PEDIATRICS, THE NUTRITIONAL DISEASE

XV.

Margaret Shepard

PEDIATRICS.

THE NUTRITIONAL DISEASES.

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A BRIEF HISTORY OF MEDICINE.

NUTRITIONAL DISEASES.

A BRIEF HISTORY OF MEDICINE.

To get a clear picture of infant nutrition and nutritional disturbances and diseases of infants, it is quite important to know briefly of the rise of medicine from early times to the present.

THE BEGINNING.

In the beginning, medicine was on the whole a system of magic and mysticism. The belief was that all disease represented a seizure by some demon of illness, and, therefore men believed that it was necessary to eject these demons from the body by means of magic. The magic included, in part, dancing naked about fires at midnight, burning incense, murmur- strange formulas, and having a definite confidence in charms. Scientific medicine really began with the time of Hipprocates in the days of ancient Greece. It was, then, for the first time, that a gradual separation of the art and science of healing from superstition and blind belief was apparent.

The date of the Hippocratic era is approximately 300 B.C. Before this, men worshipped gods of healing in every nation. In Babylonia the god was Ea, the lord of deep wisdom, and his son, Marduk, who influenced the functions of man through the sun, moon, and stars. And, in addition, there were minor deities of healing of lesser significance. Thoth, inventor of all the arts, sciences, learning and magic was recognized by the Egyptians , as was Ptah, who was known as the father of the beginnings. And, most famous of all the gods of healing in Egypt was Imhotep, the son of Ptah. A temple was erected to him at Memphis, where the Egyptians had knowledge of medicine, is recorded in the Edwin Smith Papyrus dated between 3500 B.C. and 2500 B.C. and, also in the Papyrus Ebers, the most complete record of Egyptian medicine that is known. This Papyrus is

probably of the date 1550 B.C. In these documents knowledge of the functions and characteristics of the man body is indicated. One example is the formula of Cleopatra's hair tonic made from the heel of an Abyssinian greyhound, date blossoms, and asses' hoofs in oil. There are also instructions for making salves, suppositories, plasters, and gargles, which involve the use of such drugs as castor oil, opiums, hemlock and squill. Of interest, too, is the evidence in the Ebers Papyrus of the knowledge that the beat of the heart forced the blood to the fingers, forehead, and feet. There was some early attempt to discover the nature of disease, but no coordinated study of the course of disease leading to what is recognized today as scientific diagnosis was apparent. The ancient Egyptians, however, had some knowledge of hygiene, as the practice of cleanliness was applied both to community and the individual. Although recent studies in paleopathology have indicated that types of rheumatic conditions, inflammations of the joints and infections of the bones existed in human beings of thos days, there does not appear to be any real evidence of tuberculosis, rickets or syphilis in their bones.

The precepts of Hoang-Ti, of about 2600 B.C. were followed by the ancient Chinese in their medicine. Very advance in medical science was made by the ancient Chinese, although very much was written. They did, however, seem to have some conception of the uses of Indian hemp for producing semi-consciousness before a surgical procedure. Also, great reliance was placed on the technic of multiple punctures of the skin with a needle. as a means of producing irritation which they believed stimulated healing.

The records of medicine in India go back four or five thousand years. Dhanwantari was the Hindus god of healing. In the writings of Sascuta, a disciple of the god of healing are chapters describing leprosy, epilepsy, and tuberculosis.

Many text books have been written about the medicine of the ancient

Hebrews, but it is more significant for its hygiene than its medicine. We find Biblical injunctions, which regard the purification of women after childbirth, hygiene of menstruation, venereal diseases and various subjects. The comprehensions of these subjects, however, was based on empiricism rather than knowledge.

Occasionally mentioned in the scriptures are medical procedures using the flint knife for circumcision, roller bandages for fractures, and passible references to gonorrhea and bubonic plague. The Hebrews possessed more extensive knowledge of anatomy than most of the other ancient peoples. In view of the fact that the Jews had such dietary laws, as demanded careful eximination of animals killed for culinary purposes, it can be seen that some consideration was given the function of digestion.

But, all in all, the medicine of the ancient Egyptians, Babylonians, Hindus, Chinese, and Jews was not scientific; it was based on magic and mysticism. Their medicine was mainly a belief in spiritual control, and higher powers. The art of trephining was developed to permit the evil spirit of illness to escape from the skull. Sometimes, these ancient people believed that it effected a cure, but it was only because life had already departed from the body, due to this crude form of surgery.

Hippocrates- The Father Of Medicine.

It seems remarkable that a man, of whom so little is known, should should develop methods and knowledge which are the foundation and main-spring of scientific medicine of the present date. From the legends, a semi-divine origin is attributed to Hippocrates. His ancestory is traced back to Hercules on his mother's side, and to Aesculapius on his father's side.His father's name was Heraclides, who was also a physician. It is said that Hippocrates had two sons , and a son-in-law who were also physicians. They were credited with being founders of the school of dogmatism in medicine, and they held implicitly to

the ideas of Hippocrates. It is probable, though not definitely known, that Hippocrates died in Thessaly at Larissa, at an advanced age of eighty five. He was an active practitioner of medicine, and two of his best known patients were Perdiccas II, King of Macedonia, and the philosoher Democritus of Abdera. The latter, Hippocrates treated for insanity. It should be noted that all of the Hippocratic collection was not from hishands. Dr. Charles Singer, prominent British medical historian, says that there is no exact evidence, but that the works in the collection are by many hands. There has also been some doubt as to whether the Hippocrates-father of medicine- was the one who wrote these, because there were seven physicians by that name who lived during the period when this collection was being written, but it is generally conceded that he was the second one.

