SUMMARY

1. About four ounces of each of the food elements — albumin, fat, and sugar — must be eaten daily.
2. To oxidize this amount of food requires about twenty-four ounces of oxygen, which is about the amount breathed in.
3. A diet of bread, eggs, meat, milk, and butter will furnish the best food elements.
4. If too much sugar or starch is eaten, the albumin and fat are not fully oxidized.
5. If too much food is eaten, all the oxygen is used up, and there is none left for an extra exertion.
6. If little or no food is eaten, not enough heat and energy are produced to keep the body alive.

DEMONSTRATIONS

59. Weigh out the different amounts of bread, eggs, meat, milk, and butter which are required daily. Also measure out a quart of water. This will show the class the amounts of food required daily.

60. Weigh out the required quantities of albumin, fat, and sugar. Albumin may be represented by gelatine or glue.

REVIEW TOPICS

1. Give the amount of albumin, fat, and sugar required daily.
2. Give the amount of oxygen required to oxidize the food.
3. Give the results of oxidizing an excess of sugar.
4. Give the amounts of bread, meat, etc., required daily to furnish the body with the proper amount of albumin, fat, and sugar.
5. Give the best times for eating.
6. Give the effects of eating too much food; of too little.

CHAPTER XV

DRINKING WATER

216. Pure water. — Water is the only food which man habitually takes without its previous preparation. Water is the same from whatever source, but substances dissolved in the water change its appearance. Carbonic acid gas, oxygen, and air are dissolved in all ordinary water, and in it float particles of dust and harmless living germs. Such water is clear and colorless. It has a slight taste, due to the dissolved air. When the air is expelled by boiling, the water is insipid and almost tasteless.

217. Hard and soft water. — Water also contains a variable amount of mineral matter, especially lime, soda, and potash. Water containing lime makes the fingers feel slightly rough and puckered. The lime combines with soap, forming a scum which will not dissolve. Water containing lime is said to be *hard*, while water with little or no lime is *soft*. Although some gases and minerals are dissolved in all water, they are harmless and do not make it impure, but rather they give it a more pleasant taste. When very hard water is boiled, some of the lime is deposited on the sides of the kettle, and the water is improved but not made soft.

218. Mineral waters. — When much mineral matter is present the water is called *mineral water*. The principal minerals thus found in water are salt, lime, soda, potash, iron, and sulphur. These waters form springs in various parts of the country, and have borne a great

reputation as healing agents even among the Indians. Enormous quantities are sold for drinking and medicinal purposes. Some contain one or two ounces of mineral substance to each gallon of water. Some springs contain almost pure salt, and furnish the greater part of the table salt in common use.

219. Impure water. — When water contains substances which are directly injurious to health, it is impure. Water which stands in lead pipes may slowly dissolve some of the lead, but if the water is allowed to flow, the dissolved lead will be washed away. Water from muddy or stagnant streams is of a bitter taste and unpleasant odor and turbid in appearance, so that it is not likely that it should be used as a drink; but well water often becomes polluted with poisons far more injurious than those developed in stagnant streams, and the danger is all the greater because it often remains clear and sparkling and pleasant to the taste.

220. Decayed matters and disease germs. — The dangerous substances most often found in water are decaying matter and disease germs. While decaying matter is itself poisonous, yet its greatest danger lies in the fact that it forms the food upon which living germs of disease can live. These are ready to grow when taken into the body. Typhoid fever is almost always transmitted in this way. In pure water germs soon die of starvation, but they grow readily if a small amount of decaying matter is present. Water which is colored or has an odor or a taste is almost sure to contain decaying matter, which may become a breeding place for the germs. Such water should be avoided; but water which is clear and sparkling may still contain food for the germs.

221. Source of impurities. — Sewage and slops from a person suffering with an infectious illness may contain

germs of the disease. These germs may grow in the slops after they have been emptied. If these slops find their way into a well, the disease germs may continue to grow and may infect any one who drinks the water. Ice from such water may also contain the germs. A shallow well near any source of dirty water may become infected and so be a center for the spread of disease.

222. Purification by oxidation in the soil. — The ground has the power of oxidizing decayed vegetable and animal matter so that only the mineral parts remain. Slops from the house are thus oxidized, if the ground is not soaked through with them. But when the quantity is great, some may work their way through the ground for a considerable distance and finally enter the well.

223. Purification by filtration. — Clean sand has the power to screen out particles carried by the water. Screening out substances from water by passing it through a powdered substance is called *filtration*. As the slops slowly soak through the soil, their solid parts are filtered out in the first few inches of the top soil, and if the quantity is not too great, are soon oxidized. Soils differ in their ability to filter. Clean sand is the best; clay is the poorest. It is almost impossible to saturate sandy soil about a single house so that decaying matter can reach the wells; but in villages and cities the soil is so completely soaked that the well water of these places is impure; and at any time germs may enter the polluted wells and grow.

