEDICINAL
AND HISTORICAL COMMENTARY*

BY

BODOG F. BECK, M.D.

Author of BEE VENOM THERAPY

"My son, eat thou honey, for it is good."

SOLOMON (Proverbs 24:13)



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HONEY AND HEALTH

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PREFACE

THE principal aim and object of this volume is to evaluate honey and appraise its true worth, particularly as an important nutrimental and superior medicinal substance. The author's venture in preparing and publishing this review during moments snatched from the hubbub of an active medical practice was inspired by a long cherished ambition to contribute his best efforts to the reinstatement of honey to its former exalted place. The advantages and efficacy of this substance should be appreciated.

For someone who knows the extraordinary merits of honey, it is difficult to comprehend the reason why this salutary substance has suffered such a setback. For sixty centuries, throughout historic ages and undoubtedly even in prehistoric times, honey was man's only "sweetener" and his most favored food, delicacy and medicine. But Nature's own sweet was displaced by one of man's inferior, nay, objectionable products. Upon the intrusion of "refined" sugars, honey declined in use and now, instead of being an important household necessity, it has become an article of luxury. Civilization and even science often post only dim lights as warning signals before deep chasms; on the other hand, they neglect to mark with road-signs abandoned paths which lead to a better life.

The culpable disregard of honey is a grave and lamentable error of the present generation and a sad reflection on its intelligence. It is almost unbelievable that such an ideal and nourishing food, with its delightful bouquet, is almost entirely missing from our tables. If honey were ever rehabilitated, man would wonder how he could ever have gotten along without it.

The medicinal merits of honey are fully discussed in the respective chapters of this book. The author considers it an especial privilege to avail himself of an opportunity at least to try to promote the physical, and indirectly, the moral welfare of his fellowmen. It accords a sense of gratification to hope that the advocated measures may benefit society.

It is curious that the numberless books on dietetics scarcely mention or only superficially treat the subject of honey. This applies to lay as well as to medical literature. While the ancient classical writers and those of the Middle Ages liberally contributed to the practical knowledge and appreciation of honey, their extravagant statements today sound fantastic, almost absurd. Their faith in the substance was so implicit that the information one gains from their comments has the aspect of legendary lore rather than of facts. On the other hand, the disregard of honey in current literature is diametrically opposite. It is astounding how meager are the scientific data available today concerning honey. Not a single book has been published of late years which creditably and thoroughly discusses its nutrimental and medicinal values. This actuality was an additional incentive for editing the present volume. May it induce further research in this almost virgin field.

B. F. B.

New York City
January, 1938

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INTRODUCTION

THROUGH my friendship for the author, it has been my privilege to read the manuscript of this book. Thus I have been given an opportunity to have a brief word with others who will read the book after publication.

First I wish to congratulate the readers on obtaining such a vast store of information on the merits of honey and the wonders of its past recognition. In the rush of modern affairs we are prone to overlook old beliefs and traditions and to forget that they ever existed. While today we do not concede that honey cures all human ailments, it is nevertheless interesting to learn that earlier people held such views. The lore which the author has so well collected, not only on bees but also on honey, is, however, far greater than could possibly be included in a single book. With such an array of expressions of faith in honey, we are perforce brought to increase our own confidence in this worthy product.

Honey has needed just such a book as this. Modern works on honey have dealt chiefly with its chemistry and physics, with some attention to its dietetic value and more to its use in cookery. These are rather prosaic aspects of an interesting and delectable article of human diet, by no means to be scorned, but on the other hand not to be pursued to the exclusion of the romantic side. It is not surprising that beekeepers attribute almost supernatural virtues to a substance which they assist the bees to produce but there is no impropriety on the part of others, not so engaged, if they question the merits claimed by enthusiasts. Statements which this book contains should give pause to everyone who disdains the opinions of those without scientific attainments. I have no intention to belittle

scientific investigations but there is, on the other hand, something to be said for accumulated experience.

I am happy to commend this work to the general public, to the beekeepers and, last but not least, to the medical profession. I sincerely hope that it may serve the purpose for which it is intended.

E. F. PHILLIPS

Cornell University
Ithaca, New York, 1938

PART I
HONEY AND HEALTH

CHAPTER I

GENERAL COMMENTS ON DIET

Some, as thou saw'st, by violent stroke shall die,
By fire, flood, famine; by intemperance more
In meats and drinks, which on the Earth shall bring
Diseases dire, of which a monstrous crew
Before thee shall appear, that thou mayst know
What misery the inabstinence of Eve
Shall bring on men.

If thou well observe

The rule of "Not too much," by temperance taught
In what thou eat'st and drink'st, seeking from thence
Due nourishment, not gluttonous delight,
Till many years over thy head return;
So mayst thou live, till, like ripe fruit, thou drop
Into thy mother's lap, or be with ease
Gathered, not harshly plucked, for death mature.

Milton—*Paradise Lost: Book XI*

THE author is fully aware of the fact that this treatise is not "just another book" on foods or general dietetics and that his real purpose is to advocate the wider use of only one special food substance, namely, honey. However, to explain fully certain principles that are correlated with the main topic, he must allude to the facts and precepts discussed in the present chapter which, therefore, justifies the addition of an apparently irrelevant issue.

There is a deep-rooted yearning throughout animated Nature for well-being and the preservation of life. Health always was and will remain our most cherished possession. Nobody doubts this axiom. The principal human efforts are yet concentrated on

preserving health and when on the wane or lost, on regaining it. It is evident that the present generation is extremely conscious of this fact and fully appreciates the value of health. A two-year survey, conducted by the University of Chicago, the American Association for Adult Education and the United Y.M.C.A. Schools, revealed that the first and principal interest of adults is health and the preservation of life. Magazines and newspapers of wide circulation have their regular health-columns, a proof that Americans are no exception and that they are eminently health-conscious. Before drinking and after sneezing, we hear the convivial wish: "To your health!"

Among all educational measures for disseminating knowledge of health-culture, undoubtedly dietetics reign supreme. This is only natural because no other hygienic factor contributes more effectively to health than the logical selection of the proper quality and quantity of food, that is, what and how much we should eat. A sound knowledge of the essential principles of vital nutrition must be acquired, fully understood and—above all—well remembered. Of course, the innumerable scientific and unscientific doctrines and many suggestions, disputes and contradictions with regard to dietetics make it difficult to select the right path to follow.

The first and one of the more important points to be considered is what to eat. If we wish to decide this question, a brief excursion into the field of anthropology, or, relinquishing our pride, to zoology, is indispensable.

The physical history of man, his first appearance on this habitable globe, preceded his civic or general history. While the latter is based on comparatively authentic facts, the former is veiled in impenetrable darkness. There must have been a time, place and manner when man first appeared on earth. He had to maintain his existence and nourish his body. Undoubtedly, fruits, nuts and honey were the first foods of primitive man. Man's first environment is reminiscent of our present gardens, with their fruits, flowers and beehives. They are monuments to Nature and to our brief sojourn in Paradise, offering incomparably more inspiration to

poetry and art and more benefits to health than slaughter houses.

The bees of fossil ages, imbedded in amber, are not unlike our existing bees, which clearly demonstrates that they reached their complete evolution in preadamitic times and supplied the primates with an abundant supply of sweets, so much coveted by all living creatures. When man acquired the knowledge of agriculture and learned husbandry, he probably added to his fare vegetables and cereals and only later, after he had invented mechanical implements to kill animals and catch fish, he turned to animal diet. Evidently primeval man was at first a vegetarian and in process of time—call the deviation perversion or civilization—became a carnivorous being.

It is not difficult to teach animals of strictly vegetarian habits to eat meat. Horses easily become meat eaters (even alcohol drinkers). Dr. Philippi of St. Jago, Chile, disclosed the acquired habits of his two saddle horses which eagerly snapped up and consumed chickens; they even pulled young pigeons from their nests and devoured them. In Norway horses are said to dash into the sea to catch and eat fish. Rabbits and squirrels, if they are kept fasting for a while, will greedily eat meat; they become used to it and will gnaw on bones like dogs, even when not short of vegetable food. So it is not surprising that *Homo sapiens* acquired the meat-eating habit. Regarding drinks, if horses, dogs, cats and other quadrupeds, even birds, become addicted to alcoholic beverages, why not man, an unusually adaptable creature?

Food and physical comfort are closely connected with social and moral well-being, and they have played an important part in man's progress. Our first trouble in Paradise commenced with food. "God created man to be immortal and made him to be an image of His own Eternity." . . . "And the Lord God commanded the man, saying, of every tree of the garden thou mayest freely eat; but of the tree of knowledge of good and evil, thou shalt not eat of it; for in the day that thou eatest thereof thou shalt surely die." Then occurred our first transgression in food, a bad habit which we still persistently practice.

Human civilization has been greatly influenced by the food

consumed. Nutrition is not only a problem of the individual but of society. We must distinguish between nutritive and stimulating substances. Meat, though undoubtedly of valuable protein content, an important compound for successful tissue building, is a highly stimulating food. Wild boar was the favored food of the romantic Niebelungen warriors, who, though mythological creations, were regarded as the greatest fighters of the world. Carnivorous animals in general are fiercer and more cruel in disposition than herbivorous ones. Meat-eating without doubt has modified man's disposition and tendencies. This is disputed by some scientists. They try to prove their objection to the theory by the ferocious nature of the herbivorous bull and by the gentle disposition of the carnivorous Eskimo. They seem to have overlooked the fact that the ferocity of the bull is attributable to sex (the tranquil cow feeds on the same rations) and that the unfolding of a high-mettled disposition of an Eskimo is checked by the arctic climate. It is noteworthy that abstainers from meat possess greater endurance than those who indulge in meat. The "punch" of the latter group far excels their endurance.

Meat is a rather unclean food because toxins are created in the tissues of animals during the process of living which are difficult to eliminate entirely even through boiling or roasting. Even savages avoid eating carnivorous quadrupeds and birds. The ancient Greeks, though maritime people, abstained from fish because they are cannibalistic creatures. Cereals, vegetables, nuts, eggs and dairy products contain sufficient protein substances and easily take the place of meat. The regrettable fact is that meat eaters crave alcohol, which is a digestive aid, but which only adds to the existing stimulation. The introduction of a vegetable diet would be a radical cure for intemperance.

The critical and important question, as already stated, is what to eat! The human body is an intricate machine which requires proper fuel not only to generate heat and energy but also to rebuild worn-out parts. In this respect our body excels, by far, the most complicated engine—we may just as well distinguish it as a "living" engine. It is unfortunate that the average man knows so

little about it. Horace Mann, the great educator, remarked that he knew all about the working of the heavenly bodies but nothing about those of his own body. Anatomical, physiological or even chemical erudition is not an absolute concern of the average person; there is no need for him to know how to overhaul the "engine" and to repair any damaged parts—Nature and the physicians will attend to that. But it should be every man's duty to know, at least, how to supply his body with proper fuel and to acquire a knowledge of food values. And this is not impossible. Primitive man is extremely proficient in this respect as is proved by the fact that he possesses incomparably greater physical perfection than civilized man. It is evident that modern man is to be blamed for all shortcomings in supplying the "living engine" with the proper fuel. This is a great pity, in fact, a catastrophe because the knowledge and application of the significant laws of nutrition serve not only to maintain physical life but to establish mental, spiritual and moral distinction. Proper food moulds one's personality and that of one's offspring.

We obtain our food supply from the animal, vegetable and mineral kingdoms. We require a mixed diet consisting of proteins, carbohydrates and fats. Meat, eggs, milk, vegetables, fruits, starches, sugars are and should be our main reliance. Milk is an essential food with its main components of protein, fats, sugar and water. Meat is another important food, but, as explained, it is by no means indispensable. Fresh fish have exceptional nutrimental value. Cereals, e.g., rice, oats, wheat, rye, corn, barley, millet, etc., are valuable food materials. The populations of China, India, of the tropics; in fact, the largest proportion of the human race lives on cereals. The inhabitants of the United States annually, per capita, consume even today about 350 pounds of cereal foods, approximately a pound a day. Dr. G. Fordyce (*On Digestion*, 1791) mentions how Benjamin Franklin personally related to him that he lived for a fortnight, when a journeyman printer, on bread and water at the rate of "ten pennyworth of bread per week" and had found himself stout and hearty on this diet. It did not seem to shorten his life, as he died when eighty-six. Good bread,

the "staff of life," composed of protein, starch and mineral substances, is a vital food, though admittedly a monotonous one, especially if eaten in the humble way Franklin consumed it. St. Anthony lived on a few ounces of bread and water and though he never washed himself or changed his garments, reached the age of one hundred and five. Fruits, nuts and vegetables, containing starches, fats, sugars and plenty of palatable organic acids and water, keep in excellent condition the strength and life of the *major portion* of the inhabitants of our earth. We may as well omit alcohol, coffee and tea, because they are not nutritive substances but stimulants. The heat of coffee and tea itself is a stimulant. Tobacco is a narcotic. Alcohol and tobacco indulged in at the same time have an effect similar to that which results when the accelerator and the brake of a motor car are applied simultaneously.

How to select essential food materials? There is no hard and fast rule for sensible eating other than the use of common sense. Unerring regularity is impractical. The strict adherence to any sort of diet always has a bad effect on the human system. Nature has provided a great variety of nourishment for us and we should select with discretion what best agrees with our constitution and mode of living. A diversity of nutriment is paramount. We require sodium, potassium, calcium, magnesium, iron, manganese, copper, chlorine, iodine, fluorine, phosphorus and sulphur for our organism and we cannot obtain all these minerals from a diet which is not sufficiently diversified. Empiricism will be more helpful in our search for appropriate food than scientific analysis. Everyone must study his special personal requirements.

The first consideration is that the intake of food and the output of energy must be balanced. The human body is a perfect machine, the cells are able to regenerate and, to all appearances, should go on forever. The waste must be compensated for and an equilibrium established between loss and repair. The dissolution of our body is possibly due to the disrespect or ignorance of this seemingly occult law. The curse of our civilization, in addition to denaturalized food, is unbalanced diet. Food faddists with their ir-

rational precepts and dietary whims contribute their share by excluding desirable foods. Fortunately most diet fashions seldom last longer than a year or so.

If an engine carries a heavier load and is run with greater speed, it will require more fuel and lubrication. The prime considerations should be the innate quality of the engine and the purpose which it is meant to serve. Age and climate must be considered. The body requires different food in winter than in summer; the same contrast which exists between the north and the tropics. People in extremely cold climates prefer fat which is a heat producing food; the population of the tropical countries, on the contrary, prefer fruits and leafy vegetables. In cold climates the organism will be more capable of enduring dietetic errors.

The various ages of life are important. If we divide the periods of life into three principal parts: (1) Period of Preparation, from birth to about twenty-one; (2) Active Usefulness, from twenty-one to forty-five; and (3) Period of Decline, we can easily understand why the food requirements vary considerably. In the first period of life, next to starches and sugars, proteins are most important. In the second "act", the catechism of metabolists, that carbohydrates, proteins and fats should be in a $4:1\frac{1}{2}:1$ ratio, is more applicable. During the period of decline, when tissue building is on the decrease, the body requires less protein to repair the wear and tear but more calorogenic carbohydrates to create much needed energy. Of course, the principle that one man's meat is another man's poison should be considered. Constitution, hereditary traits, temperament, habits and environment, on the whole, must be taken into account. The main precept should be, however, to be mindful of the stomach (the boiler and its purpose) and not of the palate and the tongue, especially when they are not under the control of the brain. The rule of common sense is more important even than that of science. Too much science only adds to the confusion. If we were to eat entirely according to science, especially in our science-mad era, we should soon be served a fair-sized pill, containing carbohydrates, proteins, fats, vitamins, enzymes, calcium, iron and "sixteen" other minerals in proper ratio, previ-

ously irradiated, of course, with ultra-violet rays, which would mean the end of the good old-fashioned "square" meal. Too bad that philosophers have maimed and deprived us (we also did our share) of the power of instinct and have indemnified us with reason—because instinct in selecting food could be of considerable assistance. As it is, we simply have to envy the intelligence (with apologies to Descartes) exhibited by the lower creatures in their choice of food and . . . drink.

We could learn a lot also from the ancients in the selection of their food. Hesiod remarks: "The uncultivated fields afforded fruits to the Greeks and supplied their bountiful repast." Porphyry, the Platonic philosopher (third century B.C.), a man of great talent and learning, related that "the ancient Greeks lived entirely on the fruits of the earth." The diet certainly must have agreed with them and aided their intellect and imagination, enabling them to create the greatest classic of all times, their mythology. Their unusual longevity sounds today more like a myth. The ancient Greek and Roman legislators introduced strict laws for the preservation of health and it was the duty of officers of high rank to enforce public health laws. Simple, natural and physiologically rational nourishment is more fitted to promote health than unnatural, stimulating foods.

Hygienic measures formerly constituted a part of religion. Moses, Mohammed, Confucius and Buddha prescribed health laws. When countries once healthy and prosperous disregarded these tenets and changed their habits, they became decadent. The Holy Land, once flowing with milk and honey and producing sufficient grain and fruit to supply a great population, became a land of doom, a deserted land, the abode of lawless Arabs and Turks. A Sanebat from Egypt, about 2500 B.C., described Palestine: "There were figs and grapes; its wine was more plentiful than water; abundant was its honey, many were its oil-trees, and all fruits were upon its trees; there, too, was barley and spelt, and cattle of all kinds without end."

Napoleon remarked that an army marches on its stomach. We could easily apply this maxim to nations; in fact, to the inhabitants

of the entire globe. Ideal nutrition would entail not only physical but mental and moral reform, consequently raising sanitary as well as social, economic, and even spiritual standards. If we were to introduce, for instance, a five-year trial period of sensible eating—a procedure very much in vogue today in other matters the world over—or even nominate a food-czar, many problems of sociology, economy, criminology and of agriculture would become *avaunt*. Through economy of food not only ill health, but many a depression could be averted. The actual and current fact, mentioned without political or any other allusion, that sixty-five million Germans are led today by a vegetarian ought to arouse the interest of food experts and induce them to use telescopes instead of test-tubes. The indefatigable German Führer is a liberal consumer of honey, in which he indulges daily at breakfast, in typical Bavarian fashion, with milk, oatmeal, bread and cheese. The full appreciation of honey by the Nazi government is best proven by the fact that its exportation is strictly prohibited.

With regard to the quantity of food to be consumed, we must obey one of the principal commands of Nature and that is economy. The old precept that we eat to live and do not live to eat, must be remembered. The ancient Egyptians placed miniature mummies, and the Carmelite monks, human skulls, on their dining tables to remind them of this truism. The consumption of tasty and wholesome food, *in moderation*, is the safest and most essential approach to the conservation of health, prolongation of usefulness, enjoyment of the senses and the complacent exercise of intellect to appreciate the beauties of this world. Samuel Johnson well expressed this sentiment: "Health is, indeed, so necessary to all the duties as well as pleasures of life, that the crime of squandering it is equal to folly; and he that for a short gratification brings weakness and diseases upon himself, and for the pleasure of a few years passed in the tumults of diversion and clamors of merriment condemns the maturer and more experienced part of his life to the chamber and the couch, may be justly reproached, not only as a spendthrift of his happiness, but as a robber of the public; as a wretch that has voluntarily disqualified himself for

the business of his station, and refused that part which Providence assigns him in the general task of human nature." Socrates, who preached and also practiced moderation in food consumption, escaped all plagues which raged in Athens, where he resided. The glorified Spartan diet produced superior physical prowess.

People in general consume more food than is physiologically necessary. Eating too much, to eat until one cannot eat any longer, overstrains the digestive powers and prevents digestion. There is an old and very true saying, "stop eating while you still have some appetite." An excess of food defeats its object; besides, it is detrimental to health. Occasionally, or for a short period of time, it is not so harmful but when prolonged it will lead finally to the destruction of the organism. But, as Cato said, "it is a difficult task to argue with the stomach, which has no ears." Gluttony is the greatest sin which an individual can commit against himself. Of course, it is not easy to change established habits which have prevailed for generations. Let us apply the words of the Earl of Rosebery, Prime Minister of England and successor to Gladstone: "We cannot expect a nation to stride into perfection at once. It was only by slow painful efforts that a nation worked out its redemption from darkness and ignorance." In fact, it would be an error and a tax on the system to change suddenly. Changes must be gradual. Meanwhile, the rich man should eat when he has a good stomach and the poor, when he can get a good meal.

Some hae meat and canna eat,
And some wad eat that want it,
But we hae meat, and we can eat;
Sae let the Lord be thank it.—Robert Burns

The confusion and lack of discipline in the field of dietetics is mainly caused by the rivalry between the stomach and the palate, especially when the latter, as already remarked, is beyond the control of reason. Taste is the most indiscreet among our five senses. Also, it is unreliable. The same food or substance varies in

taste with different individuals. An identical chemical compound will be tasteless to some persons; to others it will be bitter, sour, sweet or salty. Modern cookery is chiefly to be blamed for the excesses in eating because it tries to flatter and tickle the palate and we cannot resist the temptations and the charms of taste. Culinary art has become very ingenious and persistent in provoking and maintaining unremitting appetite of the palate without taking into consideration the requirements and even the capacity of the stomach, which has to bear all the burden by receiving many times more food than it can manage. The palate has no responsibilities or toil; its only aspiration is to be pleased and satisfied. And how we accommodate that selfish desire and cater to its caprices, unmindful of the penalties which we have to endure afterwards!

The cunning strategy of modern culinary art is to create, by any means, false appetite. The result is: most impossible and harmful combinations. Foods which by themselves are salutary become injurious when combined. Meat, eggs, milk, starches, sweets and acids alone are digestible, but become heavy and indigestible when mixed. Ice cream is not objectionable but when eaten after a meal it will convert the otherwise digestible food to a state of decomposition. The Hebrew religion forbids eating meat and dairy products at the same time. Wrong food is not always the cause of trouble; a wrong mixture of good food is just as harmful.

The hors d'oeuvre with all its innumerable salted, dyed, smoked, pickled and spiced varieties tends to irritate the stomach and induce it to oversecrete. The production of more than the normal amount of gastric juice creates a craving for more food to get rid of the excess irritating juices. Hot soup with all its condiments produces the same result. The gastric juice will welcome the inward-bound conglomeration as an affinity which will absorb it like a sponge. If the food is insufficient to absorb all the gastric juices and there is still acidosis, people will resort to bicarbonate of soda and hundreds of other digestive powders with which the medicine chests are richly stocked, to remain, as they say, on the "alkaline side." Occasionally victims perspire freely and feel faint

on account of the toxic state and have to be taken to the air to obtain needed oxygen, which will assist to eliminate the surplus acid through increased respiration.

Stimulated appetite is simply a forced craving for food, parallel to administering aphrodisiacs. And the happy possessor of the wonderful organ called the body, loaned to him by Nature for use during his lifetime, is satisfied and believes that he has pleased his belly, his false (and often his only) god. The French are past masters in this special art and it is not surprising that Montesquieu made the statement that dinner killed one-half the inhabitants of Paris, and supper the other half. We try to imitate the French, though rather poorly, if we take Dr. Wiley's word, who remarked that there is "no country in the world where food is so plentiful and so badly cooked as right here in the United States of America."

Most people do not wait until the previous meal has been thoroughly digested. "Sometimes to feast and sometimes to fast"—is not in their catechism. But there is a good remedy in modern *Materia Medica* for everything (if not, the radio announcer will help you out) and the impatient epicures often resort to the extremely popular use of drastic purgatives to make room for the next, anxiously awaited food and drink. We live in a rapid transit age! To all this we may add the destructive effect of another intemperate habit; namely the overindulgence in intoxicants, though, to be frank, Drunkenness is not half as disastrous (in physiological respects) as her demure sister, Gluttony, who claims incomparably more victims. The concentration of foods, e.g., essences, like beef broth (*consommé*), made from pounds of meat and marrow bones, is also an error. The system receives more nourishment than it is capable of using. Such principles are admissible if there is an urgent need of aliments, as in sickness, when the digestive organs are weakened, but not in everyday diet. Most of the so-called easily digestible foods are really indigestible because they are absorbed before they have been properly prepared for assimilation. This is against all natural laws. Coarse foods have great advantages; they require mastication which means use of the teeth, and salivation which helps digestion. Coarse food is retained longer

in the stomach and incites it to activity—which renders food more homogeneous with our own body substances.

Another harmful (though occasionally enjoyable) conventional practice of civilized races is to eat in company. A multitude of people are assembled, each one with individual requirements and tolerance, and served the same food. This is as impractical and infeasible as to supply one size of shoes to a large number of people. But we are more congenial at banquet tables than in shoe stores. If not, a few drinks will make up for the ill-fit. (Shoe-stores really ought to adopt the same policy. It probably would expedite sales, as difficult as it is to please a disgruntled and sober customer.) Meals, by right, ought to be physiological and not social or family affairs. Tables “dressed up” with fancy china, silver and glassware, flowers and other ornaments distract the attention from the food. Dyspeptics, anemics, diabetics, young and old, fat and lean people, and those with low and high blood pressures, ought to eat in respective groups which would save much discomfort, the lure of temptation, hospital expenses, doctors’ and surgeons’ fees, etc. While small children eat in the nursery they get along well with their diet but as soon as they join the family table trouble commences.

A multitude of diseases, physical and mental, are due to the improper stoking of fuel. The “fire box” is sometimes in a fiery blaze but we still add more fuel, not even natural foods but too frequently artful explosives. The formed gases puff out (we call it belching, eructation, etc.) through all openings, which is really a blow-out of safety valves. The exquisite engine often ejects the objectionable matter (the act is designated in human language as vomiting, diarrhea, voiding, etc.) but the precious machine will soon be filled up and maltreated again with other noisome stuff. The forefront part of the “furnace”, which is less reinforced by Mother Nature, possibly because such abuse was not anticipated (especially not in the case of man), bulges out, forming a corporation or paunch, which signifies the beginning of the end, but the “handwriting on the wall” is still disregarded. Pliny suggested:

“Simple diet is best; for many dishes bring many diseases.” Will civilized man ever wake up and live?

If man would eat frugally and adopt the rules of common sense, there would be few sick people and hardly any occasion for remedies, in a word, everybody would be his own physician—and he would never have had a better one. Physicians would then be reduced to treating accidents and epidemic diseases. In modern Nazi Germany, efforts are being made by the authorities to reinstate Nature-Cure. With regard to medicines, there is lots of truth in the statement of Dr. Oliver Wendell Holmes, “If all the medicine in the world were sunk into the sea it would be better for humanity and worse for the fish.” There is an old saying: “Many medicines produce few cures.” King Solomon, on the other hand, must have been a great believer in medicines when he made the complimentary statement: “A merry heart doeth good like a medicine.”

THE OBJECT OF NUTRITION

The human body, besides water, consists of proteins, carbohydrates (starch and sugar), fats and inorganic substances, e.g., salts, calcium, phosphor, iron, iodine, etc. Each has its special function, and when utilized, must be replaced. Proteins, carbohydrates, fats, minerals, vitamins and water are the basic elements in successful nutrition. The component parts of our food become transformed, through the highest degree of purification, into vital organs and organic fluids.

Food and eating have three cardinal purposes:

1. To satisfy hunger. Hunger is individual—depending on the physical and mental output of energy, size of the body and also on habit, which accounts for the fact that small people sometimes eat more.
2. To rebuild wasted and used-up tissues, i.e., to replace the proteins, fats, limesalts and water. Proteins, both animal and vegetable, have as their main purpose the repair and formation of

tissues. We also require phosphates, calcium and magnesium salts for the bones and body fluids, iron for blood-cells, lecithin for nerves, vitamins, etc.

3. To produce heat and indirectly, energy. Motion, strength and thinking require energy. The body also emanates a considerable amount of heat. Carbohydrates and fats are most important for generating and replacing heat and energy. In addition, they spare proteins. Starches and sugars are converted in the alimentary canal, under the influence of various enzymes, into simple sugars (monosaccharides). After absorption into the portal circulation, simple sugars are carried to the liver where they are stored as glycogen. Under the influence of specific hormones, the glycogen is converted to dextrose, which is stored in the tissues and gradually liberated into the blood to be oxidized through many intermediate steps into carbon dioxide and water. Insulin plays an important part in the utilization of carbohydrates only after they reach the blood stream. This complex chemical process creates our heat and energy. In all the functions, the extremely active element, oxygen, a component of air and water, plays an essential, nay, vital part.

CHAPTER II

NATURAL AND ARTIFICIAL SUGARS

SUGARS are carbon compounds which, when consumed by the human organism, undergo a process of physiological combustion and, as stated, create heat and energy. Sweets are vitally important sources of dynamic energy and in this respect they surpass all other foodstuffs. They are the ever-ready generators of physical and mental force. Sweets are not only indispensable as a source of heat and energy but they have a constructive effect because they produce fat which is a quasi-reserve fuel.

The physiological value of sugars depends mainly on their character and origin, that is, whether they are natural or artificial. Natural sugars are sweets which prevail in Nature, for instance, in honey, fruits, vegetables, milk, etc. Artificial sugars are prepared, as a rule, from natural sugars by means of extraction and concentration.

Natural sugars are directly and effectually digested, absorbed and assimilated and become oxidized through a process of combustion. Artificial sugars, like cane, beet, corn and maple, must be converted before ingestion. The main drawbacks of the artificial products are that they are highly concentrated and have the effect of explosive substances. They oxidize violently in the system at the slightest contact with oxygen. Oxygen, though it constitutes only one-fifth of the air, is a very active element. Artificial sugars interfere with oxidation of less ignitable nitrogenous materials, such as proteins. We could compare the effect of artificial sugars on the system with that of highly explosive substances added to fuels in automobile engines. The engine would soon be destroyed; in the same manner as our liver, kidneys and lungs are affected,

resulting in high blood-pressure, cellular asphyxia, diabetes, arthritis and innumerable other complications. While artificial sugars during their process of oxidation flare up in the system like straw fire, they create a rapid but brief stimulation, without nutritive benefits. If these sugars are taken in excess they will pass through the kidneys unchanged and remain in the system as poisons, producing instead of the required heat and energy, decay and degeneration. Artificial sugars are especially harmful in renal diseases and for high-strung individuals. Many nervous states can be attributed to excessive sugar consumption. Natural sugars transform in the system into beneficial natural acids instead of into harmful acids which are created by the sundry juggled, so-called refined products.

While natural aliments are rarely harmful under normal conditions, we should always view artificially prepared food substances with a certain mistrust, especially when consumed in large quantities as in the case of cane or other artificial sugars. To our detriment, however, we do not seem to realize the dangerous habit which we have gradually acquired. If someone should "try" to introduce today artificial eggs, milk or fat he would be accorded a very cold reception.

Primitive races are healthier by far than civilized ones. They live on simple natural nutriments and do not indulge in artificial foods which, as a rule, are stimulating. They consume more fruit sugars and vegetable albumens. Of course, our swift modern life requires rapid metabolism to create or replace the much needed physical and mental energy and we resort to stimulating foods which are rarely nourishing.

Natural sugars are not only stimulating but are also nutritive. On the West Indian plantations the negroes during the harvest season grow fat on the juices of the sugar-cane. The children suck the cane with avidity and likewise thrive on the juice. Domestic animals, horses, cattle and pigs, even dogs, grow fat from eating the cane. On the other hand, animals fed on artificial sugar become feeble and sick. With regard to the effect of sugar-cane on

teeth, there are no people on earth who have finer teeth than the negroes of Jamaica.

Simple or natural sugars, like dextrose and levulose, which honey contains, are monosaccharides, i.e., they have only one sugar radicle to the molecule. Sucrose, lactose and maltose are disaccharides; starch, dextrin, glycogen, etc., are polysaccharides. The two latter groups must first be hydrolized. All carbohydrates must be changed, first, into simple sugars, monosaccharides, before they are assimilated. This is the best proof of the value of honey, as it is a predigested substance.

CHAPTER III

HONEY

HONEY, a most assimilable carbohydrate compound, is a singularly acceptable, practical and most effective aliment to generate heat, create and replace energy, and furthermore, to form certain tissues. Honey, besides, supplies the organism with substances for the formation of enzymes and other biological ferments to promote oxidation. It has distinct germicidal properties and in this respect greatly differs from milk which is an exceptionally good breeding-ground for bacteria. Honey is a most valuable food, which today is not sufficiently appreciated. Its frequent if not daily use is vitally important.

The universal and natural craving for sweets of some kind proves best that there is a true need for them in the human system. Children, who expend lots of energy, have a real "passion" for sweets. This is really instinct. Proteins will replace and build tissues but it is the function and assignment of carbohydrates to create and replace heat and energy, and to provide what we call "pep".

Honey, which contains two invert sugars, levulose and dextrose, has many advantages as a food substance. While cane-sugar and starches, as already intimated, must undergo during digestion a process of inversion which changes them into grape and fruit-sugars, in honey this is already accomplished because it has been predigested by the bees, inverted and concentrated. This saves the stomach additional labor. For a healthy human body, which is capable of digesting sugar, the actuality that honey is an already predigested sugar has less importance, but in a case of weak digestion, especially in those who lack invertase and amylase and de-

pend on monosaccharides, it is a different matter and deserves consideration.

The consummation of this predigestive act is accomplished by the enzymes invertase, amylase and catalase, which are produced by the worker bees in such large quantities that they can be found in every part of their bodies. However, there is plenty of it left in honey for our benefit. The remarkable convertive power of these enzymes can be proven by a simple experiment. If we add one or two tablespoonfuls of raw honey to a pint of concentrated solution of sucrose, the mixture will soon be changed into invert sugar. The addition of boiled honey, in which the enzymes have been destroyed, will not accomplish such a change.

The frequent Biblical references to milk and honey demonstrate the importance of these two oldest aliments. Neither, however, is a complete food nor a proper nutriment alone for a long period of time. They are effective only to supplement deficiencies of other food substances.

Milk has many drawbacks. As mentioned, it is an excellent breeding medium for bacteria. The inhabitants of the East quickly sour the milk of cows, goats, sheep, mares and camels and prepare curds and cheese from it, because in warm climates milk cannot be preserved otherwise. Honey, on the other hand, requires little attention and does not deteriorate even in the tropics. Honey has often been given preference over milk. It is not surprising that Van Helmont gave milk the epithet, "brute's food" and suggested bread, boiled in beer and honey, as a substitute. Liebig also recommended a substitute for milk. Honey has many advantages as a staple article of diet to secure optimum nutrition.

THE PHYSICAL AND CHEMICAL ASPECTS OF HONEY

PHYSICAL QUALITIES

Honey, a sweet, thick, viscid fluid of agreeable taste and aromatic odor, is collected by the honeybees from the nectaries of flowers, swallowed, assimilated in their honey-stomachs (crops),

regurgitated, stored and thoroughly ripened in the cells of the combs. This supplies them, their young, the idle drones, and . . . mankind with nourishment. It is also a precautionary measure so that they and their progeny will be provided with food during seasons when there are no more flowers available. What the bees extract from the flowers is named nectar, a sweet juice which is stored in the special containers of the flowers called nectaries. This luscious drink lures bees and other insects to flowers as an inducement to perform their vocation, the pollination of trees and plants. Nectar is their reward for these services. (Dr. A. W. Bennett thought that the perfume of flowers is generally derived from their nectars.) It is a singular combination, a friendly cooperation between the most admired and beloved objects on earth, flowers, and the most detested and feared creatures, insects.*

Taste, color shading, flavor and density of honeys greatly differ. There are various methods to determine the gradings of honey colors. The color depends entirely on the flowers from which the honey is collected. Honey has normally a whitish color, tinged with yellow. There are, however, brown, red, green and even black honeys. Clover and fireweed are typical white honeys; golden-rod, eucalyptus, marigold, magnolia and some poplar are amber colored; thistle is green; buckwheat and heather have a dark color. In Africa, green honey is found in red combs; in Russia and Brazil there is black, and in Siberia, snow-white honey.

The density (specific gravity) of honey varies. The standard weight of honey is about 12 pounds to a gallon. If it is less, the honey is considered too thin, and if more, the reverse.

There are as many kinds of honey flavors as there are varieties of trees and flowers. Honey is the quintessence of flowers and its savoriness depends on the fragrance of the blooms, just as the varieties of wine depend on the grapes from which they are obtained. The savoriness of meats also depends upon the food on which animals feed. This applies even to human beings! The cannibals of Australia do not find carnivorous white people delectable

* The name *flower* in itself reflects on honey. It is derived from *flow*, of course, of nectar (*flos florum*).

because their flesh produces nausea, which the flesh of the vegetable-fed black or yellow races will not provoke. The rice-fed Chinese are considered among them a great delicacy and Carl Lumholtz describes (*Among Cannibals*) how ten Chinamen had been consumed and relished at one dinner. Flesh-eating influences not only the taste but also the odor of the organic tissues of all creatures. The Chinese dogs bark at foreigners. Carl Crow, in *Four Hundred Million Customers*, relates that on many occasions in Shanghai he stepped from a house-boat, bathed, shaved, redolent of the odor of soap, as immaculate as a male can be, and in a few minutes every dog to the windward of him had registered an anguished protest. The dogs seemed to act as though he were a fox or had the uncured pelt of a skunk in his pocket. He relates that the dogs always raise a terrible hubbub any time foreigners—even charming alien ladies—pass, but never bark at natives. Some would believe that the dogs' aversion might be due to the clothing but a Chinese may pass in continental attire and the dogs will ignore him. We Occidentals acquire a peculiar and irritating aroma through years of meat-eating while the Chinese are either odorless or more delicately scented because of their diet of rice, barley, cabbage and fish. The Chinese are rarely uncomplimentary but "confidentially" they will intimate that we have a rather offensive and nauseating odor. They believe we badly need the frequent traditional bath which is, however, only of little benefit. We, as a rule, do not eat carnivorous quadrupeds and birds; the meats we consume are basically composed of plants and seeds. The Hebrews are permitted to eat the meat of animals that "chew the cud and divide the hoof and birds which are not scavengers."

The honey of Mount Hymettus, gathered from thyme, the Hyblean honey of Sicily, the Cretan honey of Mount Carina and that of Cyprus and Cos were best known in antiquity. The famous Hungarian Acacia honey is collected from the redolent acacia flowers (*Robinia pseudacacia*), out of which also one of the sweetest smelling perfumes is manufactured. White clover, linden, orange blossom, thyme, buckwheat, sage, raspberry, etc., produce delicious honeys, each with its individual flavor. Persia, Malta and

Florida are well known honey-producing centers. The rosemary honey of Narbonne and that of Languedoc are popular in France, so is the honey of Grasse, where many acres of fragrant jasmine blooms are planted, their essence being in great demand by the perfume manufacturers. The honey of Narbonne is white, granular and highly aromatic. It is often imitated by the addition of an infusion made from rosemary flowers. Another well-liked product of France, the honey of Gatinais, is usually white but not as odorous and granulates less easily than the honey of Narbonne. Honeys collected from the flowers of sycamore trees and gooseberry bushes, though of sea-green color, are unsurpassed in excellence. If there is a sufficient supply of the same flowers, the honey will be uniform and of a definite type, otherwise it will be a mixture of nectars and the flavor will depend on the blooms which predominate. Honey-growers often mix several honeys and produce a blend to suit individual taste. In spite of the divergencies in honeys, with regard to their color, flavor and consistency, their food value is essentially the same. About two hundred and fifty varieties of honey are produced in the United States out of which only twenty-five are distributed commercially. Clover honey predominates among these (about 60%).

Nectar has to undergo some changes before it is converted into honey. The nectar is mixed by the bees with saliva and changed into a digestible substance. Honey is also made from other substances besides nectar, e.g., from honeydew. This extra-floral honey is collected by the bees from the foliage of certain plants. Honeydew is not solely a product of plant secretion because it is secreted, or rather excreted (it is a waste product), by certain families of insects, principally plant-lice, aphids. This dew, a gummy, glossy, sweet substance, ejected in abundant quantities from the end of their abdomens by the insects, often imparts to the foliage the appearance of having been coated with varnish. At certain times, especially on hot and dry days, honeydew drips from the leaves like rain. The ancients thought that it fell from heaven. They called it the saliva of the stars (*saliva siderum*). Charles Butler remarked: "The greatest plenty of purest nectar cometh

from above, which Almighty God miraculously distils out of the air." Honeydew is more easily gathered by the bees than nectar but produces a honey of inferior quality on account of the impurities it contains, since it is exposed to air. This honey is not much favored because it has an unpleasant taste and is generally used for baking purposes, for the manufacture of lubricants and other industrial supplies. Honeydew is not even good as a winter food for bees. It is really the most undesirable among all honeys.* Coleridge thought differently when he sang in *Kubla Khan*:

"He on honey-dew hath fed,
And drank the milk of Paradise."

The honeydew exuded by certain coniferous trees (fir trees) is of better quality. The famous German *Waldhonig* of the Black Forest is such a product.

Honey is made also by other species of bees and by diverse insects, e.g., by some ants and wasps, but when we speak of honey, we mean the produce of the honey-bee. In Ethiopia there are mosquito-like honey-making insects. The honey which they produce is called *tazma*, and is considered an excellent remedy for throat ailments. The honey-making ants in South America are eaten by the natives who rate them a delicacy on account of their sweet taste. The stingless bees (*Trigona* and *Melipona*), aborigines of the Americas and Australia, also produce honey which is rather thin but of agreeable odor. The natives prefer it to the honey of the white man's stinging fly and also attribute a greater remedial value to it.

The season of the year has considerable influence on honey. There is spring, summer and fall honey; summer honey, made on dry days, is best. Fall honey is usually darker in color. Nectar is amply secreted on dry and warm days. Pliny calls summer honey, "season honey" and adds, "Nature has revealed in this substance most remarkable properties to mortals, were it not that the fraudulent propensities of man are apt to falsify and corrupt every-

* The ancients called it *tree-honey* in contrast with *bee-honey*.

thing." Pliny continues, "If the honey is taken at the rising of the Sirius, and if the ascent of Venus, Jupiter or Mercury should happen to fall on the same day, as often is the case, the sweetness of the substance and the virtue which it possesses of restoring men to life, are not inferior to those attributed to the nectar of the gods." (Book XI. 14) "Such crop must be gathered at full moon and is richest when the weather is fine." (Ibid.)

Honey is marketed in combs or in liquid form. The latter is extracted from the combs, as a rule, by centrifugal force. During highpowered extraction which is in vogue today, undoubtedly some volatile bodies are lost. This may account for the somewhat superior taste of comb honey. A vacuum method of extraction may be worthy of consideration. In former years, liquid honey was obtained by pressing and straining the honey from the combs, a method not nearly as successful, because strained honey contains a considerable sediment of wax, pollen and other foreign substances. Besides, it was a wasteful performance as it ruined the combs which today, with the aid of modern extracting methods, can be used again, saving time, labor and material for the bees. It is now a question whether the old-fashioned method of straining was not, from a therapeutic viewpoint, more beneficial, considering the fact that the residual brood pap and pollen contain protein. To this we may also add the presence of enzymes, which have an important digestive value.

Liquid honey is almost as good as comb honey and is simpler to handle. Comb honey looks attractive only if the wax is fresh and white and not yet darkened by age. White honeycombs are obtained only when the honey flow is fast and the cells are quickly filled. Honey producers often remove combs prematurely for the sake of a better appearance. This practice is a drawback because the honey is too liquid and not yet fully ripened. Fresh, immature honey sours and lacks aroma. Comb honey is, on the average, 50% more expensive because, as mentioned, valuable wax is wasted. The so-called virgin honey, often mentioned by ancient writers, is supposed to have been made by young bees. The ex-

pression is rarely used in modern terminology; young bees do not produce honey of any sort because they do not visit the fields.

Honey, like other sugars in solution, undergoes crystallization, commonly called granulation. It sometimes becomes as hard as candy. This occurs usually in dry climates where there is little atmospheric humidity and honey cannot absorb water.

The three component sugars in honey must be in natural proportion to prevent granulation. Water content, temperature and motion are important factors. Tropical honeys, as a rule, remain in a liquid state. Immobility assists granulation. Dextrose granulates rapidly and honeys which contain an excess of dextrose, like alfalfa honey, will quickly form crystals. Levulose is very hygroscopic and honeys rich in levulose are not prone to granulate. Tupelo and sage honey are of this type. Sucrose (saccharose) also hastens crystallization while dextrin retards or prevents it. The high sucrose and low dextrin contents of honey will increase the crystallization speed; on the other hand, low sucrose and high dextrin contents will lower it or crystallization will be absent. Alin Caillas established the crystallization speed quotient, as follows:

8% sucrose and 0.12% dextrin contents, granulation speed.....	0.5.
3% sucrose and 5% dextrin contents, granulation speed.....	7.0.
3% sucrose and 11% dextrin contents, there is no granulation at all.	

Granulated honey is easily made liquid in a tepid water bath. Honey should never be heated above 160° F. or for too long a time because heating, though it retards granulation and prevents fermentation, will rob honey of its flavor, taste, minerals, proteins, diastatic ferments and vitamins. Cooked honey quickly spoils, although if hermetically sealed, it remains liquid and good for years. In Europe and Canada people prefer granulated honey instead of the liquid because they know that it is pure and is not spoiled through heating. Granulation of honey is a quasi evidence of purity. Honey dealers sell liquid honey because the customers demand it.

Honey should never be kept or stored in an icebox or in the cellar. It is too hygroscopic and it will absorb, condense and retain moisture. A dry and not too warm place and a tightly closed container are most desirable. Honey does not spoil easily and will keep almost indefinitely. There is no other foodstuff which requires less attention. According to the September 1913, issue of the National Geographic Magazine, T. M. Davis, the American explorer, during his excavations in Egypt (the tomb of Queen Tyi's parents) was startled by the discovery of a jar of honey, still in a fairly liquid state, with its characteristic aroma preserved after 3300 years. Honey, of course, will deteriorate with age, like all organic substances, its color turning deep red, even black. The Egyptian report could be rationally explained by assuming that the jars had been hermetically sealed. Our honey producers should find in this discovery an inducement to pack their honey in airtight containers. The glazed earthen jars of the Egyptians should also be an object lesson because tin and new glassware are not free from acids, alkalies and mineral sediments which influence the action of enzymes. Tin containers should be carefully lacquered and glass should be sterilized. Extractors, pumps, piping, strainers and tanks must be thoroughly cleaned with steam.

Many housewives think that honey is not convenient for use because it is messy and sticky. It must be conceded that granulated, powdered and lump sugars are easier to handle than this bottled sunshine. A dripless syrup-pitcher, the so-called drip-cut dispenser, however, easily solves the problem. Placing a pitcher or jar in warm but not hot water for ten minutes will make honey thin and free of stickiness and then it can be drizzled over salads, fruits or any other food without making them too sweet. Thin honey will penetrate the tissues of the food substances. Mixing honey with hot water will serve the selfsame purpose and will also reduce the sweetness of honey.

To recapitulate the physical characteristics of honey there are four distinct features which contribute to the evaluation of honey as a commodity. These four attributes are:

1. Taste
2. Color
3. Aroma, and
4. Consistency

With regard to the worth of these qualities, as a rule, sixty points are given to taste, twenty points to color and ten points each for aroma and consistency.

Taste, of course, is a preeminent consideration, depending on the palate. It is entirely individual. Each person will select or prefer a different honey. The same discrimination applies to aroma and consistency. With respect to color, certain people, with expressed visual senses, prefer white, others amber, some even darker shaded honeys. The American buckwheat and the European heather honey are dark colored and highly flavored. Heather honey is of such density that it is difficult to extract it with centrifugal apparatus.

Entirely too much attention is paid by apiculturists to the fine grading of honeys according to color. The Department of Agriculture designed a colorimeter, honey grader, to determine exactly the color shadings. This has really less value than is attached to it. Undoubtedly, dark honeys are rich in mineral contents, compared to light ones, but the practice of making a delicate distinction of the intermediate colors seems to be insignificant from a nutrimental or medicinal standpoint. Dark honeys contain more iron and it seems that the color of honey is dependent on the medicinal value of the plants from which they are extracted. The Hebrews prefer dark honey for baking their honey cakes.

We may compare the selection of light and dark colored honeys to our discrimination between blondes and brunettes. Many people (also countries) fancy light honey and they also "prefer blondes", though dark honeys, like brunettes, possess higher mineral contents, especially iron, and, on account of that, more power. Connoisseurs will select dark honeys and . . . brunettes. Not only the color but also the aroma of honey is closely correlated with its chemical composition.

There are various mechanical devices to change the consistency, color and taste of honey. These procedures do not detract from the nutritive value of honey and their sole purpose is to cater to certain tastes. Honey-frost, whip-honey, etc., are light and creamy and are favored by many.

THE CHEMISTRY OF HONEY

Honey belongs to the carbohydrate group of foods (sugars and starches), and is mainly a watery solution of two invert sugars, dextrose (glucose or grape sugar) and levulose (fructose or fruit sugar), in nearly equal proportions. The terms dextrose and levulose originated from the use of the two prefixes, dexter (right) and levis (left), because the former turns the polarized light to the right and the latter, to the left. These two invert sugars we may call *natural* or *simple* sugars because they are readily absorbed by the bloodstream without requiring the assistance of the salivary, gastric or intestinal secretions to accomplish the process of inversion. Cane and some other artificial sugars must first be inverted into simple sugars before they are assimilated.