The chief emphasis in the Hippocratic writings is on the natural history of disease. These writings illustrate a sharp observation and a scientific study of disease although he seems to attempt to cover diseases in general. The Hippocratic texts, however, were always scientific. The study of Anatomy and physiology was hindered due to the fact that the opportunity for dissection was lacking.

In the medical treatment of his patients he was concerned primarily with diet, baths, inunctions, hydro therapy, the use of sunlight, massage, and gymnastics. He also frequently bled his patients. Sometimes in this period that was done to promote good health. No present day writer has given as thorough an account of dislocations, especially of the hip, as was found in the Hippocratic collection. But of course, with the present use of X-ray, a better study of fractures is permitted now than in that time. There is a section in the collection called "On the Physician", which gives exact directions for cleanliness, preparation, light management,

care and use of the instruments, methods of bandaging, and use of splints. There are also directions for opening the chest to relieve accumulation of pus in the pleural cavity as occurs in empyema, and trephining.

The technique of the operation room at this time was almost a perfect one. The nails of the operator must not exceed the finger tips. All operations should be practiced with each hand and then with both together, the object being to obtain the utmost in ability, speed, painlessness, and readiness. Also, the patient must be held by helpers of the physician, so as to keep the body steady and the attendents must keep silent and obey their superior. This technic is carried out, in part, even today. Besides contributing much in the way of personal health, and hygiene, good operating technique, and the fundamentals in diagnosis and prognosis, Hippocrates was responsible for the Hippocratic Oath, which for twenty-five centuries has inspired, stimulated, and guided, one of the greatest of all professions.

GALEN

Dominating medical science for the next twelve thousand years was Galen of Pergamum. He lived in the period I30 to 200 A.D. and was the successor of Hippocrates in summarizing scientific medicine in a series of text books. He is to be considered primarily as a physiologist but, as his father was a wealthy, well-educated man, it was quite logical that Galen should be educated, he chose the medical field field. He first studied the work of philosphers and began medical studies at the age of seventeen. He traveled extensively, and acquainted himself with medicine in different countries. He returned from his t travels at the age of twenty-eight, and was appointed physician to the gladiators. The position is similar to the chief physician to a professional ball team of the present day. Galen practiced five years

in Pergamum, from here he went to Rome. At the age of thirty three he was offered the position of physician to the emporor but due to policical difficulties which resulted in jealousies and rivalries he declined the offer and went home. Later he was summoned again to Rome to attend Emperor Marcus Aurelius. Here Galen spent the rest of his life compiling medical texts which dominated the scientific field for twelve centuries. It is possible that Galen was the first psycho-analyst. He was called to see a lady whose symtoms consisted of general malaise without fever or increased action of the pulse. He could see that her trouble was obviously mental, and he engaged her in a conversation to get at the seat of the trouble. He found that by mentioning a certain actor's name that her pulse consistently showed a marked increase and irregularity. This did not happen when he mentioned any other actor. Therefore, he conceded that she was in love with the actor. The treatment was not recorded, but the diagnosis was significant as a psycho-analysis.

Galen did not discuss the human body, but he told his students to watch for any bones exposed in a grave yard. He once found the corpse of a robber with the bones picked bare by birds and beasts. This afforded him an excellent opportunity for study. As he was primarily a physiologist, it is interesting to note that he came close to discoering the circulation of the blood, as he proved that the arteries contained blood and not air. He realized that the blood in the arteries and veins were different, but he failed to make the connection between the beat of the heart, the flow of the blood through

the veins. The function of the largyngeal nerves, the motor and sensory functions of the spinal nerves and the effects of cutting the spinal nerves, was demonstrated by Galen. He had faith in drugs and collected various herbs with which to supply the community. He followed the teachings of Hippocrates almost exclusively in his medical practice.

Galen retired from active practice at the age of sixty and devoted the remaining ten years of his life to writing medical works. Of great significance is his influence on succeeding generations. He was an honest man, energetic and a lover of strife. He loved the truth, but loved argument as well.

MIDDLE AGES

The period between 200 and 1400 A. D. is called the Middle Ages. During this time very little was added to the progress of Medicine. Men were more concerned with their souls than with health and disease, little realizing that a healthful soul thrives best in a healthful body. There were, however, during this time a few important investigations made, such as, the descriptions of small pox and measles between 600 and 650. An attempt was made by the Arabian to keep medical science alive through their own copies of previous works. Avicenna, a Persian by birth, published a large encyclopedia in the year 1000, in which anatomy, physiology, medicine, surgery, obstetrics, psychiatry, and materia medica were discussed, as they were known at that time. The School of Salerno was founded in Northern Italy at that period and a famous text, a handbook on health, was written. It was first printed in 1480. St. Bartholomew Hospital was founded in London by the beginning of the twelfth century, which was about the time Maimonides, a famous Jewish philosopher and physician appeared in Cordova, Spain. The thirteenth century was inaugurated by the founding of a hospital and medical

school at Montpellier, France and the issuance of a statement by the Great Emperor Frederick II that all candidates obtaining licenses to practice medicine must be examined by the Masters at Salerno.

During the thirteenth century a woman physician was first introduced to the medical field, and Gui de Chauliac was credited with being the possible founder of modern surgery. "Chirugie de Magna", a book written by him, influenzed surgical practice throughout the world for many centuries.

In the fourteenth century C. John Gaddesden, and John Arderne, in England were leaders in medicine and surgery, mainly as practitioners. The black death swept across the country at this time, and people still clinging to superstitious beliefs concerning illness, attempted to scare the disease away by marching about in processions with banners and sacred relics. However, at the time of the black death, we notice the first attempt of a public health council to consider the importance of scientific means of combating and preventing the disease. After the black death epidemic, came the new horror, syphilis towards the last of the fifteenth century. By the beginning of the sixteenth century ,however, it was common knowledge that the use of mercury was valuable in curing the disease.