224. Purification by running water. — The third way in which water is purified is by the action of the air and sun upon running water. Sewage from the towns is conducted into rivers, and the sunlight and agitation of the waters soon cause the waste matters and germs to be oxidized.

225. Purification by boiling. — It is dangerous to use impure water for washing, for germs may remain upon the things washed. Typhoid fever has been spread by milk cans which were washed in water from a polluted well. A ready safeguard against the greater dangers of impure water is boiling, which destroys the germs of disease.

SUMMARY

1. Water containing lime is *hard*, but without lime it is *soft*. Lime seldom injures water for drinking purposes.
2. When other minerals, such as sulphur, iron, soda, or potash, are present, water is called *mineral* water. Such water is used as medicine.
3. Air dissolved in water gives it a pleasant taste.
4. Water containing decaying matter is poisonous.
5. The greatest danger from impure water lies in the germs of disease which it may contain.
6. Boiling the water is the best safeguard against impure water.
7. The soil purifies water by oxidizing and filtering the impurities. Running water is generally pure.

DEMONSTRATIONS

61. Show that all water contains mineral matter by evaporating a few drops of pure spring water upon a piece of clean glass. A little white spot will be left by each drop. Boil some water and notice the absence of taste. Cool it and shake it in a can, and notice its natural taste again. Set aside some pure water containing a few bread crumbs or a shred of meat, and notice the unpleasant odor of decay developed in a few days.

62. A rough test for the purity of water is to stir in a little pure sugar and set it aside. If it contains any organic matter, it will turn yellowish in a few days, but otherwise it will remain colorless. Collect some rain water from a dirty building, or mud-puddle water, or water from a barnyard well, and note the color and the odor. After keeping it a few days, note the deepened color and worse odors, showing decay within the water.

63. Doubtless the class will ask to be shown "animalculæ" in water. Water has to be almost turbid and putrid before living beings are present in sufficient numbers to be easily detected with a microscope. If a drop of very stagnant water is examined under the microscope with a power of 100 to 400 diameters, many strange beings will be seen moving about. Place a little hay in a bottle of water and examine a drop of the water every day, and notice the changing forms of the living beings as one kind dies and another is produced.

REVIEW TOPICS

1. Describe the appearance and taste of pure water.
2. State what substances are found in all water; what in mineral water; and the difference between *hard* and *soft* water.
3. State the two common dangerous impurities of water.
4. Give three ways in which nature purifies water.
5. Show how to avoid pollution of a well.
6. Show how to render impure water safe for use.

CHAPTER XVI

NARCOTICS

226. What man eats besides food. — Besides eating food and harmless things which please the taste, man also eats a variety of dangerous substances, both for pleasure and to overcome some real or fancied weakness of the body. The physician prescribes them to overcome diseases of the cells, but thoughtless and ignorant people use them on their own responsibility, and suffer great harm thereby. They may be divided into *narcotics*, *drugs*, and *poisons*.

227. Narcotics. — There is a class of drugs which benumb the sense of pain and fatigue and lessen the action and strength of the cells of the body. These drugs are called *narcotics*. They all are powerful poisons. They lessen the sense of effort and of fatigue, and are often supposed to be stimulants. A peculiarity common to all is, that when their benumbing effects have passed off, the real weakness of the body becomes doubly apparent, and there is an overwhelming desire for more of the drug to benumb the increased weakness caused by the first dose. Thus enslaving habits are formed.

228. Alcohol as a narcotic. — Alcohol should be classed as a narcotic drug. It really belongs to the class of stimulants as well. A small amount acts as a stimulant; but a large amount overwhelms the body and produces an insensibility to pain and fatigue, a dullness of mind, and a deep sleep. The use of alcohol tends to become a fixed habit, as is the case with other narcotics.

229. Alcoholic poisoning. — Besides slow poisoning, alcohol can produce severe poisonous effects at once. A man "dead drunk" is poisoned by alcohol, and is in danger of his life. In treating him, vomiting should be induced as soon as possible. He should be rubbed to keep up the circulation, and stimulated with hot coffee. Keep his body, and especially his feet, warm.

230. Tobacco and nicotine. — The essential part of tobacco is a strong narcotic poison called *nicotine*. Pure nicotine is a clear and colorless liquid. It can be turned to vapor, and is found in the smoke when the tobacco is burned. It is a powerful poison, producing stomach sickness and great weakness of all the cells of the body, especially of the heart. Two or three drops will kill a man.