In addition to the two invert sugars, honey contains aromatic volatile oils, which bestow its flavor, mineral elements (sodium, potassium, calcium, magnesium, iron, copper, phosphorus, etc.), some protein, various enzymes, vitamins and coloring matter. With regard to the vitamin content of honey, there are considerable disputes about the subject among research workers. Hoyle, of the Lister Institute in London, Hawk, Smith and Bergheim allege that honey is deficient in vitamins. Dutcher thinks that there is a small vitamin content in honey but the amount is negligible. Faber believes that there is "probably" no antiscorbutic vitamin present in honey. French scientists, such as A. L. Clement, L. Iches, Laborde and others, however, found vitamins in honey, though in minute quantities; they are water-soluble B and C and fat-soluble A vitamins. Alin Caillas, the well-known agricultural chemist of France, remarks (*Les tresors d'une goutte de miel*, 1924) that plants contain vitamins and that honey, produced from

fluids which circulate in their organic tissues under the beneficial influence of the sun, must contain vitamins though we are unable to determine exactly their presence. We might call the vitamins sparks which ignite food substances.

The main chemical components of honey (in percentages) are:

Invert sugars	73.31	} dextrose, 36.20 } levulose, 37.11
Sucrose (cane-sugar)	2.63	
Dextrin	2.89	
Nitrogen substances	1.08	
Water	18.96	
Ash	0.24	

These component parts vary in different honeys. Honey is soluble in water, is of distinctly acid reaction and becomes vinous by fermentation. Its specific gravity is 1.40 to 1.45, that is, it is heavier than water. While a gallon of water weighs 8.3 pounds, a gallon of honey weighs 12 pounds. It is a rather perplexing problem to decide whether honey is a vegetable or animal product. Considering, however, the fact that the bees make honey also from white sugar (in which all vegetable components are destroyed) we ought to place honey in the latter group.

Of the two invert sugars, levulose is of greater importance. While dextrose is half as sweet as cane-sugar, levulose is twice as sweet. Levulose is an ideal sweet, the sweetest of all sugars in Nature and would be the sugar of the future if chemists could succeed in manufacturing it at a fair selling price. Today the price of chemically pure levulose is prohibitive (several dollars a pound) because it is difficult to produce in large quantities. Some chicories, dahlia bulbs and the Jerusalem artichoke (nothing to do with the Holy City, the name is merely corrupted from the French plant *girasole*) are rich in levulose (12-15%). Levulose is most soluble, delightful in flavor and is easily assimilated. It is the most valuable potential energy creator for the human system because it is an excellent glycogen (animal starch) producer. Gly-

cogen is deposited in the muscles and especially in the liver, where it is available and may be rechanged into dextrose to furnish energy by oxidation. Levulose absorbs slowly and does not cause rise in blood sugar (hyperglycemia) which is the reason that it can be used by diabetic patients. The absorption of levulose is so tardy that it often reaches the large intestines, to which contingency some of the laxative effect of honey may be attributed.

Honey, as mentioned, is of acid reaction. Various authors believe that the bees inject or spray some venom (which is also of acid reaction) into each comb. This is supposed to impart an anti-fermentative, antiseptic and conserving quality to honey. Many scientists differ on this point. Dr. Phillips, Professor of Apiculture, Cornell University, Ithaca, thinks that there is not a shred of truth in the statement that honey contains bee venom. He adds that "no acid is necessary to preserve honey, for it is such a concentrated solution of sugars that fermentation cannot occur if honey is fully ripened." According to Dr. Phillips, honey contains yeasts of a peculiar sort, commonly called nectar yeasts or "sugar tolerant" yeasts which are able to grow only in certain concentrations of sugar. Honey is normally just above the limit of the sugar content under which these yeasts commence to sprout. The identical process takes place when honey granulates. The incoming nectar is thin, therefore the excess water must be eliminated to prevent fermentation. The United States Pure Food Law permits no more than 8% of sucrose in honey but most honey contains much less than that amount.

Returning to the subject of venom in honey, it is difficult, almost impossible to comprehend the intricacies of the complex biology and physiology of the bees and more so of their bewildering chemistry. Bee venom is not a digestive ferment like the venom of snakes. It must have some other purpose than that of punishing transgressors or even of curing arthritics. The remarkable and age-old curative effect of honey in external use cannot be attributed alone to its sugar content and hygroscopic power. It is more than a conjecture that bee venom may impart some advantages to honey (Alin Caillas). Needless to say, a minute quantity of

venom would not make honey harmful as a food because our digestive ferments readily destroy even large quantities of bee venom. If it were not for that fact, the author would surmise that the presence of venom (though admittedly not chemically proven) might confer some benefits on honey when taken internally.

The acid reaction of honey may also be due to minute quantities (1/10 of 1 per cent) of lactic, succinic, citric and malic acids. Malic acid has a rather pleasant taste. It is found in some apples (from which it has derived its name) and in other plants and sour fruits. Currants contain an especially large quantity of malic acid. On the other hand, the statement that honey contains formic acid is based on a misconception, or rather, it is an error of chemistry. The age-old belief that bee venom contains formic acid is also a fallacy. It is remarkable that even the latest medical and chemical works have failed to correct this misstatement. Theodore Merl, in 1921, through carefully conducted chemical experiments proved that bee venom does not contain the slightest trace of formic acid, because the most sensitive tests were negative. Fiehe and Farnsteiner conducted numerous experiments which also proved, beyond any doubt, that the average honey does not contain formic acid. The former misconception was possibly due to the fact that silver nitrate reagents were used for the tests.

Reverting to the mineral constituents of honey, usually called ash, this is an extremely important consideration. Bones contain a considerable amount of calcium, and muscles, about 3 to 4% of mineral substances. During osmotic and oxidative processes many mineral elements are utilized which must be replaced and for this purpose honey is very useful.

Honey derives its greatest mineral content from plants; the ultimate mineral source of plants is, again, the soil in which they grow. In a word, the inorganic substances which honey contains are indirectly dependent on the soil, which is the reason the mineral constituents of honey greatly vary. A good fertilizer of the soil will also improve honey. It is an old English saying: "Where there is the best honey, there is also the best wool."

Bees require mineral substances for their maintenance. Dried

bees contain almost 5% ash. This explains the popularity of burned bees in ancient medicine. Of course, bees do not obtain all minerals from plants; hard water will also contribute its share. Bees fed on sugar-syrup lack minerals.

The mineral content of honey is not high; it is about one-fourth that of meat and a little less than that of milk. It seems, however, that the quality of the minerals makes honey valuable for dietetic use. Dark colored honey contains more minerals, mainly iron, copper and manganese which makes it especially fit for medicinal purposes. People who prefer light honey to dark make a great error. Heather honey is the richest in ash. Dark honey has a higher specific gravity; one "drop" of it will travel faster and also goes "further" in the organism.

The comparative analyses of ten samples of light and dark honeys in ash content, according to Schuette, in milligrams per kilogram, is the following:

	Silica	Iron	Copper	Manganese
Light honeys	.065	2.4	.29	.06
Dark honeys	.173	9.4	.56	.32

The consumption of dark honeys, which have a higher manganese content, possibly contribute to intensifying glorified maternal love. The experiments of Dr. Elmer V. McCollum of Johns Hopkins University prove that lack of manganese will cause mother rats and guinea pigs to refuse to cuddle or nurse their young. When these animals were fed an *infinitesimal* bit of manganese chloride the mother instinct was immediately awakened.

The following figures give the mineral constituents of thirty-four 100 gram samples of average honeys in milligrams. (Elser and Sundberg):

Phosphoric acid.....	56.93
Iron	1.80
Manganese48
Chlorine	16.37

Calcium	15.86
Silicates	8.91
Magnesium	5.48
Potassium	149.40
Sodium	23.37

In establishing the relative difference of the sweetness of honey and other sugars, a tabulation of the comparative sweetness of various types of sugars, expressed in units, will be useful:

Levulose	173
Invert sugars	123
Cane-sugar	100
Glucose	74
Maltose	32
Galactose	23
Lactose	16

The hygroscopic quality of honey, as mentioned, is mainly due to levulose and to the colloidal substances which honey contains. Honey far excels molasses, commercial glucose and malt syrup in moisture-retaining power. Levulose is most hygroscopic among all sugars.

CHAPTER IV

REFINED SUGAR

EXPERIMENTS conducted in feeding animals with refined sugar to determine its effect on them have so far not been sufficient or thorough enough to clearly and conclusively establish its worth. One fact has been proven, that animals live longer without food whatsoever than when fed on refined sugar. The effect of refined sugar on human beings is entirely empirical. It is possible and probable that it does more harm than we know or suspect. Considering the vital importance of the subject, science has done comparatively less research on foodstuffs, and on correcting our depraved and vicious habits in nutrition (and habit is second nature) than in any other field; to discuss this point, however, is much beyond our scope.

We must distinguish between sugar-cane products in general and refined sugars. The juice of the sugar-cane is a valuable and wholesome nutrimental substance. Sugar-cane syrup is an excellent sweetener without objectionable qualities. Whoever has eaten Chinese candy will understand the meaning of this statement. The so-called Chinese candy is an ideal product and is used to sweeten coffee, tea and other beverages. It is bright, transparent and of exquisite taste, similar to our rock-candy. The name, candy according to some philologists, is derived from the Latin *candida*: bright, pure. Refining sugar in loafs was never practiced in the East.

The history of sugar is rather interesting. In spite of the fact that refined sugar was introduced for popular use comparatively late, we find traces of its existence as far back as several centuries B.C. Theophrastus, Pliny, Strabo and Seneca mention sugar

and sugar-cane. Theophrastus (320 B.C.) called sugar "honey extracted from reeds" which looked like salt. It was very probably inspissated cane-juice. Aristotle was the first to give a detailed description of the substance. Sugar was then a great rarity and used exclusively for medicinal purposes. Many ancient authors referred to sugar as honey. Varro (68 B.C.) thought there were three kinds of honeys, one collected by the bees from flowers, another type formed on the leaves as dew and the third, obtained from the "Indian reed."

Nearchus, Admiral of the fleet of Alexander the Great, returning to Greece from the discovery of the Indian Ocean (324 B.C.), brought back with him "sugar-candy" and a marvelous "honey-bearing reed" which was used by the natives of India. Candy making has been practiced in China since remotest antiquity; their confections were exported in large quantities to India, but the source and how they were made was a well-guarded secret for thousands of years. The actual knowledge of the origin of sugar-cane was first revealed in the middle of the thirteenth century by the celebrated traveler, Marco Polo.

The plant was soon taken to Arabia, Nubia, Egypt, Ethiopia, where it was extensively cultivated. Some sugar-cane was found in Sicily, Crete, Rhodes and Cyprus at an early period, possibly brought there from India by the Saracens.

The Spaniards conveyed sugar-cane from the East only in the fifteenth century, and successfully planted it in Madeira and the Canary Islands. From there, in the sixteenth century, it was taken to St. Domingo and to other West Indian islands and to South America. Though it is generally believed that the home of sugar-cane was China, some explorers record having found sugar-cane in Brazil before the Spaniards and Portuguese had a chance to plant it there. Father Hennepin, who was the first European to explore the lower Mississippi regions, reported that he found sugar-cane even there.

Sugar-cane was imported in the seventeenth century from Arabia to the European Continent where it gradually gained ground. Sugar-cane syrup was a great luxury; the privilege of

royalty and the highest nobility, and used even by them only on special occasions. They also found several medicinal uses for it. Honey was still the dominant sweet, and not until the end of the eighteenth century did sugar gradually supersede it. Within the last two generations, through the efforts of a technically perfected industry, sugar has become one of the cheapest of food substances, so low in price that even the poorest families can afford to buy it.

CHAPTER V

HONEY vs. SUGAR

HONEY contains about 1600 calories (calorie is the amount of heat which is necessary to raise the temperature of one gram of water by one degree Celsius) to the pound and is at the head, in this respect, of all other natural foods, far exceeding meat, eggs, milk, grains and vegetables. The date is the only edible substance which surpasses honey in calories.

The caloric value of honey nearly equals that of cane-sugar (1800 cal.) but in every other respect it is far superior. If honey contained no water its caloric value would be practically the same as that of cane-sugar. A tablespoonful of honey weighs about an ounce and provides the body with 100 calories. Honey does not contain any harmful chemicals and is entirely utilized by the digestive tract. Not more than one two-hundredth part is wasted. Commercial or white sugar, made from sugar-cane, beets, corn, etc., is submitted to several complicated boiling procedures during the process of manufacture. The organic acids, protein, nitrogen elements, fats, enzymes and vitamins are extracted or destroyed; on the other hand, hydrochloric, phosphoric and sulphuric acids, lime and other foreign substances are added. While honey is Nature's own sweet, untouched by human art, sugar is a concentrated, denatured and polluted substitute, a produce, as a rule, of sugar-cane, robbed by superheating of most of its natural and valuable constituents. Honey and other simple or natural sugars, like that in dates, figs, raisins, etc., are live physiological sugars which contain the germs of life, while industrial sugars are anti-physiological, dead or, as a matter of fact, murdered sweets. Brown sugar contains some minerals, but white sugar is entirely demin-

eralized because it will not crystallize if any minerals remain. The first step in the manufacture of sugar is to neutralize the free acids of the cane-juice. Cane-juice is quite dark in color because of its mineral constituents. To remove the sugar from the cane-juice it is treated with the fumes of burning sulphur or heated with bisulphide of lime. The process in industrial language is called "defecation". The lime neutralizes all acids and prevents the cane-sugar from changing into an uncrystallizable invert sugar.

Clarence W. Leib, in *Eat, Drink, and be Healthy*, remarks that sugar undermines the nation's health and that the best sugars are *simple* sugars, liberally supplied by nature in honey, fruits and vegetables. They require little digestive effort for assimilation. White sugar depresses the appetite, irritates the stomach, produces heart-burn, acid fermentation, gastric catarrh, indigestion, exhausts the pancreatic activity and thus leads to diabetes. The ravages of artificial sugar increase in proportion to the degree of its refinement. Refined sugar is not only irritating to the intestinal tract but to the skin. Grocers and people who handle sugar often suffer from skin eruptions.

No better authority can be quoted than Dr. Banting, the discoverer of insulin, with regard to the causes of diabetes. "In the United States the incidence of diabetes has increased proportionately with the per capita consumption of cane-sugar. One cannot help but conclude that in the heating and recrystallization of the natural sugar-cane something is altered which leaves the refined product a *dangerous foodstuff*." (Edinb. Med. J. 36, Jan. 18, 1929.)

Dr. Banting comments on the incidence of diabetes among the many wealthy Spaniards in Panama, who eat large quantities of cane-sugar and even cook their food in sugar syrup. Diabetes among this class is surprisingly high. The effect of the ingestion of cane-sugar is even more startling in India where there is no diabetes among the poor but among the wealthy classes over fifty years of age, who indulge in sugar, about 40% are diabetics.

That sugar is an important contributory factor in producing

diabetes was best proven during the World War when the disease was not as prevalent in the United States. This can only be rationally interpreted as due to the lessened consumption of white sugar during that period of time, long enough to justify the correctness of the statistical data. The subsidence of diabetes in belligerent foreign countries was even more manifest. During prohibition the sugar consumption in the United States increased over 30%, and diabetes in the same proportion. The parallel advance was disrupted only when insulin was discovered. According to Stefansson the Eskimos had neither constipation, stomach or dental troubles while on an exclusive meat diet but since the use of devitalized sugars and starches these diseases have become prevalent.

If the Food Section of the United States Department of Agriculture would not respect the "big interests" so much, but would faithfully and meticulously discharge its obligation toward food control, sanitation and the protection of health, it certainly would prohibit the manufacture of refined sugar and of white flour, both of which are low-grade, denatured, dealkalinized fuels, robbed of all vital elements. Laboratory experiments have also proved that animals live longer without food than when fed on refined sugar and white flour. The nutritive part and vital force of grain is gluten, which is in the bran, and therefore should not be removed. Of course, the millers know that degerminated products are less perishable. The patriarchal device of "braying" the grain (brayed, bread), is today only a matter of history; the ancients ate the vitamins, we write and read about them. The flour from which some white breads are baked is not only devitalized and devitaminized but, to look better, it is bleached and artificially matured by chemicals, e.g., potassium bromide, chlorine, nitrogen trioxide, benzoyl peroxide, etc.

Dr. E. V. McCollum, Professor of Chemical Hygiene, School of Hygiene and Public Health at Johns Hopkins University, Baltimore, addressing the Northern Ohio Dental Association's seventieth anniversary convention at Cleveland, Ohio, said that the American people ought to be ashamed in permitting two

atrocities to be put over on them. He referred in particular to white flour and refined sugar. McCollum said that he sometimes wondered which of the two evils is greater.

Recently one of the milling companies advertised a "wheat germ product" one dollar a pound, as an addition to diets, to replace vitamins B, G and E and *valuable* mineral salts which are taken out from the wheat during the process of manufacturing white flour. First these vital elements are removed, then, realizing the *faux pas*, they are sold separately. In the good old days only the chaff was separated from the wheat but in a scientific era all things must be changed.

Sugar is just as habit-forming as narcotics. Sugar contains calories which artificially create temporary energy but it is not a food because it is without nutritive value and not only does not benefit the tissues of the organism but harms them. The use, misuse and abuse of refined sugars (in the shape of candy or in any other form) is a modern nutritional disaster. We employ these sugars not with the purpose of obtaining strength but simply for gratification of an unhygienic and illogical craving for sweets. The Anglo-Saxon races head the list of sugar habitués. Napoleon craved and incessantly munched chocolates and it is no wonder that he had to get up nightly and thrust a finger into his throat to relieve himself of excessive gastric juice. As we know, he died from a perforation of the stomach.

The writer is firmly convinced that if the youth of the country would eat good old-fashioned rye-bread, the kind which mother used to bake, and not highly praised (of course, only in advertisements) proprietary breads, and would consume natural fruit sugars, like honey, dates, figs, raisins, grapes and other sweet fruits, instead of cheap candy, their physical defects would not be so manifest, as exposed by the staggering revelations of 1917. In spite of the lowered physical standards that had to be instituted then, less than half of the young men were found fit for military duty. So let us be better prepared for the next war. Sir William Osler's remark that any disease which Nature can not cure will remain uncured pertains also, by proper application, to all de-

natured foods. It is too bad that the term "denatured" is almost exclusively used today only for the designation of a certain type of alcohol. If exploitation can triumph over Nature, it is time—at least—to be aware of it.

Dr. Harvey W. Wiley, former chief chemist of the Department of Agriculture and Director of the Bureau of Foods, Sanitation and Health, in a letter to the American Honey Institute, wrote thus about the "honey matter": "Unfortunately, the amount of honey that is now produced in the United States, or that may or can be produced therein, is entirely insufficient to supply the wants of even a small percentage of our people. If we stress the honey matter too prominently we may do injury, not to the bees nor the keepers, nor the honey merchants, but to those who prefer honey to other sweets. I am one of that kind. I get every year about sixty pounds. If we urge everybody to use honey instead of sugar, we will have the same condition that now exists with codliver oil, calf's liver and agar.* A few years ago agar was quite cheap. I with others have been urging people to use agar to avoid constipation. It now costs over \$3.00 a pound. In the same way the craze for liver to cure anemia has greatly advanced the cost of that commodity. I am a great believer in honey, both on account of its flavor and because I think it is far more wholesome than refined white sugar. I use it every morning in my coffee, of which I drink one cup a day."

Dr. Wiley also declared saccharin a harmful substance. When the ketchup manufacturers and canners wished to add saccharin to their products, he protested. During a hearing, the late Theodore Roosevelt, at that time President of the United States, was amazed to hear that saccharin was objectionable. "You are telling me, Dr. Wiley, that saccharin is injurious to health?" Roosevelt asked. "Yes, Mr. President, I do tell you that," answered Wiley. The President remarked: "Well, Dr. Rixey (at the time White

* The California Fruit Growers' Exchange appropriated for 1937 a million and a half dollars for cooperative advertising of alkaline-forming citrous fruits. It is not surprising that the price of oranges, lemons, and grapefruit has increased 46% over the 1935 level.

House physician) makes me take it every day." Wiley was embarrassed and explained: "Probably he thinks that you are threatened with diabetes and considered it better for you than sugar." The manufacture of saccharin has been forbidden in Germany and Italy.

What effect refined sugars have on the alarmingly increasing prevalence of arthritis is another important question to solve. The fact alone that arthritics, who suffer from delayed sugar removal, are legatees to all the scourges of this malady, while diabetics who cannot digest glucose and eliminate it from their systems are almost entirely free from symptoms of arthritis, deserves consideration. The main complaint of diabetics is lack of energy, a complication with which the arthritics, who are perfectly well otherwise, are not concerned. This prevailing contrast between the two groups could be rationally attributed to some unknown conditionality superinduced by two divergent functions of the respective organisms.

Dr. Serge Voronoff was evidently not a believer in sugar when he made the statement that the human race could easily extend its period of life to 120 years by eliminating from its diet sugar, white flour and salt.

England was one of the first nations to assail the mischiefs and ravages of refined sugar and to raise her voice against its use by calling attention to its harmful effects. According to records, the art of refining sugar was first practiced in England in 1544. John Gardiner and Sir William Chester were the proprietors of the first two "sugar-houses" in England. The introduction of sugar immediately raised the question of its desirability, and a great part of the population feared that it might have bad effects. Sir Thomas Mildmay, in 1596, petitioned Queen Elizabeth for the exclusive right to refine sugar because he believed that frauds were practiced in the process of refining.

Theophilus Garencieres, a physician (1647), was the first to attack sugar in its infancy. He thought sugar created *Tabes Anglica* and also caused consumption of the lungs because the heating quality of sugar was "not a little" injurious to the lungs.

Thomas Willis, the celebrated English physician, was next to attack it in 1674. He thought that sugar largely contributed to the immense increase of scurvy. He argued: "For it plainly appears by the chemical analysis of sugar that this *concrete* consists of an acrid and corrosive salt, tempered with a portion of sulphur." He referred to eminent authors who attributed the cause and frequency of consumption of the lungs in England to the immoderate use of sugar. Scurvy made great ravages in England in the seventeenth century, so did consumption of the lungs and scrofula. Angelus Sala also attributed many ailments to the abuse of sugar; among them, loss of appetite, blackness and loosening of the teeth, offensive breath, colic, lax bowels, also bilious, scorbutic and hysterical complaints. It was observed that sugar produced worms in children. It seems that Garencieres and Willis were the founders of the wide-spread cult, known in England as *Antisaccharites*.

Charles Butler, in *Feminin' Monarchi*, 1632, comparing honey with sugar, remarks: "In respect of the marvellous efficacy which fine and pure honey hath in preserving health, that gross and earthy stuff is no whit comparable to this celestial nectar."

It is the prodigy of knowledge not only to discriminate between similarities of things different but also between divergencies of things resembling one another (Medical trickology).

CHAPTER VI

THE NUTRITIVE VALUE OF HONEY

TICKNER EDWARDES wrote thus about honey: "Honey is good for old and young. If mothers were wise they would never give their children any other sweet food. Pure ripe honey is sugar with the most difficult and most important part of digestion already accomplished by the bees. Moreover, it is a safe and very gentle laxative. And probably, before each comb-cell is sealed up, the bee injects a drop of acid from her sting. Anyway, honey has a distinct antiseptic property. That is why it is so good for sore throats or chafed skins. If only doctors could be induced to seek curative power in ancient homely things, as they do with the latest poisons from Germany! That applies also to the treatment of obesity. Fat people, who are ordered to give up sugar, ought to use honey instead. In my time I have persuaded many a one to try it, and the result has always been the same—a steady reduction in weight and better health all around. Then again, dyspeptic folks would find most of their troubles vanish if they substituted the already half-digested honey wherever ordinary sugar forms part of their diet. And did you ever try honey to sweeten tea or coffee? Of course, it must be pure, and without any strongly-marked flavour; but no one would ever return to sugar if once good honey had been tried in this way, or in any kind of cookery where sugar is used. In extracting honey it gets into most places, the hair not excepted. At any rate, honey as a hair-restorer was one of the most famous nostrums of the Middle Ages, and may return to popular favour even now . . ."

Good honey is an ideal food, nutritious and easily digested. Professor Klemperer of Berlin claimed that a tablespoonful of

honey is equivalent in nutritive value to the largest-sized hen egg. According to Professor von Bunge, 98% of the lime, iron, salt and grape sugar, of which honey contains 77%, are directly absorbed by the blood. Honey is six times richer in fuel value than milk and, in addition, it contains more inorganic substances. The flavor of honey has also a dietetic value as it induces the free flow of saliva which in itself promotes digestion. It is not surprising that the Germans called honey *Urnahrung* (aboriginal food). There is also a breath of romance in each drop of honey.

The nutritive value of honey was well proven by a recent experiment (March 1935) of Dr. Mykola H. Haydak, of the Agricultural Department of the University of Minnesota, who for a four-month period lived exclusively on honey and milk. Dr. Haydak wished to prove that solids are not necessary to sustain life and that this combination was a perfect diet. During the third month he developed scurvy which, however, was easily cured by adding a small quantity of orange juice. He was pronounced, by the examining physicians of the University, to be in perfect health. At the beginning of the diet Haydak lost several pounds but he soon regained the deficiency and his weight remained constant thereafter.

Honey is best suited for the young and the old. Before puberty and during the years of decline the ductless glands, especially the thyroid gland, do not function adequately and meat is not indicated. The toxic products formed in the organism by the decomposition of meat cannot be destroyed. People when their endocrines are undeveloped or in a state of retrogression will not tolerate meat but crave sweets. Pronounced meat eaters and consumers of alcohol have little desire for sweets; on the other hand, children, the aged, the weak and invalid, especially women, crave them.

The Biblical designation, "a land flowing with milk and honey," should be suggestive enough to combine honey with dairy products. Honey cream, honey butter, honey cream cheese are wholesome combinations. To please the palate they could be flavored with chocolate, vanilla or malt.

Honey is widely used today as a food among primitive races. They mix it with milk, curds, cheese and especially with cereals and bread. The Anyanja tribe (Central Africa) make from maize flour, bananas and honey the so-called *mkate*, which is practically their sole food.

Honey is also used extensively, internally and externally in veterinary practice. A lean horse fed on honey and bran will rapidly put on flesh. Homer relates in the *Iliad* that Diomedes fed his horses honeyed barley.

Luther C. Headley, of Madison, New Jersey, has experimented for years on feeding cows an admixture of honey, and has found that their milk and by-products are more nourishing. Leghorn pullets, fed on mash to which some of this milk had been added, lay gigantic eggs which almost burst out of the ordinary box and ran in weight more than thirty-three ounces to a dozen as compared with eggs weighing twenty-four ounces to a dozen laid by pullets of the identical strain not fed the same mixture. Honey has a marked effect on the muscles and bones of growing cattle. Members of the State Agricultural Association of New Jersey, who visited the Headley farm, expressed amazement at the size of a six-month old calf fed since birth on honey.

The owner of a large turkey farm in Connecticut, which is famous for the size and tenderness of its turkeys, feeds the birds on mash mixed with honey.

1. IN INFANT FEEDING

“Sleep with the mouth at a honey bottle.”

Bedouin proverb

In infant feeding, after milk, honey ought to be considered first in importance. The Papyrus Ebers (The Leipzig Mss.), 1600 B.C., mentions that infants were fed on honey. Galen considered nothing better for teething infants than honey and butter; the combination was supposed to help ulcers of the mouth. Galen's direction was “to rub the gums with honey, for it conduceth wonder-

fully to the growth, the conservation and the whiteness of teeth.”

Among many modern authors, Dr. Paul Luttinger, Pediatricist of the Bronx Hospital, New York City, recorded 419 feeding cases of infants where honey was used with success and where the use of sugar would have been prejudicial. Luttinger found so many decided advantages in honey for infant feeding that he discarded other sugars. He used one to two teaspoonfuls in eight ounces of feeding mixture, substituting honey for orange juice and cod liver oil. Honey is certainly more palatable than cod liver oil and is just as good, if not better; it is tasty, nourishing, and is easily and quickly digested because there is no resistance and delay in its absorption. Infants fed on honey rarely show flatulence. The facility of absorption prevents fermentation. A teaspoonful of honey to eight ounces of barley-water is an excellent remedy for summer diarrhea. In marasmus, rickets, scurvy, in fact, in every case of malnutrition, honey is a *sine qua non* because it contains not only proteins but mineral salts and vitamins which are missing in sugar. The mineral content of honey is higher than that of human or cow's milk which contain only exceedingly small quantities. Honey has a great antituberculous reputation in infant feeding among European peasants. The sedative, hypnotic and diuretic effects of honey are well-known.

Dr. M. W. O'Gorman, Chief of the Division of Hygiene, Department of Public Affairs of Jersey City, New Jersey, used honey for 25 years as a valuable addition to milk modification for infant feeding and in the growing child's dietary. The fact that many of the infants admitted to his institution had been suffering from malnutrition, some even with little chance to survive, makes his statement more impressive. His charges received at first one-half teaspoonful of honey every 24 hours and the amount was gradually increased to two teaspoonfuls, according to size and bowel movements. In case of constipation the amount of honey was increased. Honey has a decided laxative effect on infants. This effect, however, is lost if the honey is boiled.

There are innumerable other reports praising the value of honey in modified feeding of infants. Dr. H. W. Wiley in the

May 1926 issue of *Good Housekeeping* also recommends honey as a sweetener in infant feeding. Condensed milk and other proprietary milk products contain a large amount of cane-sugar because it is sweeter than the appropriate milk sugar. It is a proven fact that infants brought up on condensed milk are less resistant to infections than those fed on mother's or cow's milk. Dr. R. G. Flood thinks that honey is a very valuable sugar in the treatment of constipated bottle-fed infants due to the laxative effect of the levulose fraction which is slowly absorbed and eventually reaches the large intestines. Constipated infants benefited in his hands a great deal through the use of honey as a substitute.

Titian's painting, representing infant Jesus holding a bee in His hand, may well symbolize the value of honey for infants.

2. FOR CHILDREN

The old Gaelic honey was reputed to have served better for children than any other tonic. The Scotch believed that honey-suckle, a favorite of the bees, contained some kind of a "life-substance." The nomad Arabs, the Bedouins, feed their youths even today on buttermilk and honey. Important antituberculous and antiscrofulotic effects were attributed to honey by the peasants of many countries, also in children's dietary. Honey and cream or butter for adolescents was considered a safe-guard against tuberculosis. A glass of barley water with a tablespoonful of honey is a popular health-drink for juveniles on account of its mild laxative effect. On the European continent and in all Slavic countries honey is still the preferential sweet for children. The peoples of the Orient are experts in preparing honey-confectionery, called sweetmeats.

Many clinical experiments have been conducted in institutions, not unlike in infant feeding, to test the nutritive and tonic effects of honey on children. The Frauenfelder Home, in the Canton of St. Gallen, Switzerland, is famous for its honey and milk cures. Weak and sickly children are brought there from all parts of the world to recuperate and gain health. If any medical man wishes

to be convinced of the nutritive value of honey, he should visit this institution. Dr. P. E. Weesen, of the Frauenfelder sanitarium, experimented in feeding patients in three groups: the first group received normal food; the second group, normal food with honey; and the third group, normal food with tonics and medications. The group fed with honey far excelled the other two groups, both in looks and in strength. *Facta loquuntur!*

Dr. Paula Emrich also conducted parallel feeding observations with 100 children. At the start the group which was assigned to be given honey, received a teaspoonful of honey in a cup of warm milk. The honey was gradually increased to as much as two tablespoonfuls daily. Those who manifested digestive disturbances were exempted. To be objective and also to avoid errors the selected groups of children were, as much as possible, of similar types as regard to age, size, constitution, living conditions of their families, hemoglobin content of blood, etc. The children of the separated groups were often sisters and brothers, some of them were even twins. The comparative results and the statistics proved that the children who received honey, but were otherwise on the same diet, after six weeks gained less in weight but more in the hemoglobin content of their blood (12%).

That the mineral elements, such as copper, iron and manganese, which honey contains, have important blood-building functions has been proven by Dr. Rolleder's experiments (on 58 children) in an Austrian orphanage. During the school year he gave half the number of boys one tablespoonful of honey in the morning and the same amount in the afternoon; the other half were not given any. The result was that the children who received honey showed an increase in hemoglobin (8½%); the others showed a corresponding loss. It has been demonstrated by experiments that animals will form decidedly less hemoglobin in their blood when fed on sugar than during a similar period of fasting.

Beyond any doubt, a great error in the present feeding methods for children is to permit them to consume sugar-candy instead of natural sweets. Dr. Seale Harris (*New Orleans Med. & Surg. Journ.* 81, Sept. 1928) remarks: "The sugar-fed child often be-

comes rachitic, is prone to acquire colitis and other infections. If he survives infancy he becomes the pale, weak, undernourished child, or the fat flabby indolent and self-indulgent adolescent. Sugar-saturated and vitamin-starving America presents a problem. . . . An ounce of prevention in an infant is worth more than the proverbial pound of cure in an adult. Sugar-fed children will not enjoy milk, eggs, fruit and vegetables to provide them with protein, fats, minerals and vitamins, which are needed for their growth."

Dr. Harris thinks that the sugar-saturated American children are confirmed sugar habitués. They cover their breakfast cereals with sugar, spread sugar-syrup over their pancakes, cheap jams over the muffins and often even sweeten their milk. They are served sweet desserts (the sweeter the better) for lunch and dinner. Between meals they devour candy and ice cream, and indulge in all kinds of sweet "soft" drinks. Candies contain 40 to 60% of some sort of processed sugars. As a result, these children suffer from flatulence, hyperacidity and headaches and become irritable, restless, capricious and undernourished. They are physically underweight or overweight and mentally precocious or retarded; are easily fatigued and unmanageable, suffer from one cold after another. Physicians, instead of conducting the fashionable search for some non-existent endocrine deficiency, should rather be guided by the fruity breath of acetone of these children, which in itself usually reveals the difficult (?) diagnosis. The French Dr. Le Goff contends that about 80,000 children die in France from the direct effect of industrial sugar. Dr. Le Goff would not permit in his practice the minutest quantity of sugar in the food and drink of infants and children. The results are astounding because almost all the new-born grow up to robust childhood. Many pediatricists recognize the existence of a so-called "sugar-fever."

Dr. W. E. Deeks also has found that sugar-eating children are badly nourished, pasty-looking, irritable, restless, particularly at night, and frequently suffer from incontinence of urine during sleep; they have decayed teeth, are constipated at times, alternat-

ing with diarrhea; they are subject to rheumatism, chorea, recurring bronchitis and sore throat. In early infancy they are prone to gastro-intestinal disturbances and eczema. Sugar eaters have, as a rule, a very red and irritated tongue, rapidly recurring hunger with a ravenous appetite which is, however, easily and quickly satisfied; a tendency to heartburn and ineffectual belching.

Digestive disturbances in children predominate in the wealthier classes. When these children grow up they become accustomed to sweets and as adults will persevere in their slow suicidal efforts. The sweet-toothed child becomes a toothless adult. Most oral infections, bleeding gums, decayed teeth and pyorrhea are produced by carbohydrate fermentation, or by some additional harmful substances which candies contain. Sugar fermentation, through the formation of lactic acid and the consequent decalcification, is the main cause of tooth decay. The resisting power of teeth to withstand decalcifying agents varies considerably.

Refined sugars possess a decided affinity for lime and they deprive the teeth and bones of this important mineral substance; in consequence the teeth decay and the bones become weak. Candies lack minerals, which fact is a drawback because adolescent children require a great amount of minerals for their teeth. An excessive consumption of candy produces anemia which, in itself, is a contributory cause of dental caries. While refined sugars, of which candy is made, do not contain even a trace of calcium or iron, the ash of 100 gm. of honey contains 6.7% of calcium and 1.2% of iron (Von Bunge). Efforts to replace organic minerals with inorganic ones have always proved a failure. Natural or simple sugars like that found in honey, dates, figs, raisins and other fruits will not cause oral defects. This is proven by the teeth of Arabs, Turks and the African negroes. Half an apple, half a banana, one orange, one fig, or two dates contain the equivalent of two level teaspoonfuls of sugar. But civilized man grows his sweet tooth first and only later his . . . wisdom tooth.

The truth of the many accusations that sweet drinks and foods, especially candies, are the main source of tooth-decay was conclusively established by the recent Dental Research Expedition of

Columbia University which was sent to the remote areas of the Bering Sea. Dr. L. M. Waugh, leader of the party, states that the Eskimos have perfect teeth so long as they abstain from "civilized" diet. "We found natives," Dr. Waugh reports, "with practically perfect teeth, lacking in decay, so long as they lived in their natural state untouched by the white man and ate their native diet which lacks sugar in its refined form. When the natives are subjected to the white man's diet their teeth decay." Dr. Waugh recommends that natural sugar be substituted for refined sugar and for sweets which contain it.

Food excesses, as a rule, imply fares of which we are fond. Sugar products are pleasing and palatable besides being abundant and cheap. The temptations are great and it requires a certain amount of self-control to resist the craving. We cannot expect, however, such virtue in children; only proper education will enlighten them. Children have to be taught to resort to natural sugars and not to indulge in devitalized, vitamin-free substances. Universal ailments of children such as dyspepsia, eructation, appendicitis, gall bladder, liver and pancreatic infections, furunculosis, eczema, general debility and many other physical and mental complaints, due mainly to excessive use of sugar, could be eliminated. It is a great public health and educational problem. To supply the proper food for children should be our foremost duty. It is like laying a corner-stone for a better generation. Those who have reached or passed middle-age today have already made so many errors in diet, and their inveterate habits are so firmly established, that they are almost hopeless. To spare pregnant and nursing mothers from an unbalanced and deficient diet should be our next aim. We pay attention to the feeding of thoroughbreds; so why not to that of our own race?

Craving for sweets is a source also of other transgressions because often harmful substances are added to sweet foods and beverages. In an Alabama school, for instance, it was established that 60% of the children indulged in cola drinks which contain, besides sugar, harmful caffeine substances.

American children are the greatest candy-eaters in the world.

All one has to do is to observe the traffic around the candy counters in schools or in the neighborhood candy stores. One seldom sees children without the inevitable lollypops or their near or far relatives. Candies decrease the appetites of children and irritate the delicate linings of their stomachs, this irritation in itself interfering with the absorption of food. Parents should know that starches, such as bread and cereals, manufacture sugar in the organism. Fruits and certain vegetables, of course, contain a considerable amount of natural sugars. Candies will establish an excess in sugar consumption with all its dire consequences. The irony of the situation is that in many schools we find the candy counter in one wing of the building and the dental clinic in another.

Statistics based on examination of a large proportion of over twenty million school children in America show that 15 to 25 per cent have diseased tonsils or adenoids; 50 to 75 per cent have defective teeth; and 15 to 25 per cent suffer from malnutrition (Leete, *Mother and Child*, 2, 358, 1921). Terman (*The Hygiene of the School Child*, 1914) also found that fourteen million school children in the United States were handicapped by some kind of physical defect. Medical examinations during drafting of our young men for the World War revealed similar results.

Teeth have a great importance in their relationship to other organs of the body. The value of good teeth as a dependable indicator of health was known during the days of slave-trading when two dollars were deducted from the agreed price of a slave for each decayed tooth (Finke, *Medical Geography*, I. p. 449). Dr. Oliver Wendell Holmes once remarked that longevity depends not so much on the importance that children should be born to long-lived parents but to parents with good teeth. The Biblical edict that the sins of the fathers shall be visited on their children also refers to teeth.

The "sugar capacity" of children greatly varies. Dr. Ch. G. Kerley, the noted pediatricist, observed in many children serious maladies which could be traced to the indiscriminate use of candy. Among the diseases he found persistent head-colds, otitis, enlarged

tonsils, recurrent bronchitis, bronchial asthma, vomiting, rheumatism, chorea, eczema and urticaria. Kerley found in 78 cases:

Recurrent vomiting.....	8
Eczema	13
Asthmatic bronchitis.....	7
Asthma	4
Frequent colds, coryza, tonsilitis.....	17
Chorea	11
Rheumatism	4
Rheumatism and endocarditis.....	6
Urticaria	2
Recurrent bronchitis	6

Several cases were conjoined with one or more of the other ailments. Of the group, for instance, there were combinations of:

- Eczema, urticaria and rheumatism;
- Eczema, urticaria and bronchial asthma;
- Eczema and chorea;
- Eczema and bronchitis;
- Rheumatism and asthmatic bronchitis.

Most of Dr. Kerley's patients improved without medication by simply depriving them of candy. Some of the "sugar susceptibles" were so sensitive to "candy poisoning" that a small piece of candy was sufficient to produce an outbreak. "It would seem," remarks Kerley, "that to some individuals cane-sugar is sufficiently toxic to produce a perversion of functions with symptoms of its own . . . and in others to produce enough change to invite or allow bacterial invasion, as in acute articular rheumatism and endocarditis."

Candy and sweet cakes will produce in children *malaise*, drowsiness, languor, epigastric heaviness and bilious, green-colored vomiting. Dr. E. H. Bartley reported the case of a girl who vomited two hours after every meal for a year. After inquiry the doctor

found that the child had been living almost entirely on cake because her appetite (?) did not crave anything else. The vomiting promptly ceased by withholding the cake. Three weeks later, after eating cake, the child suffered a relapse.

Dr. Bartley reported autopsies on two children who died from excessive indulgence in candy. The result of the autopsies showed an acute and intense inflammation of the gastric mucosa; the candy was not even entirely dissolved and was mixed with the abundant mucus of the stomachs. Some of the gastric contents were ejected by vomiting that preceded death. The coroner's findings were acute inflammation of the stomach and duodenum, caused by excessive eating of candy. Chemical analysis failed to reveal any foreign toxic substances. Candy alone in large quantities is a sufficient irritant. An excessive amount of cane-sugar inhibits the secretion of hydrochloric acid.

Dr. R. Blosser, of Atlanta, Ga., reported the case of a child 8 years old who suffered an attack which was termed *delirium tremens*, attributed to excessive use of brown sugar. The father, a grocer, allowed him free access to the sugar-barrel, from which the boy indulged between meals. The violent attack lasted for four days and the child had to be "held in bed." After the boy had been forbidden to eat any more sugar, the delirium did not recur. Another proof that sugar contains deleterious substances.

The gastric catarrh of children caused by indulgence in candy has, undoubtedly, a remote effect on the nose, throat and lungs, diffusing the catarrhal condition. In young girls menstrual disturbances and leucorrhœa may also supervene. The most harmful effect of candy-orgies is that the victims lose their appetite and as a result exclude highly essential nutriment.

Our schools should show concern and teach more dietetics instead of so much theoretical science. It is difficult to depend on parents, considering how most of them . . . feed. With the aid of a little more solicitude on the part of teachers, children could carry the knowledge of proper diet to their homes and educate their parents.

The harm caused by the excess consumption of candy is not

due solely to its sugar content. Cheap candies, to preserve and lend color and flavor, are admixed with sulphates (the hat cleaners also use them), lead, arsenic, benzoate of soda, anilin and other coal-tar dyes which are decidedly toxic. We Americans are past-masters in preserving and adulterating food materials. Years ago several foreign countries forbade the importation of California dried fruits because they had been sulphured. The imputation that we are a nation of 100,000,000 guinea pigs (why disregard the other 30 million worthy fellow-citizens?) must have had some justification and the epithet adduced by substantial evidence.

There is a little story about a Christmas party which a charitable lady gave to the working girls of a provincial town. Among the divertissements of the evening, each girl received as a gift a box of chocolates. When the jollity ended and the crowd dispersed, a group of girls who were ready to depart did not take the boxes of candy. The hostess reminded them of their apparent oversight but the girls answered in unison: "No, thank you, we know this candy; we make it."

3. FOR ATHLETES AND SOLDIERS

For physical and mental fatigue and over-work there is no more excellent stimulant in the medical armamentarium than honey. A glassful of hot water with several tablespoonfuls of honey is a quickly acting energy-builder, far superior to alcohol because it is without depressive action, or better, reaction. Strenuous exercise consumes lots of sugar from the blood-stream which must be replaced. The popular German honey-tea, which is plain hot water with honey, is considered by the Germans a pleasing, wholesome and strengthening beverage.

The Greek athletes ate honey before they entered the arena for the Olympic games. Homer described in the *Iliad* (IX. 631) how the tired heroes recuperated in Nestor's tent by consuming honey. The Roman soldiers, on festive occasions or upon returning from war and celebrating the glory of victory, drank honey and wine (*mulsum*) to prolong their life. According to the Old Testament

(2 Sam. 17: 29), honey and sour milk was the food for the tired warriors. When Christ was resurrected and asked for food, He was given honey. This seems to be a testimonial to its refreshing and resuscitating power. (*Obtulerunt ei partem piscis assi et favum mellis.* Luke 24: 42.)

The Masai warriors, according to Seyffert-Dresden, received for many days no other food but honey. In the old German army, each soldier carried a tube of it in his knapsack. The Alpine climbers never omit the eating of honey, the principal course of a Swiss breakfast. To long distance swimmers, at frequent intervals sponges saturated with honey are thrown to restore their strength. Ethel Hertel, who won the world's championship for women swimmers in the Third Wrigley Marathon Race, held at Toronto, ate honey before and during the race. She consulted a number of athletes (runners, wrestlers, boxers and oarsmen) and discovered that they all fared on honey before their contests. Hockey players and basket-ball teams are served honey three to four times weekly during their training period. The consumption of liberal doses of honey creates heat, wards off fatigue and aids recuperative power. The ice-cold waters of the English Channel and of Lake Ontario consume a great amount of body heat which must be replaced. No Channel swimmers have ever succeeded in finishing the course except those who possessed abundant adipose tissues, in addition to the heavy greasy coating with which they are always anointed. Helene Madison, the sensational seventeen-year-old girl swimmer who, in 1930, broke twelve world and twenty-six American records in eight months, used honey as her major sweet on the advice of her trainer (*Gleanings in Bee Culture*, 1931).

During exercise, lactic and carbonic acids are formed in the tissues which must be oxidized. Lactic acid is one of the principal causes of exhaustion. The acids are neutralized by the alkalies of the blood. Low alkali reserve means fatigue. Alkaline foods are important. Beans are one of the richest alkaline foods and soy-bean flour tops them all. The soy-bean is a perfect food and a harmless stimulant.

Recently Professor Dennig of the Robert Koch Hospital in

Berlin suggested the use of bicarbonate of soda for the Reich Army to increase the efficiency of the soldiers. Experiments and control tests proved that through administration of bicarbonate of soda, the effect of which lasts for several days, runners were able to dash at full tilt for 42 minutes instead of 20, as formerly, and a bicycle racer was able to maintain a sprint for 16 minutes, instead of 11. The administration of bicarbonate of soda followed by the consumption of honey ought to be a helpful combination for athletes. During athletic training less acid forms in the muscles and the alkali reserve is increased.

The blood-sugar content of many participants in marathon races has been carefully studied by biochemists. Prolonged exercise will lead to depletion of liver glycogen and cause marked depression of blood-sugar levels. Runners who became exhausted and gave up previous races showed a definite sugar deficiency in their blood. After having been fed with honey before and during subsequent races they completed the course. These tests are further proof that honey produces considerable endurance.

W. L. Finlay, Director of Athletics of the Young Men's Christian Association of Toronto in a letter (Nov. 12, 1926) remarks: "For almost three years the members of Central Y. M. C. A. Walkers' Club, the premier club of its kind in Canada, have been using honey as a staple article of diet. Following extensive medical research work on diet and athletes' endurance, in which was involved estimations of blood sugar before and after competitive walks, these members aforementioned were advised to incorporate in their bill of fare a large quantity of natural sugars, and the article deemed most suitable by medical opinion was honey. This type of athletic activity in which these men are engaged demands great stamina and endurance, and the food problem with us is one that demands close attention.

"Honey has the following advantages over other sugars:

1. It is non-irritating to the delicate membranes of the digestive apparatus.
2. It is assimilated rapidly and easily.

3. It quickly furnishes the demand for energy.
4. It enables the athlete to recuperate rapidly from severe exertion, and the men using it show less evidence of fatigue, according to standardized medical tests.
5. As far as our research work has demonstrated, the use of honey spares the kidneys, lessening tissue destruction.
6. It has a natural and gentle laxative effect.
7. It is easily obtained and it is inexpensive.

“The group of athletes already mentioned have been very successful in the past and are now in the throes of intensive training for the largest walking race in the world.”

H. W. Haggard, Professor of Physiology at Yale University, considers honey one of the most assimilable carbohydrates. He also emphasizes that “the taking of readily assimilable carbohydrates is stimulating and helps to relieve fatigue.”