Various contributions were made and recorded in advancement of medical knowledge during the middle ages, but, due to the chaotic state of affairs in Europe, the discoveries made were the limited knowledge of a few. Empericism still dominated science. This is really a period of marked sterility, when Greek and Roman science had been cast out, and almost all learning was confined to the church. The state of medical pracice then, was a curious mixture of theology, magic, astrology, and galenic practice. However, during the fourteenth and fifteenth centuries great universities were being founded, and printing was developed.

PARACELSUS

And now, the sixteenth century heralds the coming of Paracelsus, who influenzed medical science greatly. He was the Charlatan, scientist and philosopher. Paracelsus, born Theo Phrastus von Hohenheim, was born in Einsiedeln, Switzerland in I493. In I502, he moved with his family to Villach Karinthia, where as a boy he attended school. There he was taught the basic facts of chemistry and the illusions of alchemy, which were intermingled at that time. In I5I0, he attended the high school at Basle. At twenty-two years of age, Paracelsus joined the workers in the silver mines and laboratory of Schwatz where he worked for about two years. At the end of this time, he traveled extensively, and attended various universities. He acquired the title of doctor, but this was not conferred on him by any university. He visited the medical school at Montpellier in Southern France and the school of Salero where the curriculum was developed on the basis of Hippocrates' teachings. In his practice of medicine, which was done in many different countries, he used drugs such as tincture of opium, solutions of antimony, mercury, arsenic, and preparations of zinc, iron, and sulphur. He burned the works of Avicenna and lectured to the public using his own experiences. Paracelsus settled in Colmar in March, I528, and there he dedicated books to two great friends--one "On Open and Visible Diseases" to Konrad Wickram and the other"On the French Smallpox, Paralysis, Boils, Perforations, and the Like" to Kierymus Boner. At this time, Paracelsus was thirty-five years of age and he had already made his name and reputation known in his world.

He died toward the end of I54I.Paracelsus' contributions to medicine consist of his classical descriptions of hospital gangrene and syphilis; he pointed out the connection between cretinism in the infant and goiter which occurs in children, and is due to an iodine

deficiency. It seems that he knew the hereditary relationships of syphilis and had remarkable results in its treatment.

VESALIUS AND HARVEY

Until the beginning of the sixteenth century, medical thought had been dominated by the medeival mind. In I542 came a renaissance particularly in anatomy through the writings of Andreas Vesalius. He studied at Paris in I533 and in Venice in I537 he made many observations. At the age of twenty-four, he was elected to the chair of anatomy and surgery in Palua and he pursued investigations which earned the title of the father of scientific anatomy for him. He employed in his investigatins and lectures, not only human subjects which were not easy to secure, but cats, dogs, and pigs as well. He wrote a book in I542, which contained many drawings by both Versalius and his students; this book put anatomy on an orderly basis at last. In I546, he became physician to Charles the Fifth, and from then on he was known only as a practitioner and a surgeon.

Greatest of the men following Vesalius was no doubt William Harvey, an Englishman, who is credited with the announcement in I628 of the discovery of the circulation of the blood. This represents the beginning of modern physiology. Harvey attended the University of Padua and inI602 he received the degree of doctor of medicine from Padua, and also a degree from Cambridge in England. In I628 he published a book in which he discussed his views concerning the development of the heart and the circulation, and proved these two views by using animals as an example.

SEVENTEENTH AND EIGHTEENTH CENTURY MEDICINE

Contributions to medicine in the seventeenth and eighteenth centuries were made by several men, and fundamental studies in anatomy and physiology were being made. In England, toward the end of the seventeenth century, Thomas Sydenham made remarkable descriptions of

gout, scarlet fever, measles, chorea, and hysteria. In his treatment of disease, he used Peruvian bark, later to be known as quinine. In this same period the first book on vital statistics was written by John Graunt. The contributions of Ambroise Pare' were his treatment of war wounds by letting them alone or spreading an ointment on them, and his reintroduction of the ligature which was first used by Celsus, a great Roman physician. Pare' also developed the use of trusses for hernias and suggested the possibility that flies might transmit disease. Toward the end of the eighteenth century, a Vienese physician Leopold Auenbrugger introduced the art of percussion or thumping as means of diagnosis. John Hunter is familiar because of his operation for aneurysm, his accurate description of changes taking place in the early stages of syphilis, his studies of the blood and of the teeth and of changes in tissues subjected to trauma and disease. Edward Jenner made a great contribution to medicine, especially to preventive medicine in the eighteenth century establishing conclusively the value of vaccination in smallpox.

In 1700, Bernardion Ramazzini introduced the first classical work in occupational disease. He mentioned specifically two causes of industrial disease, first the unwholesome qualities of the working material, and second the improper position of the body of the workman. He also mentioned possible antidotes for certain forms of poisoning.

Philippe Pinel's contribution to preventive medicine was to begin a study of the habits of the insane in Paris and of the effects upon them of kindly treatment. Heretofore, these unfortunates were taunted and beaten unmercifully by brutal keepers who were chosen for their ferocity. Later, in 1850, Dorothea Dix began to advance the ideas of Pinel among superintendents of institutions for the insane in the United States. Today the control of the mentally afflicted is approaching an almost universal scientific method. Rene Laennec, a great French physician made a striking advance in the art and science of

physical diagnosis by his discovery of the stethoscope. William Smellie of London, obstetrican, invented a special forceps for use in aiding childbirth. Percival Pott, surgeon to St. Bartholomew's Hospital, was an authority on spinal diseases, hernia, fistula, and injuries to the skull, and his name is associated with "Potts fracture" and "Potts disease of the spine". Joseph Priestley, a chemist, discovered oxygen, which is widely used in the treatment of many diseases today, especially pneumonia. Thomas Percival did much to establish the use of vital statistics, to emphasize the value of cod-liver oil, and to draw up a series of principles of ethics.