231. Effects of its continuous use. — When used continuously, the body becomes somewhat accustomed to nicotine, so that it does not produce so great a feeling of sickness. Then instead of producing a feeling of weakness, it acts more to benumb the cells and to quiet the body. This is really the first stage of poisoning, although it seems like a stimulation. If a little more tobacco than usual is used, the benumbed and pleasant feeling changes to one of sickness, as though it were being used for the first time. It always continues to have bad effects upon the muscles, heart, lungs, eyes, and brain. Tobacco is especially injurious to young persons, hindering their growth and lessening their strength.

232. How tobacco is used. — Tobacco is used in smoking, in chewing, and in snuffing it up the nose.

233. Smoking. — Tobacco is smoked in a pipe or by lighting the end of a roll called a *cigar*. Some of the nicotine is turned to vapor and enters the mouth, where it may be absorbed. Some of the nicotine is half burned,

and forms a substance called *pyridine*, which is even more poisonous than nicotine. In a cigar the burning is more complete, and less pyridine is formed. *Cigarettes* are small cigars made of shredded tobacco. They are cheap and may be quickly smoked, and are less liable to produce immediate sickness than a cigar. So the young are especially apt to use them. But they are commonly used to excess, and so make up in quantity of poison what they lack in quality.

234. Chewing. — Chewing tobacco is the most harmful form of its use, for all the nicotine is taken into the mouth. Few people can chew tobacco without spitting out the saliva which contains the nicotine. The continuous spitting which is necessary to get rid of the saliva makes this form of using tobacco offensive to everybody near the chewer. This reason alone should deter any one from the practice of chewing tobacco.

235. Snuff. — Snuff is powdered tobacco. A hundred years ago it was fashionable for women, as well as men, to use snuff. Now a snuffbox is a rare curiosity.

236. Adulteration of tobacco. — The nicotine from stalks and remnants is extracted by boiling, and the liquor is used to saturate poor tobacco and the leaves of other plants.

Chewing tobacco owes much of its taste to rum, molasses, licorice, and other things with which it is flavored.

Most *cigarettes* are flavored with drugs which color the fingers of the smokers. Cigarettes are harmful enough at best, but the harm is far greater when they contain opium. Probably a great part of the craving which cigarettes induce is caused by the opium.

237. Tobacco habit. — Like all other narcotics, when it is used for a short time tobacco produces a persistent craving. Men laugh at the idea of being slaves to such a small thing as smoking or chewing, and yet when the habit

is interrupted, there follows a peculiar unsatisfied and nervous feeling which few men are able to overcome.

Alcohol and tobacco often go hand in hand. Tobacco produces a dry state of the mouth which demands drink, while alcohol causes a nervous excitement which the benumbing tobacco tends to overcome. Most users of alcohol smoke. The only way to break off the habit of using tobacco is to do so by resolute efforts of the will. So-called cures of the habit are of no value, for they cannot give a man a strong will. On the other hand, they may induce sickness.

238. Tobacco poisoning. — Severe tobacco poisoning is rare; for when swallowed or inhaled, it produces vomiting, which expels the poison. When applied to the skin in the form of a poultice, as is sometimes done, enough may be absorbed to produce great weakness, for then the stomach cannot expel it. The principal sign of poisoning is extreme weakness of the muscles and heart.

To treat it, strong coffee should be given, and the patient should be kept perfectly at rest.

239. Opium. — Opium is a narcotic drug which is used to benumb the feelings of fatigue and care. A little of the drug acts partly as a real stimulant, causing the cells to act more vigorously and clearly. At the same time its benumbing action is beginning, and only a little more is needed to produce a drowsy feeling or a deep sleep. Just as it causes the brain cells to cease acting in sleep, so also it lessens the action of all the other cells, and especially of those of the alimentary canal. The disturbance in the action of the intestine sets up digestive trouble, which extends rapidly to the liver. Then the nutrition of the whole body is lowered. No habit is more enslaving or more harmful in its effects.

240. Cure of the opium habit. — The only cure for the opium habit, and yet a safe and sure one, is to keep the

patient entirely away from the drug for a few weeks, confining him if necessary. After a short time the craving disappears and the patient recovers his health.

241. Opium poisoning. — A lump of opium the size of a small pea, and weighing about two grains, is enough to put a man into a deep sleep. Twice that amount may cause death. When a person takes an overdose he falls into a deep sleep, from which he can be awakened only with difficulty. He breathes very slowly, and distends the lungs very slightly. The pupils of his eyes contract to small points. These three signs nearly always mean opium poisoning. They should be remembered, for this is the most common form of poisoning.