There is no other more severe, nay, crucial test to appreciate the physical and chemical fitness of the human system than the enormous strain to which it is exposed during deep-sea diving, especially at great depths and during long submersions. In such an artificial atmosphere the metabolic machine must function to perfection, because the minutest deficiency will frustrate the truly superhuman efforts. The faculty of honey to attend to the vital oxidative requirements of deep-sea divers is remarkable. Captain John D. Craig, 33 years old, who, on the salvage ship *Ophir*, is now ready to penetrate the hull of the sunken *Lusitania* buried on the bottom of the Atlantic, describes in *The American Magazine* (April, 1937) the physical fitness which is exacted for the task: “All of us are in the pink of condition. We have trained for months, working off every ounce of fat. Those of us who do the diving, like myself, have given up tobacco, alcohol and mixed foods. That is most important. For weeks we shall have nothing for breakfast but a glass of orange juice and *a pound and one-half of honey* in the comb which we chew thoroughly, spitting out the wax. The honey provides a carbon background for the oxygen to burn upon and prevents its burning our tissues. When we come

up from the seas we are given nothing to eat except a half-tumbler of strained honey, lemon juice and rain water. We carry crocks of rain water in the ship's refrigerators because it is not only pure but contains a high degree of oxygen. When we emerge from the water our body temperatures have fallen from 98 degrees, normal, to 85, although we do not feel cold. The rain-water-honey mixture warms us up, and then, after a massage, we go to bed. After a brief rest we eat, but we must stick to one thing at a meal—proteins or carbohydrates, not both. We immediately feel it if we take the combination and we suffer nausea or weakness. Our physical discipline is most severe.”

4. IN LONGEVITY

“Father Time, though he tarries for none, often lays his hands lightly on those who have used him well.”

Charles Dickens

To prolong life has been at all times the chief desire and principal object of mankind. Man always has done his utmost to reach old age. The expediency and value of this tendency is, however, somewhat disputed. Philosophers, economists and students of eugenics are not in accord about its practicability. There is even an old charge against medicine and hygiene that by preserving life they often tend to weaken the human race. Unhealthy people give birth to weak offspring. Haeckel called it “medical selection,” and thought that humanity degenerates because of the influence of medical science. Others oppose longevity from the psychological standpoint. Edmund Goldsmid (Introduction to Cohausen's *Hermippus Redivivus*) thought that it is not the length of the day which makes us love the summer but its brightness, the beauty of flowers and the singing of birds. “Ask the man whose sun of ambition has passed its zenith, who has gathered the flowers of love and friendship and found that they sometimes wither and die while he yet held them in his grasp, for whom voices he loved best have ceased to resound; ask such a man whether life is a

blessing as the ignorants imagine it . . . and you will receive for reply the words so old and yet so true: *Vanitas, omnia vanitas.*"

Yet innumerable attempts have been made—before and after Ponce de Leon—to discover the secret of eternal youth and the deferment of old age. The *Elixir Vitae* was a problem of all times and still is today. If we scan ancient records we find an infinite list of tricks, schemes, suggestions, dietetic regimens and substances from the mineral, plant and animal worlds employed to preserve and regain youth or to stave off old age. Long life has been considered, in all ages, a blessing from Heaven. To cling to life is an inherent longing not only of man but of all living creatures.

Life, a physico-chemical phenomenon, has certain laws which must be understood. Accordingly, man, the last object of creation and likewise the most perfect, should be competent to comprehend and respect the rules which were enacted to make the "living engine" more durable and to extend the limit of its usefulness, respectively, its existence. If the organs do not function normally life is more a curse than a gratification. To understand the normal functioning of the body requires knowledge and experience. To enforce the laws of health is man's responsibility to Nature, because he is supposed to be the acknowledged (by himself, at least) masterpiece of creation.

It is disappointing that this is not the case. Animals far excel man in obedience to moral and hygienic laws. So-called civilization has made us forget the experience which primitive man and our ancient or even medieval ancestors acquired. Our present-day civilization, often enough, prefers material possessions to the enjoyment of health and life and when man loses his gains, the sole object of his existence, in despair he destroys life, an act which other creatures never do.

The art of prolonging life, of course, does not entirely depend on our will and intelligence. Part of our existence, as a matter of fact an essential portion of it, is beyond our control. For our congenital traits, for our conduct during infancy and childhood, and for our early environment we are not responsible; they are mere

accidents which we may call luck or misfortune. Our intelligence regarding the physical and moral comportment of life, which we subsequently acquire through education or by our own efforts, can guide us only afterwards.

Spiritual and moral principles in the management of life, in its enjoyment and extension to the farthest possible limits, are just as essential as physiological laws. To discuss the value, benefits and the necessity of the first two mentioned requirements is much beyond the scope of our purpose. With regard to the rules which we must know and obey to secure physical and mental health, to preserve life and delay its termination, they are only the *Laws of Nature*. Science, in spite of all its wonderful achievements, is not as dependable, due to our limited faculties. It is difficult to intrude into the *sancta sanctorum* of Nature. Haller exclaimed:

“No mortal being, howe’er keen his eye,
Can into Nature’s deepest secrets pry.”

What was considered a verity yesterday, is a fallacy today. Our present-day science will suffer even more reversals than that of the days of old; it has grown too materialistic, and our near and far scientists are frequently nothing more than the employed but well-disguised agents of certain interests. Nature, on the other hand, is always absolute, constant, sincere, trustworthy and dependable. Obey the laws of Nature, because if you violate them you betray yourself and pare down your life. The further you deviate from them, the shorter will be your existence.

One of the cardinal laws of Nature is economy. Applying this law to the nourishment of our body, which is one of the principal and vital functions for maintenance of life, we must study the proper requirements of the complex physico-chemical engine and practice economy according to Nature. Enough or sufficient denotes a supply equal to the demand, not too little, not too much. To choke the engine is just as disastrous as no fuel at all. Primitive man observed this rule of Nature, consumed simple food and lived longer, but civilized man plunged into luxury and corrup-

tion and confused the appetite of the palate with that of the stomach; the result is shorter life with innumerable "engine troubles" which finally lead to destruction. These are complications unknown to the "children" of Nature. Meticulous care of the stomach by selecting proper fuel, both with regard to quality and quantity, is one of the most important considerations for preserving health; without it the attainment to a great age is impossible.

There are many instances in history which confirm the belief that a liberal consumption of honey is conducive to prolongation of life. Anacreon, who died at the age of 115, attributed his long life to the daily use of honey. Pythagoras, who lived exclusively on honey and bread, was convinced that it was due to this routine that he reached the age of ninety, otherwise he would surely have died forty years earlier. His followers, the Pythagoreans, lived on the same diet. "Bread and honey was the Pythagorean's meat." Apollonius, a disciple of Pythagoras, lived to the age of 130 (died in 95 A.D.). Bread and honey is mentioned in the Septuagint, the Greek version of the Old Testament: "I have eaten my bread with honey." Occasionally this combination serves also as a regal food. In the nursery rhyme, *Sing a Song of Sixpence*, from *Mother Goose*:

"The King was in the counting house, counting out his money,
The Queen was in the pantry, eating bread and honey."

Pliny mentioned (Book II, Ch. 14) that the Pythagoreans believed that the absence of blindness and of eye troubles in general was attributable to the daily consumption of honey. Antichus, the physician, and Telephus, the grammarian, lived on Attic honey and bread, to which their old age was ascribed. Epaminondas, the statesman and general, is said to have rarely eaten anything else but bread and honey. Hippocrates prescribed honey to those who "wished" to live long; he himself reached the age of 109 years. When one of Augustus Caesar's guests, Pollio Rutilius, 100 years old, was asked by the Emperor how he preserved

the natural vigor of his body and mind, he answered: *Intus mulso, foris oleo* (Honey within, and oil without). This old gentleman was very fond of dipping his bread into honied wine. Pliny, and also Lycus, often refer to the long lives of the Cyrneans (inhabitants of Sardinia) who "continually" ate honey, of which there was an abundance on the island.

Democritus was convinced that even the odor and emanation of honey helped to prolong life. Athenaeus described (II, 177) how Democritus (470 B.C.) in his old age, when he wished to hasten his approaching end, decided to abstain from all food and to starve himself to death. The female members of his family, who were eager to celebrate the impending rituals of Thesmophoria, a three-day autumn feast attended only by women, implored him to survive the festivals at least. To this he agreed; and—though he did not eat—he ordered a jar of warm honey and by inhaling its aroma kept himself alive during the holidays, soon after which he died at the age of 109. This was the same Democritus, commonly called the "laughing philosopher," who laughed at the follies of men even in his dreams, and who, not to be disturbed in his deep philosophical reflections, blinded himself because he was not able to look at a woman without a craving to possess her. They say that Diophanes, when he was 110 years old, also tried to prolong his life by inhaling the balmy odor of honey.

It was a wide-spread belief among the ancients that inhalations, not only of honey, but of all sweet emanations, benefit life and retard old age. This principle was extolled by Galen and later by Roger Bacon, Hufeland and others. Healthy, vigorous young people—also animals—were supposed to comfort and revive old men by emanating health-giving vapors. This influence had also a distinctly opposite effect, namely that the contact debilitated youth. The faith prevailed for thousands of years and still exists today. Borelli and others quoted names of dying persons who recovered by prolonged blowing of the breath of healthy friends into their mouths. Cornaro attributed his old age to youthful environment. When he became old and was at the point of death, he gathered eleven of his grandchildren round him to renew his

vital forces. To quote him: "I often sing myself with them, for my voice is now clearer and stronger than it ever was in my youth; and I am a stranger to those peevish and morose humors which fall so often to the lot of old age." Marriages between persons of widely differing ages seem to confirm the theory. Hufeland comments thus upon the subject: "We cannot refuse our approval of the method if it be remembered how the exhalations from newly opened animals stimulate paralyzed limbs, and how the application of living animals also soothes a violent pain." This probably led to the first blood transfusion which was performed on animals. In the seventeenth century (1666) it was already accomplished on human beings. Blood transfusion was prohibited in England by the Parliament and in Italy by the Pope.

We all know the story of King David, when he became old and stricken in years. The Bible tells us (Kings 1: 1) that they covered him with clothes but "he gat no heat." "Wherefore his servants said unto him, Let there be sought for my Lord the King a young virgin: . . . and let her lie in thy bosom that my Lord the King may get heat." And they sent for the beautiful Abishag, the Shunammite virgin, who slept by the king and served and left—as a virgin. Boerhaave, the famous Dutch physician of the seventeenth century, recommended an old burgomaster of Amsterdam to lie between two young girls, assuring him that he would thus recover strength and spirits.

Hermippus, a teacher of a girls' school, lived to the age of 155 and, according to his own statement, was kept young by the breath of young girls. Quoting from Hermippus: "When Thisbe, in the blooming flower of her age, decked by the Graces, taught by the Muses, converses with old Hermippus, her youth reanimates his age, and the clear flame with which her young heart glows lends its heat to that of the old man. Each time that the lovely virgin breathes, the sweet vapour which escapes from her breath is full of vivifying spirits which swim in her purple veins. And even as spirits attract spirits, so these same vapours mingle themselves on the instant with the blood of old Hermippus. From thence, passing through his body, they fill that same blood, so that we

may say, almost without metaphor, that the spirit of Thisbe brings life to this old man."

Rudolph I, one of the greatest admirers of women, also believed that "the breath of a beautiful young girl is the best medicine in the world." When the king was 66 years old he married the glorious Agnes of Burgundy. During the wedding ceremonies the Bishop of Speyer assisted the bride from her carriage. The prelate was so struck by her dazzling beauty that he could not abstain from kissing the bride. His Majesty forbade the Bishop, after that, to visit the court, advising him to remain at home and kiss—instead of Agnes—the *Agnus Dei* (the Lamb of God). Even old Socrates reported that his shoulder, where a beautiful young girl had touched him, itched for five days. (St. Hieronymus suggested that the strength of the Devil was in his loins. *Diaboli virtus in lumbis.*)

The French Count de Montlosier, a man who was reputed for his great originality and force of character, kept thirty cows in each wing of his house which communicated with its interior. The rooms were filled with the "sweet breath" of the animals and the Count attributed his physical power and old age to this contingency. When he had passed 80, his hearing and eyesight were perfect, he could read any type without glasses and retained his thirty-two teeth without decay.

To retrace our lost steps to "real" honey, it is not surprising that beekeepers who, as a rule, consume (and also inhale) great quantities of honey and only rarely indulge in sugar, reach a ripe old age. This belief is very prevalent. The list of famous apiarians who passed eighty and even ninety years of age is almost endless. François Huber, Dzierzon, Langstroth, Dr. C. C. Miller, A. I. Root, Charles Dadant, Thomas W. Cowan, for fifty years Editor of the *British Bee Journal*, are typical examples. John Anderson, lecturer on beekeeping at the University of Aberdeen, remarked: "There is nothing in the world that could beat honey as an aid to defy old age. Keep bees and eat honey if you want to live long. Beekeepers live longer than anybody else." Many old life-elixirs of great reputation contained honey. Paracelsus Bom-

bastus ab Hohenheim, who traveled over half the world and collected wonder-working medicines from all quarters, was a great believer in the health-giving power of honey.

Father Sebastian Kneipp, of "dew-walking" fame, mentioned that he knew a man, well over eighty, who prepared daily a drink at his dinner table, consisting of a tablespoonful of good ripe honey in a glassful of boiling water. "In my advanced age"—the man used to say—"I am thankful for my health and strength, which I attribute to this drink." Father Kneipp was one of the greatest propagandists of honey. He thought honey "a dissolving, purifying, nourishing and strengthening substance," and freely dispensed it to patients who made pilgrimages to his sanitarium from all over the world. Bernarr Macfadden's honey-grape fruit juice-water mixture, of which people drink several quarts daily without any other nourishment, is well known.

On account of the author's known interest in honey, he is deluged with letters from all quarters praising the salubrious effects of the substance. R. D. Horton, of Blossburg, Pa., wrote recently (in his own good handwriting) as follows: "Although ninety-one years old I cannot see any reason why I should not add some more years to my life if I continue the daily use of ripe honey (extracted) of which I have consumed for the last eleven years three pounds per week and a little more for supper (in combs). I cured myself from a heart disease when eighty years old, of which I suffered for five years. I am not a doctor or a chemist but a farmer and have kept bees for the last 57 years which was my hobby since boyhood. Some people call me a doctor because I helped and cured so many heart diseases, stomach ulcers and coughs with honey. I give bloated babies a spoonful of heated honey in warm milk, which does the trick."

During his nearly half a century long medical practice the author has met many surprisingly energetic folk of advanced age with remarkably healthy complexions. In taking their histories, the report of a liberal daily dose of honey was seldom missing. About two years ago, a patient of his, a former Mayor of Kansas

City, eighty years old, stepped into the office without an overcoat. The thermometer registered 14° below zero, besides, a blustering north wind was howling. When the patient was scolded for his recklessness, and at the same time was reminded of his age, he nonchalantly explained, "All my life I have been taking a goodly portion of honey for breakfast and I am not afraid of catching cold." Similar reports are not few and far between. A publisher consulted the writer last summer and he was impressed by the patient's ruddy cheeks, youthful expression and sparkling eyes. He did not look a day older than fifty. When asked about his age, the reply was, seventy-four. Further information about his mode of living revealed the same account, "a goodly portion of honey every morning for breakfast."

It is a professional pleasure to chat with octogenarians, nonagenarians and centenarians and gather their secrets of physiological and mental longevity. They all seem to have had simple rules, consisting of regularity and moderation and a decided repudiation of most modern scientific principles. Metabolism did not seem to interest them. One "baby" in fact referred to metabolic diet as diabolic diet; and the proof of the pudding is in the eating.

It is true that the span of life has been increased in the last half century or so, mainly as the result of the reduction in child mortality. People, however, do not reach such an advanced age as in bygone days. No other factor could better explain the reason for the comparatively few veterans of the passing centuries than the quality and quantity of food and drink consumed.

From the history of the Jews, we learn that Moses, who during his life was exposed to ordeals and fatigue, lived to the age of 110; Abraham attained to the age of 175; his son, the peaceable Isaac, to 180; Jacob, who possessed more cunning, lived only to 147; Ishmael, the warrior, to 137; the ever-active Joshua to 110; Sarah to 127; and Joseph, much afflicted in his youth, to 110. Josephus, the historian, commented on the advanced ages of ancient Jews: "Their food was fitted for the prolongation of life;

and, besides, God afforded them a longer life on account of their virtue." The secrets of food seem to have been lost and the cultivation of virtues forgotten.

The Essenes (Essenos in Greek means king bee, the epithet of Zeus), a tribe among the Hebrews whose occupation was bee-keeping, enjoyed health and life much longer than other people. Many of them passed the hundred-year mark. Josephus thought that it was due to their "slender" diet. Honey surely was not missing from their bill of fare.

Pliny mentions in his *Natural History* the traditional manner in which the inhabitants in the Po district placed their bee hives on floats and drifted along the river to supply their bees with new pastures. Apiculture must have been far advanced to furnish the great demand for honey. This was nearly twenty centuries ago, at the time of the birth of Christ. People in the olden days did not have sugar and, as they required and desired sweets, it is logical to surmise that they must have indulged in the sweetest of all, honey. Historical records amply confirm the supposition.

In the seventh book of Pliny's work we find the following passage:

"The year of our Lord seventy-six, falling into the time of Vespasian, is memorable: in which we shall find, as it were, a kalendar of long-lived men; for that year there was a taxing (now a taxing is the most authentical and truest informer touching the ages of men), and in that part of Italy which lieth between the Apennine mountains and the river Po, there were found 124 persons that either equalled or exceeded a hundred years of age, namely,

Fifty-four.....	of 100 years eac
Fifty-seven.....	110
Two.....	125
Four.....	130
Four.....	135 or 137
Three.....	140

Besides these, Parma, in particular, afforded five, whereof

Three were.....	120 years each
Two.....	130
One in Bruxelles	125
One in Placentia	131
One in Faventia	132

A certain town, then called the Velleiatium, situated in the hills about Placentia, afforded ten, whereof

Six were.....	110 years each
Four.....	120
One in Rimino, whose name was Marcus Aponius.....	150."

Pliny quotes from Alexander Cornelius that an Illyrian, named Daudon, lived for 500 years. According to Lucian, Tiresias lived for six centuries. Epimenides of Crete had seen three centuries succeed each other. Onomocritus, the Athenian, reports that certain men in Greece and their families enjoyed perpetual youth.

Pliny has written more about the nutritional and medicinal value of honey than any other ancient author. In his day, honey was an important food and a component of most popular drinks. Pliny's frequent eulogy of honey and the above statistics must have some correlation.

Honey was an important food, medicine and a principal commodity, and mead the universal drink also among the ancient Britons. The bardic name of Great Britain was, "THE HONEY ISLE OF BELI." There is not a shadow of a doubt but that the inhabitants of the British Isles freely indulged in honey. Pliny reported that these "Islanders" consumed a great quantity of honey-brew. Tickner Edwardes remarks, "among the Anglo-Saxons the beehives supplied the whole nation, from the King down to the poorest serf, not only with an important part of their food but with drink and light as well." It is not surprising that the old Britons reached a ripe old age. Plutarch remarked, "the ancient Britons only begin to grow old at 120 years." The following documentary evidences may be of interest:

Thomas Carn, according to the parish register of the church of St. Leonard, Shoreditch, died on January 28, 1588, aged 207 years. He was born under the reign of Richard II (1381 A.D.) and lived through the reigns of twelve kings and queens of England.

Thomas Parr, a native of Shropshire, died on the 16th day of November, 1635, at the age of 152. There is a story about Parr that he was asked by his sovereign Charles I. what he had done in his long life that other people could not accomplish. He answered that the Church had ordered him, when he was 102, to do penance. Thomas Parr at that age fell in love with Catherine Milton and had a child by her. Later, at the age of 120, he married a widow. Shortly before his death Parr was invited to London by the Earl of Arundel, where he was introduced to his monarch and royally feasted. The rich food he indulged in, did not agree with him and he died soon afterward. An autopsy was performed which revealed a congestion (plethora) of his viscera, otherwise the doctor who made the postmortem found his internal organs in perfect condition and believed that Parr could have lived for many more years if it had not been for his visit to London. Parr's maxim was, to keep one's head cool by temperance and the feet warm by exercise; to go to bed early and to rise early; and if one were inclined to become fat, he should keep his eyes open and his mouth shut. Parr's grandfather, a native of Bedfordshire, died in his 100th year. At the age of 85, he had a complete set of new teeth and his snowy hair became darker (*Philosophical Transactions*, Vol. XXIII). It was recorded of Parr that he was very fond of metheglin (honey wine).

Henry Jenkins, a native of Yorkshire, lived to the age of 169 years and died on the 8th day of December, 1670, as a result of a chill. It is said about Fisherman Jenkins that shortly before his death he was still swimming like a fish. He left one son 102 and another 100 years old.

Catherine, the Countess of Desmond, died in Ireland in 1612 and

saw her 148th year. She renewed her teeth thrice during her life, according to Lord Bacon.

Thomas Damme died in 1648 at the age of 154.

James Bowels, aged 152, lived in Killingworth and died on the 15th day of August, 1656.

Mr. Eccleston, a native of Ireland, lived to the age of 143, died in the year 1691.

Peter Torton died in 1724 at the age of 185.

John Ronsey, Esq., of the island of Distrey, Scotland, died in 1738, aged 137. He had a son one hundred years old, who inherited his estate.

Margaret Patten, a Scotch woman, died in 1739 at the age of 137.

Colonel Thomas Winsloe, a native of Ireland, aged 146, died on the 22nd day of August, 1766.

Francis Consist, a native of Yorkshire, aged 150, died January, 1768.

William Ellis, of Liverpool, died on the 16th day of August, 1780, at the age of 130.

Kentigern, the Bishop of Glasgow, called also St. Monagh, lived to the age of 185, which is certified on his monument, erected in 1781.

Margaret Foster, aged 136, and her daughter, aged 104, natives of Cumberland, were both alive in the year 1771.

John Mount, a native of Scotland, who saw his 136th year, died on the 27th day of February, 1776.

William Evans, of Carnarvon, aged 145, still existed in 1782.

Dumiter Radaloy, aged 140, who lived in Harmenstead, died on the 16th day of January, 1782.

Sir Owen of Scotland died at the age of 124; he left a natural son, born to him when he was 98. Sir Owen lived on milk, honey, vegetables, water and wine, and during the last year of his life he walked 74 miles in 6 days.

Peter Garden, a Scotchman, died at the age of 131. He was a tall and lean person and kept the appearance of the freshness of youth until his very end.

John Taylor, a Scotch miner, lived to 132; always smoked and kept his teeth sound until his death.

James Sands, an Englishman of the sixteenth century, died when 140; his wife, at the age of 120.

Lawrence Hutland, of the Orkney Islands, reached the age of 170.

Almost all these people came from a low station of life, except the Countess of Desmond. Their diets were, without exception, moderate, and in some instances, abstemious. Sir William Temple (the author of *Health and Long Life*), who also reached an old age, remarked, with respect to moderation in alcoholic drinks, "The first glass I drink for myself; the second for my friends; the third for good humor; and the fourth for my enemies." Sir William thought that "health and long life are usually the blessings of the poor." With regard to the influence of sex functions on longevity, it is remarkable that most men who reached an extreme age were "much" married and at a very late period of their lives. De Longueville, who lived to the age of 110, had ten wives and married again when 99. He had a son when he was 101 years old. Great corporeal strength, acquired by labor or athletics, does not favor longevity. Few people with great physical prowess arrive at a great age.

Piast, the beekeeper, who was elected King of Poland in 824 A.D. and whose family ruled Poland for several centuries with the greatest glory, lived to the age of 120. That he indulged in honey and mead is proven by the contemporary legends.

These are all authentic records. If we also accept the reports about abnormally advanced ages mentioned in the Bible, like that of Methuselah, the grandfather of Noah (Genesis 5:27), who is believed to have lived to the age of 969 years, we must admit that during bygone generations longevity far exceeded that of the present times. They say that at the time of the patriarchs the years were shorter than they are at present, according to some historians, one-fourth of our calculation. Each season was sup-

posed to have represented a year. Even so Methuselah would have lived 242 years. We call our modern patriarchs old at 90.

St. Patrick died in 491 A.D. at the age of 122. St. David lived to the age of 146, St. Simon was martyred at the age of 107. St. Narcissus died at the age of 165 and St. Anthony at 105, and Paul, the Hermit, at the age of 113. Several monks of Mt. Athos reached the age of 150. Albuna, the first Bishop of Ethiopia, lived beyond the century and a half mark. Attila, who reigned over the Huns in the fifth century, was supposed to have died during his wedding festivities (not the first either) at the age of 124 years. The Chaldean, Egyptian, Chinese, Greek and Roman writers often mention very advanced ages. Asclepiades, the Persian physician, died at the age of 150, Galen at 140, Sophocles at the age of 130. Hirpanus, according to Pliny, lived 155 years and 5 days. (Some historians are convinced that he referred to Her-mippus.)

Among the Slavic races, we also find parallel instances. Old records mention that Peter Czartan, a peasant, died in 1724 in Belgrade when he was 185 years old and was still engaged in begging, a few days before his death. He left behind a son 155 years old, and another 97 years old. A Russian of Polozk, hale and hearty in 1796, was supposed to have married the third time when 93 years old, and to have lived to the age of 163. He had 138 descendants; at the time of his death his youngest son was 62. John Rovin, of the town of Temesvár, formerly in Hungary, reached, according to records, the age of 172 and his wife, Sarah Rovin, the age of 164. They were married for 148 years and they had a 116-year-old son. Hungary was a well-known Eldorado of beekeeping and honey always was and still is in great favor. Humboldt assures us that he became personally acquainted there with a peasant, aged 143, whose wife was 117.

We find many similar reports among African and Asiatic tribes. A peasant of Bengal, named Numas de Cugna, is alleged to have reached the age of 370 years. He died in 1566. Cugna grew four new sets of teeth and the color of his hair frequently changed from gray to black and the reverse. Roger Bacon refers to Papa-

lius, of German origin, a prisoner of the Saracens, who lived to 500 years. M. Solarville, in 1870, computed that there were 62,503 people in Europe above the age of 100.

All this plainly demonstrates that science, civilization and our present regimen of food not only do not contribute to longevity but the reverse. Culture and art, in general, seem to have curtailed life. There must be some confusion between the discovery and the application of the fundamental principles of Nature.

Most authors who pointed the way to longevity, failed to attain to the aim of long life. Sir Francis Bacon, who wrote the famous treatise, *History of Life and Death*, died at sixty-five. Medical men, especially those who have written a great deal on the subject, died far below the average of standard life. Hippocrates, who lived to the age of 109, was one of the few exceptions but he was also a student of Nature and had spent his life in the country, calling on patients, very probably, on foot.

The golden rule of longevity seems to be moderation and simple, natural food. Every animal, but man, keeps to one dish. Pythagoras, who was a great philosopher and also a physician, laid down the principle that simple food is the best means to sustain life. He went even further when he made the statement that there is no disorder to which human nature is incident that could not be cured by such simple things as the Almighty Creator has provided. Honey was for Pythagoras No. 1 on the list. His disciples all reached an advanced age. Benjamin Franklin also emphasized that "against diseases known, the strongest fence is the defensive virtue, abstinence." Hufeland believed that it is within man's power to extend his existence to at least two hundred years. Buffon was a little more conservative; he thought the natural length of human life should be one hundred years.

Simple life and nature cures had many enthusiastic advocates during the Middle Ages. A book, edited by a Lover of Mankind, *Nature, the Best Physician or Every Man, His Own Doctor* (printed at Shakespeare's Head, 17 Paternoster Row, 1745), suggests remedies for all ailments consisting of products collected

from Nature's fields and gardens. Honey was a component of many of his remedies.

Thuanis, in the Third Book of his *Historia Sui Temporis* describes an incident which occurred in 1540. There was a "Cause" tried before the Parliament of Dijon. Thuanis' father was the presiding judge. Among the witnesses examined was Peter L'Marr, aged 40, who was so infirm that he was scarcely able to deliver his evidence. When asked by the President the nature of his illness, he answered that a great part of his life had been spent in tampering with medicines which reduced him to the miserable state in which he appeared. Thuanis explains that the processes of Equity were "rather" slow those days in France and the same "Cause" was submitted again for decision before the Parliament of Paris in 1590. Thuanis was appointed advocate for the plaintiff. One of the witnesses was Jean L'Marr, aged 90. When the evidence was read of the first trial (50 years before) the name of Peter L'Marr came up and Jean was asked whether he was related to the other L'Marr he answered, "Yes, I am the twin brother of Peter who died about 49 years ago, a short time after he gave testimony at the first trial." Thuanis, himself much advanced in age, remembered that trial which occurred during his student days. Curious to know how Jean had preserved his health so well, he asked him about his mode of living. The answer was, "I live regularly and frugally and when I am ill I never consult the Faculty but take only remedies which Nature's gardens provide (honey among them), with the consequence that I soon recover without being obliged to swallow 'nauseous loads of physics'." Jean L'Marr lived for many years afterwards and died after a short illness.

LUIGI CORNARO

Speaking of abstinence, we cannot fail to mention the life of Luigi Cornaro (1464 to 1566), a wealthy Venetian nobleman, the most famous valetudinarian and the immortal proto-

type of abstemious living. His experience is a remarkable instance of the efficacy of temperance toward procuring long life. Up to his thirty-fifth year Cornaro had led a life of dissipation, so much so that he was deprived of all honors and privileges to which he was entitled on account of noble birth. A descendant of a family of many Doges (Duce) of Venice and of ancestors who rivaled with kings, he was not even permitted to occupy a State position. His health was so far gone under the weight of infirmities that physicians assured him that he could not live longer than two months and that all medicines were useless. One physician, however, suggested the observance of a most meager diet as the only hope. Cornaro followed the advice and rapidly improved. He became active and happy and healthier than he ever had been before, and he also regained the respect and affection of his fellow-citizens in spite of all disadvantages of his early life. They soon conferred upon him the epithet, "The Temperate." Later he married and had a daughter. The fact alone that he had a female descendant proved that constitutionally he was stronger than his wife because Nature, infallibly, favors the weaker sex.

Cornaro's diet consisted of bread, light broth, eggs, veal, mutton, fowl, birds, such as partridge or thrush, and occasionally fish. The only sweet he indulged in was honey. He lived on this diet during all his remaining years; consuming daily not more than twelve ounces of solid food and thirteen ounces of liquid. The quantity and variety fully satisfied him. When seventy years old, he suffered an accident and was seriously injured. His horses bolted, upset the carriage and dragged him along the road. Physicians gave up hope for his life. They suggested blood-letting and a strong physic but he refused both. Cornaro, in spite of all, quickly recovered without complication.

When eighty years old, his friends prevailed on him to make a slight addition to his meals. On their persuasion he increased the solid food to fourteen ounces and drinks to sixteen. Ten days later he became uneasy, dejected and choleric, a burden, as he re-

marked, to himself and others. He resumed his former regimen and immediately felt better.

Cornaro wrote his autobiography, *The Temperate Life*, in four discourses with the intent of glorifying "divine sobriety." To quote him: "Divine Sobriety, pleasing to God, the friend of Nature, the daughter of reason, the sister of virtue, the companion of temperate living, . . . the loving mother of human life, the true medicine both of the soul and of the body; how much should men praise and thank thee for thy courteous gifts! for thou givest them the means of preserving life in health, that blessing than which it did not please God we should have a greater in this world—life and existence, so naturally prized, so willingly guarded by every living creature!" The respective parts were published in the 83rd, 86th, 91st, and 95th years of his life. These treatises, which ought to be important contributions to medical literature, gave inspiration to many in the pursuit of a temperate life.

The life of Cornaro is remarkable in every respect. He had a happy disposition considering his advanced age. "I never knew the world was so beautiful until I reached old age," he used to say. Cornaro was devoid of peevishness and morosity, altogether too often the lot of old age. After meals he felt he had to sing and often commented on the good quality of his voice; after singing he wrote eight hours daily, for the benefit of humanity. When eighty-three he climbed steep hills and walked a great deal. Hunting was his favorite sport. Cornaro's memory, intellect and senses were unaffected. He died peacefully in his one hundred and third year as one who falls asleep, all but pen in hand.

Cornaro's favorite sayings were:

To eat nothing but what is necessary to sustain life.

The food from which one abstains is more beneficial than that which is eaten.

A man cannot be a perfect physician to anyone, except to himself.

As you grow older, eat less.

An old man who lives regularly and temperately, even though he is of poor constitution, is more likely to live than a young man in perfect health if addicted to disorderly habits.

His aphorisms on longevity were often repeated by Francis Bacon, Sir William Temple and others who have written on life and death.

Cornaro's portrait by Tintoretto in the Pitti Palace, Florence (No. 83), and his beautiful palace in Padua, one of the most remarkable buildings in Italy, with its magnificent loggia, are often pointed out and remain monuments to Divine Sobriety and Longevity. He was a friend of reason and an enemy of gluttony, intemperance and sensuality.

* * *

Horace Fletcher, the advocator of famous "fletcherizing", suggested eating when hungry and swallowing only well-chewed food. Mahatma Gandhi lives on goat's milk and simple sugars, such as honey and dates. He firmly believes that by regulating what enters the stomach we control what enters the brain.

CHAPTER VII

THE MEDICINAL VALUE OF HONEY

1. IN ANCIENT THERAPEUTICS

TO SUBDIVIDE the dietetic and medicinal values of honey is rather a difficult task. Wholesome food preserves health and likewise prevents or aids the cure of a disease. The advantages attributed to honey as an aliment apply as well to its medicinal properties. The rapid assimilation of invert sugars which honey contains makes it, for instance, a desirable source of quick energy, a practical food and, at the same time, an effective heart stimulant.

The use of honey as an internal and external remedial agent must be much older than the history of medicine itself; it is, beyond doubt, the oldest panacea. While primeval man had to search first and probe the curative effects of the various organic and inorganic substances, honey, the greatest delicacy of Nature within his easy reach, surely could not have escaped his attention very long and he must soon have become convinced of its supreme curative value.

In the most ancient scripts we already find references to honey as a glorified food, an ingredient of favored drinks, a popular medicine and the principal component of liniments and plasters. The oldest mythologies praised the invigorating and health-giving qualities of honey. Many allusions were made to its magic healing power.

The Bible (both the Old and New Testaments), the Talmud, the Koran, the sacred books of India, China, Persia and Egypt, all speak of honey in laudatory terms, as a food, beverage and medicine.

Honey is frequently mentioned in the Bible. Solomon in his Proverbs (24:13) advises: "My son, eat thou honey, for it is

good." The Jews advocated honey as a producer of wit and intellect; it was supposed to make one "mentally keen." Moses, when exposed in the fields, sucked honey from a pebble (Exod. R. 23:8). The resuscitating and invigorating effects of honey are disclosed in the Bible. Jonathan, the son of Saul, had his eyes enlightened with the aid of honey, after which he had a better understanding of the people than his father had. While Jonathan was passing through the woods during the war against the Philistines, he found honey dripping on the ground; he plunged his spear into it, and ate enough to restore his lost strength. He was, however, sentenced to death because he ate honey on a day of abstinence.

Honey was referred to in most ancient writings as a gift of God. St. Ambrose said: "The fruit of the Bees is desired of all, and is equally sweet to Kings and Beggars and it is not only pleasing but profitable and healthful, it sweetens their mouths, cures their wounds and conveys remedies to inward Ulcers."

The Koran, the Code of Islam, recommended honey as a wholesome food and excellent medicine. In the XVIth Chapter of the Koran, entitled *The Bee*, we find: "There proceedeth from their bellies a liquor of various colour, wherein is medicine for men." The "various colour" refers to the diversified colors of honeys. Mohammed pronounced: "Honey is a remedy for all diseases." The Prophet ordered the eating of honey not only because it was an exquisite food and an important healing substance but because it brought one good luck. The followers of Islam looked upon honey as a talisman. The Mohammedans, to whom alcoholic fermented drinks were prohibited, drank their water with honey, which habit still prevails among the African Mohammedan negroes. Ismael Abulfeda, the thirteenth century historian, relates how Mohammed, on the day after his wedding to Safiya Hoya, a Jewess of Aaron's tribe, celebrated the occasion with a luxurious meal. Among the main delicacies, he mentions honey, dates and cream. When Mohammed reached the seventh heaven he found Christ, Who ordered Archangel Gabriel to offer Mohammed a cup filled with honey. The Mohammedan conception of Paradise was "rivers flowing with honey."

According to a Mohammedan legend, young Abraham (Aburam), who lived about 2000 B.C. spent fifteen months in a cave. On Allah's order, he obtained water from his thumb, milk from his index finger, honey from the middle one, date juice from the fourth, and butter from his little finger.

There is a story that a man once went to Mohammed and told him that his brother was afflicted with violent pains in his belly and with diarrhea, upon which the prophet bade him give his brother honey. He heeded the prophet's advice, but soon returned and reported to Mohammed that the medicine had not done his brother any good. Mohammed exclaimed: "Go and give him more honey, for God speaks true, and thy brother's belly lies." The dose being repeated, the man, by God's mercy and the salutary effect of honey, was cured. The Koran repeatedly mentions the technical skill of the bees in producing sweet honey from the bitter juices of plants. Mohammed maintained that medicines administered by physicians are bitter but those given by God are as sweet as honey. (The moderns believe that the more bitter the medicine the better the doctor.) An Arabic writer (Ibn Magih) quotes the words of the Prophet: "Honey is a medicine for the body and the Koran is medicine for the soul; benefit yourselves by the use of the Koran and of honey." The Arabs, before they ate honey, exclaimed: "Bism Allah" (in the name of Allah) or "Allah Akbar" (Allah the greatest). The Arabic name of the bee is *nahlat*, which means a gift—of course—of Allah, and *han* means honey. Apparently it was the root of the German "honig" and English "honey." Arabia was the last stepping stone before honey invaded Europe from the East.

Honey must have been abundant in ancient Egypt. The Hebrews referred to it as "a land flowing with milk and honey." The Egyptian papyri are full of praise about the curative properties of honey. The *Papyrus Ebers* especially praised its medicinal value. According to this most ancient source of knowledge, honey was not only a staple commodity but a popular medicine, extensively used internally, and also externally in surgical dressings for burns, ulcers and preeminently for weakness and in-

inflammation of the eyes. Laxative and worm remedies of ancient Egypt without exception contained honey. Milk and honey was their choice for infant feeding. There were only a few medicines in ancient Egypt which did not contain honey. The bee, its producer, occupies a prominent place in all hieroglyphic writings. Most prescriptions of the papyri were taken to Greece and the Greeks introduced them to Europe where they are still used today.

In ancient China honey was used only as a component of diets and as a medicine. The Chinese never utilized honey as a sweetening substance. China is the native land of the sugar cane, and for this reason bees were rarely cultivated. Even today in the interior of China, honey can be obtained only in the old-style medicine shops.

In India, Persia, Arabia, Assyria, Greece and in the Roman Empire, honey was much in demand as a remedial agent for internal and external use. On the entire European Continent it was in popular use, especially among the Slavic and Nordic races. In the Eddas we find that the life of Liabsburg, the mother of Saint Lindgar, was saved with a spoonful of honey.

If we review the therapeutic field in which honey was used by the ancients, we find that its main employment was as a helpful remedy for gastric and intestinal disorders, especially as a pleasant laxative. Respiratory troubles were next in order. The sedative and soporific power of honey is often emphasized. The diuretic effect of honey was well known and it was a favored remedy for all kinds of inflammation of the kidneys, for gravel and stones. The antiseptic property of honey made it a desirable gargle, expectorant and a valuable adjunct in mouth hygiene. In inflammation of the eyes and eyelids honey was extensively used. Attic honey had a special reputation as a curative substance for eye disorders. The Egyptians carried its fame with them to their country. In one of the Egyptian papyri it is mentioned that a man begged that they fetch him some honey from Attica which he needed for his eyes. In surgical dressings and skin diseases it was a remedy of first choice. The smallpox patients were anointed with honey. It

was also employed as a vehicle for nauseous or bitter medicines. Lucretius referred to it 2000 years ago:

“Physician-like, who when a bitter draught
Of wormwood is disgusted by a child
To cheat his taste, he brims the nauseous cup
With the sweet lure of honey.”

Hippocrates was a great believer in honey. He considered it a very good expectorant. According to Hippocrates, the physical virtues of honey were: “It causes heat, cleans sores and ulcers, softens hard ulcers of the lips, heals carbuncles and running sores.” (Hippocrates alleged that if the seeds of cucumbers and other plants are first soaked in honey and then planted, “the fruit that groweth of them will taste sweeter.”) He recommended honey for difficulty in breathing because “it causes spitting.” Hippocrates believed that honey “with other things” is nourishing and induces a good complexion but eaten alone it attenuates rather than refreshes because it provokes urine and purges too much. According to the legend (Samuel Purchas, *A Theatre of Politicall Flying Insects*, 1657, p. 163), a swarm of bees lived for a long time in the sepulcher of Hippocrates, the prince of physicians, and produced honey there. Nurses carried children to the grave and anointed their lips with this magic honey which *easily* cured them. Dioscorides, the Greek physician (first century A.D.), whose *Materia Medica* is one of the oldest sources of medical knowledge, often mentions honey as an excellent medicine. He also praises the medicinal value of wax, propolis and honey-wine.

Cornelius Celsus remarked in *De Medicina* (first half of the first century A.D.) that a physician must heal in a safe, quick and pleasing manner (*tuto, cito et jucunde*), and all this could be best accomplished with honey.

Galen recommended the mixing of four parts of honey with one part of gall of the sea-tortoise which, when dropped into the eyes, would improve the sight. To quote Marcellus: “The honey pure and neat wherein the Bees are dead, let that drop

into the eyes; or honey mixt with the ashes of the heads of Bees, makes the eyes very clear." Pliny also credited honey in which bees have died with the faculty of relieving dullness of sight and hearing. In antiquity, honey had a great reputation in producing clearer vision, which may be the reason for its reputation of endowing the power of divination, improving thus not only the physical but also the spiritual sight. Some historians believe that when Jeroboam sent his wife with a cruse of honey to the prophet Ahijah it was meant as a remedy for the prophet's blindness.

Honey and dead bees were used by Galen for growing hair. "Take Bees dead in combs, and when they are through dry make them into powder, mingle them with the honey in which they died and anoint the parts of the Head that are bald and thin-haired, and you shall see them grow again." The *Syriac Book of Medicines* recommends a handful of bees roasted in oil as a remedy to turn gray hair black. This ancient book of medical knowledge contains three hundred recipes in which honey is an important ingredient (over fifty of them contain wax).

Celsus recommended raw honey as a laxative and boiled honey as a cure for diarrhea. The reason, he thought, was because "the acrimony is taken away by boiling which wont to move the belly and to diminish the virtue of the food" (Libr. 3 C. 3). Galen recommended boiled and only seldom raw honey but forbids long or too intensive heating because this would make honey bitter. The Hindu physicians assumed that fresh honey was a laxative and honey which was over a year old, an astringent. Pliny burned the bees, mixed their ashes with honey and used the substance for all kinds of ailments: "Powdered bees with milk, wine or honey will surely cure dropsy, dissolve gravel and stones, will open all passages of urine and cure the stopping of the bladder. Bees pounded with honey cure griping of the belly." Muffet also had faith in honey with dead bees. "Honey wherein is found dead Bees is a very wholesome medicine, serving for all diseases." Aelian reported that honey from Pontus cured epilepsy.

Porphyry thought that honey had four excellent qualities: first, it is a nourishing food; second, a good cleanser; third, it has heal-

ing power; and fourth, it is pleasant on account of its sweetness. According to Aristoxenus (320 B.C.), anyone who eats honey, spring onions and bread for his daily breakfast will be free from all diseases throughout his lifetime. The ancient Hindus had great faith in the medicinal virtues and magic properties of honey, especially of aged honey. They used it mainly for coughs, pulmonary troubles, gastric and bilious disorders. The famous Arab physicians, such as El Madjousy and El Basry, all spoke in laudatory terms of the curative power of honey and liberally used it in their professions for a variety of ailments. Arab physicians were reputed to cure tuberculosis with an extract made from the petals of roses and honey. The efficacy of this medicine was recognized for many centuries. Rosed honey is yet an official remedy in most modern pharmacopoeias. Paul of Aegina, Aetius, Oribasius were other honey enthusiasts.

The Koran recommended honey not only as a wholesome food, but as a useful diuretic, a laxative, an excellent remedy for various distempers, particularly those occasioned by phlegm, and also as a substance greatly assisting labor pains.

Norman Douglas describes in his *Paneros* the love-philters of antiquity and the value of honey in the preparations of amative elixirs. Besides honey, according to Douglas, the wings of bees have been used.

Honey was an important ingredient of all ancient satyriaca (*ad coitum irritantia tentaginem facientia*). The ancients had implicit faith in the power of honey to increase strength and virility. (The French consider not only honey but also the sting of the bee a powerful aphrodisiac.) The Hindu novices for priesthood had to abstain from meat, women, perfumes and . . . honey.

The ancients believed that people who fared freely on honey became more congenial and affectionate. They considered honey a cure for a sour disposition and bitter feelings. Pliny said: "All acrimony of the mind is pacified with sweet liquors, the spirits are made peaceable, the passages made softer and fitter for transpiration; and they are also good physick for manners." Pythagoras thought that body and soul function in harmony and

that no food could be considered beneficial to one without being subservient to the other. He believed, for instance, that music was food for the soul and likewise conducive to good health. David played the harp before King Saul to cure his melancholy.

2. AS MEDICINE IN THE MIDDLE AGES

The population of the Middle Ages had great faith in honey. This is best illustrated by the statement of Charles Butler in the *History of Bees*, 1623: "Hoonni cleareth all the obstructions of the body, lossenth the belly, purgeth the foulness of the body and provoketh urine. It cutteth and casteth up Flegmatic matter and therefore sharpneth the stomachs of them, which by reason thereof have little appetite; it purgeth those things which hurt the clearness of the eyes and nourisheth very much. It breedeth good blood it sturreth up and preserveth natural heat and prolongeth old age; physicians do temper therewith such medicines as they mean keep long; yea the bodys of the dead, being embalmed with Hoonni, have been thereby preserved from putrefaction. It is drunk against the biting of a Serpent or mad Dog and it is good for them, which have eaten mushrooms or drunk Poppy; against which evil Rosed-hoonni is taken warm. It is also good for falling sickness and better than wine because it cannot arise to the head as wine doeth. Hoonni is most fit for old men, women and children, for such as rheumatic and flegmatic and generally for all that are of cold temperature. To young men and that of a hot constitution is not so good because it easily turned into kholer."

The climax of Butler's statement is "Hoonni is altered by distillation into a water which Raimundus Lullius (that excellent Kymist) called the Quintessence of Hoonni. This quintessence dissolveth gold and makes it potable; likewise any sort of precious stone that is put therein. It is of such virtue that if any be dying and drink two or three drams thereof, presently he will revive. If you wash any wound therewith, it will heal quickly. It is good also against cough, catarrh and pains of the melt and against

many other diseases. It helpeth also falling sickness and preserveth the body from putrefaction. Of so marvellous efficacy is this water." Butler thought that honey "comforts and strengthens the stomach in the wise."

Samuel Purchas, pastor of Sutton, Essex (1657), claimed that it would require "a good day's work" to enumerate the worth and benefits of honey. Don Juan Manuel, from the royal house of Castile and Leon, the 13th century Spanish writer of stories, in his *El Conde Lucanor* still uses the old Spanish word *melezina* (mel=honey) instead of *medicina* (medicine).

Hieronymus Bock, in *Teutsche Speiskammer*, Strassburg, 1539, made the same comments about honey as Charles Butler and both seem to quote the writings of Dioscorides (Libr. II), who believed that honey was best for weak and old people and for those of cold temperament. In young and "hot" people honey turns into gall. Old people obtain from honey good food and new blood. Dioscorides advocated the inhaling of honey for coughs, and its internal use as a good diuretic. Honey, he thought, was good for those who were poisoned by opium and mushrooms or were bitten by snakes and mad dogs. Dioscorides recommended that honey should be rubbed into the hair to kill lice and nits.

Jos. Roach, in *Parnassus medicinalis*, Ulm, 1663, eulogized honey in verses. For instance,

"Der Honig treibt den Harn
Und ist zur Lunge gut,
Von Husten, Faulung auch
Es stark bewahren tut."

(Honey drives the urine, is good to the lungs and a strong protector against cough and decay.)

An old English chronicle remarks: "Honey is still our chief sweetness, favorite salve and indispensable medicine."

(The German women for centuries had great faith in a popular remedy called *Salvemet*, made from honey and crushed bees. This was taken on St. Catherine's day and was supposed to have

a beautifying and strengthening effect, besides regulating the menstrual flow.)

We find evidence in the folklore of almost all nations of the faith the rural population had in the curative, even magic power of honey. Youthful America is no exception. In the *Journal of American Folklore* (II Vol.) there is an illustrative tale told by an old woman. The story is about Mark Flaherty who was riding home once after sunset when he heard a voice behind him. Turning around, he could see no one. Arriving home he heard the same mysterious voice but was unable to trace its source. After retiring he could not sleep and had a feeling that somebody was sitting on his chest. Next morning he noticed that his hair had turned gray overnight. Towards evening he distinctly heard the same voice again and noticed that a man was crawling in his direction. Trying to nab the figure it vanished. Flaherty thereafter was afraid to go out in the dark, became ill and emaciated.

A beggar called on him one day and when he learned of his predicament advised him to get some honey and rub his entire body with it. The bees suck the strength of flowers which they mix with their own honey and that would cure him, turn his hair dark again and his cheeks rosy. Flaherty followed the suggestion and he fully recovered. He never heard the weird voice again.

3. IN MODERN THERAPEUTICS

Honey plays an insignificant part in our modern *Materia Medica*, though strained, clarified, borated and rose honey are listed in many pharmacopoeias. The mel depuratum (clarified honey) is rather an inadequate substance because it is subjected to heating and is filtered through cloth which also robs it of some mineral elements.