NINETEENTH CENTURY MEDICINE

At the beginning of the nineteenth century, the medical world was just beginning to find itself in the field of science, and to have some understanding of the uses of devices beyond the human brain, eye, and hand, which was the use of machines. Much was learned from accurate observations and from study of diseases at the bedside during this period. Investigations in the field of tuberculosis is associated with the name of Pierre Louis. Meckel accurately described various organs and tissues in the body. Richard Bright made important studies in disease of the kidneys, and the disease was given the name, Bright's disease. Thomas Addison, a British physican has his name associated with Addison's disease, a condition brought about by a deficiency of the cortex of the suprarenal glands. Thomas Hodgkin is recognized for studying conditions involving inflammations of the spleen and lymph glands which is called Hodgkin's disease. A Frenchman, Armand Trousseau made great contributions to therapeutics by investigating infections in the chest by the insertion of a needle. He was also known for his use of tracheotomy. Sir Willian Beaumont published a book containing studies of the functions of the human stomach.

THE DISCOVERY OF ANESTHESIA

With the introduction of the use of ether as an anesthetic and of antisepsis in the operation room comes the real awakening of modern scientific surgery. For centuries physicians had sought to alleviate pain by various means of dulling sensation. In the latter part of the eighteenth century, chemists began to discover combinations of elements producing states of intoxication and exhilaration. Sir Humphry Davy, a famous British chemist experimented upon himself with nitrous oxide and believed that it could be used with advantage in surgical operations. Ether was described by Valerius Cordus about I540 and re-discovered by a London pharmacist in I730. In serious cases surgeons intoxicated patients with alcohol and opium before reducing dislocations or attempting to tie large arteries. Dr. Crawford Long was credited with being the first surgeon to use ether scientifically in a surgical operation. Dr. William Morton, a dentist in I846, extracted a tooth painlessly from a patient by the use of sulphuric ether. So, to Dr. Long goes the credit for first using ether in an operation; to Dr. John Collins for using ir first in a major operation and to Dr. Oliver Wendell Holmes, for naming it anesthesia.

THE SCIENTIFIC GERM CONCEPTION.

The idea of infection and communicability of disease existed in Biblical times or legends, but exact knowledge did not come until much later. Leeuwenhoek, who developed the microscopes, discovered minute organisms about which he wrote, but he did not have a correct conception of their nature. It remained for Louis Pasteur to found the modern conception of disease on a scientific basis. Pasteur was trained as a chemist and studied ferments and microorganisms from the commercial point of view in relation to the spoiling of wines and beers. Later, he studied the diseases menacing the wool and silk industries.

It is a well known fact that heating some foods and liquids for a long period of time at a low temperature prevents spoiling of the substances by microorganisms. This process is known as pasteurization and was discovered by Pasteur. By I874, the germ conception was well understood. Pasteur confirmed the work of Robert Koch, who had cultivated pure cultures of the organisms of anthrax, and described their life history in the relationship to the disease. Pasteur made investigations which led to the discovery of prevention of hydrophobia through injections of material taken from the spine of an infected animal.

Robert Koch also contributed much to the science of bacteriology. He was a scientific investigator, and he was responsible for the method of growing cultures of organisms of anthrax, of fixing and staining bacterial smears on slides and of photographing these slides. In I882, Koch discovered the tubercle bacillus, and formulated some laws known as Koch's Postulates, which definitely proved that a certain germ is the cause of a certain disease. He worked with, in addition to tuberculosis, the germs of cholera, with tropical malaria and plague. He developed sterilizers, autoclaves and apparatus and technic for isolation and cultivation of germs.

Joseph Lister was a Scotch surgeon, and was in complete sympathy with Pasteur's announcements that germs caused disease and were responsible for many types of infections, After seven years of study, he was led to the opinion that such infections as erysipelas, septicemia, lockjaw and hospital gangrene were the results of contamination of wounds by germs. He used carbolic acid as a spray in the operating room, and found that infections were prevented. He constantly labored to improve his dressings from earlir devices to his experiments with double cyanides of mercury and zinc. He is also known for introducing catgut ligatures to surgery.

THE RISE OF SPECIALIZATION IN MEDICINE

Until the middle of the nineteenth century, the practice of medicine was, on the whole, carried on by the family doctor or general practitioner, who presumed to be competent in all the fields of medicine. He was largely dependent uponhis five senses for making diagnosis. Modern medicine has the X-ray to aid in diagnosing, reflecting mirrors for viewing tissues thoroughly, such as, the ophthalmoscope for the eye; laryngoscope for the throat; bronchoscope for the bronchial tubes; otoscope for the ear; gastroscope for the stomach; proctoscope for the rectum, and cystoscope for the bladder. With the use of the electrocardiograph it is now possible to transform the movement of the heart to a visible record on a revolving drum. The basal metabolic machine makes it possible to calculate the chemical changes going on in the body. Also, of great aid in diagnosing, is the chemical quantitative and qualitative analysis of every secretion and fluid of the human body. With the development of these methods and of the necessary apparatus for application, specialization came into the field of medical practice. So much information applicable to every field, was developed that it was apparent that one man could not be fully efficient in all of it. Specialization makes for shorter hours of work, more interst in the work, greater opportunity for research, and better fees. In I890, medicine was still taught in some medical schools in curses of two years, each in night school. By I905 a legislation was established against this type of low grade medical education, and the Council on Medical Education and Hospitals of the American Medical Association was founded. This led to the present standard of requiring at least four years of college education, three years of medical school, and one of internship to become a physician. And the rise of specialization in fields of pediatrics, eye, ear, nose, and throat, deseases, skin diseases, and the teeth is of great significance for the advancement of medical science.

INFANT NUTRITION.