242. Treatment of opium poisoning. — *First.* Keep the patient awake by such vigorous measures as slapping his face, shaking his body, and compelling him to walk.

Second. Induce vomiting. A tablespoonful of mustard in water should be given at once if the person can swallow. Tickling the throat with the finger or a feather will generally cause vomiting.

Third. Stimulate the patient with strong, hot coffee. Carry out these measures slowly and deliberately.

243. Forms of opium. — Opium is the dried juice of a kind of poppy plant growing in Southern Asia. *Laudanum* is opium dissolved in ten parts of alcohol. *Paregoric* is a more dilute solution of opium. A teaspoonful of it contains one quarter of a grain of opium. About one tenth of opium is a white substance called *morphine*. One quarter of a grain of morphine will cause a deep sleep and contracted pupils like a large dose of opium.

244. Use of opium. — Opium is used to quiet pain, produce sleep, and to quiet the intestine.

Paregoric is sometimes used to quiet babies when they cry. It produces indigestion and leaves the child worse than before. "Soothing sirups" are nearly always some preparation of opium.

245. Chloral. — Chloral is a colorless solid, having a peppery odor and taste. About twenty grains will produce sleep, but an overdose may produce death. It injures the digestive organs and weakens the whole body. It is a narcotic and a poison.

246. Chloral poisoning. — In treating a case of chloral poisoning the patient should be kept awake by walking him about, or even by slapping him. Give a tablespoonful of mustard in water to make him vomit. Then give strong coffee to stimulate him.

247. Cocaine. — Cocaine is a drug which, when injected under the skin or applied to a mucous membrane, takes away the sense of feeling of the part. A grain of it will render a large area so completely insensitive for half an hour that large operations can be performed without sense of pain. It may cause excitement like the beginning of a state of drunkenness; sometimes it produces great weakness of the heart and death.

The excitement caused by the drug is pleasant, and persons can acquire a slavish habit of its use. It rapidly disturbs digestion and nutrition, and soon causes death. It is one of the most rapid and terrible forms of habitual drug-taking.

248. Hasheesh. — Hasheesh is the juice of the Indian hemp plant, and is sold as a medicine under the name of *cannabis indica*. In Southern Asia it is extensively used as a narcotic. It produces a happy delirium, in which a person sees most beautiful persons and figures. The state is really a temporary insanity, in which one is liable to injure others. The word "assassin" means one under the influence of hasheesh.

249. Chloroform. — Chloroform is a sweet-smelling liquid which, when breathed into the lungs, causes a deep sleep. It is used to produce insensibility during surgical operations. Its use requires extreme care, for it can easily result in death. No one should even smell a bottle containing it, for two or three breaths of it may render a person insensible.

SUMMARY

1. Narcotics lessen the sense of fatigue and pain and produce sleep, but weaken the body and may cause death. Their use may become an uncontrollable habit.
2. Alcohol is a kind of narcotic.
3. Tobacco contains the narcotic *nicotine*. A little nicotine quiets the cells, while more causes weakness, and stomach sickness which may result in death.
4. Tobacco used in any form produces poisonous effects.
5. The tobacco habit tends to the use of strong drink.
6. Opium quiets the cells of the body, lessens the sense of pain, and produces sleep. A little causes a feeling of exhilaration, while a few grains may cause death.
7. The opium habit deranges digestion and finally causes death.
8. In poisoning by opium there are a deep sleep and contracted pupils and slow breathing.
9. The poisoned person should be kept awake, made to vomit, and stimulated by coffee.
10. Laudanum, paregoric, and soothing sirups are all forms of opium.
11. Chloral produces sleep. A large dose may cause death. Treat its poisoning like opium poisoning.
12. Chloroform, when inhaled, produces insensibility.

REVIEW TOPICS

1. Define and describe *narcotics* and show how their use may become a habit.
2. Show that alcohol is a narcotic, and give the signs and treatment of its poisonous effects.
3. Describe the poison of tobacco and its effects.
4. Describe the harm resulting from the use of the several forms of tobacco.
5. Show the fraud and harm of adulterating tobacco.
6. Show that the use of tobacco and alcohol naturally go together.
7. Describe the effects of *opium* and the opium habit.
8. Describe the signs and treatment of opium poisoning.
9. Name some common forms of opium and give their uses.
10. Describe *chloral*, and give the signs and treatment of poisoning by it.
11. Describe *cocaine*, its use in surgery, and its poisonous effects.
12. Describe *hasheesh*.
13. Describe *chloroform* and the danger of its use.