In lay, let us call it unscientific medicine, especially in the rural districts, however, honey is today a more popular nostrum than the medical profession would surmise. Physicians, with few exceptions, grin broadly at the mere mention of the medicinal and food merits of honey. Of course, the name honey sounds rather

homely, almost dilettant. How much more knowledge and intelligence the term, cinchophen, for example, reveals. This substance was widely advertised and the medical fraternity, conformably, employed it. It soon became so popular that the general public began to use it indiscriminately. After it had caused irreparable harm and many patients had died from its effect, the sale without a prescription was prohibited. This is only one instance. On the other hand, people will ignore good things which are within their reach.

Something should be done to induce the medical profession to look more carefully into the remedial and dietetic value of honey. On the European continent, where physicians are paid for keeping patients in good health, honey is freely used. It is time that American physicians should do likewise and obviate the possibility of a rather embarrassing accusation that instead of preventing disease, they prevent health. It is the physician's duty to help and to educate the public.

In antiquity and all through the Middle Ages, honey was an important medicine. Up to the end of the last century, it still held the place of honor in the service of Aesculapius. Only with the advent of the millions of patented and well-advertised domestic and imported whatnots was honey almost banished as a curative substance, the same fate which it suffered as a sweetening matter upon the introduction of refined sugar. Thanks to the simple country-folk and to the primitive races, honey is yet in its glory as a dispenser of health and as a valued remedy. Honey cures were popular in many European countries for the tired feeling caused by the so-called spring fever.

The consideration alone that a snake is pictured coiled around the stick of Aesculapius, eager to feast from a cup of honey, ought to be sufficient exhortation to medical men to be more interested in this substance. (Aesculapius, the god of Medicine, who not only healed the sick but restored the dead to life, held the snake sacred. The snake was the emblem of health and recovery. The snakes were fed on honey or honey cakes. Whoever entered the cave of Trophonius had to throw honey cake to the snakes

(Pausanias IX. 39:5). Honey was also the favorite food of the fabled serpent, the guardian of the Acropolis (Herodot. VIII. 41). The snake of Aesculapius in Cos was given honey and honey cake (Herondas IV. 90; Virgil *Aeneid* IV. 484).

Among the Asiatic races, including the Chinese and the Hindu, and among the Egyptians, Arabs and the African tribes, honey is still considered an excellent protective food and a sovereign internal and external remedy. Amongst the Wa-Sania tribes, British East Africa, a mother's only nutriment for several days after the birth of a child is honey with hot water. A boy, after he has been circumcised (usually at the age of 3 or 4) is permitted only to consume honey and water for a week. Among the Nandis some honey is placed on the tongue of a child before circumcision. Honey is often combined by them with the bark and leaves of certain trees and plants. Among the rural population of the old countries, especially among the Greeks, Italians, Hungarians and all the Slavic races, honey is a popular home remedy. Their laxative medicines, likewise those for coughs, bronchitis, tuberculosis and other pulmonary ailments, contain honey. For respiratory troubles honey is often mixed with anis, pepper, horseradish, ginger, mustard and garlic. A glassful of warm milk with a tablespoonful of honey is used for bronchitis and debilitated conditions. Goat's milk or buttermilk and honey is a favored and popular remedy for tuberculosis. Goat's milk is most nutritious and very digestible. It is nearest to human milk. There are more vitamins, minerals, fats and proteins in goat's milk than in any other milk. In the East, Far East, Africa and in most European countries goat's milk is extremely popular. Recently there have been considerable efforts made in the United States to popularize goat raising.

The diuretic effect of honey which was well known in antiquity, is still employed in kidney and bladder involvements. In pyelitis (inflammation of the renal pelvis) honey increases the amount of urine and exerts a decided antiseptic effect. The patients quickly improve; the urine clears and loses its putrid odor. The laxative effect of honey in these cases is also of advantage. One of the

author's correspondents (J. L. McD., of Marion, Indiana), wrote thus about the subject: "A bee-keeping friend of mine suffered from tuberculosis of the kidney and was given up by two doctors fifteen years ago. He got to eating honey and plenty of it and he is today as peppy as a youngster." Honey is an important ingredient of worm-cures. The African tribes also mix their tobacco and their aphrodisiac remedies with honey.

Among the so-called "civilized" communities we find some people who favor honey, especially for throat and bronchial ailments. During many years' professional contact with opera singers, the writer has found that they frequently resorted to honey for the treatment of their throat affections. They consider it an excellent demulcent and expectorant. Three parts of honey and one part of compound tincture of benzoin is popular among singers; so is an occasional gulp from a mixture of two ounces of honey, one ounce of lemon juice and an ounce of pure glycerin. Honey (125 gm.) and alum (25 gm.) added to one quart of water is a useful gargle. The mixture of honey and alum is highly valued for sore throat and ulcerations of the gums and mouth. Hot milk and honey make an excellent remedy for husky throats.

Another correspondent of the author (M. S. of Kansas City, Mo.) has written about the curative value of honey in pulmonary affection, as follows: "In 1925, I became ill and consulted several doctors, all of whom gave the verdict of active tuberculosis. After seven months, two doctors gave me up, and said that my only chance was to go West, which I could not afford to do. At a later date, they frankly informed me that I had only three months to live and insisted on sending me to Colorado. I was then living in Kansas City, Missouri, and had previously been engaged in cement and paving work. I managed to land a job in Nemaha County, Kansas, about 140 miles west of Kansas City. My work was to establish an apiary of one hundred colonies for a commercial orchard. I was to 'batch' in a room in the apple house, which had a cement floor. Often it took all my strength to carry a gallon bucket of water from the well, one hundred feet

away. In studying bees, I had learned the value of honey in driving out and destroying all germs in the human body. I used honey regularly and I worked to the limit of my strength. Three years later, the same doctors examined me and found only a few spots on my lungs. They absolutely refused to believe that I was the same person. Today, I take my place as an average man. I take care of two hundred fifty colonies of bees and a farm of twenty-five acres of land. The only help I have is about one month during the honey harvest. I don't know whether the honey cured me, or it was the fact that I was too lazy to crawl into my coffin, but I believe the honey and possibly the raw diet were the major factors of my recovery."

J. J. H., of Brownsville, Florida, reports that when his grandmother was a young girl she was given up by her physicians as a hopeless consumptive. Someone prescribed a diet of honey and goat's milk, with the result that she lived to the age of eighty-eight and was free from illness during the rest of her lifetime.

M. D. A., of Old Forge, New York, is certainly a great admirer of honey. He writes: "Having kept bees and eaten honey for over thirty years, I can tell about my own experience and give also observations of other people who use honey exclusively for sweetening. I never have known a beekeeper who had any kind of kidney trouble. They all have a clear complexion, good eyesight and no lameness. Among my friends who eat honey and keep bees, there is no cancer or paralysis. My best remedy for a bee sting is to cover it with honey, even a deep burn will not scar if treated the same way. I have seen sour milk, whole wheat cracked for cereal, honey and butter do wonders in diet. I cured the cough of a great number of my friends, where other remedies failed, with this prescription:

4 tablespoonfuls of honey
1 teaspoonful of sulphur
5 drops of pure turpentine

Mix it, take half-teaspoonful two or three hours apart."

The soporific effect of honey is *par excellence*. The French

Voirnot advocated it for insomnia. Dr. Lorand (of Carlsbad) also recommends honey as a good hypnotic and reconstructive. D. Dumoulin, when eighty years old, commented, "Chaque soir, avant de me mettre au lit, je prends une cuiller á cafe de miel, soit pur, soit dans du lait chaud, et je dors comme á vingt ans." (Every night, before I go to bed I take a teaspoonful of honey, sometimes pure, other times in hot milk and I sleep like when twenty years old.) A tumblerful of hot water with one or two tablespoonfuls of ripe honey and the juice of half a lemon has been the author's favorite potion for nervous insomnia. This simple and inexpensive home remedy has been greatly appreciated by his patients and most of them have assured him that it is more helpful than (an infinite number of patented drugs could equitably replace these dots).

In digestive disturbances honey is of great value. Honey does not ferment in the stomach because, being an inverted sugar, it is easily absorbed and there is no danger of a bacterial invasion. The flavor of honey excites the appetite and helps digestion. The *propoma* of the ancients, made of honey, was a popular appetizer. For anemics, dyspeptics, convalescents and the aged, honey is an excellent reconstructive and tonic. In malnutrition, no food or drug can equal it. The laxative value of honey, on account of its lubricating effect, is well known. Its fatty acid content stimulates peristalsis. In gastric catarrh, hyperacidity, gastric and duodenal ulcers and gall bladder diseases honey is recommended by several eminent gastroenterologists.

Dr. Schacht, of Wiesbaden, claims to have cured many hopeless cases of gastric and intestinal ulcers with honey and without operations. It is rather unusual that a physician of standing has the courage and conviction to praise honey. The beekeepers and their friends know that honey will cure gastric and intestinal ulcerations, this distressing, prevalent and most dangerous malady, a precursor of cancer. But the news has not yet reached 99% of the medical profession. The remaining few physicians who know it, are afraid to suggest such an unscientific and plebeian remedy, for fear of being laughed at by their colleagues and

scientifically inclined patients. You may read in almost every issue of apicultural papers the reports of correspondents regarding their experience with honey for gastric ulcers, after going through the medical *mill* for years without improvement, without even hope of ever getting cured. Then incidentally they meet a beekeeper or one of his converts and if they have courage and common sense (there are few) to heed the advice, they get well. It is disheartening for a physician to read such reports. For instance, a correspondent (A. L. T. of Omaha, Nebr.), writes in *Gleanings in Bee Culture*, February, 1931, "I have been a sufferer from ulcerated stomach for several years, part time in the hospital, part time in bed and nearly all the time in much pain. I noticed from the middle of September I was much better and gave no thought to the reason but kept up eating honey because I relished it. I had no attack since and it held good. . . ." It would fill a volume to assemble similar testimonials, praising particularly the curative value of honey in gastric and intestinal disorders, including ulcers. Father Kneipp, a great admirer of honey, remarked: "Smaller ulcers in the stomach are quickly contracted, broken and healed by it."

Honey is a rapidly acting source of muscular energy and has great value as a restorative. The protoplasm craves sugar as does an individual. Muscles in action consume three and a half times as much glycogen as when at rest. A normal heart, according to Starling, uses glycogen at the rate of four milligrams per gram of heart per hour. The invigorating effect of honey was discussed under the heading, "Honey for Athletes and Soldiers." It is not surprising that many well-known physicians recommend honey for an ailing heart. Dr. Lorand in *Old Age Deferred*, and in *Life Shortening Habits and Rejuvenation*, expresses his faith in honey as a *sine qua non* in arteriosclerosis and weak heart. Dr. G. N. W. Thomas, of Edinburgh, Scotland, in an article in the *Lancet* remarks that "in heart weakness I have found honey to have a marked effect in reviving the heart action and keeping patients alive. I had further evidence of this in a recent case of pneumonia. The patient consumed two pounds of honey during the

illness; there was an early crisis with no subsequent rise of temperature and an exceptionally good pulse. I suggest that honey should be given for general physical repair and, above all, for heart failure." Sir Arbuthnot Lane also emphasized the value of honey as a heart and muscle stimulant, and as an excellent source of energy. There is no better food, he thought, to meet muscular fatigue and exhaustion.

Carbohydrate and especially sugar metabolism has great importance. Energy is primarily the result of carbohydrate assimilation. Hyperglycemic individuals are, as a rule, more energetic and less prone to fatigue; subglycemic people tire easily and are apathetic. Certain nervous types, though glycophile subjects, exhaust their sugar reserve fast and wear out just as quickly. Lack of energy is not always due to laziness.

In typhoid fever and pneumonia, where the digestive functions are badly crippled, honey is most beneficial. Why embarrass enfeebled digestions with foods which require chemical changes before their assimilation when we can administer a serviceable and pleasant food which is predigested? For the treatment of typhoid fever, honey diluted in water is the author's preferential food. It is an ideal substance, in this special instance, on account of its demulcent effect on the inflamed intestines, its rapid assimilation and its capability to supply food and energy without causing fermentation, which is so much feared in typhoid fever. Honey, a concentrated and predigested food, is absorbed orally 100% and per rectum 96%. For rectal feeding honey is exceptionally well adapted. Galen's honey and oil enema was highly valued in antiquity. While sugar favors worms, honey was considered as one of the best vermifuge remedies by all ancients and it is widely used for this purpose, even today, by primitive races.

Medical textbooks pay only little attention to the real worth and merit of honey. The results which some physicians have derived from the use of honey, as a rule, have been incidental. Dr. C. H. English, Medical Director of the Lincoln National Life Insurance Co., vividly describes his own experience (*Gleanings in Bee Culture*, 55:1927). About forty-one years ago the

doctor practiced medicine among rural folk. He acquired two colonies of bees which soon increased and it was not long until he had more honey on hand than he and his family could use. Not wishing to sell honey, it occurred to him to distribute his surplus stock among patients. There were a sufficient number of cases which offered an excellent field to try out the nutrimental, medicinal and tonic effects of honey. In respiratory troubles, the doctor found that honey acted not only as a good expectorant but as a valuable heart tonic. In pneumonia, near the crisis, when honey was freely given, it had a marked effect. The benefits were so evident that the administration of honey became a routine practice with him. He found no other food or heart stimulant which had a more lasting effect. This practice he kept up for fifteen years with the most gratifying results. Occasionally in severe cases, when he ran short of honey, he noticed the difference and when he succeeded again in procuring some the improvement was quite manifest. Dr. English also used honey successfully in infant feeding.

The blood reconstructive power of honey can be surmised from a recent report from Germany. According to this information Edmund Eckardt (thirty-five years old) a champion blood donor, whose only visible means of support is to supply blood for transfusions, just celebrated his jubilee. He has saved fifty lives in the last three years. When interviewed as to how he makes good his losses he described his diet. During daily breakfast he consumes honey; for luncheon he has fish and vegetables and drinks orange juice with his dinner. His main reliance is on honey and oranges, of which he eats thirty a day. An expert of the Blood Transfusion Betterment Association of New York, when interviewed on the subject, suggested that Eckhardt's faith in oranges is unjustified because what a blood donor needs is iron, and Eckardt in fact, "does not mention that any part of his diet contains iron." Another occasion where "dethroned" honey was utterly disregarded! Count Luckner, of World War fame, is an extremely moderate eater. He is about sixty-five years old and looks no more than forty. Luckner bends a silver half-dollar

with two fingers and tears a Manhattan telephone directory into small pieces with greatest ease. The Count relates that his first food in the morning is a "goodly portion of honey."

Many people, especially beekeepers, and a few physicians (this writer among them) claim that honey taken internally prevents and often cures arthritic and rheumatoid ailments. The peasants of Hungary even put a honey poultice over the big toe in gout and they say the pain disappears in half an hour. Such assertions have, of course, all the earmarks of unscientific broach. Still there are many who insist that honey has benefited them more than all the "scientific" vaccines. Vitamin C deficiency would explain an impaired circulation and recent researches (James F. Reinhart, Studies relating to Vitamin C deficiency in rheumatic fever and rheumatoid arthritis, *Annals of Internal Medicine*, December, 1935), clearly prove that lack of vitamin C favors the development of infectious arthritis. Dr. Heermann of Kassel, Germany, suggests (*Fortschritte der Medizin*, Vol. 54, 1936) the use of honey for rheumatism, atrophy of muscles, nervous conditions, tuberculous glands, etc., both internally and externally. He employed honey with success for thirty-five years. Dr. Heermann thinks it is unnecessary to extract the venom of the bees to treat these conditions. Honey itself contains some venom because the bees use their stings not only for defense but also for the preservation of honey.

Many beekeepers are of the opinion that, besides the admitted and generally recognized curative effects of the stings in rheumatic ailments, honey also contributes its benefits in preventing and curing these diseases. As an illustration, I quote a letter from J. L. McD., of Marion, Indiana: "I began beekeeping because I had rheumatism, and it has disappeared, but I consider it due more to the fact that I ate honey than to bee stings. Nearly four years ago, I had rheumatism in my knees. I finally went to Dr. K., of Marion, Indiana, for advice. He put me on a citrous fruit diet, allowing only honey. In a week, he allowed breakfast food sweetened with honey. It did the work, and I liked honey so well that I bought a few hives of bees to supply

my family, and now—nearly four years later—I want everyone to know honey and to like it, as Nature's own health-sweet, full of pep and vitamins that God gave us, pure as snow. My growing son is developing into a healthy, sturdy ten-year old since the use of honey, egg and milk drinks. My rheumatism never returned."

Honey, taken by itself and not mixed with other foods, was considered by the ancients an excellent remedy for obesity. Beekeepers today, who know it from their own experience, will confirm this allegation. The regimen, at a glance, sounds rather unscientific to a modern physician; nevertheless it has a deeper biochemical meaning than it appears to have. Fats and sugars are both carbon-containing and energy-providing foods which burn up by contact with oxygen and create energy. Sugars which contain more carbon elements and are more inflammable produce energy more quickly. Fats which contain less carbon and oxygen than sugars, are utilized slower because their purpose is only to supply reserve energy; they require more oxygen and more draught to set them afire and are not meant for immediate use. If there is not enough sugar to keep the fires burning, the system will resort to its reserve fat. Accordingly when sugars, especially honey, are ingested into the system they will cause a rapid combustion and the fats will burn with the aid of the draught produced by their "fire." If an organism is slow to burn up fat (as in obesity), it will be assisted by the rapidity of sugar metabolism. The process could be compared to setting slowly inflammable coal ablaze with the aid of straw, kindling wood or even oil. Of course, there is sufficient oxygen in carbohydrates to assist in the combustion of carbon elements even without an outside source of oxygen.

Acknowledging some more medical information received from the laity, the writer's attention has been repeatedly called to the beneficial effect of honey on hay fever victims. There are many reports that the consumption of honey collected by bees from goldenrod and fireweed will cure hay fever superinduced by the selfsame pollen. Now comes Dr. George D. McGrew, of the

Army Medical Corps of the William Beaumont General Hospital in El Paso, Texas, with a statement in an article published in the *Military Surgeon* that during the 1936 hay-fever season thirty-three hay-fever sufferers obtained partial or complete relief through the consumption of honey, produced in their vicinity. The brood cells contain a considerable amount of bee-bread (pollen) stored by the bees for their young and when this is orally administered it will produce a gradual immunity against the allergic symptoms caused by the same pollen. Dr. McGrew found particular relief for patients when they chewed the honey with the wax of the brood-cells. The hospital staff also made an alcoholic extract from pollen and administered it in from one to ten drop doses, according to the requirements of the patients.

Old beekeepers will tell you that a glassful of hot water with a tablespoonful of honey and some lemon juice will cure influenza and also help the pocketbook. (We physicians should not begrudge the medical propensity of farmers. They seem to agree with Bernard Shaw's remark that every profession is a conspiracy against the laity, so they retaliate. And the time-honored principle, experience versus theory, upon which Napoleon so often commented, should also be taken into consideration. The Hungarians have liberally consumed paprika for a thousand years and are convinced that it has contributed in a great measure to their health and temperament. After Professor Szent-Györgyi, the discoverer of Vitamin C, had tried unsuccessfully in Chicago to produce this vitamin from tons of liver, he returned very much disappointed to Hungary, where he accidentally found that red pepper is a rich source of Vitamin C.)

Honey would have a wider and better use in modern medicine if comprehensive microchemical and physiological studies would be instituted to determine the types of honey which are best suited to particular cases. The properties and tendencies of honeys vary according to the chemical characteristics of the nectar and pollen of plants from which they were collected. Dr. C. A. Browne, Principal Chemist in charge of research, Bureau of Chemistry and Soils, U. S. Department of Agriculture, admits that the gross

composition of honeys of various types have been accurately determined but that comparatively little has been done and much more remains to be done toward ascertaining the nature and quantities of less common substances that occur in honey. Nitrogenous compounds (proteins), though honey contains these in small amounts, still play a very important rôle in the utilization of honey. The same applies to amino acids, various colloidal substances, to the mineral constituents and enzymes which honey contains. We have comparatively little definite knowledge about the so-called dextrans. The mineral content of honey considerably affects the degree of its acidity (pH). Dr. Browne thinks that more knowledge on the subject would be of great value in earmarking the various types of honey, which would serve as a guide in choosing the most suitable types for particular use.

HONEY AND DIABETES

Diabetes is a fundamental disorder of metabolism, primarily that of carbohydrates. It is due to a deficiency of the pancreas, a gland connected with the alimentary canal which, under the circumstances, does not produce sufficient insulin. It is a weakness or exhaustion of the gland. In diabetes the ingested carbohydrates, sugars and starches cannot be utilized, but are eliminated in the urine. Part of the food turns into sugar and the glutton has to return to Nature his illegitimate gains. The victim must famish in the midst of plenty. It is really a revenge of Nature. Lean people rarely acquire diabetes. In obese subjects the excess sugar and starch which they consume does not sufficiently oxidize, but forms fat which is already a disintegration of the organism.

A word should be said regarding the cause of diabetes. Most medical textbooks carefully avoid even mentioning the subject. Others acknowledge that the cause of diabetes is unknown. The author's personal comprehension is that the abuse of artificial sugar and salt are mainly to be blamed for it by producing an inflammation or sclerosis of the pancreas. The influence of white

sugar already has been discussed. With regard to salt, he would set forth that animal diabetes is confined to horses, cattle and dogs. Salt is given to horses (occasionally also sugar) and to cattle, mixed in their fodder, and dogs obtain it in our waste food.

R. Arima of Tokyo, Japan, Director of the Arima Institute, experimented on himself. He had never had any diabetic ailment. In 1934, at the age of fifty-three he purposely consumed an excess of salt with the result that he suffered from excessive urine secretion, followed by diabetes. He repeated the experiment twice with the same result. He thought that diabetes could be easily cured by the limited use of, or total abstinence from salt. Arima quotes a noted authority who made the statement that civilized man is "pickled" in salt. In his opinion even hardening of the arteries and premature senility is caused by salt. A friend of the late John D. Rockefeller related to this author that during a dinner the old gentleman warned him never to use salt because the substance is injurious to health. As Mr. Rockefeller almost reached the class of centenarians his admonition is worthy of consideration.

Vegetarians and herbivorous animals crave salt because they require it. Fruits, vegetables and plants, in general, contain ample other minerals but are insufficient in sodium chloride. Meat eaters can get along without salt. Many teachers of nutrition are against the use of salt. They claim that an excess of it will produce rigidity and inactivity. The brain, heart, arteries, muscles, salivary glands, eyes and sex organs lose their elasticity, become indurated and finally ossified. Lime, which commercial sugars contain, has a similar effect. When the biological chemists will use more commonsense than microscopes they will also establish the fact that refined sugars contribute more to the prevalence of arthritis than has so far been surmised.

It is much beyond the scope of this review to enumerate the ill effects of diabetes. One of the cardinal troubles is lack of glycogen (animal starch) which is normally deposited in the muscles, of course, the heart, the blood and mainly in the liver (the savings bank of glucose), where it is stored and later utilized

as the most important energy-producing substance of the organism. Normal blood contains about 0.10% glucose.

If a diabetic organism is unable to oxidize glucose, it will have vital effect also on other processes of metabolism, mainly on the metabolism of fat. The burning of carbohydrates, especially glucose, is indispensable for the burning of fat. Fats burn in the flame of carbohydrates. Imperfect oxidation of fats produces the formation of unoxidized fatty acids, commonly called acetone bodies, which will disturb the acid-base equilibrium of the system and finally will deplete the entire alkali reserve of the body.

The importance of sugar metabolism on the spinal column and brain is evident. The blood of the veins which leaves the brain contains less sugar and more acids than the blood of the arteries which centers upon it. Sugar assimilation has an important function in the chemical activities of brain cells. The successful therapeutic application of insulin in various mental disorders clearly demonstrates this. The lack of sugar assimilation of a diabetic, the accompanying depression, comatose states, even fatal ending, prove the vital importance of sugar metabolism on the activities of the brain cells.

The administration of insulin, a pancreatic hormon, corrects the pathological condition in diabetes and converts the carbohydrates into glycogen, which a diabetic constitution is unable to perform. Insulin is an adjunct in the treatment of diabetes but by no means a cure. The use of insulin is a burdensome procedure. The patient must inject insulin about half an hour before each meal to effectuate this function. Its dosage must first be determined because the units of insulin must correspond with the subsequent meal, with the patient's sugar tolerance, etc. The patient's individual response and also the amount of carbohydrates must be rigorously controlled and frequently modified. It is a tedious performance involving considerable time and expense, besides anxiety, and a careful application of complex chemistry and mathematics.

Any substance which could be utilized in mild diabetic cases to convert carbohydrates, by oral administration, into glycogen

would be invaluable and far exceed in usefulness the dominant but otherwise beneficial insulin. The relinquishment of the cumbersome self-administered hypodermic injections alone would be of inestimable service.

Whether diabetics could utilize honey by converting it into glycogen to supply a much-needed source of energy for their depleted systems is an issue worth a thorough and *unbiased* investigation. There are many indications that there is more than a possibility of using honey for these sufferers.

Honey and refined sugars greatly differ not only in chemical characteristics but also in physiological effects. The circumstance alone that honey contains invert sugars and saves the debilitated alimentary organs the additional labor of inverting commercial sugars, is an important factor and of considerable advantage.

In relationship to diabetes there are also other distinctly heterogeneous features in sugar and honey. If insulin were administered to a diabetic patient before a meal and the insulin units were in excess of the consequently consumed carbohydrates, or there was no food given at all, a severe, often disastrous insulin-shock would supervene. The reason for this occurrence is that the insulin will digest and consume the already scanty sugar reserve of the organism and an undersupply of blood-sugar (subglycemia) is just as dangerous as an oversupply (hyperglycemia). The only way to correct such a contingency is to administer a sufficient amount of glucose to compensate the action of excess insulin.

Cases have been reported where a liberal amount of honey was administered to avert an insulin shock due to subglycemia, but it was of no benefit; on the other hand, a subsequent administration of glucose rapidly neutralized the harmful effects of insulin. The slow absorption of levulose and the delay of transforming it in the system into glucose would account for the inefficiency. This plainly proves that a fundamental chemical and physiological contrast exists between ordinary sugar and honey. There is much the same disparity between glucose and levulose, the latter an important component of honey. The symptoms of subglycemia which follow the complete removal of the liver in

animals are promptly dispelled by the administration of glucose, while levulose is ineffective. It is noteworthy that levulose is rarely, if ever, found in the blood.

Diabetic patients who have had to endure for endless years the self-inflicted injections of insulin are often exposed to insulin-shock, which is really subglycemic reaction. Sometimes it is impossible to give an adequate reason for this dangerous and occasionally fatal occurrence. There are many causes which may produce such a state and diabetics ought to be well instructed in their appreciation. This is a difficult task for a layman, often enough even for an intelligent physician. The most common causes which are responsible for such a state are, as a rule, errors in administering the proper amount of insulin, usually too large a dose; a delay in eating an appropriate meal; that is, a poor adjustment of diet or loss of part of the food by vomiting, diarrhea or gastric obstruction; violent exercise in combination with insulin, etc. Diabetics often use the same site for injections. This delays or prevents absorption and requires an increase of insulin, which additional dose, if injected into a new site, will absorb rapidly, lower the blood-sugar level and produce a shock.

Many instances have been reported where honey was well tolerated by diabetics and supplied them with required energy. In 1933, after the author had published a questionnaire to beekeepers through the courtesy of apicultural journals, to obtain information about the effects of bee stings, especially about their remedial value in rheumatic and arthritic conditions, many correspondents volunteered illuminating reports about the medicinal value of honey. Some of these communications state that honey has been used by them in hopeless diabetic conditions with the best success and resulted in cures. Some reports are very instructive. Mr. G. J., of Kaukauna, Wisconsin, writes, "I am a railroad engineer by trade, but I became a diabetes victim and I had to resign my job because I fell away to nothing. The doctors gave me up and proclaimed that there was no hope for me. Then I made up my mind to take up a diet that I asked for but the doctors refused and here it is:

Spinach, raw or cooked, mostly raw.

Lettuce, sweetened with honey and lime juice.

Raw carrots, washed, brushed and grated, sweetened with honey to taste.

Raw cabbage salad with lime juice and honey.

Ripe tomatoes, raw or canned, sweetened with honey.

Whole wheat bread.

“Began this diet in 1922 and at the end of 1923 the doctors could not find a trace of sugar, though several of them have tested me to satisfy their curiosity. I am now past 65, eat anything on the table, and will do as much work as any man of my age, if not more, after going through two railroad wrecks and being picked up twice for dead. Whisky was not the cause of the wrecks, for I do not touch the cursed stuff.”

Mr. L. M. D. of Edmeston, New York, writes that he not only cured many cases of rheumatism with bee stings but also supplies a list of people who were victims of diabetes. After they indulged in honey they recovered. “Mr. and Mrs. F. D. both suffered from diabetes, doctoring with various physicians for a long time without improving. Finally they went on a diet consisting of large amounts of honey and plenty of fruit, and today both are alright.”

Such disclosures (call them intrusions), even though they originate from the laity, ought to arouse the attention of the venerable medical fraternity.

To justify the supposition that honey can be given to diabetics, there are also statements from members of the medical profession. Dr. F. C. Ameiss advocated tupelo honey for diabetics, as having a minimum percentage of dextrose and a maximum of levulose. (Tupelo is a tree of the dogwood family.) Dr. Desiderius de Beszedits, of Coyuca de Catalan, Guerrero, Mexico, in an article in the *Medical World*, October, 1934, “Treatment of Diabetes,” wrote the following: “Just one more thing to conclude: the employing of honey-diet in the treatment of diabetes may look antiscientific, antimicrobial, even rather silly

to the theoretical minded, uninitiated or to a superficial observer. Just at this writing, my bee flocks (a cross between the lazy native Indian wasp-like bee and the large, ever-busy Hungarian—also called Italian—bee, I imported from Europe) are busy gathering honey from a plant now in bloom here, called retama or tecoma mollis, retania or tronadora. We make tincture and fluid extract of this plant (leaves and roots), and I give it to diabetic patients in drop doses in manzanilla tea when I cannot obtain the leaves for the tea that I use in preference. The tea, the tincture and the fluid extract of this plant have a decidedly and markedly antiglycosuric and eupeptic quality and its antipolyuric effect is notably rapid. Now we all know that the bee sucks the quintessence of the flower juice, adds something of her own to it (saliva or some other substance) and so manufactures it into honey. Each country has a large number of provenly medicinal plants, and the bees gather their honey from such flowers. Making our deductions, it is not difficult to understand why, on this basis, honey fits into the curative diet for diabetes. Most likely it is just the proper food for the depleted hungry glands." (The belief that the curative properties of certain plants are transmitted by the bees from the blooms into the honey they produce, is rather widespread. Menelik, the great King of the Ethiopians, according to Dr. Theodorows (*Lancet*, 1897) grew Coso trees under which he placed the hives. The Coso honey which the bees gathered from the blooms was considered an excellent worm remedy. A tablespoonful of the honey in water was supposed to be sufficient to produce results. The natives of India drop lotus honey into the eyes to cure cataracts. The belief in the anti-tuberculosic effect of Eucalyptus honey is world-wide.)

Dr. A. Y. Davidov of Russia has found honey a good substitute for sugar and other sweet foodstuffs in diabetes. Dr. Davidov believes that honey prevents acetonemia and diminishes the amount of sugar in the urine in spite of the fact that honey contains 75% sugar. One of his patients used one pound of honey in ten days without an increase of the sugar rate in the urine. When the use of honey was stopped for a while the sugar per-

centage in the urine rose and the patient was again given four teaspoonfuls of honey daily, after which the sugar rate again dropped. Dr. Davidov reported six more instances where honey had a beneficial effect in diabetes.

Dr. L. R. Emerick of Eaton, Ohio, a specialist in diabetes, used honey in the diet of more than 250 diabetic patients with success. The fame of the late Dr. R. J. Goss of Middlebury, Vermont, was proclaimed throughout the State for helping diabetics on a honey diet. A neighbor of his related that he has seen many patients arrive for treatments weak and emaciated but they soon gained in weight, looked splendid and were able to walk for miles.

(The author would earnestly caution diabetics not to use honey without the advice and strict control of their physicians.)

Professor A. Szent-Györgyi, the discoverer of Vitamin C, published interesting results which he obtained by peroral administration of succinic acid in the treatment of acidosis of diabetics (*Orvosi Hetilap*. Budapest, No. 24, June 12, 1937). These, if confirmed, may explain the beneficial effects of various acids, among others lactic, succinic, citric, malic acid, etc., which honey contains. The formation of dangerous acetone in diabetes is possibly corrected through the aid of these acids.

HEATHER HONEY

Magic healing power was attributed to heather, this modest little wild flower of the Scottish Highlands, so dear to the heart of all Scotsmen. The legendary lore and lay connected with this favorite mountain bloom, the emblem of solitude, was shared by the honey which the bees extracted from it. Heather designates a flower of the heath (in German, *heide*) and its connection with the word heathen, pagan (in German, *heide* also means pagan) reflects a quaint superstition. Both in Scotland and in Germany a belief existed that the heather grew from the blood of a heathen. In Scotland, on Halloween, the witches are supposed to ride on heather brooms.

The heather flower is purplish, suggesting the color of blood. White heather is extremely rare and it is supposed to bring good luck, not unlike a four-leaf clover. Queen Victoria mentioned in a letter that when she was a young bride and was driving fast to Balmoral Castle, her coachman suddenly jumped off the carriage to pick a white heather for which "he had an extraordinary eye to find," and remarked that "a Highlander would never pass one without picking it, because it is considered to bring one good fortune."

The nectar which heather blooms contain is rich in minerals. The Picts had the secret of making excellent ale from the "tender tops of the twigs." Heather ale was called heather-crop, meaning the top of the plant. Robert Louis Stevenson refers to heather ale in *A Galloway Legend*:

From the bonny bells of heather
 They brewed a drink lang-syne,
 Was sweeter far than honey,
 Was stronger far than wine.
 They brewed it and they drank it,
 And lay in blessed swound
 For days and days together
 In their dwellings underground.

Leyden also refers to it in *The Heather*:

For once thy mantling juice was seen to laugh
 In pearly cups, which monarchs loved to quaff;

Heather ale was much used among the Picts; but when that nation was extirpated by the Scots the secret of making it perished with them.

We know the legend relating how anxious were the Scots to learn the secret of the strength-giving heather ale. When the last two living members of the Picts, father and son, were brought before Kenneth the Conqueror, he offered them their life on condition that they reveal the method of heath-liquor

making. After they refused Kenneth ordered the son to be killed. The father was still obdurate but his life was spared and he was imprisoned. He lived much beyond the limits of mortal existence but became blind and bed-ridden. Once he overheard some young men boasting of their strength. He felt their wrists, remarking that they were not feeble but their vigor could not be compared to men who drank heather ale. He asked for an iron bar and broke it with his hands. It was an old Scotch saying that mead-drinkers have as much strength as meat-eaters.

The medicinal properties of heather had a wide repute in antiquity. Parkinson in his *Theatrum Botanicum*, 1640 A.D., remarks: "It hath a digesting quality, resolving the malignity of humors, by transpiration or sweating; which a decoction of the flowers being drunke, doth perform, and thereby giveth much ease to the paines within the body, and expelleth the worms therein also; the leaves and flowers made into a decoction is good against the stings or bitings of serpents and other venomous creatures; and the same being drunke warm, for thirty days together, morning and evening, doth absolutely breake the stone and drive it forth; the same, also, or the destilled water of the whole plant, being drunke easeth the chollicke; the said water or the juyce of the herbe dropped into the eyes helpeth the weaknesse of the sight."

A decoction of heather "with faire water to be drunken warm both morning and evening in the quantity of five ounces three hours before meat, against the stone in the bladder; but at last the patient must enter into a bath made of the decoction and whiles he is in the said bath, he must sit upon some of the heather that made the foresaid bath. By the use of bath, dyet and decoction hee has knowne many to be holpen, so that the stone has come from them in very small pieces." Dioscorides' highly-praised *Erica* plant was undoubtedly heather.

The same curative power which was imputed to the plant was also attributed to heather honey. Rev. Hugh Macmillan remarked that "Mount Hybla itself could not boast of more luscious honey than the liquid amber which the bees gathered from the

heather-bells." The Scotch thought that heather honey had a "grousey" taste.

Heather honey has world-wide repute as a specific remedy for many ailments. It is in great demand in foreign countries and is sold at a premium. Dr. Barton, during his stay in Edinburgh, noticed the distinct soporific effect of heath-honey. It is often so thick that it can not be readily separated from the combs by centrifugal force unless kept in a warm place for several days before extracting.

Pure heather (ling) honey does not granulate unless 10 per cent of pollen grains of other plants are present. (But 5 per cent of charlock might start granulation.) It is of a jelly consistency with a multitude of tiny air bubbles which give a characteristic sparkle. If the honey is heated these bubbles rise to the surface and their absence at once reduces the merit of the honey. In common parlance, pure heather honey does not imply absolute purity. If there is 20 per cent of other pollen present, it would still be reckoned good heather honey; and even if it had upwards of 40 per cent of foreign pollen grains, that honey might, by flavor, aroma and consistency, pass anywhere as good heather honey. Bell heather (*Erica*) does granulate, and it is to be classed with other dark honeys; for it has not the characteristic color, sparkle, consistency, astringency, flavor, and pollen of the genuine heather honey (John Beveridge, President of the Scottish Beekeepers' Association).

EUCALYPTUS HONEY

The cultivation of Eucalyptus trees in malaria-infested regions proved to be instrumental in eradicating this dreadful disease. In certain parts of Australia, malaria entirely disappeared after these fast growing *fever-trees* had been planted. Important medicinal values were always attributed to the sap of these trees. Their blooms are rich in pollen and nectar.

The Trappist monastery of *Tre Fontane*, near Rome, was built by the monks on soil which was infested with malaria. (The

name originated from the legend which relates that when St. Paul was decapitated there by a powerful blow, his head rolled along with great force and from three places, where it touched the ground, wells issued.) After the monks had planted forests of Eucalyptus trees, the region became habitable. The Trappist monks conduct extensive apiaries there with two honey harvests, in May and in October. Some hives produce yearly as much as 120 pounds of honey (H. Reepen). On account of the considerable demand, Eucalyptus honey is high-priced and it affords a fair income to the priests.

Eucalyptus honey is dark in color, with a rather unpleasant taste and a strong aromatic odor. Australia supplies the largest part of the demand. In Germany they pay three to four marks a pound for such imported honeys. Dr. Ullersberger of Strassburg thought that genuine Eucalyptus honey is an unparalleled substance; it is strengthening, blood-forming, blood-purifying, nourishing, and besides, produces appetite. He advised adding, on account of its reconstructive power, one to three tablespoonfuls to any diet.

The Trappist *Liqueur de Tre Fontane* is also popular. The monks prepare the extract, with the aid of the most modern distilling apparatus, from the leaves of the Eucalyptus trees.

CHAPTER VIII

HONEY IN SURGERY

HONEY has a distinct bactericidal power which is mainly due to its hygroscopic property. All living organisms require a certain amount of moisture to maintain their lives. When bacteria come in contact with honey they are deprived of the vital moisture and perish. The acid reaction of honey also renders it an unfavorable medium for the bacteria to grow in. Most microorganisms which affect the human body are destroyed in honey.

Honey applied to ulcerated surfaces has a unique function. Soon after its application a profuse and intense centrifugal flow of lymph is noticeable and the entire torpid surface of the wound becomes soaked in fluid. This leucocytic lymph collection which honey produces has not only a bactericidal power but the rinsing function of the free-flowing liquid will greatly contribute to the cleansing of the wounds and will stimulate and promote granulation and healing. The ancient Greeks often refer to "epomphalia", a navel ointment made from honey for the newborn. Old mead, which is almost as extinct today as the dodo, was also used as an antiseptic lotion.

The external application of honey has an age-old history. The ancient Egyptians used it as a surgical dressing. The Papyrus Ebers recommended that wounds be covered for four days with linen dipped in honey and incense. They believed that cataracts yielded to treatments with honey. Honey dropped into the eyes was supposed to have cured inflammations and other ailments of the eyelids. To quote the amusing report of Vigerius: "I have cured a Horse stone blind with Honey and Salt and a little crock of a pot mixed. In less than three daies, it hath eaten off a tough

filme, and the Horse never complained after." In the July, 1937 issue of the *American Bee Journal* (page 350) "A Subscriber" from New York State writes as follows: "I had a horse going blind with a white film over his eye which seemed to hurt. His eye was shut and watered. I dipped white honey into his eye with a feather for several nights. In a day or so the film was gone and the eye looked bright and good."

The Chinese and Hindus cover the entire bodies of their small-pox patients with honey to hasten the termination of the disease and also to prevent the formation of scars. Galen thought that "Hony warmes and cleares Wounds and Ulcers, attenuates and discusseth excrescencies in any part of the body." The Talmud recommended honey for ulcerated wounds, especially for extensive sores of animals. *Ceromel*, made with one part of wax and four parts of honey, is popular in the tropics for ulcers because it never becomes rancid.

During the Middle Ages honey was extensively used in the form of ointments and plasters for boils, wounds, burns and ulcers, plain or mixed with other ingredients. Charles Butler thought that honey "will knit together hollow and crooked ulcers and likewise close other disjoyned flesh." He highly praised the *Unguentum Aegyptiacum* which was made by boiling honey, vinegar and wintergreen. This plaster, according to Butler, would "open, clean, dry and digest all inflammations and resist putrefaction." Rectal suppositories contained honey and wax. Galen's honey and oil enema was popular for centuries.

Richard Remnant (*The History of Bees*, London, 1637) had implicit faith in "admirable baths made of honey which are excellent for Aches and strong Itches." A friend of his had "a foul itch that he was like a Leper." He cured him in the following manner: He used an empty Wine cask, called a Pipe, and "took out one head" and made a liquor of water and honey, making it pretty strong with honey and "heated it as hot as he could endure to stand in it," and poured it into the Pipe and "caused him to stand in it up to his neck a pretty while." This he did "three days, one after another, and he recovered as clear as ever." He had a like

experience with "divers Aches." "If it be renewed every day with a little honey, it will be better."

The rural populations of the European continent, especially that of the Slavic countries, used honey for all kinds of wounds and inflammations. "Honey ointment", consisting of equal portions of honey and white flour, well mixed with a little water, had a wide usage. A good ointment should be more solidified than too liquid. Honey and burnt alum was another popular combination. In croupous diphtheria it was the accepted method of mothers to grip with their fingers a chunk of honey and vigorously rub, as far as they could reach, the throat and air passages of the patients. A honey poultice was also applied around the neck. Several drops of warm honey in the ear was considered an excellent remedy for pain, inflammation and ringing of the ear. Galen remarked: "Hony infused warme by itself wonderfully helps exulcerated ears, especially if they cast forth ill flavours, as also their singings and inflammations." Marcellus Empyricus suggested: "Honey, Butter and Oyle of Roses, of each a like quantity, warme, helps the paine of the ears, dulness of the sight and the white spots in the eyes."

The writer learned through personal communication that honey is still used for trachoma in the form of eyedrops. A Canadian mother related to him that two of her daughters contracted sore eyes while attending school, where there was an epidemic at the time. They were cured in two or three days by dropping honey into their eyes. It took two and three weeks for the other children in the school to get rid of the same trouble. Cataracts of the eyes were reported to have been cured by the same method, dropping honey into the eyes three times daily.

Our good friend, the famous globe-trotter Dr. W. E. Aughinbaugh, described an operation he witnessed in Panama, during the construction of the canal. A native Indian surgeon of considerable repute performed a disarticulation of the hip joint. He smoked cigarettes incessantly during the operation, laid them down occasionally, picking them up again with his bloody fingers. After the stump was sutured, the surgeon took from a large pail several

handfuls of honey, which he smeared over the wound, covering it subsequently with gauze. He assured Dr. Aughinbaugh that he had never had an infection when he applied a layer of honey over the wound. Dr. Aughinbaugh has seen the natives of the Amazon region "suture" extensive injuries by letting beetles unite the margins of wounds with their robust mandibles. After the heads of the insects were severed, the mandibles remained closed and the wounds were covered with honey mixed with liquid wax. The results were excellent.

It is singular that, though honey was used for thousands of years for treatment of wounds and skin troubles, our modern medical literature ignores the subject. Lately, it seems, honey is gradually regaining its age-old repute and lost popularity. Dr. Zaiss, of Heidelberg, considers honey in the treatment of wounds superior to all other ointments. He has treated several thousand cases of severe infections with honey and could not report a single failure. Dr. Zaiss prefers honey even to tincture of iodine. He dresses the wounds with strips of gauze dipped in honey, and finds the wounds perfectly clean in 24 hours. The sloughs, even deep ones, usually adhere to the dressing material. Dr. Zaiss states that the application causes, at first, a transient smarting but the pain is soon relieved and a cooling sensation supervenes. The healing is remarkably rapid. He suggests a daily change of dressing.

The Germans were always firm believers in the curative power of honey, both internally and externally, as a surgical dressing. It is interesting that honey is now combined in Germany with another old popular remedy; namely, cod-liver oil. Pliny highly praised cod-liver oil as a wound dressing (*Hist. Nat.* 31:27). The Eskimos, Laplanders and the natives of Greenland use cod-liver oil even these days for the dressing of wounds. German surgeons, Zaiss, Sack, Lucke, Buchheister, Löhr, Gundel, Blattner and others, published recently in the medical journals miraculous results which they obtained through the use of a honey-cod-liver oil ointment called Desitin-Honey salve. Infected wounds, ulcerations, burns, fistulas, boils, carbuncles, felons, etc., are

reported to heal in the shortest time. The ointment is supposed to check inflammation, stimulate granulation and remove deep necrotic tissues. Subjectively the ointment is very well tolerated because it alleviates pain and eases tension. The change of dressings is not painful because in twenty-four hours the wound is soaked in a rich exudate of lymph which prevents adherence of the dressing material to the wound and is easily removed. The odor of the ointment is rather pleasant, without a corrigent. It is difficult to say whether the honey or the cod-liver oil is the more helpful ingredient but it seems that it is a fortunate combination. The surgeons advise that, though its function is not scientifically proven and therefore justified, these facts should not interfere with its use. In skin diseases, even in psoriasis, the results obtained were excellent. For frostbites on ears, fingers and toes there is nothing which will take out sooner the frost and swelling than when these parts are wrapped in honey. Verrucae (warts) were reported to have been removed by the overnight application of a honey poultice.

Recently Dr. Charles Brunnich, a surgeon of Switzerland, joined the ranks of those who advocate honey for surgical dressings, especially for contused and badly slashed septic wounds. He quotes the case of a man whose finger was smashed in a grinding machine. The bone of the terminal phalanx of the finger was broken and hung on a skin flap. After wrapping the extremity in honey the finger grew on and rapidly healed. Another man had, in succession, two large carbuncles on the back. While the first carbuncle was operated on by a surgeon and left a deep ugly scar, the second was treated only with honey. The cores rapidly eliminated and the wound left only an insignificant scar.

In the "*Alpenländische Bienenzeitung*" (February, 1935) we find the following report from a man: "In the winter of 1933 I heated a boiler of about thirty-five gallons of water. When I opened the cover, it flew with great force against the ceiling. The vapor and hot water poured forth over my unprotected head, over my hands and feet. Some minutes afterward I had violent pains and I believe I would have gone mad if my wife and my

daughter had not helped me immediately. They took large pieces of linen, daubed them thickly with honey and put them on my head, neck, hands and feet. Almost instantly the pain ceased. I slept well all night and did not lose a single hair on my head. When the physician came he shook his head and said: 'How can such a thing be possible?'"

CHAPTER IX

MEAD

“. . . Valhall's blushing maids round-proffer
the Mead-Horns, rich with foam of gold, . . ."
Frithiof's Saga

HONEY and water, called hydromel, is one of the oldest drinks known. It was later called mead, meth, or metheglin.

There are three distinct kinds of mead, the simple, the compound and the vinous. *Simple mead* is made of water and honey which does not undergo fermentation. It is made by boiling about three parts of water to one part of honey; the honey may be increased or diminished according to taste. The boiling is done over a slow fire until one third has evaporated, then the remainder is skimmed and put into a cask, until the cask is full. In three or four days it will be fit for use. Simple mead is a favorite drink of the Mohammedans who are forbidden alcoholic beverages.

Compound mead is made in the following manner: While the simple mead is boiling, some raisins, cut in two, are cooked separately, allowing one-half pound of raisins to six pounds of honey. During the time while the boiling mead is diminishing, the liquefied raisins are added through a coarse linen filter and the mixture is boiled together for a short time; a toasted crust of bread, steeped in beer, is then put into it and after the scum, which forms afresh, has been removed the liquid is soon taken off the fire and allowed to settle. After it has been poured into a barrel (new barrels must be rinsed with brandy), an ounce of salt of tartar, dissolved in a glass of brandy is added. Kept in a warm room or exposed to the sun, with the barrel open, it will commence to ferment. Some

pieces of lemon peel, a few drops of essence of cinnamon and some syrup of gooseberries, cherries, strawberries and aromatic flowers may be mixed with the concoction to suit individual taste. The froth must always be replaced with some of the remaining stock and the barrel kept continually filled. Compound mead ferments a considerable time, usually about two months. After the fermentation has ceased, the bung-hole is closed. The longer the mead is aged the better and more potent will it be. After several years in a cask it may be put, with the addition of a lump of sugar, into bottles which then must be well corked.