INTRODUCTION TO INFANT NUTRITION

That pediatrics, the disease and care of children, is a field all its own is now a well-recognized fact. It is true, that to a certain extent, a nurse is able to apply the principles of nursing adult patients to nursing children, but these principles are soon definitely limited. As there are many diseases which are peculiar only to infants and children, it can readily be seen that only a general knowledge of disease as applied to adults would be of very little use in treating the diseases of children. There are some diseases of children which are also common in adults but they are manifested in children in an entirely different way. Other diseases have their origin before maturity, and, therefore, must have early diagnosis and preventive treatment.

The nurse's part in the field of infant and child nutrition is especially important. The food requirements are great, but the infant's digestive capacity of the infant. The results of food deficiencies are more apparent in the child than in the adult and the consequences are greater. An example is the occurrence of tooth decay, which is due to deficiency of the average daily diet. Resistance to disease and the ability of recovery from disease depend largely upon nutritional habits in the child. Important in the maintenence of the health of the child is the application of nutritional knowledge.

Child Guidance is another especially important field of pediatrics which is often neglected. The aim of child guidance is to rear a child so as to produce an adult both mentally and physically healthy and one whose behavior is such that he fits easily into any social group. The habits, behavior, and personality of adults depends to a large extent on the environment and training as a child. The education of the parent also plays an important part in child guidance and other phases of pediatrics. It would be almost impossible for a person-the nurse or physician- to carry out a program of health habits without the help of the parent. One common cause of mal-nutrition is the continued failure

of a child to eat sufficient food to promote growth, build body tissue and produce heat and energy. These food requirements are especially important in children, and without the proper attitude and knowledge of the parent, it is likely that the child will be allowed to refuse any one of these, and thus result in mal-nutrition, or other nutritional disorders.

Pediatric nursing is literally, "the medical treatment of children" and includes not only the nursing care of the sick child, but the care of the child, sick or well. By nursing care is meant all the things that can be done to combat disease and to promote both physical and mental health. It is necessary for a nurse to understand children before she can understand pediatric nursing; and even though the nursing care of children differs from that of adults, she may apply the same principles if she keeps in mind the mental and physical characteristics peculiar to children.

Pediatric nursing is centuries old. As Medical sciences have developed, the care given children has also developed. The child welfare movement can be traced down through the ages to our present time. Also the reports of the nation-wide White House Conference on Child Welfare spreads an effective light on pediatric nursing. The first asylums for children were for orphans, sick or well, and a number of hospitals were founded for children in the United States during the latter half of the nineteenth century. The few major functions of the children's hospital are: (I) the care of the sick child,(2) to serve as a laboratory for the instruction of students of different professions who assist in the care of children,(3) to promote the health of children and, (4) to serve as a laboratory for research.

It is necessary for a nurse in order to secure profficient and successful results in the nursing care of children to acquire and apply special knowledge of the attributes and peculiarities of children and the illnesses to which they are subject. She must be constantly

alert to improvements in this field, and apply her knowledge whenever the opportunity accurs.

INFANT NUTRITION

Comparison of the amount of food required by adults and children. An infant, if healthy and well fed, may be expected to double his weight by the time he is four or five months of age, and treble it by ten to twelve months. Not at any later time is such a rate of growth noticeable. It is mainly for this reason, then, that an infant, in proprotion to his size, requires more food than adults. As the infant's equipment for utilizing food is immature and limited, it is impossible to offer him the food given to adults. However the protien, fat, carbohydrate, vitamin and mineral salts content must be the same as in adult food. These requirements are offered, therefore, in a liquid form- milk being the most suitable during the early months- and a gradual addition of soft foods is made until the child is eating pureed vegetables, cereals, and toast at the age of about one year. When food is given even in suitable amounts and in readily digestible form, the infant is constantly threatened by illness of nearly any cause. When illness occurs that effects the gastro-intestinal tract, the infant is deprived of part or all of his food through diarrhea or the refusal to take food. It is obvious then, that it takes more study and attention to the diet of infants than adults, because his digestive apparatus is so easily disturbed. It is important to know something of the nutrition and reactions of the normal baby to understand more clearly the diseases due to faulty nutrition, the prevention and cure.

The essential constituents of any diet are: carbohydrates, protteins, fats, mineral salts, vitamins, and water. Milk is selected for food and is in a form most readily utilized. Either mother's or cow's milk is used with good results, Mothers sometimes state that milk does

not agree with their infants, but this should not be true if there is sufficient quantity and it is properly prepared. There are some cases, however, where cow's milk is unsuitable due to an allergy of the infant to the milk proteins. In this case the baby may be desensitized or the milk of some other animal used.

Proteins are made up of amino-acids, lactalbumin, casein. and nitrogen. Milk proteins are complete, which makes milk the most satisfactory source of proteins for infants. A good standard for the protein requirements of babies has been accepted as from 1.5 to 2 grams of protein per kilogram of body weight. This is due to the fact the average breast fed baby receives this amount. But infants are rarely ever given too much protein and it even seems more desirable to feed in excess of the requirement than feed too little. Infants require more protein than adults due to the rapid rate at which they grow.

Fats do not seem to be an essential part of the infant's diet, because their chief function is to supply heat and energy, which can be supplied by carbohydrates. But, even though there is no definite fat requirement, it is desirable to include certain fats in the diet, because they contain fat soluble vitamins. They are also desirable because they furnish more energy per unit of weight than protein or carbohydrates and thus they conserve the functions of digestions and absorption and distribute the production of energy among a greater number of body functions.

Carbohydrate is an essential constituent of the body. Its chief function is to supply energy. It is possible to derive enough sugar from food protein to satisfy carbohydrate requirements, but, this is neither practical or economical. Carbohydrates in some form should furnish at least 10 to 15% of the calories of the carbohydrate and fat of the diet. Although there is no definite sugar requirement, they in some form are an important part of the infant's diet.