For the preparation of *Vinous mead* there are more diversified instructions, rules and procedures than for all other alcoholic liquors combined. Every nation, every class and age has had a different method of mead-making. The component parts, the technic and innumerable other considerations, had to be carefully bethought to produce an excellent mead. One Greek mead contained thirty-six ingredients and was called "true nectar." The ancients depended even on the constellations of stars to select the best time for preparing this favorite drink. The fermentation period of mead was of such vital importance with some races that during that time sexual abstinence had to be observed, otherwise it was believed the mead would spoil. The number of ingredients which were selected is simply amazing. Thyme, ginger, nutmeg, cinnamon, cloves, pepper, sesame flour, sweet marjoram, rosemary, even whites of eggs, were added. In later centuries whisky, brandy and gin were used to strengthen and flavor it. Even the water was of consequence. Pliny, for instance, advised (Libr. XIV. ch. 20) in making hydromel the use of rain water which had to be at least five years old.* The *thalassiomel* of the Greeks was prepared with sea-water.

The pervading principle in the innumerable orthodox procedures of mead making was to determine first the correct proportion of honey, water and other ingredients; the period of time and the slowness of boiling; the vessel (copper, glass or earthenware); the proper scumming of the froth; the time and manner of fer-

*Tickner Edwardes, even today, makes his mead with rain water.

mentation and stirring; and finally how long to let it stand until it had aged enough and was fit to drink (Saxon quality).

Dr. Bevan's recipe for making mead was a typical *modus operandi*: "Dissolve an ounce of cream of tartar in five gallons of boiling water, pour the solution off clear upon twenty pounds of fine honey, boil them together, and remove the scum as it rises. Towards the end of the boiling add an ounce of fine hops; about ten minutes afterwards put the liquor into a tub to cool. When reduced to a temperature of 70° or 80° Fahrenheit, according to the season, add a slice of toasted bread smeared over with a little yeast, the less the better because *yeast invariably spoils the flavor of wines*. If there is a sufficiency of extractive matter among the ingredients employed, yeast should not be introduced; nor if it is fermented in wooden vessels. The liquors should now stand in a warm room, and be stirred occasionally. As soon as it begins to carry a bead it should be tunned and the cask filled up from time to time from the reserve, till the fermentation has subsided. It should now be bunged down, leaving open a small peghole; in a few days this may also be closed and in about twelve months the wine will be fit to bottle."

The invert sugars, dextrose and levulose, which honeys contain, readily produce alcohol by fermentation. Saccharose (sucrose), the main component of cane-sugar, must first be inverted before it ferments.

The celestial nectar, the drink of the gods, was really fermented hydromel, that is, honey-wine, which was only later called mead or meth. Mead is often mentioned in the Bible and in the sacred books of India. Abraham à Santa Clara called the bees (Judas IV. 14) the "little mead-brewers." The wide-spread popularity of mead is best proven by the philologists. In Scythia it was called medos; in Greece, methu; in India, madhu; in England, mead; in Old Irish, mid; in German, meth; in the Slavic countries, medu; in Lithuanian, medus; etc.

Previous to the introduction of grape wine and malt liquors, mead was a universal drink the world over. It was prized in the remote past as good wine, beer, whisky and cordials are today.

Mead preceded in Greece the wine-era by many long centuries. Aristotle remarks: "When the honey is squeezed out of the combs an agreeable strong drink, like wine, is produced." Beer drinking among the ancient Greeks was considered a barbaric custom. Apollonius Rhodius (235 B.C.) related that the Argonauts kept vast stores of food and mead which the cup-bearers drew forth in beakers and described how the heroes grasped the full goblet in both hands and relished it, pouring also a cup of mead upon the seas before lifting their anchors. The Nordic races highly valued mead and it was the drink of their heroes. The Niebelungen heroes drank meth out of golden goblets and ox-horns. The high halls of Valhalla flowed with mead and the dead warriors freely drank from the inexhaustible supply. The intrepid Goth, Beowulf, was offered mead by the bracelet-covered queen at the court of Hrothgar who made the hall the greatest mead-house ever known. Mead was the "nectar" of all Scandinavian countries. It was their national drink. On an ancient Runic calendar, found in Scandinavia, consisting of pictorial symbols, two of the twelve months of the year bear witness to the popularity of mead. January first, the day of Yuletide festivities, was represented by two crossed ornamental meadhorns (these embellished horns look very much like those from which visitors in Upsala (Sweden) drink mead today (for a good price) at the "Barrow of Odin"), and the month of September, by a beehive and a swarm of bees, a reminder to collect the honey which is so necessary for brewing mead. In the Eddas, mead is often mentioned. Speaking of heroes: "Blue mead was their liquor, and it proved their poison; they marched to Cattræth filled with mead and drunk." In the early Christian era mead still was a favorite drink. In the "*Legends of the Holy Rood*," mead is also mentioned. Chaucer alludes to "meth" as a common drink (*Knights Tale*; *Miller's Tale*). Shakespeare alludes to metheglin when he suggests something sweet (*Love's Labour's Lost*; *The Merry Wives of Windsor*).

It seems rather remarkable how mead, the first fermented drink known, was ousted by the fermented produce of grapes, namely, wine. It suffered the same fate as honey as a food and

sweetening substance. Wine prepared from grapes came into vogue comparatively late. Grapes came from China to Greece and Sicily; the Phoenicians carried them to the South of France, and the Romans to the Rhine and Danube. The first grape vines were planted on the Rhine in Ludwigsau by King Ludwig, "The German," in 842 A.D. But it required many centuries before mead was entirely "dethroned."

Among primitive races, especially the African tribes, mead has remained, up to this day, the popular drink. The East-African nomadic races not only eat the wild honey but they dilute it with water and let it ferment into wine or beer called *tetsch*, which is their favorite drink. The African soothsayers and prophets intoxicate themselves with this honey-wine. During ceremonials and magical practices it is liberally used. They drink it from horns, like the Niebelungen used to do, and also distil it for brandy.

In Africa honey is found in huge quantities; in some places the bees are so numerous, as Seyffert-Dresden describes it, that they even obstruct the passage of travelers and the air is filled with the odor of honey and the continuous buzzing of bees. The African races, without exception, are fond of honey. They mix it with flour, cereals, butter, milk and bake pastries with it; they even knead their tobacco with honey, making dry cubes for chewing-tobacco which they call *Latuka*.

The Boros and the American Indians of the Western Amazon forests are also fond of honey. They use it for food and prepare their beverages from it, which they drink in excess during festive occasions. The wild honey is collected from the cavities of dead trees or from the hollow tree-trunks which the natives set up in the *thatch* of their houses for the new swarms to nest in.

In India, honey is an important article in the preparation of foods and drinks, especially in the manufacture of alcoholic liquors. The Himalayan mead has an unusual potency; one cup is sufficiently intoxicating. In ancient Babylon, date and honey-wine, called *sikaru*, was a powerful alcoholic drink. The *misshu* of the Koreans is a brandy with a high percentage of alcohol. It is a distilled honey-wine. Some Persians have a tube gently inserted

between their teeth while still asleep, and have a mixture of warm milk, whisky and honey poured into their mouths so that the taste of "nectar" should be their first conscious sensation each day (*Patrick Balfour, Grand Tour*).

According to ancient Anglo-Saxon history, the beehive supplied the whole population, from the king down to the poorest subject, with food, drink and light. Mead was served at the royal tables, in monasteries and in the houses of the poor. During royal festivities, mead was served in horns. English history mentions how Ethelstan, the subordinate King of Kent (Xth Century), expressed his delight, when visiting his relative, that there was "no deficiency of mead." The affluent supply of mead in medieval Germany is proven by the fact that when hostile tribes tried to burn the town of Meissen, on the Upper-Elbe, in the year 1015, its population, owing to shortage of water, extinguished the flames with their reserve stock of mead.

J. Magnus, in the *Historia Sueonum* (The History of Swedes), describes how Hunding, the 23rd King of Sweadland, upon a false report of the death of his brother-in-law, Hading, King of Denmark, invited all his nobility to a sumptuous feast and provided a large vessel of mead. After they had become drunk, as a token of friendship for his supposedly dead friend, Hunding plunged into the vessel and *willingly* drowned himself. The Swedes considered him immortal and superior in courage to the Greek and Roman heroes.

Many varieties of honey-brew were used during the Middle Ages. Frequently the crushed combs were steeped in water, strained, and then put into earthen vessels until the liquid fermented and became mead. It was preferably kept in wooden barrels, and the longer it aged the more it gained in flavor and strength. This was the most common procedure. The stronger and "more generous" kind of mead was called metheglin. In its preparation spices, like thyme, sweet marjoram, rosemary, ginger, cinnamon, bay leaves, cloves and pepper were used in liberal proportions. Sometimes sweet apples, pears and quinces were added. In some parts of Wales, the refuse-combs were brewed with malt or

the variety of ingredients which were added for its improvement, or rather, for its degradation. The finest mead can be brewed from pure honey and water alone. Any addition of spices or other material serves to destroy its unique flavor.

During the sixteenth and seventeenth centuries, certain bee-masters were renowned in their day for mead brewing. One of the best mead-brewers claimed that his potion was absolutely indistinguishable, even by the most competent judges, from old *Canary Sack* (sack, a kind of wine, was a popular drink in Shakespeare's days). This authority gave careful directions for the manufacture of mead. If kept for a number of years, such mead, when poured into a glass, frothed like champagne, stilling soon, leaving the glass lined with sparkling air bubbles. It was of a pale golden color and had a bouquet like old cider, but its delicate taste was hardly comparable with any other known liquor. Dryden suggested diluting stronger wines with mead:

T' allay the strength and hardness of the wine,
Let with old Bacchus, new Metheglin join.

In the courts of the Princes of Wales, the Mead-Maker was the eleventh dignitary, preceding even the court physician. He received his land and horses free; the Queen supplied him with linen and the King, with woolen clothing. A certain amount of mead was his allotted share. In the principality of Wales, "the spacious halls of the Princes resounded, accompanied by the lyre, with the praises of mead." Mead-hall and mead-bench are often mentioned in songs of the Druid bards. There were three things in Court which had to be communicated to the king before they were made known to any other person:

"1st, Every sentence of the judge;
2nd, Every new song; and
3rd, Every cask of mead."

Innumerable drinks were prepared from honey and wine. The famous old *athole brose* consisted of equal parts of honey and

cream, to which mature Scotch whisky was added. (This was supposed to cure all ills—even without faith.) Boswell, in *The Life of Johnson*, mentioned a drink, “a curious liquor peculiar to his country,” which the Cornish fishermen drank. They called it *mahogany*. It consisted of two parts of gin and one part of treacle, well beaten together. Johnson begged Mr. Eliot to have some made, which was done with proper skill. Johnson thought it a very good beverage, a counterpart of what was called *athol porridge* in the Highlands of Scotland, a mixture of whisky and honey, but he considered the latter a better liquor than that of the folks of Cornish, because “both of its component parts were better.” (It is not surprising that Johnson suffered from bad gout.) Johnson remarked that “mahogany must be a modern name, for it is not long since the wood called mahogany was known in this country.” Johnson also had the bees in mind when he remarked that “Tom Birch is as brisk as a bee in conversation.”

Edwardes quotes the old bee-master: “But of all the good things given us by the wise physician of the hive, there is nothing so good as well-brewed metheglin. This is just as I have made it for forty years, and as my father made it long before that. Between us we have been brewing mead for more than a century. It is almost a lost art now; but here in Sussex there are still a few antiquated folks who make it, and some even remember the old ‘methers,’ the ancient cups, it used to be quaffed from. As an everyday drink for working-men, wholesome, nourishing and cheering, there is nothing like it in or out of the Empire.” Joseph Warder, a physician, (1726) dedicating a book about bees to his ruler, Queen Anne, refers to mead as a “liquor no ways inferior to the best of Wines coming either from France or Spain,” and suggests a toast to her Majesty’s health “not with the expensive wine of our enemies but with a glass such as our Bees can procure us.” Rev. Thorley also thought mead “not inferior to the ‘Best’ of foreign Wines.” Honey-beer was very popular with the ancient Gauls. They had two kinds, *zythus* prepared with pure honey for the rich, and *corina*, made from the combs after the honey had

been extracted, for consumption by the poor. The Russian *miod* is an old-fashioned honey-drink, of the same strength as beer.

The French being ardent wine growers, despised mead. It was never sold under that name. Nonetheless, much mead was sold in France under fictitious names like Rota, Madeira, Malmsey, etc. The Bavarian meth was the precursor of the beer industry of München. The use of hops in beer-making originated in Russia.

THE MEDICINAL VALUE OF MEAD AND OF OTHER HONEY-DRINKS

HYDROMEL, i.e., honey and water, made under the special direction of Pliny and Galen, was for centuries not only a popular drink but a salutary medicine. Pliny was a firm believer in hydromel; he thought that "it is an extremely wholesome beverage for invalids who take nothing but light diet; it invigorates the body, is soothing to the mouth and stomach, and by its refreshing properties allays feverish heats. It is well suited for persons of chilly temperament or of a weak and pusillanimous constitution, . . . diminishing also the asperities of the mind." According to Pliny, anger, sadness and all other afflictions of the mind can be modified by diet. *OXYMEL*, made of honey, vinegar, sea salt and rain-water, was in great vogue in olden times, when it was considered an infallible cure for sciatica, gout, and rheumatic ailments. It was also used to "gargarize with in *Squinancy*." There were many other preparations made with honey. *RHODOMEL* was a mixture of roses and honey; *OMPHACOMEL* was made from fermented grape-juice and honey; and *OENOMEL* from unfermented grape-juice and honey. This last combination was used for gout and "nerves." Clysmas of honey and water was considered a remedy of merit for cleansing the bowels. The ancient Greek *conditum* was honey mixed with wine and pepper. It was a popular medicine for all kinds of digestive ailments. Most ancients attributed to honey-drinks a soporiferous effect.

Butler thought that the virtues of mead were about the same as those of honey. He advocated old mead as "a wine most

agreeable to the stomach, as it restores appetite, opens the passages for the Spirit and breath, and softens the bellies." He also thought that "it was good for those who have coughs, quartan ague and cachexia and that it helps to guard against diseases of the brain (*Epilepsie* or falling evil) for which wine is pernicious." The attainment of old age he attributed to its use.

For many centuries mead was considered a veritable *elixir vitae*. Its principal medicinal value was in kidney ailments, as an excellent diuretic without disastrous effect on the kidneys. As for gout and rheumatism, mead ranked not only as a curative but also as a preventive medicine. It was widely used as a good digestive and laxative.

VINEGAR is another profitable by-product of honey and it far excels in quality all similar products, not excepting wine vinegar. Inferior types of honey can be well utilized for this purpose. Any liquid containing sugar can be used for making vinegar. Five parts of water to one part of honey exposed to acidous fermentation will produce vinegar. It should be boiled for about 10 minutes in a jug or glass container (never metal). Some minerals and a little yeast can be added to hasten the process. Left in a barrel, in a warm room, the bung-hole closed with cheesecloth, the fermentation will be complete in several weeks.

Honey-vinegar, pure or mixed with honey (*oxymel*), also had wide employment in ancient therapeutics both as a medicine and as an external application.

CHAPTER X

WORDS TO THE WISE

TODAY honey does not have the significancy which it enjoyed for thousands of years. It was forced into the background upon the intrusion of refined sugar in the middle of the eighteenth century. This is a regrettable error. It would greatly benefit humanity if honey could be restored to the rank which it occupied in antiquity and physicians, above all, should help the good cause. The modern housewife uses "honey" only . . . as a word, when she is anxious to have a new fur coat, an automobile or jewelry.

Honey is physiological sugar and not a counterfeit. Through the prodigious genius of Nature, through a wonderful cycle, the energy of the sun is preserved in the nectar and pollen of flowers, and is liberated when honey is eaten. The influence of ultraviolet rays on sugar, imparting inhibitive power against the growth of various bacteria, yeasts and molds, is also conveyed to honey, which may be one of the reasons that it has such distinct antiseptic and antifermentative qualities. Pollen, which honey contains, even though by accidental admixture, is the procreative germ, the endocrine of plant-life, and is transmitted into the human body when honey is consumed. The newest discoveries in biochemistry emphasize that quantity is not essential to produce effects. Honey is reasonable in price, is more nutritious than many other foods, for instance, butter, and keeps almost indefinitely.

Honey ought to have more attention in feeding not only the healthy but invalids and infants. Honey behooves the well and the ill: it is a good, practical and delicious food, the source of the oldest and most salubrious drinks and an excellent remedial agent. Honey conserves health and also restores health. It is more than a plain sweet. There are treasures buried in honey, yet undiscov-

ered by science. The ancients compared it with molten gold. Many diseases, which never follow the consumption of honey, could be avoided by using honey instead of resorting to the indiscriminate, though admittedly more comfortable, substitution of sugar. When will people wean themselves, for instance, from the corrupt habit of "sugaring" their coffee, tea and other beverages? By right every family and restaurant table should be provided with a handy *drip-cut* pitcherful of honey to sweeten coffee, tea, grapefruit, berries, salads, pancakes, etc., and to make it possible for anyone to take occasionally a glassful of hot water-honey mixture to promote a free flow of bile and induce gastric and intestinal activity.

There are, of course, a few people with whom honey does not agree. They will experience a griping soon after its consumption. This is due to the high hygroscopic property of the substance, which readily absorbs gastric and intestinal fluids. The thirst which one feels after consuming honey is due to this circumstance, or rather advantage, because if the craving for water is gratified the system benefits by it. Diluting honey with water or mixing it with other foods will, at times, prevent such griping.

The thirst produced by the consumption of honey with the urge to drink more water is extremely important. The average person does not drink sufficient water. The human system requires daily about two and one-half quarts of liquid. Water, besides being a regulator of body temperature, is an important vehicle for removing waste products. Seventy per cent of the body weight consists of water and any loss must be replaced.

Certain individuals have an idiosyncrasy for honey. They cannot eat even the smallest amount. This is often an allergic condition, that is, they are honey-sensitized, like people who suffer from hay fever or asthma are sensitized to certain pollens which produce these conditions. Some people can eat extracted honey but not comb-honey and can not approach bee-materials, such as frames, combs, etc., without provoking an asthmatic attack. There are people who are sensitive to honey from one State and can eat honey from another State without trouble. Certain people can

not tolerate buckwheat or sage honey but any other type agrees with them. In general, sensitivity toward honey is very rare and is least common among all food allergies. It is best for these few victims to leave honey alone.

Sugar consumption has increased in the United States during the last half century by 500%. While 100 years ago the daily per capita industrial sugar consumption represented 45 calories, today it has increased to 550 calories, that is, about twelve times. As the daily requirement of an average individual is approximately 2500 calories, commercial sugar supplies one-fifth of the total. This amount is far beyond the mark, because it encroaches on the scope of calories to be supplied by starches, fats, animal and vegetable proteins and, last but not least, by more beneficial simple sugars. It is not surprising that obesity is on the increase. Uncle Sam will soon lose his lanky figure and acquire the paunch of John Bull. The daily candy expenditure of the United States is well over a million dollars.

Alfred W. McCann thought that America had become a nation of "sugar-hogs." In 1830 the annual per capita consumption was $7\frac{1}{2}$ pounds; in 1870—23 pounds; in 1918—89 pounds and in 1926—120 pounds. During prohibition years sugar consumption greatly increased, not only because there was a demand for a substitute "pick up," but also because most breweries converted their facilities into candy and chocolate factories, and manufactured soft drinks. Since the repeal of the Prohibition Act the yearly sugar consumption has decreased twelve pounds per capita. Today it is about one hundred and eight pounds. Each man, woman or child in the United States consumes about one-third of a pound; that is, about a teacupful of sugar a day. According to the 1919 statistics this amount was distributed as follows:

- 80% home consumption
- 10% by confectioners
- 6% by bakeries
- 3% in soft drinks
- 1% in tobacco and chewing gum

The United States is the "sweetest" country in the world. (If this has two meanings, both are correct!) While the entire world consumes forty billion pounds of sugar yearly, the consumption in the United States alone is ten billion pounds. The regrettable part is that most of it is imported. All the sweetening could be supplied by domestic honeys and there would be no need of one hundred and eight pounds of sugar per capita, because honey satiates more quickly than sugar. The person who will succeed in inventing a process of putting honey in cube or powder form will prove to be the greatest benefactor of humanity. The hygroscopic, that is, the water absorbing quality of honey will, however, place an almost unsurmountable obstacle in his way. (Dr. Bevan mentions in *The Honey Bee* that the Jews of Moldavia and the Ukraine prepare from honey a sort of sugar, which is solid and as white as snow. They expose honey in a vessel, which is a bad conductor of calories, to frost for three weeks, in a place where neither sun nor snow can reach it. By this process the honey, without being congealed, becomes clear and hard like candy. They send it to the distilleries at Danzig.)

Sweets, coffee and tea remain, so far, our best stimulants. They are less harmful than alcohol, especially if this is taken in excess. In 1918, during the World War the sugar rations of the A. E. F. were increased 100% and coffee, 50%, to supply the soldiers with much-needed energy. In ancient times, warriors used honey for this purpose. Honey, of course, will bestow more benefit during the winter months.

It is singular that the population of the United States, considering the excellent nutritive, tonic and protective value of honey, has not as yet become honey-conscious. There is no other country in the world where the public is more interested in health and, of course, in diet problems than in America. Innumerable books are published on the subject and there is an endless list of health magazines. The daily papers have their columns on physical culture and diet; there are free lectures; and colleges, schools, commercial and industrial organizations, federal, state and community health officials vie in giving health suggestions.

Officials of circulating libraries will tell you that more books are read on health than on any other topic. The books plainly show the wear and tear.

A remarkable fact in modern literature, as already mentioned, is that honey is so sadly neglected, though it is the end-purpose of apiculture. In textbooks, honey is treated more from a technical viewpoint, namely, how to produce as much honey as possible. The same comment applies to foreign literature. The writer has found the lengthy chapter on honey in the *ABC and XYZ of Bee Culture*, edited by E. R. Root, the most exhaustive and important treatise on the subject.

Though there is an old proverb that "good wine needs no bush," * yet the American Honey Institute uses its best efforts to popularize the sale and a more widespread use of honey. The lack of interest and the apparent opposition of the medical profession, of course, entails a tremendous handicap. Several years ago a pamphlet appeared, written by E. R. Root, the Editor of *Gleanings in Bee Culture*, entitled *Honey as Food*, but indorsement by the Committee on Foods of the American Medical Association was refused because they considered it "an offense to honest advertising." The booklet was a compilation of actual and valuable statements about honey by eminent physicians, many of them university professors, chiefs of health, food, nutrition departments and hospitals; excerpts from outstanding medical journals, etc., but the learned Board considered it a "hodgepodge of misinformation concerning 'alleged' (the quotation marks are the author's) values of honey." (*Journ. Am. Med. Assn.*, June 23, 1934).

Among the "misinformers" whose statements were quoted in the pamphlet, we find the following names:

Dr. E. P. Joslin, Professor of Medicine, Harvard Medical School

* The proverb has a Central European origin. It was an old practice to hang out a bush or a tree branch before an inn where fresh wine was sold. The custom still prevails in Vienna. Shakespeare uses the phrase in the epilogue of *As You Like It*: "Good wine needs no bush; a good play needs no epilogue."

- Dr. F. G. Banting, the discoverer of insulin
- Dr. B. P. Hawk, Professor of Jefferson Medical College, Philadelphia
- Dr. C. H. English, Medical Director of the Lincoln National Life Ins. Co.
- Dr. G. N. W. Thomas, of Edinburgh (*Lancet*, 207: 1924)
- Dr. W. G. Sackett, Bacteriologist, Colorado Experiment Station
- Dr. H. E. Barnard, Food Chemist of the American Honey Institute
- Dr. J. H. Kellogg, Battle Creek Sanitarium
- Dr. Arnold Lorand, internationally known physician and author
- Dr. Paul Luttinger, Pediatricist
- Dr. Clarence W. Leib, author of *Eat, Drink and be Healthy*
- Sir Henry Baldwin, King George Fifth's dentist
- Dr. Leonard Williams, London, author of *The Science and Art of Living* and others.

The erudite Committee, however, accepted and *approved* one suggestion of the pamphlet about the usefulness of honey as an antifreeze in automobile radiators,* as "probably the most enlightening paragraph of the entire leaflet." Needless to say the Council exceeded its authority in regard to automobiles, inasmuch as they have no dictatorial rights as yet in such matters. The flippant and ill-disposed argument certainly did not benefit the cause of honey. (Luckily the pamphlet omitted to mention another novel use of honey, that of filling golf balls, otherwise, very likely, the golf balls would have obtained commendation and honey, another stroke.)

* * *

Of course, the acceptance of honey by the medical profession as a protective and curative substance and their indorsement would

*E. R. Root thinks it sacrilegious to use honey for any such purpose when wood alcohol is available.

create pandemonium not only in medical circles but among pharmaceutical chemists, wholesale and retail druggists, radio announcers, even undertakers, not to mention the sugar refining companies, the candy manufacturers and retailers, soda counters, etc. It would be a veritable economic catastrophe. The sale of laxative remedies (it would be interesting to know their number), digestive and headache powders, bicarbonate of soda, enema bags, and rectal suppositories might entirely stop. To these we may add sedatives, various cough remedies, expectorants, throat lozenges, gargles, etc. The external use of honey would make a dent in the sale of antiseptics and have influence even on the cosmetic counters.

The wide use of honey would also cripple surgical practice because hemorrhoid, gastric ulcer, gall bladder, appendicitis, tonsil and many other operations would greatly decline or entirely disappear, not considering the moral effect which the recollection of former unnecessary operations would cast on discredited surgery.

TOO MUCH HONEY

The maxim, "too much of a good thing," applies also to honey. In Prov. XXV. 16, we find: "It is not good to eat much honey—as for men to search for their own glory, is not glory." In Prov. XXV. 27, there is another suggestion: "Hast thou found honey? Eat so much as is sufficient for thee, lest thou be filled therewith and vomit it." It is an old Latin saying, *Qui mel multum comedit, non est ei bonum*. (He who eats much honey does himself no good.) The Crusaders who followed Edward I to Palestine died in large numbers from excessive heat and from eating too much honey and fruit.

Galen advised mixing honey with other food, called "sweet-meat," which would not only nourish but also impart a good color. An anonymous writer in the *Planudian Appendix* suggested that honey should not be eaten alone, and that "too much honey

is gall." Taken by itself, without other food, honey would make one lean rather than fat.

People who have glutted themselves with honey will turn against it. As a matter of fact, overindulgence in any food may produce a permanent aversion. Medical science calls this an allergic state and often presumes that such victims have been sensitized to the substance. In medical literature there are innumerable reports of such cases. Hutchinson and Duke describe abdominal allergy due to honey. A man twenty-seven years old consumed a large quantity of honey and afterwards the slightest bit produced severe abdominal pains. Rolleston mentions a case of migraine after the least consumption of honey, due to previous indiscretions. Cane-sugar, barley, oatmeal, butter, milk, eggs, in fact any food substance may cause similar reactions. As already stated, sensitivity toward honey is least common among all food allergies.

There are many mysterious circumstances which may influence a like or dislike of honey. Dr. G. H. Stover reported a case in the *Johns Hopkins Hospital Bulletin* (November, 1898) which has immunological as well as neurological interest:

"A woman thirty-five years old, single, consulted me for a rather unusual swelling on her right cheek, following a bee-sting injury received several days before. Her face was considerably swollen and she felt some unpleasant constitutional symptoms. Five days later, she had fully recovered, when she made the very interesting statement that she never before had been able to eat honey, even the smell of it nauseated her, but after she was stung, developed a craving for it and ate it with complete satisfaction." Stover finishes his report: "Will some of the immunization experimenters throw a light on this occurrence?"

The author of the present volume can corroborate Dr. Stover's observation. During his extensive experience in administering bee stings to arthritics and rheumatics he has been frequently surprised by the voluntary reports of patients that they had developed an expressed longing for honey which did not exist previously. This actuality could be ascribed to the effect of bee

venom, which, by increasing considerably the blood circulation, induces a consequent craving for an energy-producing substance.

POISONOUS HONEY

Poisonous honey is often mentioned in ancient literature. Xenophon, in the *Anabasis*, describes the "Retreat of the Ten Thousand." When the army was returning from Asia to Greece, while passing through Trebizond the soldiers discovered that the woods were filled with honeycombs which they eagerly consumed. As a result, they all went "off their heads," suffered from vomiting and diarrhea, and most of them were unable to stand on their legs. Some dropped to the ground, hundreds of them lay prostrate, apparently dead, others appeared to be violently drunk or in a fit of madness but all recovered after three or four days and acted like convalescents after a severe sickness.

The toxicity of the honey was attributed to poisonous plants. Rhododendron and azalea are plentiful in that section. Andromedotoxin, a poisonous glucoside, will produce symptoms similar to those from which the army suffered. Archangelsky discovered two new bodies in the rhododendron plant, rhododendrin and ericolin, both belonging to the camphor group, which have a strong toxic effect.

Similar observations were made in the Caucasus, near Batum, where rhododendron and azalea also grow. Honey growers in that section do not use honey in the spring when these plants are in bloom. Ssanjuk, on the other hand, doubts the toxic effect of these plants and asserts that the poisonings are due to the fact that when honey is collected in the woods from hollow trees many bees are crushed and the effect is due to the venom of the bees, which the honey contains. As a matter of fact, he noticed that such honeys were sometimes poisonous, other times not. The writer has to contradict this latter allegation because bee venom, even in large quantities, is readily destroyed by the saliva and gastric ferments.

There are also other plants which yield noxious substances.

Honey collected from goat's bane is harmful. H. M. Fraser wrote that such honey never thickens, is dark red, has a strange smell, is heavier than other honeys, and often causes sneezing. Those who eat it become bathed in perspiration, throw themselves on the ground and are relieved only by repeated doses of a mixture of old mead, rue and salted fish, which produces vomiting. On the Island of Sardinia honeys collected by the bees from certain plants will produce a painful, spasmodic laugh (sardonic laugh). On the Isle of Corsica, honey gathered from the ever-green yew is bitter and not fit to eat, a fact which Virgil mentions. Martial also alludes to the poor quality of certain Corsican plants. "You ask for lively epigrams and propose lifeless subjects. What can I do, Caecilianus? You expect Hyblean or Hymethian honey to be produced and yet offer the Attic bee nothing but Corsican thyme." (*Epigrams* Bk. XI. Ep. 42). Ovid refers to honeys collected from hemlock as infamous. Galen mentions an incident when two physicians, tasting honey at the open market in Rome, fell to the ground and soon afterwards died. In Heidelberg and its surroundings, it is well known that chestnut honey has a strong hypnotic effect. The bees collect this honey from the blooms of the chestnut trees (*castania vesca*).

If an extracted sting apparatus, which, as a rule, is accompanied by a poison bag, is imbedded in honey, it may inflict a wound hours or even days later. The venom is volatile, but its strength is well preserved in honey. Sporadic cases have been reported where buried stings were found in broken combs and persons eating such honey were injured in their mouths. A detached sting, coming in contact with body surfaces, may work automatically without the bee, and dig itself into the layers of the skin or of the mucuous membranes, emptying the contents of the poison bag into the wound.

The "mad" honey (*maenomenon*) of Pontus was often mentioned. Aelian (V. 42) commented that honey of Pontus made people mad but cured epilepsy. Its toxicity was also attributed to rhododendron and azalea, with which the woods of Pontus abound. Pliny described a mountain on the Island of Crete, nine

miles in circumference. The honey produced there would not be touched even by flies but it was highly valued as a medicine. Poisonous honeys are also found in certain districts of Persia.

Dr. Barton reported (*American Philosophical Transactions*, 1790, Vol. V.) that in the autumn and winter of the year 1790 many people died in Pennsylvania from the effects of wild honey, collected from kalmia (lamb-kill) plants. Several fatal cases were reported at the same time in New York State, caused by wild honey made from the flowers of laurel shrubs. Honey collected by the bees from mountain laurel is often poisonous. Even today the beekeepers in North and South Carolina first try the effect of laurel honey on the family dog. If the dog, after indulging in suspicious honey, shows symptoms of staggering and has a glazed look, the honey is condemned.

Maladies caused by the consumption of honey are, as a matter of fact, not attributable to the honey itself. The bees, besides gathering nectar, collect a certain amount of pollen which they deposit in the brood cells for their young. Pollen is a protein substance which the brood requires for building new tissues. After the brood is developed it will consume only honey, that is carbohydrates, to generate energy. A full-grown bee does not replace tissues, consequently does not require protein. The pollen, called bee-bread, a protein substance, is exposed to fouling and decomposition and also to formation of toxins through bacterial invasion. In a word, some ailments are produced not by honey but by protein; they are plain and simple cases of ptomaine poisoning.

In modern honey production, of course, this cannot happen. The bees do not store protein in the small upper combs, called supers, but in the larger brood frames. The honey in the supers is meant for human consumption. To prevent the queen from laying eggs in these small combs the two sections of the hive are separated by a screen through which there is a passage, large enough to permit the entrance of the smaller worker bees but which prevents the queen, on account of her massive figure, from going through it. If honey is extracted by centrifugal force even

from the brood cells, only the liquid honey is ejected and the bee-bread will remain in the combs. The contention made by some research workers that poisoning from eating honey is sometimes due to bee venom is all wrong. The venom, if there is any in honey, would be easily destroyed, as already mentioned, by digestive ferments.

It is noteworthy that the flowers of certain plants are not poisonous to the bees, but the honey made from these plants is harmful. Other plants again, e.g. poison-ash, are liable to kill a whole hive of bees. (Certain kalmia leaves are fatal even to pheasants.) Some plants affect young bees and not the older ones. Dead bees are found occasionally on tulips, though tulips do not secrete nectar. Bees collect nectar from poison ivy without injury to themselves, neither is such honey harmful. All in all, poisonings with wild honeys are rare, since bees carefully select the wholesome plants and resort to other sources only when in utmost need. Bees will avoid plants like wormwood, rhubarb, aconite, jasmine, senna, wood-laurel and rhododendron; they never visit these flowers except when there are no others obtainable. Honeys collected from the blooms of onions and leeks (the national emblem of the Welsh) are not unhealthy but their aroma is transmitted—not to the best advantage. Chinquapin honey is bitter as gall, but not harmful. The beautiful and fragrant yellow jessamine that turns the color of the Southern swamps to gold in the springtime has the reputation of yielding poisonous honey.

ADULTERATED HONEY

Honey always was, and still is, adulterated. Since the strict enforcement of the Federal Pure-Food Law, violators are severely punished and gross vitiations are now extremely rare. The fact that honey was one of the leading articles which the Food Standards Committee considered when the law was passed, attests the importance of the product as a food and it also reflects the frequency with which it was adulterated. Adulterated honey, of course, does not mean artificial honey but honey that has been

mixed with sucrose, commercial glucose, starch, chalk, gelatine, water and other substances. The greatest problem for the chemists of the Food and Drug Administration today is to detect commercial invert sugar which is not so easily traced as other adulterants.

The fact is that good honey could no more be successfully imitated than milk, a bird's egg or a genuine pearl. The apprehension most people have that certain honeys are adulterated is due to the fact that they taste differently from honeys previously consumed. Honeys have the same flavor, color and aroma only when the nectar is gathered from the same flowers; otherwise, these characteristic attributes will greatly differ. Procuring comb honey is not a protection against being deceived. Beekeepers, when there is a scarcity of flowers or during an unusually rainy season, feed their bees with sugar-water which they place before the entrance of the hives. The bees gorge themselves with this sugar and quickly deposit it in the combs without giving it a chance to undergo inversion. The result is a poor quality of honey in the comb which lacks most of the important constituents of real honey. Most extracted honeys on the market are now chemically pure.

Since the Federal Pure Food Law went into effect, January 1, 1907, as mentioned, there is hardly any adulterated honey to be found. Previously "factitious" honeys were quite common on the markets. When Dr. H. W. Wiley, during his campaign for pure food laws pleaded before Congress, he presented, among many other fraudulent articles, a bottle of honey, on the surface of which there was a dead bee. The tricky dealer believed that the buyer, seeing the bee, would not doubt the genuineness of the honey. This was just a trap because the bottle contained a sticky sweet substance which resembled honey in appearance but was never produced by bees and contained many injurious ingredients.

Date and fig-honey were known in ancient Palestine. The Bible mentions that a substance made from dates and figs was sold as honey. Quintillian and Herodotus referred to *denatured* honey. Diophanes in *Geoponica* gave already a method of how to detect it.

The United States Federal Food and Drugs Act is in need of several amendments regarding honey. In jams and jellies, for instance, the standard recognizes only sugar and not honey. In a word, if some manufacturer adds honey to these products it is technically considered an adulteration. W. S. Frisbie, Chairman of the Food Standards Committee, admits that a departure from a definite standard is an adulteration even if the substitution is effected by a more valuable ingredient instead of one of less intrinsic value. The use of gold in our copper coinage would be considered an adulteration. The Administration, however, does not bar the use of honey in jams and jellies provided the labeling calls attention to the fact that honey is used as a sweetener.

THE PRICE OF HONEY

The price of honey, taking into account countries and centuries, has varied considerably. In ancient Egypt, where honey was abundant, it was sold for an amount which was equivalent, according to our valuation, to about five cents a pound.

Stanley complained about the exorbitant charges for honey in Africa during his travels. He was compelled to give four yards of linen in exchange for two quarts of honey. Muir mentioned that in 1856, in California, the price of a pound of honey was two dollars; twelve years later the price had fallen to 12½ cents. The value of sugar underwent a corresponding change. In the XVI Century, the price of sugar was approximately \$2.50 a pound.

The wholesale price of extracted honey today is about four to five cents a pound; inferior honey for baking purposes sells at much lower prices. Comb honey is higher because the wholesale price of wax alone is about 20 to 22 cents a pound. The prices vary each year depending on demand and production. During the World War, for instance, when sugar was scarce and could not be obtained in large quantity, honey sold in carlots from twenty to twenty-five cents a pound. Ice cream was made with honey during this period, and it was a far superior product. Soon after

the Armistice, when sugar was again obtainable, the honey prices tumbled and ice cream is made today with sugar because it is cheaper.

There are, of course, objections to the high price of honey, compared with that of sugar. This drawback is mainly due to the fact that honey, as a rule, is purchased in small quantities. The customer pays for the jar, label, workmanship and the cost of the persuasive advertisements just as much as for the honey. When honey will be considered a standard article and not a fancy product and will be procured in bulk, the price should be greatly reduced. And then . . . rhyming slogans such as "Better than honey, for less money," and other efforts very much in vogue today, to make every goose appear a swan, should be accepted with less gullibility.

There are over a million beekeepers in the United States and over six hundred million pounds of honey are produced. The author's opinion is that honey production could be increased here tenfold, because only a fraction of the available nectar and pollen is utilized by the colonies of bees we have today.

CHAPTER XI

HONEY IN THE HOME

1. *IN COOKING, BAKING AND CONFECTIONERY*

HONEY is far superior for cooking and baking purposes than corn syrup, molasses, maple or refined sugars. Sugar does not possess the fragrance and flavor of honey. Honey is high in calories and in sweetening power.

There are thousands of uses for honey in cooking and baking. The list of recipes issued by the American Honey Institute of Madison, Wisconsin, is almost endless. In practically every copy of apicultural magazines, domestic or foreign, there are new suggestions for the use of honey in preparing cakes, bread, biscuits, muffins, jelly-rolls, waffles, griddle-cakes, puddings, fritters, moussés, and all kinds of confectionery. Preserves, jams, jellies, candies, ice-cream, icings, hard sauce, meringue, salad dressings (plain or French), cinnamon or pecan toast, etc., are more delicious when made with honey. Apples baked with honey are very delectable.

Honey is excellent for baking pastries and bread. They remain sweet, moist and palatable for an indefinite period. When bread and pastries, baked with honey become dry—often only after many years—and are transferred for a few days to a damp place, they will change to their original condition on account of the great hygroscopic property of honey. (Some people say that honey pastries are so tasty that they are consumed long before they have a chance to become stale). Honey jumbles are sometimes as good ten years later as on the day they were baked. Cakes and bread made with honey are easily masticated and digested and have a distinct laxative effect. Martial (XIV. 222) refers to the fact that honey was extensively used in antiquity for baking purposes when he re-

marks: "Bakers prepare for you sweet cakes in thousands of forms because the bees work for them."

Honey cakes were extremely popular in ancient Egypt, Greece and Rome. The Egyptians fed honey cakes to their sacred bull Apis and the sacred crocodiles. On the wall-painting of the tomb of Rekh-Mi-Re the mixing and baking of honey cake is reproduced. In the tomb of the Pa-Ba-Sa a man kneels and prays before honey cakes. They were used in Egypt during all ceremonial occasions. Cerberus, the three-headed dog, and the serpents guarding Hades were fed on honey cakes, likewise the sacred serpent guarding the Acropolis.

Cheese-cake baked with honey was a favorite subject and highly praised by all Greek poets. Cheese-cake was glorified by Euripides and Aristophanes and honey cake by Anacreon and Sophocles. Horace praised the "ova mellita", eggs with honey. In Rome, *libum* was a sacrificial honey cake, the root of German "Leb"-kuchen; *placenta* was baked for festive occasions; *scribitta* was decorated with inscriptions and *savillum* was eulogized by Cato as the most savory of all cakes.

The *pain d'epice* (gingerbread), made with honey, has always enjoyed great popularity in France. Mention of it is made as early as 1530. The *panis mellitus* of the Romans, baked with honey and anis, was a similar pastry. The *Lebkuchen* of Nuremberg (Germany) has a world-wide reputation. The German *Lebkuchen* is made of flour, honey, spices, alcohol, almonds, citron and orange peel. In its manufacture the main requirement is to allow the dough to rest for a considerable time before baking. This will accomplish the amalgamation of the flavors of its component parts. The dough is often kept for several months before it is placed in the oven. In Hungary and in all Slavic countries honey cakes are made in the shape of hearts, human or animal figures and are in great demand at country fairs.

Wheat, corn, groats, sago, tapioca, barley, beans and lentils are often mixed with honey, vinegar, oil, mustard and spices. In Turkey a great assortment of confectionery is made with honey. They call it *chalva*. Pastry made with honey and nuts, called *baclava*,

is the favorite dessert of all Orientals. The Arabs make up bars similar to our chocolate-bars, from sesame oil, ground nuts and honey which they call *halva*. Sesame seed, honey and nuts, called *sahm-sahm*, is another favorite confiture of the Arabs. Most oriental sweetmeats were prepared with honey. The snow-white Anatolian honey, collected by the bees from the blooms of the cotton plant, was a great favorite of the seraglios of ancient Constantinople. Recently in California confections have been made with apples, oranges, walnuts, raisins and honey.

Candy made with honey has a more distinguished taste and cannot be compared with candy made with sugar. Honey preserves the aroma and prevents staling. Honey candy seems to satisfy the craving for sweets more quickly and there is no desire to keep on ruminating unremittingly as in the case of sugar candy. Several pieces of honey candy go as far as a whole box of the cane-sugar variety. The ordinary chocolate candy contains as much as 40 to 60% cane or beet-root sugar. The cheaper the candy the more sugar it contains. Honey possessing much higher sweetening power requires a smaller amount of admixture. The same applies to honey ice cream, which, in addition to being smooth and delicious, is also more satisfying and cloys the appetite against further indulgence. But, of course, sugar is cheaper and freezes at a higher temperature. Adding honey to chocolate candies would also require less cocoa, which in itself is a harmful substance. The cocoa plant absorbs a great amount of manganese from the soil. Manganese is a metallic substance which produces symptoms similar to those caused by lead or mercury. It is supposed to impair the intellect and affect the stomach and gall bladder. Cocoa, besides, contains oxalic acid.

Honey with butter, cream or cottage cheese are very satisfactory and wholesome combinations. Honey preserves butter from becoming rancid if the honey is previously heated and the yeasts and enzymes destroyed. The mixture will keep for two or three weeks under refrigeration. It is an excellent spread for children and grown-ups over bread and pancakes and will also overcome one of the greatest objections to honey, i.e., its extreme fluidity. It

is an oversight on the part of the great milk companies not to market a delicious honey cream, which would preclude the use of unsavory cod-liver oil and the purchase of expensive vitamin pearls.

The best Italian *Zampaglione*, the Dutch *Avocat* and the Danish *Rödgröd* are prepared with honey: likewise the German red groats, *Rote Grütze*, *Kaiserschmarren*, the French *Biscuit de Savoie* and the *Tourte à la Frangipane*.

Foreign cookbooks, especially the older ones, contain valuable suggestions and numberless recipes for baking bread, muffins, cakes, cookies, etc., with honey. There are choice combinations to improve the flavor of honey with spices, e.g., anis, coriander, ginger, cloves, cinnamon, cardamom seeds, nutmeg, etc. The Farmers' Bulletin No. 653 of the U. S. Department of Agriculture, *Honey and its Uses in the Home*, is a valuable pamphlet and covers the subject well. In cooking and baking, honey has unlimited possibilities. Let us be guided by the oft-repeated statement of our ancestors, "Honey bread is good to the last crumb".

2. IN BEVERAGES

Honey added to beverages offers another grateful field for wholesome mixtures. Honey added to a cup of coffee or tea imparts an exquisite aroma, besides sweetening and laxative effects. Soft drinks, for example lemonades, sodas and fruit punches, mixed with well-ripened honey are delicious. Honey milk-shake, egg-nogg, spiced milk must be tried only once. In cases of grippe several tablespoonfuls of honey with lemon juice in a cup of boiling water or red wine, sipped while hot, will keep the doctor away more successfully than a basketful of apples. Honey mixed with carbonated water binds the gases.

Alcoholic drinks, cocktails and whisky mixed with honey are delectable. A quart of old sherry with an equal amount of water and whole cloves, sticks of cinnamon, allspice, a few grains of salt and honey, to suit the taste, boiled slowly for several hours and then allowed to stand a while, will make an unforgettable drink

on cold winter evenings. It must be served hot after being strained. The author delights in offering this drink to his guests and it is often commented upon during a cheerful evening. The cup produces warmth, benefits the digestion and stimulates without invading, as do most hard drinks, the head, feet, heart, kidneys, and not infrequently, the liver—as a rule—all at once.

3. *THE PRESERVING QUALITY OF HONEY*

Honey was used for ages as a preserver of organic matters. In medieval England meats and leather were cured in honey. In Sudan they boil meat in honey to preserve it. In Ceylon honey is used instead of salt as a conserver.

Honey is excellent to preserve fruit because it intensifies the original flavor of fruit to which it adds its own aroma. The milder flavored honeys are preferred for preserving fruits, the stronger flavored ones are better for pickling. Jams, jellies and marmalades made with honey are superior to those in which sugar is used. The world-famous Bar-le-duc (currant jam) of France is made with honey. Pickled fruits are prepared with honey, vinegar and water to which ginger, cloves, cinnamon and allspice are added. The spiced honey of the Turks is well known.

Ripe fruits contain a considerable amount of sugar. Of course, if they were pickled prematurely (green) and they were not long enough exposed to the sun and only incompletely ripened, the creative force of Nature was interrupted and resulted in a failure to convert the acids into natural sugar. Such fruits, when they are preserved, require the addition of a great amount of refined sugar to make up for the deficiency, that is, for the natural sweetness.

Plant-grafts, birds' eggs and valuable seeds which must be transported to different climates can be preserved in honey for a considerable time.

All sweet media had an age-old repute to preserve not only organic matters but life itself. This can be verified by the experience of our own Benjamin Franklin, one of the greatest of the great. While in France, he received from America a quantity of

Madeira wine, which had been bottled in Virginia. In some of the bottles he found a few dead flies, which he exposed to the warm sun, in the month of July; and in less than three hours these apparently dead insects recovered life, which had been so long suspended. At first they appeared as if convulsed; they then raised themselves on their legs, cleaned their eyes with their forefeet, dressed their wings with the hind legs, and began in a little while to fly about. This acute philosopher proposed, therefore, the following question:—"Since, by such a complete suspension of all internal as well as external consumption, it is possible to produce a pause of life, and at the same time to preserve the vital principle, might not such a process be employed in regard to man? And if that be the case," added Franklin, like a true patriot, "I can imagine no greater pleasure than to cause myself to be immersed along with a few good friends in Madeira wine, and to be again called to life at the end of fifty or more years, by the genial solar rays of my native country, only that I may see what improvement the State has made, and what changes time has brought along with it."

The preserving and hygroscopic powers of honey could be converted to divers uses in several branches of industry. It is a regrettable oversight on the part of the cigar and cigarette manufacturers, for instance, that an admixture of honey to the tobacco is not employed more universally. Honey preserves the original flavor of the tobacco, to which it adds its own aroma and sweetness; besides, it would protect the stock from becoming dry. Many foreign pipe-mixtures and chewing tobacco contain honey which considerably enhances their mellowness. Lately, American packers have been experimenting with honey-cured meats. Jewelers darken natural onyx with honey. There are about a million and a half golf balls manufactured yearly in the United States containing honey in their centers which is supposed to greatly enhance their resiliency. Carbon paper and sail cloth are more tenacious when treated with honey. Chewing gum is another product for which honey could be utilized to advantage, on account of its ability to retain moisture.

Honey has innumerable chemical and technical possibilities. Brewers ought to pry into the secrets of how the ancient Saxon "beor", honey beer, was made (beo=bee, from which the term beer was derived). Apparently there is a tendency today to produce variety instead of quality because it offers a wider field for exploitation and a better opportunity to play the favorite modern sport—called competition.

4. IN COSMETICS

The beneficial effect of honey on the skin has an age-old repute. Poppea, the comely wife of Nero, who employed a hundred slaves to attend her beauty, used honey and tepid asses' milk as a face lotion. The patrician women of Rome followed her practice for centuries. The famous beauty, Mme. Du Barry, the mistress of Louis XV, used honey extensively in her toilet preparations; so did Mme. du Sevigné, Marguerite of Navarre and Agnes Sorel. The latter called honey "the soul of flowers."

Many face creams and lotions, even today, contain honey. Honey has a nourishing, bleaching, astringent and antiseptic effect on the skin. The noted beautiful hands of the Japanese women, devoid of all wrinkles, is attributable to their daily use of fresh honey as a hand lotion. The Chinese women use a paste made from crushed orange seeds and honey for pimples and also to clear their complexions. Crushed seeds of peaches or apricots with honey they use for softening their hands. Honey, yolks of eggs and sweet almond oil is the best softener of hands. For chapped lips and skin, honey (30 gm.) lemon juice (30 gm.) and Eau de Cologne (15 gm.) is an excellent remedy. Honey, glycerine, alcohol and lemon juice or citric acid are the ingredients of most lotions for sunburn, chafed skin and freckles. Many skin-soaps contain honey. The famous Balm of Gilead was made of mutton tallow, castile soap, honey, beeswax and alum. Honey as a cosmetic remedy has an advantage over cold creams because it does not grow hair. As a cleanser of hands, honey equals even mechanic soaps in efficiency without making the skin rough.

Honey packs, honey masks and honey facials are getting more and more popular. The Creole women of Louisiana rub their entire bodies with a lotion consisting of honey and water, to which all possible assortments of spices are added. They use it not only as a cosmetic but as a cure for all kinds of skin trouble and sore throat. This application is also supposed to have the power to drive away evil spirits and to accord a clear view of the future. The Egyptian women chewed perfumed pills made of honey and spices to sweeten their breath. In ancient Rome a high-priced semisolid paste, called "honey-mint," was used for bad breath.

Needless to say the cosmetic effect of honey is not restricted to its external application because the consumption of honey in itself will greatly improve not only the color but the texture of the skin. The beautiful complexions of Spanish and Italian women are due not solely to olive oil but also to honey. Many a "pimple-face" has blessed the author for suggesting honey as the principal sweet.

PART II
THE HISTORY OF HONEY

CHAPTER XII

PREHISTORIC TIMES

PREADAMITIC man, before he changed his habitation and moved from trees to more comfortable quarters in caves and in the process of time became carnivorous, must have delighted in the luscious honey which evidently was plentiful in the forests. The friendship between man and the bees must have been sealed during those good old days, and has been preserved, even deepened, by continuous close contact and mutual service up to the present day. The bees still remain "man's best little friends in the world." They supply him with food, drink, light and medicine.

The human race, since pristine times, has looked upon Nature from the viewpoint of utility. Animals and plants which were most useful or most harmful were always best known to man. It is not surprising, therefore, that bees have been so much in favor since remotest antiquity. Divine Providence would have been devoid of benevolence if she had neglected to produce a creature like the honeybee, so essential to man, "for whom all things were made."

The history of honey is really the history of mankind. Bees, like horses, cattle and sheep, faithfully accompanied man in all his wanderings; they followed him over hills and dales, oceans and rivers, and were the chief witnesses of human civilization. To try to submit a complete history of honey would be a futile effort because there is not even a doubt that it is much older than human records and the race itself. Bees and their products were on our globe long before the Lord proclaimed: "*Faciamus hominem ad imaginem et similitudinem nostram.*" (Let us now make man in our image and likeness.) Genesis Ch. I, v. 26.

We find the earliest traces of bees in the fossil ages. They were imbedded in amber, preserved by natural inhumation. Such discoveries have been reported in the Baltic regions of Germany, in Switzerland and in other parts of Central Europe. The size of these insects was about the same as that of our honeybees today. (Plate I.) Menzel suggested that they looked very much like the present Italian bees; Tony Kellen, on the other hand, thought that they seem to represent the *Apis adamitica* or pre-adamitica, originating in an era when the human race did not exist. Pytheas, the Greek navigator and astronomer (300 B.C.), referred to these fossil bees of the Baltic countries. Martial, in his epigrams (IV. 32), alludes to bees entombed in amber, as though buried in honey, immortalized through their own labors.

“The bee inclos’d, and through the amber shewn,
Seems buried in the juice, which was his own.
So honour’d was a life in labor spent:
Such might he wish to have his monument.”

(Translated by Wm. Hay, 1755.)

The petrified bee on Plate I is an interesting, very rare and unusually well preserved specimen. It was found only recently in the browncoal beds of Transylvania.



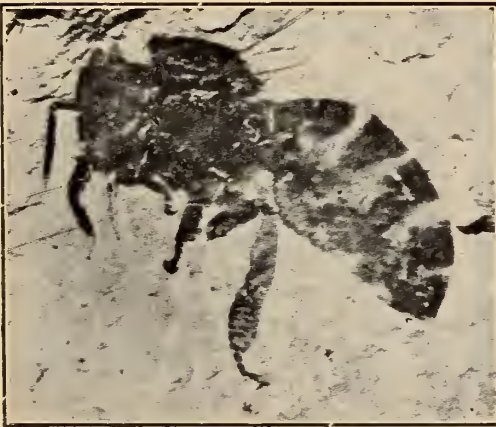
FIG. I. Spanish Cave picture.
(Courtesy Hispanic Society of America)

This fossil bee from the Tertiary strata, imbedded in sandstone hundreds of thousands of years ago, is also similar to our contemporary honeybee. The rear legs have the identical rows of brushes, the abdomen consists of six segments separated by lighter colored bands and the antennae contain the same number of joints. The author is indebted for the cut to Mr. J. Skovbo of Hermiston, Oregon, who was kind enough to place it at his disposal.



FOSSIL BEE IN AMBER

(In the Geological Institute, Zurich)



PETRIFIED BEE IN SANDSTONE

(Courtesy of J. Skořba)



THE TOMB OF ASAF, 26TH DYNASTY, 663-610 B.C.

(Courtesy of Metropolitan Museum of Art)

The oldest evidence that honey was an important human objective is revealed by a prehistoric painting, discovered in 1919 at Cuevas de la Araña (Spider Cave), northwest of Bicorp, Valencia, Spain. This picture, painted in red, is the most ancient work of art known. (Fig. 1.) It originated in the Stone Age when man, trying to find shelter from the superabounding beasts, lived in caves. The painting is supposed to be about 15,000 years old, but as likely as not, it is some thousand years younger or older. The time-worn fossil relic is rather primitive but it clearly depicts a man climbing up on long ropes, probably woven of sedge grass, to a natural hole in the cliff, which the artist evidently intended to represent the dwelling of a swarm of wild bees. The man is taking honeycombs out of the cavity and putting them into a bag or basket. Some disturbed bees around the intruder are painted on a scale much larger than that of the human figure. (Obermaier.) The ancient origin of Spanish cave pictures is confirmed by the fact that many species of animals which are represented in these drawings are extinct today.

Other evidences that honey and wax existed during prehistoric eons are the earthenware colanders found in the lake dwellings of Switzerland, originating in the Neolithic era. That these vessels were employed for straining honey, and possibly also for the utilization of wax, seems more than a conjecture because the inhabitants of the Bernese Alps still use similar vessels for these purposes.

Beyond doubt primitive man obtained honey from wild bees nesting in hollow trees and rocks, a habit which undomesticated bees still pursue. In all probability man cultivated bees as he tamed horses, oxen, sheep and dogs, instituting a cooperative partnership.

CHAPTER XIII

HISTORIC TIMES

WE DERIVE our knowledge of the earliest use and importance of honey in historic times from archives of the ancient cultural states, Babylon, Assyria, Persia, India, Egypt, Greece and Rome. The oldest existing scripts corroborate the fact that bees were already domesticated creatures and honey was extensively used for food, drink, medicine and exclusively for sweetening purposes. Honey was an important commodity. Taxes and tributes were imposed in the form of payments of honey and wax. It was equivalent to currency. Today, in the twentieth century, we could understand the vital importance of honey in the domestic life of bygone ages only if we were forced to relinquish completely the use of industrial sugar. This would overload the imagination of even a most daring dreamer.

We do not know of any people on earth, including savage tribes, who did not cultivate bees for their honey with the exception of the native Indians of the Americas and the Australian indigenes. Honeybees were unknown to them and they obtained their scanty supply of honey from stingless bees.

Before parchment, paper and writing were invented, pictorial engravings on stones conveyed the meaning of human conceptions. Geometric ideography was the first attempt of antiquity to express and perpetuate thoughts on lapidary specimens. Animals and plants were later objects and finally, anthropomorphic images. We find most petroglyphic carvings in Egypt, India, Mexico and Peru.

EGYPT

The most fertile field, in our historical research, for establishing the singular and paramount rôle which honey played in the social, economic and spiritual life of ancient nations is, unquestionably, Egypt, the land of Pharaohs. The oldest hieroglyphic carvings in temples, on sarcophagi and obelisks sufficiently prove that bees and honey had a vital significance in the daily life of the population of Egypt. These monuments symbolically perpetuate bees and their principal product, honey. On the Flamic and Pamphilic obelisks (Amada), on the famous Rosetta stone, on the pillars of the Temple of Karnak and on the obelisk of Luxor (which was erected in 1836 on the Place de la Concorde, Paris), we find many images of bees. On the colossal sarcophagus of Rameses III (20th Dynasty) in the Musée Louvre, on the sarcophagus of a priest who died during the reign of Psametic I (26th Dynasty) and on a granite statue of Rameses II, there are numerous such designs. King Menes, the founder of the First Dynasty of Egyptian Kings, the date of whose rule is variously given as 4000 to 5000 B.C. (according to Brugsch, 4445 B.C.), was called "the Beekeeper." Tony Kellen found some writing on one of the Louvre papyri which suggested that it had been a restaurant check and honey was among the food consumed.

Next to hieroglyphic representations, the wall paintings of the royal tombs demonstrate the great national importance of honey. There are only a few funeral vaults in which bees and honey are not represented pictorially. Honeycombs, honey cakes, sealed jars of honey and lotus blooms were placed next to the sarcophagi as food for the souls of the dead. (Plate II.) In the tomb of Pa-Ba-Sa, in Thebes, the entire wall is decorated by rows of bees. A man is shown pouring honey into a pail, another is kneeling and praying before a pyramid of honeycombs. (Plate III.) On the wall of the tomb of Rekh-Mi-Re all phases of the honey industry are depicted; how the combs were removed from the hives with the aid of smoke, the baking of honey cakes, the filling and sealing of jars, etc. (Plate IV.)

From a literary aspect there is little left in Egypt so far as the subject is concerned. During the conflagration of 312 B.C., the great library of Alexandria was totally destroyed and all its treasures and documents were lost. It is remarkable that one of their seers predicted this catastrophe when he said: "Oh Egypt . . . only unbelievable legends will remain for later generations . . . engraved on stones, monuments, obelisks and pyramids."

The Egyptian Papyri, representing the oldest civilization of the world, often refer to honey, especially to its medicinal value. Almost all Egyptian medicines contained honey, wine and milk. Honey sacrifices were offered to the deities. The frequent symbolical use of bees in Egypt must be attributed not only to the fact that honey was an important article of commerce and a valuable food and medicinal substance but to the admiration of the Egyptians for the diligence, industry, order, economy, endurance, intelligence and courage of the bees and their loyalty to a sovereign. The bees are the only creatures which are entirely subjugated to a ruler. Next to the signatures of Egyptian kings there was a figure of a bee. Apiculture was far advanced in Egypt, likewise in Babylonia and in Assyria.

The ancient Egyptians were habitual beer drinkers. The land was ill-suited to the cultivation of the grape-vine. Xenophon (400 B.C.) mentions an Egyptian beverage made of wheat, barley and honey. On the decline of the Egyptians and the rise of the Greeks and Romans, wine made of grapes became a drink of civilization.

INDIA

Soulful India was supposed to be not only the cradle of humanity but also the birthplace of the bee. The latter claim was, however, contested by both Egypt and Greece. In ancient Indian scripts we find scanty information about apiculture. They allude to honey and bees more from mythological, poetical, philosophical, moral and religious viewpoints. The Rig-Veda, written about 3000 B.C., often mentions honey. To the population of India



THE TOMB OF PA-BA-SA AT THEBES, 625-610 B.C.

(Courtesy of Metropolitan Museum of Art)



THE TOMB OF REKH-MI-RE, ABOUT 1450 B.C.

(Courtesy of Metropolitan Museum of Art)

honey represented everything that was sweet and beneficial. The Hindu had to turn his right side toward the beehive, as though passing a deity. God Krishna was symbolized by a bee and was called *madhava*, born in honey. The Hindu believed that whoever ate honey would become strong, rich, happy and wise and that it would improve not only his own looks but would influence even his offspring.

In India, due to the fertility of the soil and the abundance of water and sunlight, the animals and plants are the largest on earth. The bees are no exception. *Apis dorsata*, the giant bee of India, builds enormous combs, often six feet square, suspended from the highest trees, hanging rocks and other inaccessible places to gain protection from man and beast. The combs are visible from a distance of miles. Special honey hunters approach the nests with ladders and ropes, usually at night time, to collect their plentiful harvest.*

Honey had a popular use in India as a food and medicine and in the preparation of alcoholic drinks. The Hindus drank *madhuparka*, a mixture of honey and curds, during religious ceremonies with the toast: "I drink thee for luck, glory, power, and for the enjoyment of food."

CHINA

In China, the home of sugar-cane, honey was used less than in any other country. There was no need of honey as a sweetening substance because cane-juice was plentiful. The Chinese did not cultivate bees for this reason. Besides, the bees caused considerable damage to sugar plantations and also plundered the syrup during the process of extraction. Honey was used by the Chinese more as a medicinal substance and a complement to diets. In the interior of China, even today, honey can be obtained only in old-style medicine shops. *Mi-tsao* or honey-jujube is a popular con-

**Apis indica*, the "hive-bee" of India and of China, is not only smaller in size than our honeybee but is somewhat different in behavior.

fection in China. It is made from honey and *jujuba* (*Zizyphus vulgaris*), a red fruit shaped like a date. The Chinese often mix their opium with honey.

GREECE

The solemn and prominent part honey played in the history of Greece is conclusively proven by its mythology. Ambrosia, the food, and nectar, the drink of the gods, were made of honey. The *Iliad* (XI. 630) refers to honey as the food of kings. The honey of Mt. Hymettus was a daily food of Athens. This mountain was covered with odoriferous wild flowers, principally thyme, and the air was scented with the fragrance of the blooms. The bees were partial to these hills. (It is singular that the population of ancient Greece, a maritime country *par excellence*, as fond as they were of honey, utterly neglected sea-food. Homer in the *Iliad* never mentions fish; in the *Odyssey*, Menelaus complains that he and his men were so hungry that they were compelled to eat fish.)

Ancient Attica, with its area of forty square miles, recorded twenty thousand hives during the time of Pericles (429 B.C.). All ancient Greek authors praised the medicinal and nutrimental value of Attic honey, "the crowning dish of all feasts." The oldest ruins in the rural districts of Greece are buildings which originally housed the hives. These stone edifices were built high, to outwit the cunning of the bears, arch enemies of bees and bosom friends of honey.

THE ROMAN EMPIRE

In the ancient Roman Empire honey was in great abundance. All Mediterranean states surrounding this glorious sea were veritable honey-lands. During the second Punic War (218-201 B.C.), apiculture was already flourishing. Honey production was practiced at a much earlier date in Greece and the art was conveyed by the Phoenicians and early Greek settlers to the Italian peninsula.

Virgil, the poet laureate of bees, was the greatest glorifier of honey. Book IV of *Georgics* is a panegyric on "heaven-born" honey. *Protinus ærii mellis caelestia dona exsequar*, is the first line of *Georgics* (next I sing of honey, the heavenly ethereal gift). Virgil often bepraises even in the *Aeneid* the "sweet-scented honey, fragrant with thyme."

Pliny in the XIth book of his *Historia Naturalis* devotes many chapters to honey, "which the bees collect from the sweet juices of flowers, so beneficial to health." From Pliny's very voluminous works (thirty-seven books) we derive much information. This most prolific writer, who quotes no less than twenty-five hundred authors, had great admiration for honey and assembled all the Egyptian, Greek and Latin knowledge on the subject. Pliny also describes the contemporary honey industry in Italy, in old Germania and in the British Isles during the Roman invasion. Pliny refers to eight-feet long "honey-slabs", brought from Alemannia. All other Latin writers speak in high terms of bees and honey. Cicero remarks in *De Senectute* that he considers the successful production of honey essential to good farming and describes how the slaves collected wild honey in the forests. Foods and drinks, mixed with honey, were seldom missing on the daily menus of ancient Rome.* It was a courteous act of the Romans to offer a respected guest some honey, fresh from the hives. The host welcomed his visitors with the words: "Here is honey which God provided for your health." Snails destined for the royal tables were fattened and sweetened with honey.

ANCIENT BRITAIN

Pliny quoted the reports of ancient voyagers, who found in the present BRITISH ISLES a honey-brew which was freely consumed by the Islanders. This was long before the Roman conquest of the Islands, so the assumption that bee culture was introduced into England by the Romans is erroneous. Undoubtedly, apicul-

* *Mulsum*, four-fifths wine and one-fifth honey, was a favorite drink of the Romans. *Hydromel*, which is really mead, was used as a medicine.

ture was of vital importance in the Roman Empire, because its triumphant armies, when invading foreign territories, carried their beehives with them. The Britons must have broadened their knowledge of bee-craft during the Roman invasion.

That beekeeping was an outstanding pursuit among the Britons is illustrated by Tickner Edwardes' graphic account in his delightful book, *The Lore of the Honey-Bee*. "Among the Anglo-Saxons the beehives supplied the whole nation, from the king down to the poorest serf, not only with an important part of their food but with drink and light as well. . . . Britain was known among the early Druid bards as the Isle of Honey." (The Honey Isle of Beli was another bardic name for Britain.)

"British History begins"—Edwardes continues—"with the record of the first voyage of the Phoenicians, who adventuring farther than any other of their intrepid race, chanced upon the Scilly Isles and the neighbouring coast of Cornwall and thence brought back their first cargo of tin. The whereabouts of the Phoenician 'Barat-Anac', The Country of Tin, remained a secret probably for ages, jealously guarded by these ancient mariners, the first true seamen that the world had ever known. They were expert navigators, venturing enormous distances overseas, even in King Solomon's time, and that was a thousand years before the advent of Caesar. In all likelihood, they had been in frequent communication with the Britons, centuries before the Greeks took to searching for this wonderful tin-bearing land, and still longer before the name Barat-Anac became corrupted into the Britannia of the Romans. And it is hardly to be supposed that a people of so ancient a civilization, and of so great a repute in the sciences and refinements of life, as the Phoenicians—a people from whom the early Greeks themselves had learned the art and practice of letters—could remain in touch, century after century, with a nation like the Britons without effecting in them enormous improvement and development in every way that would appeal to so high-mettled and competent a race."

Honey must have been abundant in the British Isles, another veritable land of milk and honey. The Welsh and Celtic legends

teem with references to sparkling mead and honey drinks. The chief Irish God, Manannan, praised the island-paradise (Isle of Man), where:

Rivers pour forth a stream of honey
In the land of Manannan, son of Lêr

.....
Abundant there are honey and wine,
Death and decay thou wilt not see.

Tributes were paid with mead and honey and the laws fixed the amount which had to be delivered to the chieftains. The measures which the laws mention (Brehon Law Tracts) prove that honey must have been plentiful: A *milch-cow* measure of honey could be lifted by an average individual up to his knees; a *large heifer* measure of honey one could raise to the waist; a *small heifer*, to the shoulder; and a *dairt*, over one's head. The shell of an egg was also used to measure smaller quantities of honey; twelve of these equaled about a pint.

There is frequent mention that the ancient Britons used honey for cooking and baking. Meat and fish were often cooked in honey, and they mixed their porridge with it. The principal use of honey was, however, in the preparation of alcoholic drinks.

From most ancient times *merrie England* was drenched in ale. Unquestionably it was their national drink. The ale-wife, depicted with two cups in her hands, so gloriously immortalized, was the symbol of old English inns. (Plate V.) Ale was considered a wholesome liquor which supported the natural heat and moisture of the body and "there is no drink which conduceth more to the preservation of one and the increase of the other than Ale." While the English drank ale they were strong, brawny and able men and "could draw an arrow an ell long but when they fell to wine and beer, they were found to be impaired in strength and age."

The old Saxon ale or mead was not a malt liquor but "made from honey or the washing of the honeycombs." The name ale

came into the English language during the Danish invasion of England and was derived from the Danish word "öl". The mead or meth of the Norse and Teutonic forefathers was made of honey. The big and burly gods with prodigious doughtiness and appetite indulged in a copious supply of strong mead which never failed. The Valkyries, the tall and beautiful maidens, were the modern barmaids.)

Mead held its sway in old England at least for a thousand years. The Anglo-Saxon forebears indulged generously in mead, a habit they seem to have inherited from the Teutonic heroes. These chieftains were accused of gluttony and drunkenness and of going to battle drunk with mead, "bringing about the ruin of Britain."

"Hop-drinks" were introduced into England by the Flemish immigrants. Hop was considered for a long time as an adulterant and the "wicked weed" was checked by legislation, even prohibited because it not only "spoilt the taste of the drink but endangered the lives of the people." A century of industrial progress in manufacturing beer undoubtedly improved its quality. Wine always was, and still is considered the "beverage of the rich." The whiskey of the Irish and the Scotch invaded England only at a very late date.

The Saxon "beor" meant mead (beo=bee) and the term "beer" was undoubtedly derived from it. On many old English inns we find the sign of a beehive often accompanied by some rhyme. (Plate V.) At Grantham, which boasts of a three hundred foot high steeple, there is a real beehive set up before the inn with the following inscription:

"Stop! Traveller, this wondrous sign explore,
And say when thou hast viewed it o'er,
Grantham, now, two rarities are thine,
A lofty steeple and a living sign."

Before a Birmingham inn there is the verse:

“In this hive we all are alive,
Good liquor makes us funny!
If you be dry, step in and try
The value of our honey.”

GERMANY

In Germany, honey production has always been an outstanding and favorite occupation. Few nations have studied the economy and management of bees more thoroughly than the Germans. Possibly this has contributed to their far-famed thrift.

Forest apiculture preceded everywhere the cultivation of bees by cottagers and farmers. German apiculture must have been far advanced before the invasion of the Romans, the emissaries of continental culture. Pytheas and Massilia (after whom Marseilles was named), contemporaries of Alexander the Great, described that on a journey of exploration they found meth (honey-wine, often mentioned in the Niebelungen Saga) excessively used in old Alemannia, and that the inhabitants covered their bread with honey. The record in itself proves that honey must have been in great abundance. And this was four hundred years before the Christian era. Pliny's reference to the enormous honeycombs of Germania would indicate that they were removed from hollow tree-trunks. There are many traces among the ancient laws of Germany that litigations concerning honey production and especially swarming were quite frequent. Special tribunals adjudged these disputes.

Charlemagne in his famous “*Capitulares Karlomanni*” gave strict orders pertaining to honey industry. Chapter V described honey, mead and wax in minutest details. Chapter XX directed the population to take an inventory every year of their honey and mead supply. Upon the introduction of Christianity, honey production increased greatly in Germany on account of the demand for wax for church candles. Monasteries were invariably cultivators of bees. Mead must also have been plentiful, judging from an ancient record that a fire in Meissen, on the Upper-Elba, in 1015, was

extinguished with mead because the inhabitants were short of water.

Land-rule (dominium) was universal in Germany and the phrase *in signum vel recognitionem domini* (in mark and acknowledgment of land-rule) was a traditional expression. The lands were mainly owned by princes and the Church. Those who lived in such lands were obliged to pay taxes in honey and wax. Honey and wax were considered royal or princely gifts and religious people freely contributed them to the Church.

The German honey industry was closely associated with the Lüneburger Heide. These plains of stormy historical background have been a real paradise of bees and the favorite topic of German poets. The province of Hanover in which these plains are located is famous for its honey. The level land, covered with primitive vegetation, mainly heather, is unusually rich in nectar. This section of the country has been preserved in a wild state by the bees and its primitive beauty is under their protection. Few men and beasts ever approach the localities, fearing the proverbial anger of these insects. Usually a narrow path leads to the beestands; a beaten track made by the bee-fathers for the collection of honey.

The honey market of Breslau, on Maundy Thursday, was famous for centuries, and the day is celebrated even now with festivities. There were many mead breweries in München, Ulm on the Danube, Danzig, Riga, etc. According to old documents, "the judge sat in court with a jug of mead before him, so filled to the brim that a fly could drink from its border."

Honey production suffered a noticeable decline at the end of the sixteenth and beginning of the seventeenth centuries due to the Thirty Years' War. It was neglected for many years before and after this long conflict. Germany also suffered a similar setback during the World War. It is noteworthy that in the course of the same period, beekeeping made a great advance in the United States and Great Britain.



THE SYMBOL OF MEDIEVAL ENGLISH INNS,
MOTHER LOUSE, THE ALE-WIFE



THE BEEHIVE INN AT GRANTHAM
PLATE V

FRANCE

With the possible exception of the Germans and the Slavic races, there are only a few nations on the European continent who held honey in higher esteem than the French. The French regarded it as a life-giving substance much the same as bread and milk. Their folklore, fables, laws and religious customs give evidence of the importance of honey in the daily life of the nation.

Historical records substantiate the fact that beekeeping was a foremost industry in France. The ancient Barons derived considerable revenue from taxes imposed upon beehives. The lords of the land were permitted to collect tax from the people who hunted for honey in their forests and, at a later period, from those who cultivated bees there. A certain proportion of honey and wax had to be relinquished by the vassals. The French Government also imposed taxes on beehives. In 1791, when the government demanded from the prefects of the provinces an exact record of hives, the population, fearing an additional tax, destroyed their hives in preference to paying higher taxes. After that, for a long time, apiculture was wholly neglected in France.

The taxation of beekeeping in France was not solely a medieval custom. A fairly recent fiscal legislation (1934) imposes a tax on beehives. According to this new law, if a beekeeper feeds his bees on his own property he is assessed with a tax on agricultural products; but if his bees feed on the grounds of his neighbors the tax is higher because the revenue classes as non-commercial business. [The revenue collectors must have a difficult time keeping their eyes on the bees, to ascertain whether they remain at home or pay business or social calls.]

* * *

The *Island of CORSICA*, comprising 3790 square miles, had to pay 200,000 pounds of wax as a yearly tribute to the Romans, which means that they produced at least three million pounds of honey. *HOLLAND*, especially Friesland, had several thousand hives to the square mile. *SPAIN* teemed with beehives. Ex-King Alfonso

was an ardent bee lover and was keenly interested in apiculture. In the park of the royal palace he had about a thousand colonies of bees and many more hives on his country estates. The leading apiculturist of Spain, Antonio Garay Victoria, had 1500 colonies on his estate in Claveria.

HUNGARY

The ancient Roman province of Pannonia, which consisted of Hungary, Austria, Slavonia, Styria, Croatia, Bosnia, etc., was another veritable honey-land. The prevalence of bees along the Danube is verified by the statement of Herodotus (484 B.C.) who remarked that at certain intersections it was impossible to cross the river on account of bees. The Turks used beehives to thwart hostile crossings of the Danube.

Hungary always was and still is an Eldorado of bees. Priscus, who in 448 A.D. traversed Hungary with the Greek emissaries sent to King Attila, reported that he was liberally provided there with mead. Historical records show that the population of Hungary had to supply the monasteries with honey and wax. The blind king, Bela II (1138 A.D.), donated sixty beekeepers to an Abbey to attend the hives. One Palatinate produced as much as ten thousand barrels of mead. The redolent acacia honey of Hungary has always been considered one of the finest in the world.

AUSTRIA

In Austria, both Upper and Lower, likewise in Salzburg, Tyrol, Voralberg, Styria, Carinthia, Carniola and in the other former provinces of Istria, Dalmatia, Galicia and Bukowina, beekeeping was an important industry. There were many apicultural schools and societies with frequent meetings and festivals. All members of the Imperial house of Hapsburg, since the reign of the great Empress Maria Theresa, who founded the Apicultural College in Vienna (1769), were enthusiastic supporters of apiculture and lovers of honey.

THE SLAVIC COUNTRIES

All Slavic races were partial to honey production. They used honey freely on their bread, mixed it with curds and butter, employed it in baking and in the preparation of alcoholic drinks. The Russians and Poles were experts in making hot honey drinks, and there are many popular winter beverages on the European continent which originated in Russia. The Poles were reputed to be the brewers of finest mead.

The Slavs were widely disseminated over Eastern, Southeastern and Central Europe and Asia. The Russians, Poles, Ruthenians, Serbs, Croatians, Lithuanians, Czechs, Moravians, Slovaks, Wends, Bosnians, Montenegrins and Slovans were all ardent bee-lovers. The old Prussians and Silesians belonged originally to Slavic races but were later absorbed by the ancient Teutons who inherited the Slavic fondness for honey. The Slavic interbreeding with the Hungarians, the Bulgarians, the Northern Finnish and Tartar races spread this lickerish tendency among the respective lands.

Poland was especially rich in honey. Gallus, who explored Poland in the eleventh century, remarked *pane et carne et melle satis est copiosa* (there is plenty of bread, meat and honey) and stated further *ubi aer salubris, ager fertilis, silva melliflua* (where the air is salubrious, the fields are fertile and the forests flow with honey). One of their beekeepers, Piast, who treated the royal electors with mead which never diminished, was elected king and his descendants ruled over Poland for several centuries. In the fourteenth century, Poland sold honey in foreign markets which yielded millions of florins in export duties to the royal treasury.

Of Poland we read many fantastic tales, in themselves an indication of the enormous honeycombs which filled hollow trees in the forests. William Harrison, in *Holinshed's Chronicles* (1577), mentions (III, Ch. 4) that in Poland the honeycombs were so great and abundant that huge bears fell into them and were drowned before they could recover and find a means of escape.

THE AMERICAN CONTINENT

As already mentioned, there were only two continents on our globe where the honeybee was non-existent, the Americas and Australia. When John Eliot translated the Bible into the language of the North American aborigines he could not even find expressive terms in their phraseology for honey and wax.

Previous to the importation of the German bees (brown or black), there were, however, other honey-collecting bees in the Americas, such as the stingless bees (*Trigonae* and *Meliponae*), the size of domestic flies, which occasionally bite like ants and then rub their poison of rancid odor into the wound. Columbus found their honey and wax in abandoned huts. The South Americans call them "Angelitos", little angels, because they do not sting. They nest, as a rule, in the hollows of dead trees, but occasionally make their own hives in the ground or attached to the branches of trees. There are evidences that the Indians cultivated them and supplied them with wooden logs and earthenware jars in which to nest.

The honey which these stingless bees produce is rather thin but of an agreeable aromatic odor; the natives even prefer it to the honey of the white man's "stinging fly" and attribute greater remedial value to it. The combs are not as regular as those of the honeybee; they form an irregular mass of cells but are occasionally hexagon shaped.

That honey had an important part in the lives of the natives before the discovery of America is proven by the ancient Mayan and Aztec codices. The conquered tribes had to pay tributes of honey. The Codex Mendoza lists the tributes of seven hundred pottery jars of honey paid to Montezuma, the Aztec emperor of Mexico. Some of the sacred books mention that the conquering heroes permitted the defeated tribes to pursue pottery making and beekeeping, apparently two of their most important occupations. Many hieroglyphic carvings represent bees and honeycombs, and human figures carrying on their backs large jars, containing honey, as a tribute. (Fig. 2.)

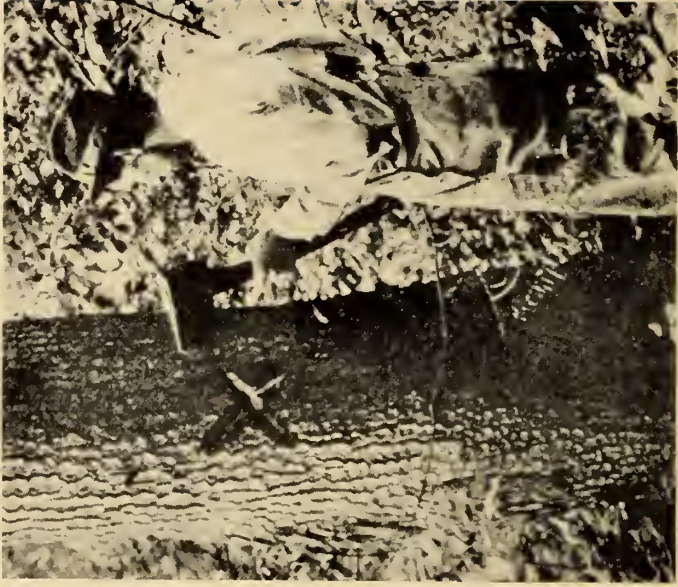


EDWIN FORBES: SCENES FROM THE CIVIL WAR

In the Executive Room of the Union League Club

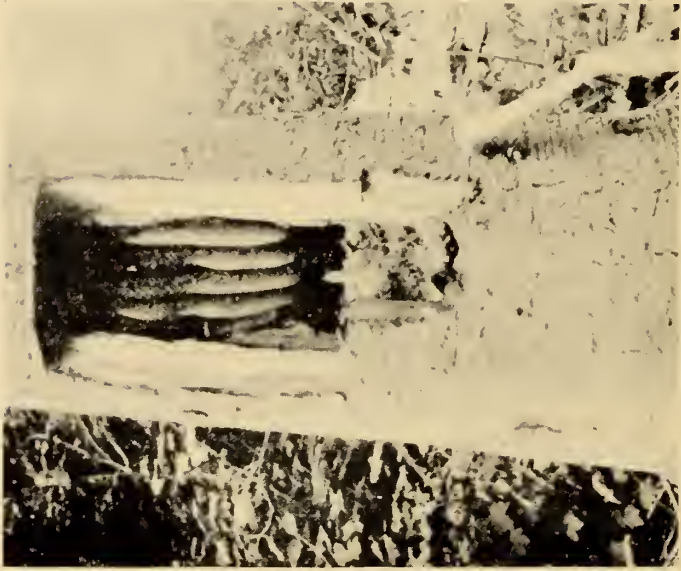
(Courtesy of Union League Club of the City of New York)

PLATE VI



MARKING A BEE-TREE AS HIS PROPERTY

(*Photograph by Alvin F. Harlow*)



THE INTERIOR OF A BEE-TREE

(*Gleanings in Bee Culture*)

Honey was unquestionably used as a food and for the preparation of intoxicating beverages. The Mexican mead (acan) was probably not unlike the mead of other nations. It is mentioned that it was health-giving and intoxicating, similar to the drinks made of pulque. The Mexican Indians had their bee-gods to whom they prayed for plenty of honey. There are several folk tales of the South American Indians connected with hunting for wild honey which are remarkably similar to those of the Russians, the Hindus, the African and East Indian natives. (See page 196.)



FIG. 2. Mexican Vase.
Gatherer of wild honey.

(Courtesy Hispanic Society of America)

Honeybees (*Apis Mellifica*) were brought to the American Continent by the Spanish, Dutch and English settlers at the end of the seventeenth century. In Mexico they were domesticated much earlier than in the United States. We find the first traces of bees in the United States in Boston in 1644, where they were imported by the English. A hurricane carried them over the Alleghany Mountains. Their tendency to migrate southward was very expressed. The bees found a new home in the United States in much the same manner as did the European settlers.

Toward the second half of the eighteenth century (1764) the bees were taken from Spanish Florida to Cuba, where, however, they did not remain very long. The planters soon annihilated them because they robbed the sugar-canes. The bees rapidly multiplied in Cuba. M. Montelle (*Choix de Lectures Geographiques et Historiques, Tome 5, Part II*) says, in speaking of the island of Cuba: "When the Floridas were ceded in 1763 by Spain to England, the five or six hundred miserable beings who vegetated in those regions, took refuge in Cuba, and carried with them some Bees: these useful insects repaired to the forests, established them-

selves in the hollows of old trees, and multiplied with a celerity which appeared incredible. The hives yield four crops every year and the swarms succeed each other without interruption." Don Ulloa in *Philosophical and Historical Memoirs*, concerning the discovery by Spain, also refers to bees: "These insects multiplied to such a degree, that they spread to the mountains and were prejudicial to the sugar-canes, on which they fed. Their fecundity was so great that a hive yielded a swarm and sometimes two in a month. The wax is uncommonly white and the honey of perfect transparency and of exquisite taste." In the Barbadoes, the bees did not visit flowers but lived in the midst of sugar refineries. In Argentina, Australia, and New Zealand the bees made their appearance around 1840, in Brazil in 1848, and in Chile and Peru only in 1857.

IN THE UNITED STATES

In the United States, the honeybees spread very rapidly. The American Indians looked upon them as the harbingers of misfortune. It seems as though they were right, and the prophecy was well-grounded. Longfellow referred to it in "Hiawatha":

"Wheresoe'er they move, before them
Swarms the stinging fly, the Ahmo,
Swarms the Bee, the honey-maker;
Wheresoe'er they tread, beneath them
Springs a flower unknown among us,
Springs the White Man's Foot in blossom."*

The Indians called the bees the "white man's flies" or "English flies." They were the heralds of American civilization, and when the Indians perceived a swarm in the forest they shouted: "The pale-faced intruders are coming, they will soon be here!" The bees swiftly covered the West. Washington Irving remarked that in the proportion that the bees advanced, the Indians and the buffaloes retired. (*Tour in the Prairies.*)

* White clover.

The bees spread in swarms from the Atlantic Coast toward the Pacific. The old settlers recorded the time when bees first crossed the Mississippi. The West was a real paradise for these nectar-seeking insects, another veritable land of promise. William Cullen Bryant vividly described the seething activity of the bee in the new country, where she—

“Fills the Savannahs with her murmurings,
And hides her sweets, as in the golden age,
Within the hollow oak. I listen long
To her domestic hum, and think I hear
The sound of that advancing multitude,
Which soon shall fill the deserts.”

The first honeybees were taken to California in March, 1853. They flourished in the Santa Clara valley, sending off as many as three swarms during the first season. How highly valued they were is best proven by the fact that during the settlement of the estate of a land owner, named Shelton, who had been killed, two colonies of bees were sold at auction for \$105 and \$110, respectively. It is recorded that four swarms were imported to California from the East Coast in 1859. The hives were placed in the rear of covered wagons. The pioneers occasionally stopped to allow the bees to hover about the flower-pastures within their reach, until darkness, when the hives were again closed.

The West, especially California, as described by Muir, was one sweet bee garden, from the snowy Sierras to the ocean, where the “bee-flowers” bloomed in lavish abundance. Plows and sheep made a sad havoc of these glorious pastures, destroying like wild-fire tens of thousands of flowery acres, and banishing many species of the best honey plants, for which loss cultivation so far has given no adequate compensation. The rich primeval soil of the United States was covered with thick forests, profuse vegetation and wild flowers. The settlers, however, lumbered the forests, slaughtered wild animals, tilled the soil, destroyed the surface moisture and created droughts by offsetting the equilibrium of Nature’s forces.

They worked the land for all it was worth and planted, instead of soil-building, soil-depleting crops. The recent formation of the Western, so-called dust-bowl, seems to be a "vendetta" of the bees.

The bees preferred the woods to comfortable hives. Forests provided them with shelter, food and good protection against the elements, the cold of winter and the heat of summer; against rains and storms and, besides, kept their treasures concealed. They made a nest in any suitable place. Muir told how a friend of his, hunting in the San Joaquin valley, sat down on a coon-trap to rest, but soon was surrounded by an angry crowd of bees. He discovered that he had been sitting upon their hive which contained over two hundred pounds of honey.

Contemporary newspapers related how bees also made their nests in abandoned houses. When the old Hawes homestead in Yarmouth, Mass., which had sheltered many generations of Cape Cod people, was doomed to be torn down, the workmen could not approach the ruins because the bees resented their intrusion and the demolishing had to be postponed until cold weather set in. The walls of the building were found to be solidly packed with honeycombs and hundreds of pounds of honey were removed.)

Bees have always suffered from drought. During the famine of the dry year 1877, it is said that the fate of the bees was the saddest of all. In Los Angeles and San Diego counties, one-half to three-fourths of the bees perished from sheer starvation. Not less than eighteen thousand colonies were lost in these two counties alone, and in others the loss was equally as great. The latest disastrous droughts and floods in the United States played havoc among the bees.

Next to successive droughts and floods there is a new danger brought on by civilization, which lurks behind apiculture, namely, the indiscriminate use of poisonous dust and liquid sprays which commercial airplanes broadcast to protect the orchards and other plantations from injurious insects. This practice is daily increasing in the West and in some Eastern States. In one county of Cali-

fornia alone there were seventeen pilots licensed in 1936 to engage in pest control.

The arsenical sprays drift to large areas, partly spread by the propellers of the airplanes, partly by the velocity of air currents. The destructive poisons often drift three to five miles from the places over which they are applied. This is dangerous not only to the bees but also to livestock and to public health. If the poison does not kill older bees, the tainted pollen which they carry into the hives will destroy the brood. This high-pressure application of sprays and dusters (3000 to 5000 pounds at a time) is a dangerous practice. The benefits which are derived from this procedure may be outweighed by the loss of the pollinating services of bees, besides a great decrease in honey production. It is noteworthy that so far not a single instance has been found of any of the arsenic getting into the honey.

Among the Southern States, Texas was another "land flowing with milk and honey." To quote J. Taylor Allen (*Early Pioneer Days of Texas*), "Honey Grove (Texas) derived its name from the immense number of bee trees of richest honey; deposited in every hollow tree, and sometimes in the tangled down weeds and grass. David Crockett and my father W. B. Allen and his pioneer comrades found here honey in abundance in the early days of Texas. Oh, what happy, indescribable times we would have if we could find such country again, but gone forever. . . . Honey Grove—let the name perpetuate the meaning that its name implies; a grove where industry, economy, enterprise and perseverance shall be perpetuated. It is said that Davy Crockett and his men, those illustrious Texan heroes, camped here a week on their way to that world-famed Alamo, and fed on the honey that gave them the joy of Service and Zeal for their country's cause. . . . I cannot refrain from paying tribute to the industrious bees. How diligently they gather and economically store during the season of labor that they may have plenty in the storehouses in the winter. What a lesson to us the bees give, teaching us the need for industry, thrift and economy, using our God-given talent while it is day and lay-

ing in store for the day when our work is done. . . . Nor shall I forget the nectar of the gods, the honey furnished us by the industrious honey bee, the most wonderful insect in God's creation, flitting from flower to flower, extracting here a little and there a little and gathering the sweetest of all sweets. If there is anything I like better than honey it is . . . more honey."

During the Civil War, soldiers carried off beehives. (Plate VI.)

AMERICAN HONEY-LORE

In American folklore, young as it is, we find many tales which reflect on honey. H. B. Parks, in "The Lost Honey Mines in Texas", *Southwest Review*, (1930. 16.) remarks: "The best place and time to hear honey-cave stories is some bee-yard in the chaparral of Southwest Texas, when the extracting crew is resting around the campfire after a hard day's work. From the prevalence and absurdity of the legends, however, it is safe to infer that they are of long standing."

"The tales of bee-caves have much in common with stories about lost mines," Parks continues. . . . The mouths of the caves were supposed to be guarded by huge rattlesnakes, vicious bats, scorpions; occasionally, by ghosts. Usually, as the story goes, some surveyor entered the cave about thirty years ago and reported vast rooms filled with honey in pure white combs. Often a well-driller in the vicinity has passed, they say, through just thirty feet of honey and wax. And someone can always (for a certain consideration and not otherwise) show you the location of the cave.

The Story of Bee Mountain, as described by Parks, is very popular. It was disclosed to two boys by a cowpuncher who was well acquainted with the mountain and who had procured plenty of honey there himself. According to the informant, this mountain was a hollow hill, conical in shape and several thousand feet in height. On one side was an opening; and if the searchers could have used sulphur fumes, sufficiently strong to stupefy the bees, they might have entered the interior of the mountain, where hundreds and thousands of pounds of honey were suspended from the roof. There was also a rumor afloat that some boys had at-

tempted to invade it, but they were frightened away by Cherokee Indians.

Another story, according to Parks, was told by a man who could remember that during his early childhood Indians would come after every wet spring to obtain honey from bees living in colonies, attached to the undersurface of a wide projecting rock at the top of a nearby cliff, some seventy feet above the bed of a river. The Indians reached the honey by splicing together mesquite poles. Then some light Indian would climb the pole and the others would move it from place to place, while the Indian aloft lowered the honeycombs by means of a rope and a grass sack. Once a group of hostile Indians came to gather some honey, and after they had obtained all they desired, turned on the white settlers and killed many of them. Mr. Parks visited Bee Mountain several years ago, and counted some three hundred colonies of bees attached to an overhanging rock. At the base of the bluff were the remains of hundreds of pieces of mesquite poles, formerly parts of ladders used probably by the Indians.

“Bee Cave up Blanco” seems to be famous everywhere except along the Blanco River. An old hunter said that one man in his party had climbed to the mouth of a great cave along the banks of the river. On arriving at the opening, he was completely covered by thousands of bees and he was saved from being stung to death only by his heavy clothing. He was able to drive the bees from his eyes just long enough to obtain a glimpse of the cave, where he beheld a solid wall of white honeycombs. The man later returned with a companion, and with the aid of smoke and the light of torches the hunters were enabled to enter this gigantic hive. They were approaching beautiful sheets of honeycombs when a warning note caused them to look to the floor of the cave. Horrified, they discovered that they were standing at the edge of what appeared to be a solid mass of wriggling, twisting rattlesnakes. The hunters, by quick movement, regained the entrance in safety.

Another famous bee cave, Parks continues, is reported to be located very close to the City of San Marcos, in the side of a cliff. The entire rock composing the bluff is full of holes and this is the

home, not only of an immense colony of bees, but also of many snakes, rattlesnakes being predominant. According to the story, a group of men tried to open a hole in the side of this bluff. The leader said that he had been assured that there were hundreds of pounds of honey and beeswax in the cave, and he felt certain that this treasure could be obtained with the aid of a patented smoke gun which he possessed. Carrying the famous smoke gun and a lantern, one of the members explored the cave to a depth of several thousands of feet. He returned with the report that enormous amounts of honey and wax were almost at their finger tips. The exploring company tried to enlarge the opening, but as soon as they commenced to pound on the rock, snakes began to issue from every little hole in the face of the bluff, and, while no one was hurt, the sight was so terrible that the men fled and no amount of hidden treasure could induce them to return.

The bee cave in the Davis Mountains is another place that can be "easily" approached. The opening is as large as the doorway of an immense cathedral. With proper protection a person can enter the cave and is at once astonished by the curtainlike sheets of honeycomb which hang from the ceiling. As far as one penetrates into the cave this white honeycomb extends, one sheet right after another. The terrible thing about the cave, however, is supernatural. The first thing that attracts the attention of the explorer is the fact that he is standing in the midst of dozens of human skeletons. If he proceeds, he feels a sudden chill in the atmosphere and something seems to take hold of him in such a way that he cannot move farther inward, although he can see nothing to stop him. If the adventurer does not heed the warning and tries to go still farther, he is crushed by an unknown force and falls dead to the floor. Should his companions attempt to remove the body, they, too, are stricken with death and add to this pile of grim reminders of the force which protects the honey bees of the Davis Mountains. (All these stories are somewhat reminiscent of the legend about the four Greeks, who tried to plunder the grotto of Zeus.)

The cave up the Nueces is thought to be located in the face of

a cliff some thousand feet in height. During the spring season, to one standing on the top of the bluff, the bees going and coming from the mouth of the cave resemble a great stream of smoke; and the hum of their wings is so loud that the roar can be heard for miles. According to the story, thirty years ago a surveyor discovered a second entrance and, making a torch of his coat, went into the cave, protected by the smoke of the burning garment. He passed through room after room filled with long white sheets of purest guajillo honey, and estimated that the cave contained several million pounds. Some of the combs were at least fifty feet from top to bottom. Before the surveyor had time to make the proper preparations to remove the honey, he fell sick and died. Just before his death, he called a doctor and gave him a map showing the entrance to the bee cave. A story was current in San Antonio some five or six years ago that this map was on sale for \$500. A second version is that a ranchman living near this canyon had a well drained for water. Some fifty feet down, the drill-bit entered a cavity, and when a sand bucket was substituted for the rock-bit, honey and beeswax were brought up in great quantities. The cavity was thirty feet from top to bottom.