An infant requires 100 to 150 grams of water per kilogram of body

weight every day, while the adult requirement is only 30 to 40 grams. The larger quantity is needed in infants because of the higher rate of metabolism and the relatively larger surface area. Water is necessary for the storage and combustion of food, and for the excretion of waste products. These processes take place at a higher rate than in the adult. Infants become dehydrated rapidly if deprived of water, or if subjected to an excessive loss, which occurs in diarrhea. It is not rare in infancy for death to result from dehydration.

Certain mineral salts are essential for life and growth. These, with the possible exception of iron and copper, can be supplied by either human or cow's milk, during the first year. The infant's body at birth normally contains a rather large quantity of iron, and this supply, during good health, is not exhausted for about four months. It is desirable to add iron to the diet after the fourth month by giving egg yolk and vegetable juices. It is not necessary to give special attention to copper. Certain diseases, such as rickets, tetany and acidosis are due to changes in the mineral content or mineral metabolism of the body.

Certain substances in small amounts that are known to be necessary for life and health are known as vitamins. The exact quantity that is necessary for growth and health is not known, but each vitamin must be supplied in abundance to insure the optimum in health. There are at least four of these, whose absence from the diet results in a definite pathological condition, and these conditions are called deficiency diseases. The really important part vitamins play in promoting health through their reaction is raising the resistance of the tissues against bacterial invasion. Only a few years ago, however, this important item was scarcely recognized at all. Now, if a person suffers from a chronic series of colds, sinus infections, or abscesses in the ears, it is at once suspected that he is eating a vitamin poor diet. The needs of the organisms for vitamins may be placed under the headings:

for growth, reproduction, and for maintaining health.

When young animals are fed on food mixtures of purified starches, proteins and fats plus the mineral salts, they cease to grow, no matter how much of the food is consumed,unless some sources of all the vitamins are provided.So is it true of infants and young children. Infants who are fed on skimmed or heat-treated milk with a starchy or sugar gruel will not grow properly because the diet is lacking in vitamins. When substances which contain the vitamins are added to the diet, the general condition improves and growth is resumed; but, to secure the ultimate in growth and development, all the vitamins must be supplied the food in liberal amounts. As milk is sometimes poor in certain vitamin content especially if heated or skimmed, it is necessary to supplement the milk diet vitamin-rich substances, such as orange juice, cod-liver oil and egg-yolk. The vitamins that are known are:Vitamin A, Vitamin B, Vitamin C, Vitamin D, Vitamin E, and Vitamin G.

Vitamin A is known as the anti-ophthalmic vitamin, as it is a preventive against some diseases of the eye. It is fat-soluble, and is present in certain fats and oils-in butter, creams, and egg-yolk, and in the glandular organs of animals, This vitamin is powerful in aiding one to throw off infections in the lungs and respiratory passages, and in raising the resistance of the entire body to bacteria. This is the reason for giving cod-liver, which is rich in both A and D, in building up resistance. Lack of Vitamin A is apt to result in eye infections in children, which is called xerophthalmia; the absence also results in failure of growth. This disease is extremely rare in this country due to the fact that American diets usually contain this vitamin in sufficient amounts. Vitamin A is relatively stable and is not unduly affected by the process of cooking.

Vitamin B is known as the anti-neuritic vitamin and is widely distributed throughout the animal kingdom and vegetable kingdom.Vitamins

B and G are components of what was formerly known as Vitamin B, but is now designated as the B complex. These vitamins are found in the same foods, but their proportion varies in different foods. They are present in fruits and vegetables, and in milk, meat and eggs in a smaller amount. Rich sources, also, are yeast and the germs of grains. Vitamin G is more stable than B, though B stands ordinary cooking fairly well. As these vitamins are not stored in the body they must be constantly supplied in food. Beri-beri results from a deficiency of Vitamin B. Abnormal functioning of the gastro-intestinal tract and a loss of appetite may also result from its absence. It is necessary for growth and for successful lactation. Vitamin G is essential for growth and probably lactation and its deficiency is the cause of pellagra.

Vitamin C is the antiscorbutic vitamin. It is present in small amounts in fresh vegetables, fruits, and in human and cow's milk. Good sources for the infant are orange and tomato juice, Oranges, lemons, grapefruit, strawberries, raspberries, tomatoes, and cabbage are also rich in it. This vitamin is essential to the building of good teeth, and acts in conjunction with Vitamin D; it, also aids in the resistance to disease. Its absence results in scurvy. This disease is always associated with sailors because several hundred years ago when fresh fruits and vegetables could not be carried on long voyages, most sailors were victims of the disease. Scurvy is sometimes seen in infants, particularly those who are fed on boiled or pasteurized milk. In some very rare cases, it occurs when the infant is breast fed or taking raw cow's milk. This vitamin is quite unstable and is readily destroyed by oxidation, which is contrary to the former belief that it was destroyed by heating. It is now known that heating is a contributing factor in that it causes oxidation to take place more rapidly. Therefore pasteurization of milk, because of the constant stirring with exposure to the air, is more destructive than boiling for a short period without stirring. Pure orange juice retains Vitamin C for a long period of time.

Vitamin D is the antirachitic vitamin and the main sources are cream and butter, egg yolk, and glandular organs of animals, particularly the liver. Cod liver oil is an excellent source. Ultra violet rays either artificial or from the sun is another valuable source of this vitamin. It is fat soluble and is relatively stable, much more so than Vitamin A with which is so often associated. It may be stored in the body for some time. Its functions are to build strong bones and teeth as it regulates the utilization of calcium and phosphorous. A deficiency results in dental caries, osteomalacia and in rickets. An adequate supply of calcium and phosphorous must be present in the food, in addition to Vitamin D, in order to prevent these conditions.

Vitamin E is the antisterility vitamin. It is fat soluble and is present in foods of animal origin, less abundant in tissues rich in Vitamin A and more abundant in muscle; it is present in green vegetables and vegetable oils. Particularly is it abundant in the germ of wheat. This vitamin is relatively stable, but it may be destroyed by oxidation if stored under unfavorable conditions. Sterility results from Vitamin E deficiency, but experiments so far have only been carried out on the rat.

THE NUTRITIONAL DISTURBANCES AND DISEASES OF CHILDREN.

THE NUTRITIONAL DISTURBANCES AND DISEASES.

It is well in a discussion of nutritional diseases to first discuss some of the minor upsets due to feeding problems in infants before taking up the more serious pathological conditions. An important phase of infant nutrition is the knowledge of correct feeding in acute illnesses, because, even though the infection is outside the digestive tract, it tends to lower the digestive capacity. This usually leads to vomiting and diarrhea if the regular feeding is continued. Therefore, it is desirable to decrease the amount of food, which is best accomplished by diminishing the amount of fat and sugar, leaving the total volume as before. As acidified milk is tolerated better than sweet milk, lactic acid milk prepared from skimmed milk with an addition of sugar, is a very good feeding for such a period. Infants with acute illnesses need their full anount of water, and often more than normally. A good emergency measure in these illnesses is to discard approximately a third of the usual feeding and replace it with water. If, during hot weather, proper hygiene is not used, the infant may retain heat, which has the same effect upon digestion as fever and acute infections. If this condition occurs, the same procedure for feeding should be carried out as for acute infections.

VOMITING DURING INFANCY

Vomiting during infancy may be due to either mechanical or physical causes. The infants stomach has a limited capacity, and it is important not to feed babies over this capacity. Sometimes after a feeding the infant will regurgitate a small amount of the feeding which flows easily from the mouth, and is due to overdistention of the stomach. This is a safety valve action of the stomach which rejects excessive amounts of foods and protects the infant from really serious consequences of over feeding. If, however, some infants have a very small gastric capacity

and are unable to take all of the food required , without vomiting, it is necessary to use a more concentrated food. Also, when food is given at such frequent intervals that the stomach is not empty before the next feeding, vomiting often results from overfilling the stomach. A common cause of overdistention of the stomach is gas, which is mostly air that is swallowed with the feeding. This can usually be easily eructated by holding the infant over one's shoulder and patting gently on the back until the air is expelled. This usually does not cause vomiting. Too much handling after feeding and too tight abdominal bands are also common causes of mechanical vomiting. Irritation of the stomach is a cause of vomiting, and may be produced by unusual diets, partially spoiled food, or by food which has fermented in the stomach. Acute infections may cause vomiting, and also conditions affecting the central nervous system, such as tumors, hemorrhage, and meningitis. Certain allergies, such as sensitization to foods, often lead to vomiting.

COLIC

Colic- gastro- intestinal colic- is characterized by contractions of the gastro-intestinal tract of greater than normal intensity. The infant reacts with crying and pain. Often, the pain is so severe that the abdomen, and the extremities are cold. As digestive disturbances occur more often in early infancy, colic is more frequent at this time. An important factor in colic is gas, which may be swallowed or is the result of bacterial fermentation of sugar. The latter cause occurs more frequently in overfed infants and swallowed air in the under fed. Elixer of Catnip and fennel, minims five to fifteen, laying the baby on the abdomen over a hot water bottle, passing a rectal tube, and giving an enema are effective procedures of eliminating the gas. Opium may be required for severe colic; and it is particularly useful if the colic is associated with diarrhea. Paregoric is the form commonly used in the following dosage: one month, minims one; two months, minims two; three months, minims three;

one year, minims five to ten. If the baby is fed artificially, it is wise to reduce the sugar in the feeding and substitute acidified milk. In the breast fed infant, where the sugar cannot be reduced, the proportions of the food constituents may be altered by giving the infant powdered casein,(ten to twenty grams every twenty-four hours) or boiled skimmed cow's milk in addition to the breast milk.

CONSTIPATION

Constipation is the result of insufficient stimulus to peristalsis, or the failure of the intestine to respond to a normal stimulus. As food is the normal stimulus to peristalsis, and particularly carbohydrate food in infants, as insufficiency will result in constipation. When the intestinal content is of such a consistency that it is difficult to move onward even though peristalsis is active, constipation results. Also certain abnormalities of the intestine lead to constipation. However, this is quite uncommon as compared with the causes associated with food. The constipation that accompanies pyloric stenosis is due to the inadequacy of the food which is allowed to pass through the pylorus. In Hirschsprung's disease, the mechanical interference is in the lower part of the intestinal tract. Persistent vomiting or underfeeding may cause constipation. With insufficient food the stools are small and darker than normal, and infrequent, though, occasionally as a result of starvation, the stools may be as many as eight to ten a day.

Most frequently constipation in the breast fed infant is due to underfeeding, although, in some cases, the stools are infrequent when an adequate amount of food is taken. This can usually be managed successfully by giving a small amount of malted milk or malt extract after one or two nursings, especially if the infant is too young to be fed fruits and vegetables which leave an unabsorbed residue. The addition of fruits and vegetables to the diet, often serves to give the increase in stimulus that is necessary in constipation of either breast or

artificially fed babies. Strained orange juice is not a laxative, because the dextrose is absorbed so quickly. Drugs have no place in the management of constipation of infancy, because it is usually due to the character and quantity of food. An occasional enema affords the necessary relief.