Another story, Parks relates, is that of an old beekeeper and former cowboy, "Jones," who said that up the Nueces canyon the whole wall was filled with bees. With a companion, he planned to take advantage of the bees, and to become rich by selling honey. "Jones" and his friend bought a blacksmith's bellows and made a machine, which they mounted on a sled, for blowing sulphur fumes. A honey extractor was placed on another sled. The men then bought two colonies of bees and several burros. When the cave-bees had finished gathering the spring crop of honey, "Jones" and a curious caravan set out for the canyon. At the mouth of the canyon, the party made camp. The next day they pushed the smoke engine as far as the first bee cave, fired it up, and pumped the fumes into the skeleton rock that guarded the honey. After a hard day's work, the bees in this cave were all killed. That night, two colonies of bees in hives were placed in front of the cave. The next day these hive-bees worked overtime, stealing the

honey from the cave. In the evening, "Jones" and his companion, as the story goes, extracted three hundred pounds of honey which they had secured with the aid of these two colonies. Elated by the success of the scheme, they sent for more colonies. By the use of the smoke-machine and by moving from cave to cave, the men were soon keeping a regular line of burros busy carrying honey to the city and returning with empty cans. The bees worked so hard that the colonies had to be replaced every two weeks. Unfortunately winter put an end to this performance.

Honey caves have been the object of many expeditions, Parks concludes. Such quests for hidden sweets were often broached by country-boys, generally without definite plan or reliable information, except that someone had told of a bee cave somewhere, and they were determined to get the honey. The stories that have appeared in the papers are among the most marvelous pieces of misinformation ever read. It is to be said in defense of the credulity of these seekers after the rumored treasure houses that there are holes in the rocks, and crevices in the bluffs, where honey bees have lived for years and each year a certain amount of honey and wax is secured from such locations.

John Taylor Allen alludes to the affluence of honey in the State of Texas: "The wonderful tales told of honey and the honey bee may seem exaggerated but no tale can exaggerate the abundance of honey that was to be found right here in Texas in the early days. What sweet, happy days we had cutting bee trees and eating the rich wild honey spread over our buttered biscuits, . . . We had a bountiful supply the whole year around—combed honey, strained honey and candied honey."

Wild bee cave tales are very much in vogue in Texas. Dr. Phillips of Cornell related a story about a man who, some years ago, came North from Texas with a most impressive story connected with huge accumulations of honey—which our man firmly believed—and who used all his efforts to interest prominent beekeepers in the promotion of a scheme. Everybody realized how silly his project was but luckily no one told him. Finally they brought him to the meeting of the National Beekeepers' Associa-

tion in Indianapolis, where, during the evening banquet, after he had told his tale, a company was organized, with a \$2,000,000 capital for the promotion of his project. Dr. Phillips was elected Secretary of the Company at some astounding salary. A well-known beekeeper was chosen as the "Chief Dronekiller" at a yearly salary of \$20,000, an important position because the worker bees are very irritable during the period when they kill the drones. All the details were attended to: how to remove the honey and wax by elaborate machinery, and how to transport the honey through glass-lined pipes to San Antonio. It was the wildest hoax. All attending the banquet were holding their sides from laughter without the victim discovering that they were having a grand time at his expense. At the end of the evening it fell to Dr. Phillips' lot to perform a most perplexing and painful duty, that of telling the victim that the entire scheme was only a huge joke.

CHAPTER XIV

WANDERING BEEKEEPERS

THE traditional manner in which the ancient races furnished the bees with new pastures, when their natural surroundings did not afford a sufficient supply of nectar, is highly interesting. The old "tillers" of Egypt placed the hives on boats and drifted along the Nile to provide the bees with fresh flowers which grew on the banks of the receding river, especially on its expansive delta. There was hardly any other pasturage for the bees in Egypt; there were no forests or meadows with wild flowers. Ancient Egypt had, by all means, less vegetation than present-day Egypt, because a considerable number of plants have been imported during the past thousands of years. On the other hand, the lotus, brought in all likelihood from India, and considered sacred, was more extensively cultivated than it is today, when it is nearing extinction. Lotus honey was in great favor in ancient Egypt.

The inhabitants of Lower Egypt well knew that the blooming of fruit-trees and flowers of Upper Egypt preceded theirs by several months. Toward the end of October, the villagers embarked on boats or rafts, packed with pyramided hives, and conveyed them down the Nile into Upper Egypt, just at the time when the inundations had subsided and the flowers had begun to bud. The bees soon exhausted the supply of nectar two or five miles around a new locality; then the floats were moved to another station and remained there as long as it proved desirable. These wanderers returned to their homes about February, the hives well-stocked with honey, gathered from the orange blossoms of Said and Arabian jessamine. The hives were carefully numbered and delivered to their respective owners. Niebuhr reported seeing such a flotilla of four thousand hives on the Nile.

We learn from the Zenon papyri that the Egyptians had wandering beekeepers even on land. These papyri, originating from the third century B.C., were discovered in 1914 by peasants digging for antiquities on the site of ancient Philadelphia on the edge of the Fayoum. Zenon was a high official of Apolloneos who sent him to Philadelphia when Egypt was under Greek influence. In one of the papyri there is an appeal of the beekeepers to Zenon, entreating him to return the donkeys which they had lent him and which they needed at once to bring home their hives from distant fields. Some farmers threatened the beekeepers that they would ruin the hives because it was necessary to burn the brushwood and inundate the fields. "The donkeys were loaned for only ten days"—said the petition—"and now it is eighteen days and the donkeys have not been returned." They begged Zenon to deliver the donkeys with the assurance that after the hives had been brought home they would be immediately returned in case he needed them. "We pay a large tax to the King and if the donkeys are not restored at once the tax will be lost. May you prosper."

The Greeks imitated the custom of the Egyptians. Columella describes how the inhabitants of Achaia took their hives overseas as far as the Attic peninsula to avail themselves of the benefits of its wonderful pastures. Solon mentioned bee-caravans and bee-floats in 600 B.C., and his laws demanded that each group of hives should be kept three hundred feet apart. It would not be surprising if the Egyptians journeyed as far as Greece with their hives. The ancient Greeks called the Egyptian bees "cecropic" bees. Cecrops was an Egyptian, who, about 1500 B.C., wandered to Greece and probably introduced apiculture.

The Romans, in the third century, took their hives with them to old Alemannia, and drifted down the Rhine. Wandering beekeepers have been known since earliest times. Pliny reported that when the local sources of honey were exhausted, the inhabitants of Hostilia, a village on the Po, placed their hives on boats and sailed during the night five miles upstream, where next day the bees helped themselves in their new location. The temporary stations were changed each night, until the bees had collected so

much honey that the boats were heavily laden. Then the villagers drifted downstream, homeward-bound. The French "bee-barges," with a capacity of sixty to a hundred hives, were frequently referred to. The Provence and the forests of Orleans were covered during certain seasons with visiting hives.

The same antiquated custom prevailed in the Mississippi Valley, starting from New Orleans. The blossoms of the river-wil-lows yielded excellent virgin honey. Perrine, of Chicago, traveled in a large boat up the Mississippi from New Orleans to St. Paul, anticipating that the shores, after the flood had receded, would supply ample pasturage for the bees. The scorching heat, however, ruined his plans; he was even compelled to pour water over the hives, which alone destroyed many colonies.

That this procedure was known also in England is shown by an article published in the *London Times*, 1830: "As the small sailing vessel was proceeding up the Channel from the coast of Cornwall and running near land, some of the sailors noticed a swarm of bees on the island; they steered for it, landed, and after they succeeded in hiving the bees they took them on board and proceeded on their voyage. As they sailed along the shore, the bees constantly flew from the vessel to the land to collect honey and returned again to their floating hive; and this was continued all the way up the Channel."

On land, the hives were placed on wagons and when the combs were filled, the traveling beekeepers returned home. In Palestine, the orange groves of Jaffa offered a rich pasturage. The hives were carried by night on camels, sixteen hives to a load. Such journeying was called "giving the bees a pasture." In medieval Spain, they had similar customs except that the hives were transported on mules. The Russians and Armenians around the Black Sea traveled like nomads, migrating with thousands of hives, pitching their tents where abundant wild flowers were to be found. Such bee-caravans, ambulatory establishments like gipsy-hordes, are often described in Greece, Italy, Germany, Austria and France. In Scotland, they conveyed the hives on carts to the Highlands, when the supply of nectar in the Lowlands was exhausted.

They closed the entrances of the hives with wire screens which secured ample ventilation. The luxuriant blooms of the mountain-heather, which last over two months, supplied plentiful nectar to the bees in the autumn when no other flowers are available. The shepherds and gamekeepers took the hives under their protection for a modest quittance; as a rule, a shilling a hive. Wandering beekeepers were also known in Switzerland, where the hives were taken to the valleys when the buckwheat, which produces excellent honey, was blooming. In the Lüneburger Heide, nomadic troupes of beekeepers were traditional, especially in the springtime and late summer. The ancient laws well protected them.

This almost archaic practice still seems to prevail in the United States. Many beekeepers make the bees work the year round. Early fall they truck about two hundred hives to a load to the winter pastures of wild flowers and orange groves of Florida. By May, when they return homeward, the colonies have multiplied considerably and produce a double crop of honey.

CHAPTER XV

HUNTING FOR WILD HONEY

PAINSTAKING efforts to collect wild honey were just as ancient a sport as hunting and fishing. When the bees were not yet domesticated and nested in hollow trees and rocks, to find the nests and rob them of honey was a profitable and favorite pastime. Special hunters devised all kinds of schemes to ferret out their habitations.

The bees' well-known sense of orientation, as acute as that of homing-pigeons, was an important aid in tracking their lair. Columella (60 A.D.) describes how the hunters followed the bees. Washington Irving (*A Tour of the Prairies*, 1835) gives an account of his experience with honey-hunters in quest of "bee-trees." They placed a honeycomb, which served as bait, on a low bush. Soon the bees appeared and after they had provided themselves with enough honey, they flew into the air and in a "bee-line" to their nest. The hunters followed the bees' course and traced them to some hollow tree-trunks where they found their caché sometimes sixty feet above the ground. Then they chopped down the trees and with knives and scoops emptied the cavities, replete with honey. John Burroughs (*Idyl of the Honey-Bee*) described an identical performance.

Tickner Edwardes (*The Bee-Master of Warrilow*) also tells how to discover wild bees' nests. It is useless to search the woods for wild honey, for one may travel a whole day and find nothing. The only plan is to follow the laden bees as they return. The bee-master produces a saucer covered with honey which is in no time black with crowding bees. The saucer is then covered with a wire cage. These captured bees are the guides to the hidden treasure-



SATYRS HUNTING FOR WILD HONEY

By Piero di Cosimo, XV Century

(A recent acquisition of the Worcester Art Museum. Reproduced with permission of the Museum)



THE MISFORTUNES OF SILENUS

By Piero di Cosimo

(Courtesy of Worcester Art Museum)

chambers. By opening a small door in the trap, one bee is allowed to escape and she immediately rises into the air, makes a circle and speeds away in a certain direction which one must follow. After a while, another bee is set free, and the same procedure is repeated until the nest is located high in the hollow of a dead tree. The Russian name of a beekeeper is "tree-climber"; in Lithuanian, a "bee-climber". The inseparable adjunct, almost an emblem of the Hungarian shepherd, is a stick with a little hatchet on its end. This, called *fokos*, was originally a beekeeper's implement for cutting the trunk of the tree to remove the welcome treasure. A similar tool is still used in the District of Hanover, Germany. It is called *Beide* and is the symbol of beekeeping.

It was a most ancient custom that the finder had the right to mark the trees with a special design or initials, after which he or his tribe had the sole privilege of collecting honey from such trees. The laws were strict and severe punishment was meted out for altering or destroying these markings. In Germany, if one were caught in the act of trespassing, he had to pay a fine and, besides, received twenty lashes. (Plate VII.)

On almost every continent there are birds which are fond of honey. They show the honey-hunters where the bees' nests are located. The birds receive their share for these services. Vasco de Gama related how the "honey-birds" of India guided the natives to the rocks where honey was to be found. The *ajaje* birds lead the Lango tribes, and the honey-ratels the Hottentots to the wild bees' nests. The honey-guide (*Cuculus indicator*), a tropical bird, shows the South African natives where the honey is located. She flies before the hunters to show them the way. As a reward, the bird receives part of the spoils. The natives faithfully obey this tradition and give the birds their liberal share; otherwise, they believe, out of revenge the birds will surely lead them the next time to a lion's den or a snake's nest, and then fly away with a merry chirp. According to a Rhodesian folk-tale, these vindictive creatures lead the travelers to the nests to retaliate for an old injury which they suffered from the bees.

Among primitive races honey-hunting was an important event

and began with solemn rites. Chastity had to be observed the night before, otherwise the hunters would be badly stung by the bees or some other misfortune would befall them.

In the Middle Ages honey-hunting was a royal sport. The German archives describe the Nuremberg forests as a hunting ground of royalty not only for game but for wild honey. Charlemagne began to domesticate wild bees in the Nuremberg forests out of gratitude because, after he had been stung by bees, he recovered from an obstinate gout. The Nuremberg forests were called the bee-garden of the Holy Roman Empire and under the reign of Charles IV (1347), the bee garden of Germany. From the honey collected there, the famous *Lebkuchen* was baked which is still popular the world over after twelve hundred years.

In many countries special permits were issued, and the amount of honey had to be accounted for and taxes paid on it. The Domesday Book mentions that the Bishop of Worcester, under the reign of Edward the Confessor, was privileged to hunt for honey in the forests of Malvern.

The ancient origin of honey-hunting is demonstrated in mythology. (Plate VIII.) The Satyrs (Fauns), the attendants of Dionysus, were extremely fond of honey. In one of the legends the jolly old, red-nosed, bloated and, as a rule, intoxicated Silenus, the schoolmaster and foster-father of Bacchus and the alleged inventor of the flute, was anxious to find the wild bees' nest and plunder it of honey. As the story goes, Silenus stood on his donkey's back, reaching for honey-combs, when the bees flew at him and stung him on his bald head. He fell on top of the donkey, which, when also stung, kicked him and escaped, to the great merriment of the other Satyrs who witnessed his plight. Ovid describes the scene and tells how Dionysus laughed and taught Silenus how to ease the pain of the sting with mud. (Plate IX.)

Innumerable fables and legends refer to honey-hunting. One of the oldest legends, often mentioned in ancient literature, is that of Antophilus, the Greek poet, who was a great lover of honey and who sang its praise in his poems. Antophilus, while searching for wild honey, climbed a precipice and swinging on a

rope, emptied the contents of a nest. Some honey trickled down the rope. His dog, also very fond of honey, chewed the rope and Antophilus fell from the perilous height and was killed.

The following, a rather amusing little story from Poland, is credited to Demetrius, the Russian Ambassador to Rome: "A man, searching in the woods for honey, slipped down into a great hollow tree, where he found himself up to his breast in a veritable lake of this sweet substance. He stuck fast there for two days, making the lonely woods resound in vain with his cries for help. Finally, when the man had almost abandoned hope, a large bear appeared upon the scene, bent on the same business that had taken

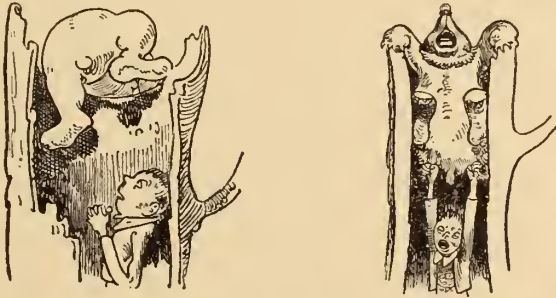


FIG. 3. The man saved by a bear.
(From Wilhelm Busch's serial)

the man there. Bruin smelled the honey, which had been stirred up by the struggles of the prisoner, and straightway climbed the tree and let himself down backward into the hollow. The man, whose wits had been sharpened by the adversity, caught him about the loins and made as vigorous an outcry as he could. Up clambered Bruin in a panic, not knowing what had got hold of him. Our man clung fast, and the bear tugged, until by main force he had pulled himself and his captor out of the tree; then he let go and Bruin, considerably frightened, took to the woods with all speed, leaving his smeared companion to his own congratulations." Wilhelm Busch, the graphic humorist and pastmaster of comical sequence, must have been quite impressed by the story since he illustrated it with a complete serial of pictures. (Fig.3.)

In connection with honey-hunting we find among the primitive tribes of far-off continents many fanciful tales which relate the identical and characteristic yarn. The honey-hunter usually finds among the honeycombs in a tree an enchanted *bee-woman* who will cook for him and will prepare a delicious honey-wine. The hunter proposes marriage to her, which she accepts under the condition that he should never mention to anybody where he had found her, otherwise, she would disappear. This actual proviso is typical also of many other myths; the story of Psyche, the Lohengrin Saga and the story of Undine, are only a few instances. This peculiar secrecy seems to be analogous, in certain respects, with the curious marriage customs of primitive races, according to which a wife was not permitted to pronounce the husband's name or it was unlawful for a husband to see his wife's face until after she had given birth to her first child.

The following is a popular legend along the Orinoco River (Amazon region): There was a man who possessed great skill in detecting bees' nests, with which the forest abounded; in fact, he was better in this respect than anyone else. One day the man tried to drill a hollow tree, with the intention of removing honey, when suddenly he heard a loud scream, "You are killing me!" He carefully opened the tree and to his amazement, saw a beautiful naked woman before him. He made her a loin-cloth and bade her marry him. The woman consented to be his wife under one condition, that he would never call her Maba (bee), or tell anyone that it was her name. Our man promised and the two became husband and wife. The hunter remained just as efficient in finding the bees' nests as in former days. His wife made the best honey-wine that was ever brewed; a cupful was sufficient to supply all the guests. On one occasion, many visitors arrived, and they all became intoxicated. The host promised his guests that the next time his wife would prepare more and still better honey-wine, and in the same breath referred to her as Maba. In an instant, like a shot, Maba flew away. From that time on the man's luck changed and honey became scarce in the region. His wife had been one of the legendary bee-women.

There are similar tales in Indonesia. The Bornean version, quoted in *The Mythology of All Races* (Vol. IX), is as follows:

A man named Rakian was out hunting for honey, when in the top of a mangis tree he saw many bees' nests, in one of which were white bees. (Several Christian legends allude to snow-white bees producing virginal honey.) Since white bees were a rarity, he carefully removed the nest and took it home. The next day he was working in his garden and when he returned to his house in the evening he found a meal cooked for him. He was surprised because he lived alone. The following day the same thing occurred, his meal was again cooked. This continued for some time. Finally he resolved to investigate the mystery.

He pretended to go to the garden but silently returned, hid himself and watched. The door of the house soon creaked and a beautiful woman came out, and went to the river to fetch some water. While she was gone, Rakian entered the house, and found that the bees' nest was empty. He hid the nest and secreted himself again. The woman returned and upon finding the nest gone commenced to weep. In the evening Rakian entered the house as was his custom. The woman sat there silent. "Why are you here?" he asked, "perhaps you want to steal my bees?" The woman answered, "I don't know anything about your bees." Rakian asked her to cook for him because he was hungry, but she refused, as she was vexed. The woman demanded her box but he was afraid that she would disappear into it again. She promised not to, and that she would become his wife if he would not disclose her identity. Rakian agreed; they were married and by and by she bore him a child.

One day Rakian went to a feast at his neighbors. All asked him whence his beautiful wife had come. He evaded the question. After a while, when they all were intoxicated, he forgot his promise and revealed to his friends that his wife had been a bee.

When he returned, his wife did not speak to him. Later she reproached him for having broken his promise and said that she must return to her home. "In seven days my father will pass here and I shall go with him, but the child I leave with you." Rakian

wept. He could not change her mind. Seven days later he saw a white bee flying by, whereupon his wife came out of the house and exclaimed: "There is my father." She turned into a bee and flew away.

Rakian picked up the child and pursued the bees. For seven days he followed them until finally he lost sight of them. Soon a strange woman appeared who directed him to his wife's home. Rakian climbed into the house and found it full of bees, except the middle room. The child began to cry, when suddenly Rakian's wife appeared. Rakian was happy but she reproached him for revealing her secret. Finally they became reconciled and all the bees dropped down from the roof-beams to the floor and became men. Rakian and the child remained in the bees' village.

There are similar fables among the African tribes.

An old Hungarian fable suggests that Christ, Himself, was a honey-hunter. Christ and St. Peter were wandering. Peter said, "It must be wonderful to be a God, help the widows and orphans, reward good deeds and punish the wicked. If this could be accomplished, there wouldn't be any vice on earth." While Peter was talking, Jesus looked around and noticed a bees' nest in the hollow of a tree. Christ suggested to Peter that he put the swarm into his cap, "Maybe they will be useful." Peter obeyed and put cluster after cluster into his cap until one of the bees stung him on the finger. With a loud cry of pain, he threw the cap, full of bees, to the ground, saying, "Oh, the devil shall take this swarm; how one of them has stung me!" Christ said, "Well, why don't you find the one which stung you?" "How can I," said Peter, "they all look alike." Then Jesus said, "If you were God, you would do the same thing; if one of your people sinned, all the innocent would have to suffer."

During the pioneer days of America honey-hunting was a profitable pursuit and a favorite occupation of the Southwestern backwoodsmen. Wild honey was sold for a quarter of a dollar a gallon and some bee-trees yielded as much as a dozen gallons of honey. The honey-hunter with his old sombrero, open hickory shirt and deer-skin breeches is often described in contemporary

writings. He is portrayed as a real character; fond of nature, solitude and the stillness of the woods, listening to the drowsy hum of the bees. His power of vision became extremely keen through education and he could follow the bees with his eyes for hundreds of yards. His equipment consisted of an axe, several buckets, a fishing outfit and, of course, a rifle to protect him from Indians and bears.

The honey hunters, as a rule, built their log-cabins near navigable rivers and grew their vegetables on the land surrounding their shacks. They depended on their rifles to procure the necessary meat. Honey was an important article of barter. After the hunters had collected several barrels of honey, they rolled them down to the river bank, placed them on boats, and paddled their cargo to the nearest settlement where they exchanged the honey for flour, gunpowder, lead and other necessities. Hunters who lived on or near the banks of the Mississippi traded their honey with the skippers of the steamboats. The rivermen took the honey to New Orleans, where they sold it at a fair profit.

The importance of felling bee trees is best proven by the dispute which occurred in 1840 between the States of Iowa and Missouri. A farmer of Clark County (Mo.) cut down several bee trees filled with honey on the boundary line between the two States. This strip of land had been claimed by both States and ended in the so-called *Honey-War*. The United States Supreme Court finally decided the matter in 1851 and settled the exact boundary between the two States.

CHAPTER XVI

IN RELIGION

AMONG polytheistic nations (Varro counted 30,000 gods), sacrifices to the gods were a common practice. These oblational services consisted of prayers supplemented with gifts, to win the favor of the gods and to express gratitude for their bounty or to appease their anger and ward off their sinister influence; in a word, sacrifices to the gods were either thank offerings or sin offerings. The hunters sacrificed their prey, the farmers their fruit and harvest products or animals, like horses, bulls, sheep, etc. In some countries, occasionally even women and children were sacrificed.

We find that honey was universally used in consecratory rites when people wished to offer something especially holy and acceptable to a deity as an expression of thanksgiving, penitence or atonement. Sophocles in the fragment of the lost *Polydos* describes the offerings, dear to the gods:

“Wool of the sheep was there, fruit of the vine,
Libations and the treasured store of grapes.
And manifold fruits were there, mingled with grain
And oil of olive, and fair curious combs
Of wax, compacted by the yellow bee.”

To the ancient Germanic god, Neckar, there was yearly sacrificed a man, a sheep, a loaf of bread and a beehive.

Honey, the celestial food, collected from the “virtues” of flowers, was considered by all ancients the symbol of purity, love and wisdom. During the Leontic (inhabitants of an ancient Greek

town in the province of Syracuse) initiation ceremonies honey was poured on the hands, instead of water, to keep them pure from everything that causes pain, harm or brings defilement. Honey was also thought to purify the tongue from every sin. St. Gregory (Pope, 590—604 A.D.), in *Morals on the Book of Job* (Vol. II, p. 185), remarked, "When the grace of the Holy Spirit bathes us, it fills us with honey and butter equally. Honey falls from above, butter is drawn from the milk of animals, so honey is from the air, butter from the flesh." In primitive baptism the neophyte drank a cup of milk and honey mixed; "the new-born in Christ" partook of the food of infants. St. Jerome mentions among the "unsanctioned rites" the cup of honey and milk. While honey was used in the early Christian services, by the end of the sixth century its use in the Roman church was discontinued. The Copts and Ethiopians, however, kept it up in their baptismal ceremonies. The wine used in Ethiopia for communion purposes is prepared from honey. Honey, in all probability, symbolized the Land of Promise. The fifth century book, *Joseph and Arsenath*, relates how the angel had eaten a piece of honeycomb and also put a piece into the mouth of Arsenath, exclaiming, "Now thou hast eaten the bread of life and hast drunk the cup of immortality and received the unction of incorruption." In Persia during the Mithraic feasts honey was used on the hands of the candidates as a cleansing substance instead of water. The Christians ate honey before fast-days, especially on Holy Thursday. On the eve of the Jewish New Year an apple dipped in honey was eaten; fruit and honey symbolized prosperity and peace.

Prehistoric man worshiped the sun, the most glorious object in Nature, as the supreme god, the giver and sustainer of all life. Only the most intellectual amongst the primitive races were sun-worshippers. Honey had a significant part in all their rituals. The Babylonians and Assyrians poured honey on the foundation-stones and walls of the temples. Nebuchadnezzar was a liberal user of honey. The priests anointed themselves with honey and placed some on the altars. At sunrise honey sacrifices were brought to the Sun-God. In one of the Magical papyri (Berlin), the worshiper

is thus instructed: "Take honey with the milk, drink it before the rising of the sun, and there shall be in thy heart something that is divine." We find that the same custom existed among the Egyptians and among the Incas of Peru. The Hindus and Persians used honey in profusion during their religious services; they considered honey a sacred substance, a divine food, a cleanser and purifier.

Many rituals of the African tribes in Somaliland, Gallaland, and also of the Bushmen and Hottentots, even today, are intimately associated with honey. The Hottentots dance during full moon and pray for plenty of honey and milk. Their honey harvests are opened with religious ceremonies. No one is allowed to collect honey before a certain time. The priests taste the honey first and then they announce that everyone is permitted to collect his share. In medieval France pilgrimages were conducted to certain shrines to pray for an abundant honey harvest.

There are many evidences in ancient archives which prove the importance of bees and of their products, honey and wax, in the Christian religion. The Lorsch (Hessen, Germany)* manuscript in the Vatican library is an interesting example. It is a supplication to the Lord to protect the bees, these "dear animals," *vihu mînaz*. The huge bronze baldachin before the main altar of St. Peter's Church in Rome is studded with bees, likewise the tomb of Urban VIII. (Plate X.) The shape of the papal tiara was unquestionably derived from an old-fashioned beehive (skep). On the title-page picture of the German edition of *De roomische byen-korf* (Roman beehive), by Filipus van Marnix, the papal tiara serves as a hive for the bees. One bee represents the pope (king bee), others function as cardinals, bishops and monks saying Mass and attending to burials and confessions. (Fig. 4.) According to a passage of the book, "our dear and loving mother, the holie church of Rome, ought not to scorn or disdaine that we do compare her customs and orders to a Bee-Hive, considering that shee herself doth compare the incomprehensible generation of the Sonne of God from his Father, together with his birth out of

* Lorsch was one of the localities where Charlemagne kept his bees.

the pure and undefiled Virgine Marie unto the Bees; which were in verie deede a great blasphemie, if the bees were not of so great vertue, that by them wee might liken and compare the holie church of Rome. And, seeing, she saith, that God is delighted with the giftes and presentes of the bees, why should not shee herself exceedingly rejoice with our Bee-Hive.”*



FIG. 4. The Roman beehive.

Title page of *De roomische byen-korf* by Filips van Marnix. 1581.

(Courtesy Hilda M. Ransome, *The Sacred Bee*, 1937)

EXULTET ROLLS

A most notable acknowledgment of the significance of bees and honey is found in the Exultet Rolls. These sumptuously illustrated liturgical parchment manuscripts, some of them twenty-two feet long and one foot in breadth, are the oldest extant texts of the Roman Mass. They date back to the early eleventh century and were named after the first word of the prayer, *Exultet iam angelica turba caelorum* (Let now rejoice the heavenly choir of

* Quoted by W. Hone, *Ancient Mysteries*, 1823.

angels). It was sung by the monks on Easter Eve during the consecration of the Easter taper. The texts are divided into short chapters, intersected by elaborately illuminated pictures. The pictures are in reverse to the text so that, when the priests chanted the songs and unfolded the rolls over the pulpit, the congregation could see the subject illustrated. Certain sections of these prayers are veritable eulogies of bees and honey. "Talia igitur Domine, digna sacris altaribus tuis munera offeruntur, quibus te laetari religio Christiana non ambigit." (Such gifts, therefore, O Lord, are offered worthy of thy altars, with which the Christian religion does not hesitate that thou rejoicest.)

The Barberini manuscript in the Vatican library is a typical specimen. (Plate XI.) In a garden of flowery bushes, with trees in the center, bees, gathering honey, cover the entire field. A crouching bee-master cuts honeycombs from the hive and places them in a bowl. Another figure is holding a pitcher under it, not to waste a drop of honey. Two other men are cutting the branch of a tree to hive a swarm which settled on it. The rolls of Monte Cassino, Capua, Troja, Fondi, Gaeta, Bari, Mirabella, etc., vary in composition but all are decorated with hives and laboring bees.

IN THE BIBLE

Honey is frequently mentioned in the Bible; it was referred to as a wholesome food, a helpful medicine, an ingredient of delicious drinks, an appropriate gift and a valued possession. There is only little evidence that the Hebrews cultivated bees, but they used wild honey in profusion. "Wild" honey is often mentioned; whether this was meant as a contrast to domesticated honey, it is difficult to say. That the Jews were solicitous about their honey supply is indicated in the Talmud (B. Batra 18, A) where a warning is given never to let mustard plants grow near bees' nests because bees are fond of these flowers which, however, burn their throats and they then consume a greater quantity of honey. The Jews were permitted, according to their religious laws, to provide water on Saturdays and holidays to their domestic animals, but

this dispensation did not apply to bees, because they themselves could secure it (Sabath 24: 3). On the other hand, in case of rain, or to protect the bees from the scorching sun, the Jews were permitted to cover the nests with linen even on holidays (Sabath 436).

Philo, the historian (in the time of Christ), in his work, *De Vita Contemplativa* (II. 663), refers to a caste among the Hebrews called Essenes, who lived in the region of the Dead Sea, and whose occupation was supposed to be the cultivation of bees and the production of honey. Josephus, in the *Antiquities of the Jews*, also mentions the Essenes of Judea. (It is noteworthy that the Greek term *Essenos* (king bee) was the epithet of Zeus. The priestesses of Artemis were called *Melissai* (bees) and their high priests, *Essenes*.)

When the Hebrews referred to Palestine they used the proverbial metaphor, expressive of plenty, "a land flowing with milk and honey." This reference is repeated twenty-one times in the Bible. (Exod. 3: 8; 3: 17; 13: 5; 33: 3; Lev. 30: 35; Num. 13: 28; 14: 8; 16: 14; Deut. 6: 3; 11: 9; 26: 15; 27: 3; 31: 20; Jos. 5: 6; Tob. 30: 17; Jer. 11: 5; 32: 22; Ezek. 20: 6; 30: 15; Sirach 46, 10; Baruch 1, 20.) The day Christ rose from the dead and appeared before His Disciples, He asked for food. They gave Him broiled fish and a honeycomb (Luke 24: 42). Christ ate the food to prove to the Apostles that He was truly resurrected and not merely a Spirit or a Thought. John the Baptist, in his camel's hair raiment, ate dried locusts and honey in the wilderness (Mark 1: 6, Matth. 3: 4). In the Hebrew language *debash* means honey and Deborah, bee.

There was honey galore in Palestine. Samuel described woods where honey was so plentiful that the combs were strewn on the ground. "And when the people were come into the woods, behold, the honey dropped." (Samuel 14: 26.) Not only trees but also the rocks poured forth honey. "He would feed them . . . with honey out of the rock." In the songs of Moses there is an allusion, "he shall not see the rivers, the flowing streams of honey and butter." (Job 20: 17.) Prophet Isaiah (eighth century B.C.) men-

tions honey and butter: “. . . for butter and honey shall everyone eat that is left in the midst of the land.” (Isa. 7: 21.)

The heaven-born manna, on which the Israelites subsisted in the desert for forty years, contained honey; it was probably honeydew. “And the House of Israel called the name thereof manna; and it resembled coriander seed, white, and tasted like wafers made with honey.” (Exod. 16: 31.) That manna contained only a small quantity of honey is mentioned in the chapter of the “Fives” in the Talmud:

“Fire is one-sixtieth of hell,
Honey is one-sixtieth of manna,
Sabbath one-sixtieth of rest of the world to come,
Sleep one-sixtieth of death,
Dreams one-sixtieth of prophecy.”

Honey must have been an important article of commerce among the Jews. Ezekiel mentions (27: 17) that the Israelites, in addition to wine, oil and balsams, also carried honey to a Phoenician mercantile town, known as Tyrus, and it is possible that they supplied other markets with honey. That the Jews put aside honey for future use is proven by the appeal of the men to Ishmael: “Slay us not, for we have stores hidden in the fields, of wheat and of barley and of oil and of honey.” (Jer. 41: 8.)

There are many references in the Bible to honey as an attractive gift. Jacob, the Patriarch, when he sent his son to Egypt, gave him honey, spices, myrrh and almonds to deliver as a present to the Governor. When Jeroboam's queen visited the blind Prophet Ahijah at Shiloh (Kings 14: 3), she brought with her a cruse of honey in order to obtain a favorable report about her dying son. Possibly honey was also intended to cure the Prophet's blindness. King David's army, 3,000 years ago, was provided with honey, . . . “they brought beds and basins and earthen vessels and wheat and barley . . . beans and lentils . . . and honey and butter for David and for the people with him, to eat; for they said, the people are hungry and weary and thirsty in the wilder-

ness." (2 Sam. 17: 28, 29.) That the Hebrews highly valued honey as a food substance is conclusively proven by the words of the son of Sirach, who recognized honey as "one of the principal things for use in man's life." (Eccl. 39: 26.) The medicinal value of honey is often emphasized in the Talmud. It was used for various diseases, especially for heart troubles, gout and as an external application for the wounds of man and beast. Mixing honey with wine is repeatedly mentioned. Assyria was called the land of honey and olive trees.

Honey was frequently employed in the Bible in a symbolical sense, namely, to draw a comparison between some act or conception and the sweetness of honey. David, who had been a shepherd boy, often utilized metaphorically the sweetness of honey: "The judgment of the Lord is sweeter than honey and the droppings of the honeycomb." (Ps. 19: 10.) "How sweet are thy words to my taste, yea, sweeter than honey in my mouth." (Ps. 119: 102.) In Solomon's Proverbs (16: 24): "Pleasant words are as an honeycomb, sweet to the soul and health to the bones." "The lips of the bride are as sweet as honey. The lips of the concubine are like honey but later bitter as vermouth" (Prov. 5:3). There are two accounts in the Bible of men being ordered to eat a book and in each case "the book tasted as sweet as honey." (Ezek. 3: 3 and Revel. 10: 9, 10.) In the Revelation: "And I took the little book out of the angel's hand, and ate it up; and it was in my mouth sweet as honey."

The mythical tale of Samson (Judges 14:5-18) is well known. Samson was calling on his Philistine sweetheart when he was attacked by a young lion. Samson had no weapon, only the Spirit of Jehovah came mightily upon him and "he rent the lion as he would have rent a kid." When he returned "after a while" he passed the spot and found that bees had taken possession of the lion's carcass and had built combs in it, where they stored their honey. Samson removed some honey, took it home, gave a portion to his father and to his mother and ate some of it himself.

During his marriage feast Samson put a riddle to the Philistine young men: "Out of the eater came forth meat and out of the

strong came forth sweetness." The young men could not solve the riddle for three days, but Samson's wife obtained from him the answer and betrayed him to the young men, who then claimed to have solved the enigma by saying: "What is sweeter than honey and what is stronger than a lion?"

This Biblical tale was much discussed by ancient and modern apicultural writers. Aristotle emphasized the bees' dislike for strong odors and decayed matter. It seems improbable that the bees would utilize a carcass for their nesting place. On the other hand, it must be taken into consideration that in tropical countries at a certain season of the year the heat is so intense that it dries up all moisture and the carcass will not undergo decomposition. In the desert dead camels remain mummified for a long time and their bodies are entirely free from offensive odors. Often jackals, vultures and dogs gnaw off the soft parts and only the skeleton remains in which the bees may build their combs. In the West of the United States (Montana) skeletons of oxen have been found which the bees had converted into dwelling places.

Honey sacrifices were prohibited by the Jews as honey was liable to ferment. "Ye shall burn no leaven, nor any honey as an offering unto Jehovah" (Lev. 2: 11). Honey, however, was allowed as a "not burnt" offering or as a tribute of first fruit (Lev. 2: 12). One may assume that the Jews used honey as a leavening for baking purposes.

Today, there is again honey in abundance in modern Palestine and vigorous efforts have been made by the inhabitants to find foreign markets for their bees and honey.



THE TOMB OF POPE URBAN VIII IN ST. PETER'S
CHURCH, ROME

Zeus, the omnipresent, omniscient and omnipotent father of the gods, was brought up on honey. (Fig. 5.) According to the legend, the father of Zeus, Cronos, one of the Titans, married his own sister, Rhea. Cronos ate his children as soon as they were born because it was presaged that one of his offspring would replace him in the heavenly kingdom. Cronos had already devoured the five elder children. Zeus, the sixth and most beautiful of them, was hidden by his mother after his birth in an almost inaccessible grotto in Mt. Ida, on the island of Crete. Rhea wrapped a stone in swaddling bands, which looked like a newborn child, and gave it to Cronos, who swallowed it, thinking that it was his son. The daughters of the King, the nymphs Melitta (the bee) and Amalthea (the goat), nursed Zeus on honey and



FIG. 6. Ancient Greek coin.

The laureate head of Zeus, on the reverse, his symbols, the eagle and bee.

milk. When Zeus grew up he dethroned his father after a ten years' war and became the ruler of Mt. Olympus. The number of legendary tales associating Zeus with bees and honey are infinite. Homer gave Zeus the epithet, *Essenos*, the Bee King. On many ancient Greek coins there is a head of Zeus and on the reverse side, a bee. (Fig. 6.) Honey was considered a heavenly gift. Zeus rained honey (honeydew) which had the power to raise the dead. Plutarch called honey the saliva of the stars (*saliva siderum*).

The Hindus believed that the heaven-born honey which fell on the leaves and grass sweetened even the milk of cows and goats. Kalidasa in the "*Hero and Nymph*" exclaims:

“Delightful words! they fell like drops of nectar,
No wonder nectar from the moon should flow.”

In Hindu mythology the moon had the epithet, *Madhukara*, honey-giver.

Artemis, the Moon-goddess, was often figured in the shape of a bee. It was an ancient Germanic belief that the moon was supposed to be a huge cup, filled with honey and mead; and the stars were swarms of bees, whose honey fell to the earth upon the oak and sweet ash. The honeydew which settled over the mighty sacred ash, Ygdrasil (representing the tree of the Universe), nourished the bees. The well of Ymir, the source of all wisdom, was under this tree and Odin pawned one of his eyes to obtain a drink from it.

The sweet ash which was believed to feed the bees with honeydew had noteworthy significance in all mythologies. The word ash (in Latin *melia*, *mel* = honey) is derived from the Norse *aska*, meaning, man. Odin fashioned the first man from this tree. Pliny mentioned that all evil creatures have a fear of the ash and that serpents would rather pass through fire than over its leaves. Mothers used to place the cradles of their infants under an ash tree to protect them from harm. The Finnish shepherds planted an ash stick on the pasture to protect their cattle and the Scotch Highlanders placed a piece of the wood over their cow stables to keep the witches from contaminating the milk. Achilles used an ashen spear and Cupid made his arrows from ash.

The Bushmen call honey *moon's water*. When the game is shot and does not die, or even arises, they believe it is due to the magic effect of moon's water. The Bushmen have a special drum called *goin-goin* and while they are beating it they dance and pray that the bees may become abundant and bring home honey, so that their women and children will not go hungry.

There is much evidence in all mythologies of how fond the gods were of honey. Ovid relates in *Metamorphosis* that Jupiter and Mercury were traveling through Phrygia as plain mortals and no one would admit them, except two charitable souls living in a



FIG. 7. Antique Roman gem.

Amor sailing on a honey-jar.

modest tent, who offered them the food which they most desired, namely, honey, milk and fruit.

Eros (Amor) was often pictured as a honey-thief. Anacreon, the Greek bard (fifth century B.C.), has written an immortal song, *Eros, the honey-thief*. Theocritus (third century B.C.) transcribed the same poem, *Love stealing honey*. Lucas Cranach, the distinguished early sixteenth century painter, composed no less than nine pictures of Amor as a honey-thief. (Plate XII.) Albrecht Dürer made the drawing

of his *Honey-Thief* in 1514. (Plate XIII.) Many antique gems depict Amor in association with honey. One of them represents Amor floating over waves with spread sails on a honey jar on which there is the image of a bee. (Fig. 7.) On another gem Amor, to protect the bees, chases some birds from a tree. (Fig. 8.) Amor is supposed to have dipped his arrows into honey to produce blissful love. He was often called metaphorically the honey-bird, with "eyes and voice as sweet as honey." In the *Idyl of Moschus*, the Greek bucolic poet of Syracuse (200 B.C.), Venus thus describes the lost Cupid, whom she is trying to find: "The child is most notable; thou couldst tell him among twenty others; his skin is not white but flame colored; his eyes are keen and burning; an evil heart and a honeyed tongue has he, for his speech and mind are at variance. Like honey is his voice but his heart of gall; all tameless is he and deceitful, the truth is not in him, a wily brat and cruel in his pastime."

It is interesting that Kama, the Hindu god of love, is also closely associated with honey and bees. Kama rides on a bee * and the string of his bow consists of a chain of bees, symbolizing the sweetness and sting of



FIG. 8. Roman gem. Amor protecting the bees.

* On a Hittite gem found near Aleppo, Atargatis (another name for Diana of Ephesus, originating in Babylon) stands on a bee.

love. (Fig. 9.) (Honey and the sting of the bee are contrasted as often as roses and thorns.) Kalidasa, the Hindu poet, refers to Kama and his bow. For instance, in *The Birth of the War-God*, Kama:

“Weaves a string of bees with deft invention
To speed the missile when the bow is bent.”

Then again in the *Shakuntala*:

“A stalwart soldier comes, the spring,
Who bears the bow of Love;
And on that bow, the lustrous *string*
Is made of bees. . . .”



FIG. 9. Hindu honey-jar.
Kama, the Hindu Cupid,
riding on a bee.

Possibly the names of the two gods, Amor and Kama, were derived from the same root, *amo*, I love.

The Hindus, Greeks, Romans and all Slavic races had gods for bees and honey. There were only a few gods in mythologies to whom honey sacrifices were not offered. Zeus, Ceres, her daughter, honied Proserpina, Apollo, Dionysus, Aphrodite, even Hecate of Hades were some of the gods to whom frequent honey offerings were brought. Dionysus was also worshiped as a honey-god. His priestesses carried in their hands the thyrsos, a cane with a crown of ivy. Euripides comments, “the ivy wands distilled from all their tops rich store of honey.”

“And as they pass, through every plain
Flows milk, flows wine, the nectar’d honey flows,
And round each soft gale Syrian odors throws.”

Virgil, in *Georgics I*, refers to the honey sacrifices brought to Ceres: “For thee let all the rural youths adore Ceres; to whom mix thou the honeycomb with milk and gentle wine.”

In one of his *Elegies*, Tibullus describes the honey offerings to the household gods:

“Or dulcet cakes himself the farmer paid,
 When crown'd his wishes by your powerful aid;
 While his fair daughter brought with her from home
 The luscious offering of a honeycomb.”

Empedocles (490–430 B.C.) mentions the honey sacrifices to Aphrodite:

“And holy offerings of unmixed myrrh,
 And sweetly smelling frankincense; and many
 A pure libation of fresh golden honey
 They pour'd along the floor.”

According to the legend, Dedalus, the divine artist and the builder of the famous Cretan labyrinth, made a honeycomb for Aphrodite from the purest gold which looked so natural that it was confused with a real one. (Diodorus Siculus IV. 78.)

Pan,* the god of shepherds, Priapus, the god of gardens, and the Nymphs were considered the protectors of the bees and they had also their share of honey offerings. In one of the *Idyls* of Theocritus, the shepherd professes: “And I will set out eight bowls of milk for Pan and eight bowls, full of the richest honeycombs.”

Many priestesses and nymphs, according to Greek mythology, gained their inspiration from honey intoxicants under the influence of which “they raved in holy frenzy.” Horace refers to it in the “*Ode to Bacchus*”:

“Give me to sing, by thee inspir'd,
 Thy priestesses to madness fir'd:
 Fountains of wine shall pour along,
 And, melting from the hollow tree,
 The golden treasures of the bee,
 And streams of milk shall fill the song.”

*The word panic was derived from mischievous Pan, who took delight in frightening unsuspecting travelers.

Homer in the "*Hymn to Mercury*" comments on the prophetic powers with which the priestesses were endowed by indulging in honey drinks:

"From these I have learned true
 Vaticinations of remotest things
 My father cared not. Whilst they search out dooms,
 They sit apart and feed on honey-combs.
 Drunk with divine enthusiasm, and utter
 With earnest willingness the truth they know,
 But, if deprived of that sweet food, they mutter
 All plausible delusions;—these to you
 I give;—if you inquire, they will not stutter;
 Delight your own soul with them;—any man
 You would instruct may profit if he can."

The hypnotic effect of honey is frequently mentioned in mythology. Orpheus sang that if anyone fell asleep after eating honey it was difficult to awaken him. Zeus, before he attacked his father, put him asleep with a honey drink:

"When prostrate 'neath the lofty oaks you see him
 Lie drunken with the work of murmuring bees,
 Then bind him. . . ."

Porphyry (*De antr. nymph.* 7)

Virgil relates that when his hero Aeneas descended to Hades, he flung a soporific honey cake to Cerberus and that the creature "in a mad rage opened his three mouths and snatched the offered morsel, relaxing his monstrous limbs, extending at vast length all over the cave." Three times each year honey sacrifices were offered to Pluto, the god of the underworld. The Romans had divers names for their religious places. One was called *scrobiculus*. It consisted of a pit containing an altar on which they poured the blood of a slain beast tempered with honey as a sacrifice to the infernal deity. To *Bona Dea* (the Earth), a mixture of milk and honey was offered and the container in which it was kept was called the *honey-vessel*. Chaucer in *The Knight's Tale*:

“With vessels in her hand of gold full fine,
All full of Hony, Milk, Blood and Wine.”

Plutarch mentions (*Symp.* 5) that the Athenians offered no wine to their gods but only water, sweetened with honey.

To the Fates who spin the thread of human destiny, honey was also offered. The Spartan women believed that the Fates, though invisible, frequently visited a newborn child, especially on the third or fifth night after birth. They left the doors of the house open on these nights and set on the table bread, honey and water to win the favor of the Fates.

The use of honey cake as a sacrificial offering was universal in all mythologies. In Egypt the sacred bull Apis and the sacred crocodile of Thebes were fed on honey cakes. It was an ancient custom in Egypt to consult in all perplexing situations the sacred bull at the oracle of Memphis. Food was offered to Apis; if this was accepted, it was considered a favorable sign, if refused, it was an indication of ill-omen. As an inducement, to tickle the palate of Apis, the food was mixed with honey to secure a propitious ruling.

Among the Greeks, Romans, the Germanic and Slavic races sacrificial offering of honey cake was an established and favorite ceremony.

In the *Rig-Veda* honey was a super-eminent subject. Vishnu, Indra and Krishna were all called *Madhava*, honey-born. The two demigods, Aswins, who attended to the welfare of men, were the children of the Sun and the Moon, the givers of dawn, of a new day. They were pictured in a three-wheeled golden chariot, on which they carried honey. Many hymns were sung to the Aswins: “Harness your bounty-shedding golden chariot with swift horses, refresh our strength with trickling honey, bring prosperity to our people and to our cattle. Animate us, prolong our existence, bring us vigor, wipe out our sins, destroy our foes and be always with us.” The Hindus prayed at daybreak to the Aswins, the creators of a new day:

“Anoint me with the honey of the bee,
That I may speak forceful speech among men.”

The Russians and all the Slavs had honey-gods, and images of these deities were only seldom missing in their gardens.

Jovial (Jove) feasts, carnal pleasures and boisterous revelries, characterized by overindulgence in food and intemperate drinking, were the daily amusement of the heathen deities. Without intoxicating beverages this could not be imagined. Wine, whisky, and beer did not exist in those days, and drinks made from honey were used instead.

Mead (derived from the Hindu word *madhu*, honey), the drink of the Norse gods, was the nectar of Mt. Olympus. Odin, the chief of the Norsemen, patron of wisdom, culture and heroes, visited Saga, the Goddess of History, and drank mead with her out of a golden goblet.

Odin was supposed to have originated in Scythia and to have subdued with his tribes the whole of Northern Europe. He later became the Anglo-Saxon Woden and the Wotan of the Niebelungen. Odin, after his birth, was exposed as a helpless child. He was stabbed and hung on a tree. Ymir freed him, healed his wounds and gave him some mead from the Wonder-Kettle of Oedroerir, which renewed his strength. But once Odin had tasted mead, he sacrificed his life to obtain the vessel. Odin gave the meal, which was put before him, to his wolves; mead alone was ample food and drink for him.

Odin and all his followers loved mead which they drank from their horns:

“Went there at times a fair maid round the board,
upfilling the mead-horns,—
Blush'd she with downcast eyne,—in the mirroring
shield her image,
Even as she blush'd too;—how it gladdened the
deep-drinking champions!”

Odin's principal pleasures were carnage, war, banquets, the "celestial" boar and mead, which virgins served to him in the skulls of his enemies. It is singular that in Scandinavian languages the word "Skol" (skull) is used when they drink to the health of people. It, undoubtedly, originated from the legend of Odin.

"Their banquet is the mighty chine
Exhaustless, the stupendous boar;
Virgins of immortal line
Present the goblet foaming o'er;
Of heroes' skulls the goblet made
With figur'd deaths and snakes of gold inlaid."

Penrose thus opens the *Carousal of Odin*:

"Fill the honey'd bev'rage high,
Fill the skulls, 'tis Odin's cry!
Heard ye not the powerful call,
Thundering through the vaulted hall?
Fill the meath and spread the board,
Vassals of the grisly lord!—
The feast begins, the skull goes round,
Laughter shouts—the shouts resound."

The Valkyries took the dead heroes to Valhalla, the slain warriors' Paradise, where under a golden roof they continued to live in celestial glory. From the udders of the goat, Heidrun, savory mead was supposed to flow; "From out her teats there runneth forth so much mead that she filleth therewith each day a huge drinking vessel and all are made drunken thereby." (Gudrun mixed her mead with the blood of her spouse.) The meth was inexhaustible, like the celestial boar, which was eaten by day and restored by night.

Alaric and Attila, the descendants of Odin, also favored mead.

"Bid him welcome, maiden; haste,
Let him our metheglin taste."

That it sometimes led to mischief we may see in the *Elder Edda*:

“For Asi sons the bowl I fill
-With mead, the source of many an ill.”

It is possible that Attila, the Scourge of God, when he married the beautiful Ildiko (about 452 A.D.) and died from nose-bleed during the wedding festivities, had indulged in too much mead. When Ossian, the Gaelic poet (third century), referred to a liquor, “the joy and strength of shells,” which so delighted his heroes, he probably meant mead. Shells were used by many ancient races as drinking vessels, e.g., the Caledonians. Their descendants in some parts of the Highlands still use them today. The expression “Feast of Shells” alludes to this custom.

In Nordic mythology, derived from the Eddas, honey is often mentioned. In Finnish mythology, the bees were implored to fly to the sun and moon, into the dwelling of the Creator; to carry honey and health in their mouths and on their wings to the good, and wounds of fire and iron to the wicked.

Bees were supposed to have made honey in Paradise and to be survivors of the Golden Age (which preceded the present state of vice and misery), when there was no need for worry, and happy simplicity for men and beasts prevailed.

CHAPTER XVIII

IN TRADITIONS, CUSTOMS AND SUPERSTITIONS

IN ALL ages honey, and indirectly its producer, the bee, were closely connected with the domestic life of the populace, and thus had a profound, almost magnetic influence on the people. The conception of honey was associated with everything that was holy, agreeable and beneficial.

The origin of these traditions and customs is almost impossible to trace. They were handed down from one generation to another, for innumerable centuries. Though some traditions have certain national characteristics, most of them were not limited to defined territories, but were disseminated among nations far apart. The same popular customs are found among the Far Eastern, Asiatic, African and European races and the distances which they traveled, compared to our present day facilities of communication, must be considered enormous.

Among the most ancient races, the Assyrians, Babylonians, Chaldeans, Phoenicians and Hebrews; in India, China, Persia, Egypt, Greece and Rome, in fact, among almost all cultural and primitive races, we find many customs and traditions associated with honey. These beliefs, closely connected and intimately interwoven with their domestic, social and religious lives, offer plentiful and intriguing material for research. On solemn occasions, like births, weddings, funeral services, and during religious ceremonies honey played an important rôle. Honey was considered a sacred substance, symbolizing the purest and noblest in Nature. It was looked upon not only as a food and medicine, but as a talisman, a protector from all evil. Among the Germanic and Slavic races there was a belief that if one ate honey on Maundy Thursday he

would gain protection for the year against all diseases, and if honey were sprinkled in a room on Holy Saturday it would kill all vermin. In Poland and Silesia honey was given to the cows and even rubbed into their eyes to prevent pestilence. To ward off contamination of wells, honey was poured into them. A string dipped into honey at sunrise and tied around a fruit tree would produce a rich fruit crop. Blessing the fields with honey was an old pagan custom. The ancient Germanic farmer, after he had finished plowing the first furrow, poured milk and honey into it. This was called *Ackersegen*. The ritual was especially employed when there was a suspicion that the fields were blighted by magic.

Many beliefs and customs connected with honey existed among the populations of all countries. For example, stingy or quarrelsome people, it was believed, were never successful in producing honey. Every year, one had to send some honey and wax to the neighbors in appreciation of their courtesy in allowing the bees to feed on their flowers. Denying honey to the sick meant empty combs in the future. To refuse honey to children was a sin against Mary and Joseph, who had fed Child Christ. To send honey to a dying person, however, was bad luck. Selling honey was prohibited among many nations but barter was permitted. Menstruating women had to keep away from the hives, otherwise the honey would turn sour.

A tree in which wild bees had nested and stored their honey was reputed to possess occult powers. Girls would carry a splinter from such trees to entertainments to assure themselves of being well supplied with dancing partners. Farmers carried the branches with them when they drove their cattle to market, with the expectation of securing good buyers. The Slavs called a bee-tree a lucky tree, and a branch of it, broken off on St. Andrew's day, was considered a lucky charm. In Finland there is a belief that if a girl bakes a honey cake on Christmas Eve, keeps it in her bed overnight, and then gives a piece to her sweetheart, he will remain true to her through life. There was a widespread belief among many nations that where there were honey and bees, lightning would not strike and the devil would never approach.

In enumerating only a few of the superstitious beliefs, customs and traditions connected with honey, the writer has thought it best to group them according to the three paramount and most solemn events of life, namely, birth, marriage and death.

1. BIRTH

The use of honey was only rarely omitted during birth-rites. Among Babylonians, Iranians, Egyptians and Hebrews, honey and milk was the first nutriment which touched the lips of a new-born. Calvin mentions in Isaiah, Ch. IX, that, "the Jews to this day, give their infants a taste of honey and butter before they suck." The Galician Jews put a piece of honeycomb into the cradle before the infant is placed in it. During Hindu birth ceremonies, after a male infant is born and the umbilical cord is severed, the father touches the lips of the son with honey taken from a golden vessel and applies it with a golden spoon, at the same time giving the child its name. The Hindus hang a branch of the sacred tree, smeared with honey, over their doors with the invocation: "The young child cries to it; the cow that has a young calf shall low to it." Amongst the Mohammedans in the Province of Punjab (N. W. India) the most respected member of the family puts *ghutti* (made of honey) into the mouth of the infant as its first food and holds honey over its head to ward off evil spirits.

There were similar customs among the Greek, Roman, Slavic and all Anglo-Saxon races. The Scotch Highlanders, soon after the birth of a child, take a fresh branch of ash (*melia*, *mel* = honey) which secretes a sweet manna-like juice, burn it at one end and after smearing some honey on the other end, they daub with it the lips of the infant. The Scotch believe that honey, being a sacred substance, should be the first food to touch the palate of the new-born. An identical ceremony prevails in Finland and in the Caucasus. During birth ceremonies in modern Greece a chosen child smears honey on the lips of the infant with the prayer: "Be thou as sweet as this honey." To give honey to an infant as its first food was also a heathen Germanic custom.

If honey were placed on the lips of an infant by some miraculous means, it was believed that the act bestowed the gift of poetic inspiration and eloquence or that the child would become a saint. Cicero described how Plato, yet an infant, was taken by his father to Mount Hymettus to offer sacrifices to the Muses. The child was laid in a thicket and while he slept a swarm of bees built a honeycomb in his mouth which presaged the singular sweetness of his discourses and his future eloquence. The same miracle happened to Xenophon, Sophocles, Pindar, Virgil, Lucanus, St. Ambrose, St. John Chrysostomus, St. Dominic, St. Isidor and many others. Among the Mohammedans, there is a superstition that if one dreams of a bee he will become a great singer. The bee was a symbol of the Koran. In Hungary the population believed that when a son was born to the King, the bees put honey on his lips for good luck. Homer was nursed by priestesses whose breasts distilled honey. Zeus, the god of Mount Olympus, was nursed on honey. The Greeks and Teutons believed that honey conferred immortality.

(Thomas Huxley, the famous biologist, humorously referred in his biography to the magic power of honey to endow mellifluous eloquence. He deplored his lack of oratorical talent, because the power of speech gains higher places in Church and State than worth, ability or honest work. Huxley blamed his incompetency in this respect on a lamentable incident: "A neighboring beehive emitted a swarm and the new colony, pitching on the window sill, was making its way into the room when a horrified servant shut down the sash. If that well-meaning woman had sustained from her ill-timed interference the swarm might have settled on my lips and I should have been endowed with eloquence.")

Once honey had touched the lips of an infant, the act was supposed to confer on it a certain magic spell. According to the ancient laws of Friesland, a father was permitted to expose an infant to its doom, but after the child had tasted honey and milk its life had to be spared. Hieron II as an infant was exposed in the fields by his father Hierocles, because the child was born to him by one of his servants. The bees cared for the foundling and fed him on

honey. When the father learned of the miracle his attitude toward his son changed. The child was raised with great solicitude and received a liberal education. Hieron subsequently became a noted patron of literature and chief of the army, and as such won the battle of Mylae (296 B.C.). After the victory he became king of Syracuse.

When the Pharaoh of Egypt gave the order that all male Hebrew children should be destroyed by drowning them in the Nile, Jewish mothers were constrained to give birth to their children in the fields. The mother of Moses kept the future Prophet concealed for three months, and it would not be surprising if he also were brought up on honey. This might account for his wisdom, eloquence and prophetic powers. According to the Biblical legend (Exod. R. 23: 8), the exposed children were given two pebbles, from one of which they obtained oil, and from the other, honey.

2. MARRIAGE

“Und süß wie der Honig
Ist der Ehestand.”

(And sweet as honey is wedlock.)

In nuptial ceremonies and in the matrimonial lives of most ancient nations and of many of the primitive races to this day, honey has played just as important a rôle as in birth-rites. In Egypt, honey was considered such an essential substance that in every marriage contract the bridegroom had to promise to supply his bride yearly with a definite amount of honey. When the nuptial knot was tied, the bridegroom said, “I take you for my wife and bind myself to furnish you annually with twenty-four hins (32 pounds) of honey” (Brugsh). During Hindu wedding ceremonies honey offering was an important function. The bridegroom kissed the bride and said: “This is honey, the speech of my tongue is honey, the honey of the bee is dwelling in my mouth and in my teeth dwells peace.” During the course of the services the



AMOR AS HONEY-THIEF

By Lucas Cranach, 1530
(*Kopenhagen Statens Museum*)



VENUS AND CUPID

By Lucas Cranach
(*Villa Borghese, Rome*)



THE HONEY-THIEF

By Albrecht Dürer, 1514

bride's forehead, mouth, eyelids, ears and genitals were anointed with honey. In Bengal, the Brahmans believed that if the bride's pudenda were covered with honey it would produce fertility. When the Dekan Hindu bridegroom called on the bride, honey and curds were offered to him with the object of scaring away evil spirits. The Hindu firmly believed that honey had the magic power to ward off demoniacal spirits, so much feared during marriage ceremonies.

We find similar customs among African natives. In Galla-land, a country bordering on Abyssinia, honey was an important food and a principal commodity of trade. Before a wedding the Galla bridegroom had to bring a fair quantity of honey to the intended bride. If the amount were unsatisfactory, the bride and her family rejected him as a future husband. The Galla women have the reputation of being the most independent among the women of Eastern Africa.

In Morocco, the wedding guests are offered honey before the ceremonies. During the nuptial rites no honey is used because it is reserved for the cult of the dead. After the wedding the groom feasts on honey to which also the Moroccans attribute a powerful aphrodisiac effect. The nuptial supper of a Roman couple consisted of milk, honey and poppy-juice.

On the European continent among the Greeks, Nordic, Germanic, and Slavic races honey had an important function before, during and after wedding festivities. The Poles sang a song at weddings: "Diligent is the life on a farm, like the life of the bee, and marriage is sweet as honey." When a Polish bride reached her home after the ceremonies, she was led three times around the fire-place, her feet were washed and when she entered the bridal chamber she was blindfolded and honey was rubbed on her lips. In Hungary the bride baked honey cake during full moon and gave it to the groom to secure his love. During the celebration of marriages the young couples were fed with honey by wise women. This was supposed to sweeten their wedded life. In Croatia the parents of the bridegroom await him at the threshold of the house with a pitcher of honey. The container must not be made of glass.

When the groom appears he asks his mother what is in the pitcher. The answer is: "My son, it contains my honey and thy good will." When the bride enters the house she is offered by her mother-in-law a spoonful of honey. The spoon is several times withdrawn but finally with a sudden dash is put into her mouth. The bride is given, besides, a nosegay and a cup of honey. While the bride walks around the house she spreads honey over each threshold and door. In Dalmatia and Herzegovina there is the same custom; even the wedding ring is dipped into honey during the ceremonies. In Slovakia, milk and honey; in Silesia, cooked barley and honey; in Bulgaria, bread and honey are given to the bride. The Bulgarians offer a special soup to the bridal couple, called *okrap*, which is made from wine and honey. The wedding cake baked with honey is broken over the head of the bridegroom and some honey is rubbed on his face. The woman who anoints the groom exclaims: "Be fond of each other as the bees are fond of this honey." In Serbia, Albania, Rumania and Turkey similar customs prevail, especially among the gipsy tribes.

During Swedish wedding festivities honey was liberally used. According to ancient records in 1500, when the daughter of a wealthy Swede, named Krogenose, was married, half a ton of honey was consumed. In 1567, during the wedding feast of Sigrid Sture, 453 jars of honey were used. The Finns also did justice to honey and, more so, to honey drinks.

In modern Greece some of the ancient customs still persist. When the bride arrives at the groom's cottage, his mother stands waiting at the door with a jar of honey of which the bride must partake that the words of her lips may become sweet as honey. The remaining contents of the jar are smeared on the lintel of the door, that strife may never enter the home. In Rhodes, when the groom arrives in his new home, he dips his finger into a cup of honey and traces a cross on the door.

In Brittany, Westphalia and Lincolnshire the betrothals are announced to the bees and the hives are decorated with red or white ribbons; part of the wedding cakes are placed before them

and the new couples must introduce themselves to the bees, otherwise their married life would surely be unlucky.

In Hungary, where honey always was an important food, the production had fallen off considerably after the World War. The town of Kecskemét decided that every newly married couple should receive from the municipality a beehive and a swarm of bees as a wedding present to encourage apiculture. (If one—or both—of the contracting parties were stung, the city fathers may also be blamed for it.)

We could not very well close this chapter without reflecting on the meaning of a popularly used term, honeymoon.* Some philologists (probably with conjugal experiences) have suggested that this sweetest period of wedlock was compared with the moon because as soon as this celestial body reaches a full phase it commences to wane, not unlike the affection of wedded couples. Others have thought that the allusion stems from the ancient custom whereby the bride and groom were wont to eat honey and drink mead during the first four weeks of their married life. That a honeymoon is not necessarily "sweet" can be adjudged from Hood's poem:

"The moon, the moon, so silver and cold,
Her fickle temper has often been told—
Now shady—now bright and sunny;
But of all the lunar things that change,
The one that shows most fickle and strange,
And takes the most eccentric range,
Is the moon—so called—of honey!"

3. DEATH

Honey had a wider use and more significance during burial services and funeral rites than during ceremonies for either birth

*The era between the years 1898 to 1902 was called the *honeymoon period* of American industry. Collective bargaining was introduced and the accord between employers and employees was compared with the harmony of newlyweds.

or marriage. Many ancient races, among them the Egyptians, believed that the souls of the departed continued to live and required food for their future maintenance, otherwise they would starve. According to ancient concept, the body was destroyed, but not the soul, which survived and was supposed to return to earth. Death was considered not so much the departure of the body but that of the soul, freed of its fetters, in flight to a future destination. Honey, as a rule, symbolized death among the ancients, an allusion to the sweetness of death, contrasted with the bitterness of life. The Greeks also thought that life was bitter and death sweet. Honey was offered to Hecate, the Chthonian Artemis. Hecate's by-name was Melitodes (honey-like).

There was no other more appropriate and favored food for the dead than honey. It was an established custom among the Hindus, Chinese, Babylonians, Egyptians, Greeks and Romans to place honey next to the corpse. Similar practices were in vogue among the ancient Mexicans, the North American Indians and the Eskimos. The Japanese supplied not only food and drink but also clothing for their dead.

Before burial, the so-called funeral repast was placed next to the bier and rations were also stored in the graves to supply the needs of the deceased. On solemn occasions, especially on death anniversaries, ritual services were held by relatives and friends during which the most favored provisions of the departed ones were laid on the burial places or in the tombs. Honey and wine were often sprinkled over the graves and over the funeral pyres.

In the various copies of the Egyptian *Book of the Dead* which are the most ancient scripts, originating as far back as the Pyramid Age, honey is often mentioned. In the tombs of kings, next to the mummies, jars of honey were placed. When found, this honey was still in a fairly good state of preservation. The great papyrus of Rameses III records that during his reign of thirty-one years, millions of jars of honey were purchased from the royal treasury for sacrificial offerings. There is an inscription on a tomb in the Necropolis of Abidos: "The King appoints that a sum of three and a half pounds of silver from the Treasury of the Temple of

Osiris be given in order to cover the *daily* demand for one measure of honey, to be used at the ceremony of the worship of the dead, for his beloved Naromantha." The picture (Plate XIV) shows how the Royal Butler, accompanied by the sacred bull, carried honeycombs and lotus blooms to the tomb of the royal dead.

Honey sacrifices consisting of honey, honey cakes and edible plants were often tendered to the Egyptian gods. The lips of the priests were anointed with honey and part of the sacrificial food was later consumed by the believers (Plutarch, *Op.* Ch. 68).

During the funeral rites of many nations, the wish was expressed that the departed ones might find a land where there was plenty of honey. The Mohammedan dream was a land with rivers of honey; this was also Mohammed's promise to the faithful and his true conception of Paradise.

The Greeks and Romans excelled all other nations in bringing honey sacrifices to the graves. In the *Iliad* Achilles offers honey at the bier of his friend Patroclus, who was killed after he had driven back the Trojans.

"And he sat therein two-handled jars of honey and oil,
Leaning them against the bier."

Achilles also sprinkled honey on the grave as an offering to the Chthonian gods.

Aeschylus describes in *The Persians* the honey libations which Queen Atossa tenders to her husband, Darius:

"I return, and bear
Libations soothing to the father's shade
In the son's cause; delicious milk, that foams
White from the sacred heifer; liquid honey,
Extract of flow'rs."

Euripides pictures Iphigenia at the grave of her brother bringing honey sacrifices:

"For him, as dead, with pious care
This goblet I prepare;

And on the bosom of the earth shall flow
 Streams from the heifer mountain-bred,
 The grape's rich juice, and mix'd with these,
 The labor of the yellow bees,
 Libations soothing to the dead.
 Give me the oblation: let me hold
 The foaming goblet's hallowed gold."

In the *Odyssey*, Circe advises Ulysses upon entering Hades to sprinkle the shadows of the dead with honey, milk and wine. Hesiod's grave in Locris was deluged with honey by the pious shepherds. Zarathusthra paid homage in similar manner.

We learn from one of the dramas of Lucian, the celebrated Greek satirist, why honey was poured over the graves. Charon, the boatman of the underworld's black river, ascends to the world above and with the guidance of Hermes surveys the realm of mortals. The first thing he wishes to see is, of course, the places where the dead bodies are inhumed. The ferryman expresses his astonishment upon seeing there all the honey and mead, which mortals call libations, poured over the graves in honor of the dead.

Charon exclaims:

"Why, then, crown they
 These stones, and why with unguent rich anoint them?
 And why do some, heaping a funeral pile
 Before the mounds, and digging out a trench,
 Burn sumptuous viands there, and in the ditches
 Pour, if I right conjecture, mead and wine?"

Hermes explains:

"I know not ferryman, what use it can be
 To those in Hades; but it is believed
 That souls returning from the world below
 Will come to supper—very probable!
 Hovering above the savor and the smoke,
 And from the trench will drink up the metheglin."

Supplying the dead with food was originally a heathen custom which later became a Christian ritual. In Russia and many other countries, even today, a jar of honey is placed next to the corpse and some is desposited in the grave. The Russian *kutja* (death food) is made of flour, poppy seeds and honey. Some of it is consumed by the funeral guests, the rest left for the dead. Honey cake, as a sacrificial offering to the deity, had an Indo-Germanic origin.

Among many African tribes, placing honey next to the bier and in the grave, is still a custom. The Indians gave their dead honey and rice.

Honey was considered by all ancients a sacred substance, the purest and best thing in the world, the symbol of eternal bliss. There was an old belief that if a corpse was preserved in honey it would reincarnate. Democritus firmly believed that. There are many mythical tales that people who perished in honey revived. The ancients undoubtedly were impressed with the efficiency of honey in protecting organic matter from decay and the origin of the belief in the miraculous preserving power of honey can be ascribed to this appreciation.

Ancient cultural states and also primitive races used their best efforts to preserve their dead and prevent decomposition of the body. The simplest method was to expose the corpse to the influence of the sun-rays until the body fluids evaporated and the tissues dried up. This is still practiced by some savages.

The Egyptians, Babylonians, Persians, Assyrians and Arabs used honey and wax for embalming their prominent dead. Herodotus records that the Babylonians buried their dead in honey. He also relates the same about the Assyrians, who, however, first covered the corpses with wax. The old Spartan Kings were embalmed in honey, as were Justinian, the Byzantine emperor, and Alexander the Great. Alexander the Great, as Statius records, ordered before his death that his remains be preserved in honey. Aristotle, his teacher, had undoubtedly made him appreciate the conserving power of honey. Aristotle wrote an extensive thesis on this phase of honey, which however was lost in the conflagration

of the library in Alexandria. Strabo described, in his fourteenth book, how the body of Alexander the Great was placed in a golden coffin filled with white honey. Herod I, King of Judea (40-4 B.C.), the superstitious despot and tyrant, more hated than any other person of his age, in a fit of jealousy ordered his beautiful wife, Marianne, to be executed; after which he kept the dead body in honey for seven years—because, he avowed, he loved her. Aristobulos, whom Caesar had ordered to Syria and who was poisoned by the followers of Pompeius, was also embalmed in honey, until Anthony sent the remains to Judea to be entombed in the royal sepulchre. The Assyrians and Persians (Herodotus I. 198) covered corpses with wax and then buried them in honey. The dead body of Agesilaus was covered with wax, we learn from Plutarch. "The attendants of Agesilaus had no honey to preserve the body (he died in a foreign country), so they embalmed it with melted wax and thus carried it home." Cornelius Nepos and Plutarch ascribed the adoption of the use of wax to a scarcity of honey. Homer in the *Odyssey* (XXIV. 68) describes the funeral of Achilles, "buried in the garments of the gods and in sweet honey." The *Iliad* (XIX. 38 and XXIII. 170) also renders an account of how the dead were anointed with honey. An old Egyptian script mentions that a corpse in honey mummifies in 120 years.

The secret of the remarkable art of Egyptian embalming is entirely lost. This is not surprising because the mysterious process was unknown even to the contemporary Egyptians. The embalmers, as a rule, inherited the proficiency from their ancestors. All we know from the Greek and Roman writers of antiquity is that the contents of the cranial, pleural and abdominal cavities were removed and filled with aromatic herbs, fragrant spices, balsams, oil of cedar, etc. That the corpse afterwards was placed in honey or wrapped in honey-soaked bandages seems more than probable because several allusions in the Egyptian papyri intimate that honey converts a corpse into a mummy in the course of years. Columella repeatedly mentions the embalming of bodies in honey. The honey-loving philosopher Democritus was also preserved in

honey. Abd' Allatif relates that some men, searching for treasures in the Egyptian tombs near the Pyramids, discovered a sealed cruse and upon opening it they found that it contained honey. They began to dip their bread into it when one of them noticed hairs upon his fingers. The jug was carefully examined and was found to enclose the body of a small child in a perfect state of preservation. After the body was entirely withdrawn, rich jewels and brilliant ornaments with which the child was covered, were revealed.

In Persia burial in honey also was practiced. In one of their manuscripts there is even a prescription for making mummies for profit. A red-haired man had to be fed until he reached the age of thirty. Then he was to be drowned in honey and drugs and the vessel sealed. After 150 years, according to the script, the honey transformed the corpse into a mummy. The reason for supplying mummies for commercial purposes was because powdered mummies were credited with curative value for both internal and external diseases. In the sixteenth and seventeenth centuries mummy-powder was in great demand and sold in the apothecaries for a good price. For this reason many tombs were plundered. The Jews in the East and the French were the best customers and used it for various maladies (Ambroise Paré). The powder had an aromatic sweet-acrid taste. It was used externally for wounds to prevent gangrene. The Arabs use it even today for the purpose. The belief in the Middle Ages in the curative effect of honey seems to suggest that the substance was used for embalming. There is a sepulchral inscription in Thelmessos (Greece), of the first century A.D.:

“Here lies Boethos, Muse-bedewed, undying,
Joy hath he of sweet sleep in honey lying.”

In the famous medieval Romanesque cathedral of Bamberg, on the tomb of Henry II (Saint), Emperor of the Holy Roman Empire, who died in 1024, there is the following inscription:

“Sus lît er da in sîner stift
 di'er het erbouwen, als diu bin ir wift
 ûz manege bluete wurket, daz man honc-seim nennet.”

(“He lies in the minster he built, as the bee her web
 from many a blossom works, which we name honey-juice.”)

When King Edward I of England, who died in 1307, was exhumed in 1774, his hands and face were found to be well preserved. This condition was attributed to the fact that they had been coated with a thin layer of wax and honey.

In Burma, during the rainy season, the eviscerated corpses are preserved temporarily in honey, until relatives are able to procure dried fire-wood for the customary cremation. If the dead person buried in honey is a holy Buddhist monk and the corpse is removed from the coffin for cremation, the honey is dispensed in one ounce jars and sold at auction. Often fortunes are realized from such sales. The Burmese firmly believes that a drop of this honey will cure any affliction.

* * *

The ancient belief that anyone who drowned in honey would revive, is best illustrated in the legend of Glaucos.

Glaucos, the son of the Cretan King Minos, while playing with a mouse (the symbol of death) fell into a jar of honey and drowned. Minos searched for him in vain. At last he appealed to the oracle of Apollo and only under its guidance did he find the body of his son. Apollo announced to Minos: “A monstrosity has been born in your land and the person who will be able to discover its meaning shall *find* and *restore* your son.” The whole country looked for the monstrosity, which was very soon found. It proved to be a calf which changed its color thrice daily; first it was white, then it became red and finally black. Minos summoned all his augurs to find out what this signified. The seer Polydos was the one who could construe its meaning. He thought the calf represented a mulberry tree, the fruit of which is first white, afterwards

red and when ripe, black. Minos ordered Polydos to find his son. At first he hesitated but after he was compelled, he commenced his search for the lost son of the King. Polydos, during his long wanderings, passed a honey-bin, on top of which an owl was perched, driving away some bees. He considered this an omen, entered the bin and found Glaucos, drowned in a vessel of honey. (Fig. 10.)

Polydos notified the King of the recovery of Glaucos' body. The seer was locked in a vault with the corpse and ordered to resuscitate it. A snake soon crawled toward the body of Glaucos, but Polydos killed the snake. Another snake, bearing an herb, laid this over the dead snake, which at once revived. Polydos then placed the same herb over the body of Glaucos, who immediately came to life. Polydos received royal rewards for his deeds and was discharged, laden with treasures.

The circumstance that the bees which tried to enter the honey-bin were driven away by the owl, was symbolical of the fact that the bees, representing the soul of the deceased, were using their best efforts to regain their former habitation and were prevented only by the sinister influence of the owl.



FIG. 10. Old Cretan gem.

Polydos finding
Glaucos in a honey
vessel.

(Courtesy Hilda M. Ransome, *The Sacred Bee*,
1937)

CHAPTER XIX

THE KALEVALA

THERE is no better illustration of the belief in the magic power of honey than in the romantic tales of the *Kalevala*, the national epic of the Finns. Through the magnetic effect of honey, steel was produced, beer was brewed, the dog created, and with the help of honey's blissful charm wounds were healed and the dead restored to life.

In Finland, the *Land of the Thousands of Lakes*, we find many delightful fables intimately connected with honey. The Finnish supposedly are a Mongolian race, like the Hungarians, Mordvins and other nations of kindred tongues. Apiculture was far advanced among them. Honey has been in great favor in Finland since time immemorial. *The Kalevala*, the epic poem of Finland, which is comparable only to the Iliad, Niebelungen, or Roland legends, often alludes to honey.

The *Kalevala* (the abode of heroes, a bardic designation of Finland) is a charming national epic and one of the most significant poetic works in existence. Its origin and introduction, in addition to its literary value, are extremely instructive from a historical viewpoint. The old sagas, the mythical and allegorical folktales and proverbs which the *Kalevala* contains, in the form of songs, ballads and incantations, were on the lips of the ancient people of that cold, bleak and desolate country for over a thousand years before they were collected by Zacharias Topelius and Elias Lönnrot, both practicing physicians of Helsingfors, and their collaborators, who spent many years of travel in Finland, Lapland and Russia, recording the popular songs and stories of the peasantry and fishermen. They traveled through forests, marshes and ice-plains, on horseback, in sledges drawn by rein-

deer, in canoes and other primitive conveyances to collect the legends and precious runes from the lips of the minstrels. The epic, filled with the power of magic, is a Herculean prototype of unwritten history. Longfellow must have had great admiration for the beauty of the *Kalevala* because the *Hiawatha* is a faithful imitation of it, both in respect to matter as well as to meter.

The enormous influence of the *Kalevala* on the Finnish population, since it was first published (1835), is best proven by the remarkable transformation, real regeneration of Finland. The disclosure of these romantic tales of wonderful heroism aroused patriotism and resulted in a surprisingly universal civic and moral revival of the nation. Formerly the upper classes of Finland had been absorbed by Sweden and Russia, while the majority of the population, as William Sharp remarked, became "a listless and inert mass."

Today Finland, after long lethargy and constant retrogression, is a new-born progressive country, full of hope, pride and ambition. The fact that Finland is the only country paying its international debts, is the best evidence. Of course, Providence is kind. Finland is a poor (which may be the reason why it pays its debts), barren country, otherwise it would long ago have been swallowed up by enterprising nations. Ethiopia, which is supposed to be one of the richest countries in the world, should envy Finland its indigence.

Some of the legends from the *Kalevala* associated with honey, are as follows:

THE ORIGIN OF BEER

Kapo, the beautiful daughter of Osmotar, was supposed to have invented beer. She took six seeds of barley, seven leaves of hop, and mixed them in seven pitchers of water.

"On the fire she sets the caldron
Boils the barley, hops and water
Lets them steep and seethe and bubble."

(Translation by John Martin Crawford)

The concoction did not ferment and had no taste.

“What will bring the effervescence,
Who will add the needed factor,
That the beer may foam and sparkle,
May ferment and be delightful?”

A snow-white squirrel was commanded to fetch some cones from the pine trees, and the weasel to gather some of the bear's saliva, “the foam from the lips of anger”, to serve as yeast. All efforts were in vain—the beer would not foam.

Kalevatar, a sparkling maiden, found a little shell lying on the ground, picked it up, and gave it to Kapo. From it, with the aid of Kapo's magic virginal fingers, a bee issued. The newly created bee was instructed to fly to an island, far over the seas, where a maiden peacefully slumbered under honey-bearing blooms, and collect nectar from these flowers. The agile creature flew off in haste and did what was ordered. The bee soon returned with the honey, which was quickly added to the stubborn mixture. Immediately, the foam rose in the vessel, and the new beverage was found to have a wonderful taste.

“Thus was brewed the beer of Northland,
At the hands of Osmo's daughter;
This the origin of brewing
Beer from Kalew-hops and barley;
Great indeed the reputation
Of the ancient beer of Kalew
Said to make the feeble hardy,
Famed to dry the tears of women,
Famed to cheer the broken-hearted,
Make the aged young and supple,
Make the timid brave and mighty,
Make the brave men ever braver,
Fill the heart with joy and gladness,
Fill the mind with wisdom-sayings,
Fill the tongue with ancient legends,
Only makes the fool more foolish.”

THE PRODUCTION OF STEEL

Ilmarinen, the master-blacksmith, the eternal metal-worker whose fame and wizardry were known over the seven seas, made arms and tools for all the people. The water was not strong enough to make his steel sharp, so he implored the bee to fetch him some honey from the field-flowers.

“Little bee, thou tiny birdling
Bring me honey on thy winglet
On thy tongue, I pray thee, bring me
Sweetness from the fragrant meadows,
From the little cups of flowers
From the tips of seven petals
That we thus may aid the water
To produce the steel from iron.”

The cunning wasp overheard the command and flying much faster than the bee returned with some venom of a viper. Ilmarinen thought he had obtained honey, and commenced to harden the steel with the water which was mixed with poison. Thereafter, all the wounds produced by his arms and tools were mortal, killing even the brothers of those who used them.

While constructing a boat, the famous minstrel Wainamoinen, the wisdom-singer, severely injured his hand with a hatchet forged by Ilmarinen. When the blood gushed in streams from the wound, the singer desperately cried for help. An old man was passing by and with magic words stopped the flow of blood. The man then sent his young son for a healing honey-balm, made from the finest blooms of the fields.

“There to make a healing balsam,
From the herbs of tender fibre,
From the healing plants and flowers,
From the stalks secreting honey,
From the roots, and leaves, and blossoms.”

He rubbed the balm on the wound, and it soon healed. The legends linked to Wainamoinen resemble very much those about

Orpheus. Wainamoinen had the epithet: "Orpheus of the North". Just as Orpheus charmed the birds and beasts with the golden tones of his music, so Wainamoinen lured, with his songs, the wolves from their lairs, the fish from the rivers, and the birds from the trees.

THE REANIMATION OF THE DEAD

Lemminkainen, the handsome young hero, in quest of a wife, wooed the beautiful daughter of Pohyola. Before their betrothal, Lemminkainen was put through severe tests and while performing one heroic act, he was bitten by a venomous snake and died. His enemies cut his body asunder and threw it piecemeal into deep water.

Lemminkainen's devoted aged mother, in the meanwhile, was sitting at home anxiously waiting for his return. Suddenly she noticed that blood was oozing from the hero's hairbrush. She had a foreboding that her son had suffered a sad fate. She left her home in anguish, weeping and trembling, in search for the hero. She questioned the trees, the rivers, the moon about her lost son. They would not tell her. Finally the Sun informed her of the sorrowful event. She immediately began a search for the submerged parts of the hero and after great effort she succeeded in recovering them from the depths of the water. The grieving mother assembled the parts but, though she used all known magic, she could not create life in the dead body.

The mother appealed to Mehilainen (little bee),* and begged her to collect the nectar of the finest blossoms. (Plate XV.)

"Tiny bee thou honey-birdling
Lord of all the forest flowers,
Fly away and gather honey
Bring to me the forest sweetness. . . ."

* In the Finnish language, meh means bee (the same as in Hungarian), and Mehilainen is a diminutive of meh. In both these related languages, a diminutive is frequently used as an endearing term.



THE TOMB OF A ROYAL BUTLER. ABOUT 1450 B.C.

(Courtesy of Metropolitan Museum of Art)



THE KALEVALA

Mehilainen (little bee) departs to fetch honey-balm for
the anxious mother

PLATE XV

In a short time, the bee returned, dripping with honey. The mother made a healing-balm from it and rubbed some over the body, but the embrocation had no effect.

The mother again asked the bee for help: "Little Bee, you queen of the flowers, fly for me again but in another direction. Look for a little island, far across the seven seas, where you will find some magic nectar, which will produce wonders." The little bee started upon the journey and flew for three days without interruption, until at last she found the isle with meadows rich in honey.

"There the honey was preparing
There the magic balm distilling,
In the tiny earthen vessels,
In the burnished copper kettles
Smaller than a maiden's thimbles,
Smaller than the tips of fingers. . . ."

The island was filled with jars of healing honey-balm. Mehilainen, after a short rest, took seven jars into her lap, seven on her shoulders and so, well laden, commenced her return trip. The mother tried again to rub the wonder balsam over the assembled body of her son, but still there was no sign of life.

Once more, she addressed the bee: "Little Bee, you bird of the air, please fly for the third time! Go over the clouds, up to the ninth heaven! You will find plenty of honey there which will surely produce results. The Lord has blessed this honey, to resuscitate His children." Mehilainen answered: "How will I, such a tiny creature, ever get there? No! My strength will give out and I will lose my way!" But the mother encouraged her: "Just fly, my little Darling; a gorgeous highway leads there and you cannot miss your way." The bee acquiesced, flew into the air, and soon reached the azure sky. She passed the Moon and she passed the Sun, flying among constellations of golden stars until she reached the omnipotent Jumala's castle. (Jumala, in Finnish, the Supreme Creator and also sky.)

Here the balm, made of the health-giving juices of flowers, was waiting for her in golden and silver vessels.

“On one side, heart-easing honey,
On a second, balm of joyance,
On the third, life-giving balsam.
Here the magic bee, selecting. . . .”

The faithful bee, collecting only the best from all the urns, put a hundred little jars into her lap and a thousand jars on her back. Heavily laden, she started her homeward trip. The eager mother happily greeted the bee, tasted the honey, and found that it was the right compound. Immediately, she rubbed it over the body of her dead son with the words: “Wake up, my son, from your deep slumber; get up from your sick-bed!”

Lo and behold! The miraculous honey, for which the bee had flown for days, worked; the blood commenced to circulate, the cheeks became flushed and Lemminkainen raised himself and uttered words. So the faithful little bee, which had made the wearisome trip through the immeasurable skies to secure the magic honey, brought back life to the dead.

In the *Kalevala* the bee is glorified by one of the most appropriate epithets with which she was ever honored, namely, “the bird of the Universe.”

THE SAVING OF CATTLE

The hostess of Northland drove her cattle daily to the meadows. In fear of the mighty bear, the honey-eater, which robbed her of the best cattle, she fetched from Heaven a cornucopia, blew into it, and soon the wide pastures were covered with honey; she begot even a golden well filled with honey, from which her cows drank. She suggested to the bear: “Otso, you beloved honey-paw, you pride of the woods, here you are now lavishly provided with honey; be content and spare my cattle.”

“Thou shalt feed on milk and honey,
Honey is the food of strangers.”

Otso agreed to the bargain and was perfectly satisfied. From that time on, the herd was unmolested.

THE CURE OF DISEASES

There were nine diseases in Northland:

“Colic, Pleurisy and Fever,
Ulcer, Plague and dread Consumption,
Gout, Sterility and Cancer.”

Wainamoinen, “the wise and wonderful enchanter”, hastens to his people’s rescue.

“Wainamoinen heats the bathrooms,
Heats the blocks of healing sandstone
With the magic wood of Northland
Gathered by the sacred river.
Then a honey heat he wakens,
Fills the rooms with healing vapors.”

Then he prays to Ukko, the Great Spirit of Finland:

“On the heated blocks of sandstone
May the water turn to honey
Laden with the balm of healing.
Send us mingled rain and honey,
Balsam from the great physician
To remove this plague of Northland.”

The “eternal wise enchanter” then:

“Rubbed his sufferers with balsams
Rubbed the tissues, red and painful,
With the balm of healing flowers
Balsams made of herbs enchanted.”

“The eternal wisdom singer
Thus expelled the nine diseases
Healed the tribes of Kalevala
Saved his people from destruction.”

THE CREATION OF THE DOG

The dog was created by the virginal fingers of the purest maiden of Pohyola. She was engaged in melting virgin honey, when some of it hardened on her fingers and from that the first dog was created. It was a neat, sweet, white-collared creature that did not bite “in the very least.”

CHAPTER XX

HONEY IN POETRY, SYMBOLISM, EXPRESSIONS AND NAMES

HONEY is frequently mentioned in the works of all poets and writers, especially by the oriental and classical writers. Honey represented to them all things that are sweet and pleasing to the palate, to the mind and to the heart. Honey, like the bees, was a symbol of spirituality and also of poetic inspiration; it was looked upon as psychic nourishment—the food of the saints, carried by the bees even to the thrones of the gods. Metaphorical references to honey are found in innumerable phrases, names, proverbs, and symbols; to all intents and purposes alluding to its many noteworthy characteristics. Honey and the hive shared in popularity. Honey and the sting of the bee were often contrasted.

Bees were called by the Greeks and Romans the *Birds of the Muses*. The golden bees were supposed to have gathered honey for the poets on thyme-covered Mount Hymettus to sweeten their verses.

Hindu poetry is literally drenched in honey. Madhukara (honeyborn) had three meanings: bee, lover and moon. There are many romantic Hindu tales associated with honey.

In the *Rig-Veda*:

“My tongue hath honey at the tip, and sweetest honey at the root.
Thou yieldest to my wish and will, and shalt be mine and only mine.
My coming in is honey sweet, and honey sweet my going forth;
My voice and words are sweet: I fain would be like honey in my look
Around thee have I girt a zone of sugar-cane to banish hate
That thou may'st be in love with me, my darling, never to depart.”

In Hindu mythology all delightful endowments were symbolized by honey. When *mem-sahib* (woman) was forged by Twaskrie, the Hindu Vulcan, he mixed a little honey in the raw material. The ingredients, by the way, were the following: The buoyancy of the leaves, the velvety gloss of the fawn, the brilliancy of the sun's rays, the tears of the mist, the inconstancy of the winds, the trepidation of the hare, the vanity of the peacock, the softness of the dawn on the throat of the swallow, the hardness of the diamond, *the sweetness of honey*, the cruelty of the tiger, the warmth of fire, the chill of snow, the chatter of the jay, and the cooing of the dove. From these components he created Woman and presented her to man. (Evidently, with a bountiful spirit of giving "something to remember me by.")

According to the Greek and Roman literature, honey possessed the magic power to confer the genius of poetry and eloquence; in Hindu mythology, even wisdom.

The deep influence which honey always has had on mankind is demonstrated by the innumerable geographic designations which include the name honey. In India, Egypt, the Holy Land; Greece, Italy, and in fact, on the entire European Continent and in Africa there are many names of towns, mountains, lakes and rivers which are associated with the word honey.

In Greece there are several towns called Melita or Melite. The classical name of the Island of Malta was Melita (Sicilian spelling). Melville, means honey-town; Melrose, honey-rose. In Germany, Austria, Hungary and the Slavic countries we find innumerable names derived from bees and honey. Dardanos, a village near the Strait of Dardanelles, means bee-town (*darda* in Turkish, bee).

In England there are Honington (honey farm) in Suffolk; Honeydon in Bedfordshire; Honnington and Honiley in Warwickshire; Honeybourne and Honeybrook in Worcestershire. There are several Clonmels (honey-meadow) in Ireland.

In the United States:

Honey, Mississippi	Honeycreek, Iowa
Honey, North Carolina	Honey Creek, Oregon
Honey Hill, South Carolina	Honeycreek, Wisconsin
Honey Bend, Illinois	Honeyford, North Dakota
Honey Creek, Illinois	Honeygrove, Texas
Honeybrook, Pennsylvania	Honey Island, Louisiana
Honeygrove, Pennsylvania	Honey Lake, California
Honeycreek, Indiana	Honeyville, Oklahoma
Honey Falls, New York	

The word amber also seems to be associated with honey. It was believed that amber was anointed with honey (ambrosia). Amber is an old English name for pitcher. Amberstone and Honeycrock in Sussex are adjoining. In Wiltshire there are Ambresbury and Mount Ambrosius. The name Melleray (Brittany), a town where the Trappist monks established an abbey, was derived from mellearium (apiary). The good old Irish name Mahoney is probably a contraction of the words my honey.

Melos (song), Melpomene, melodrama, melody, melon, mellow (rich in flavor), mellifluous, mellify, etc., etc., are derived from the root, mel = honey. "My honey" is a favorite expression of the Southern negro. In old Latin writings, we also find *puella mellita* (honey girl). *Honey boy* is a recent acquisition. The verb *honey* means to flatter, cajole.

The expression *sardonic laugh* also originated from honey. On the Island of Sardinia, there is a plant from which honey is collected by the bees and if this is consumed it will cause a grim, convulsive, often fatal laugh.

* * *

There are many legendary myths and fairy tales which glorify the bees, not only for industry, economy and the political perfection of their state but especially for supplying mankind with heaven-born honey. James Northcote's fable, *The Bee and the Ant*, is a typical illustration. "Violent dispute once arose between the Bee and the Ant, each claiming superiority for prudence and

industry; and, as neither of them would give up the point, they agreed to refer the decision of the great question to the decree of Apollo, who was fortunately at hand tending the cattle of Admetus. Accordingly, approaching the god, each made out his title to preference, with all the eloquence of which a Bee or an Ant had ever been master. Then Apollo gave judgment thus: 'I consider you both as most excellent examples of industry and prudence.' 'You', said he, addressing the Ant, 'by your care, your foresight and your labor, make yourself ample provision in time of need; thus independent, you never intrude on or tax the labors of others for help; but recollect, at the same time, that it is yourself alone that you benefit; no other creature ever shares any part of your hoarded riches. Whereas the Bee practices, by his meritorious and ingenious exertions, that which becomes *a blessing to the world*. Therefore I must give judgment in favor of the Bee.'

MISCELLANEOUS PROVERBS

Honey sometimes turns sour. (The end of good luck.)

The diligence of the hive produces the wealth of honey.

A drop of honey will not sweeten the ocean.

Don't have honey watched by a bear (make a goat the gardener).

If you want to gather honey, don't kick over the beehive. (Abraham Lincoln.)

Honey young, wine old.

Every bee's honey is sweet.

Honey you swallow, gall you spit.

If you are too sweet, the bees will eat you.

Make honey out of yourself and the flies will devour you (Cervantes—*Don Quixote*. II. 43.)

Where there is honey, the bears come uninvited.

The bear dreams of honey.

To your own honey the devil puts one spoon; to strange honeys, two spoons.

Luxury has honey in her mouth, gall in her heart, and sting in her tail.

Where bees are, there is honey.

Where a bee sucks honey, the spider sucks poison.

A still bee gathers no honey. Old bees yield no honey. Dead bee maketh no honey.

No bees, no honey; no work, no money.

Who is afraid of the sting never earns honey.

If you love honey, don't fear the sting.

Honey is not far from the sting.

Who collects honey and roses must bear the stings and the thorns.

Wit is honey lent, without the sting. (Tennyson.)

The following are some of the many foreign sayings and proverbs associated with honey:

LATIN

Where there is honey, there are bees. (*Ubi mel, ibi apes*) Plautus. Deadly poisons are concealed under sweet honey. (*Impia sub dulci melle venena latent.*) (Ovid—*Amorum* I. 8.)

Where honey, there is gall. (*Ubi mel, ibi fel.*) This was, by the way, the favorite saying of Martin Luther.

Honey in mouth, sting in tail. (*In ore mel, in caude aculeum habet.*)

GERMAN

Who shares honey with a bear, gets the least of it.

Honey is not meant for an ass.

Honey is too good for the bear.

Honey is sweet, but the bee stings.

Bees have honey in their mouths, but stings in their tails.

Bees bring honey, honey brings bees.

FRENCH

A drop of honey catches more flies than a barrel of vinegar.

A little gall spoils a great deal of honey.

A honey tongue and a heart of gall. (*Bouche de miel, coeur de fiel.*)

Who deals with honey will sometimes be licking his fingers.

Who has no honey in his pot—let him have it in his mouth.

It is dearly bought honey, that is licked off a thorn. (*Cher est le miel qu'on lèche sur épines.*)

SPANISH

Michael, Michael, you have no bees and yet you sell honey.

ITALIAN

Rub yourself with honey and the flies will eat you. (*Fatevi miele, che le mosche vi mangieramo.*)

RUSSIAN

If you make a honey barrel out of yourself, everybody wants to eat you.

ARABIAN

Honey in the hive of good fortune quickly sours.

A lazy man is never fed on honey.

Lick up the honey and ask no questions.

CHINESE

Bees make honey and men eat it.

When the nest is destroyed others get the honey.

PERSIAN

Honey is a wonderful substance but it does not help the dead.
(Sadi.)

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