DIARRHEA

Diarrhea of a mild type in infants is characterized by the passage of five to ten loose green stools daily, containing mucus and curds. The gneral condition of the infant is usually good and there is only a slight degree of fever, if any at all. Vomiting may be present, or it may not. This condtion is usually due to overfeeding with fat and sugar, and the treatment consists of a short starvation period, which is usually from eight to twelve hours. During this period, only water or cereal water is given. Then, the feeding is begun with small quantities of milk with reduced sugar and fat percentages, such as skimmed milk. The feeding is gradually increased until the infant is receiving enough to meet it's caloric needs. The more severe type of diarrhea is known as cholera infantum. This is characterized by a severe diarrhea of ten to twenty loose watery stools daily, rapid weight loss, fever, and vomiting. Because the infant loses much water through the diarrhea and has difficulty in retaining anything by mouth, he soon becomes very dehydrated. His skin becomes dry and wrinkled, his eyes are sunken, and the fontanel is depressed. He lies in a semi-comatose state and shows only a slight reaction to stimuli, even to hypodermic injections. It is very similar to a diabetic coma. The extremities are ashen gray and feel cold to the touch, even though the rectal temperature may be as high as 104°F. It is rare that this condition develops suddenly in a well infant, but usually occurs in one who has not been well for some time. This condition is more frequent in July and August, and especially after a long seige of hot weather. It is believed now that most of the symptoms are due to

dehydration. As the blood becomes concentrated due to loss of water from it, it has been given the name "anhydremia". The first important step in the treatment of severe diarrhea is to replade the water loss. As little can be retained by mouth, it is necessary to resort to other means. Subcutaneous, peritoneal, and intravenous injections have been found to be the most satisfactory. Food is usually withheld entirely for twenty-four hours and five per cent glucose in normal saline is injected by any of the above methods. The intervals between injections and the amount of solution used depends upon how much can be absorbed. Usually from three hundred to a thousand c.c. can be given during twenty four hours. If this much is absorbed, a marked improvement is noticeable in the infant's condition. Fluid and feeding in small amounts can then be started by mouth. Subcutaneous or other methods of injection may be given as often as is indicated by the dryness of the skin and subcutaneous tissues. It may be necessary, during the acute stage to apply external heat to the extremeties. Also, if necessary, cardiac stimulants may be given by hypodermic injection. At first, after feedings are started, they should be in very small amounts, ten to fifteen c.c. and given at two hour intervals. Foods with high protein, low fat and sugar are best in the absence of human milk. Casein milk, protein, S. M. A. or skimmed lactic acid milk are very suitable. The mortality of these infants is quite high, and the ones who recover have a long covalescence.

DYSENTERY

Dysentery is the result of the growth of pathogenic micro-organisms in the gasto-intestinal tract. Most commonly it is caused by the dysentery bacillus, though at times other organisms, such as typhoid are responsible. Amoebic dysentery is rare in infants, and its treatment differs some what from that of bacillary dysentery. The diarrhea of dysentery has little relation to the food, but is due to an increased irritability of an inflamed intestine. The inflammation may vary from a simple catarrhal

process to extensive ulceration with the passage of pus and blood. The inflammation is more marked in the ilium and colon. The duration of the disease is from a few days to several weeks. Because dysentery is a self-limited disease, recovery depends on immunity development. A specific serum has been developed which is effective against certain types of dysentery infection. The treatment is to maintain nutrition, which is accomplished by feeding a type of food that would not produce a worse diarrhea. A food with low fat, relatively high protein and moderate amounts of carbohydrates is preferable. Skimmed lactic acid milk is a good type of food. Cereal may be given to older children. Pain and tenesmus may be relieved by small doses of paregoric or by starch and opium enemas. It is very necessary, also as in cholera infanum, to maintain a water intake to compensate for the continuous loss. Gavage is frequently necessary in dysentery, as anorexia is usually present. This disease is a very communicable one; therefore, strict isolation must be observed with special care of the stools, as the organisms are present in large amounts.

MALNUTRITION

Mild malnutrition is characterized by the failure to gain weight, and constipation. The infant does not appear very ill, but it may have a pale and pasty appearance. The stools are hard, dry, and gray in color. There is no consistent gain in weight, even though the feeding has been repeatedly increased. The cause is usually due to overfeeding with protein and fat with relatively low sugar. The treatment is to reduce the protein and fat or increase the sugar, or both. Keller's malt soup which has very high carbohydrate and low protein and fat content, is frequently used in treating this disease. If the reduction of fat is not necessary, mixtures like S. M. A. give satisfactory results. As infants do not die of this condition, they should show an early improvement, if properly treated.

ATHREPSIA

Extreme malnutrition in infants is called marasmus, infantile atrophy, decomposition and athrepsia. As the etiology of severe malnutrition is essentially due to lack of food, athrepsia is best used term. Extreme malnutrition is often the result of prolonged underfeeding. It is encountered frequently in infants fed for weeks exclusively on cereal water. In other cases, the condition results from loss of food through vomiting or diarrhea, and from chronic infections. In these condtions, the amount of food absorbed from the intestinal tract is not adequate to meet the needs of the infant. As the infant continues to burn food, the foods that are available in the body are used. This causes the deposits of fat to be consumed and emaciation becomes apparent. The volume of blood is diminished because part of it's protein has been burned and, therefore, the flow of blood is impaired. Because of poor circulation, the digestive glands have decreased capacity, and as a consequence less food can be taken without producing diarrhea. When food is given with in the limits of digestion the stools are normal in character. An infant with athrepsia has a decreased resistance to infection and is subject to infections of all sorts chiefly, furunculosis, pyelitis, bronchitis, and upper respiratory infections. Sometimes these infants have local or general edema, which is called nutritional edema. It is due primarily to an inadequate protein ration and has no relation to kidney disease. Therefore, continuation of a low protein diet because the infant has started to gain may prove to be a serious error. The clinical picture of an athreptic infant is that of an oversized premature; there is marked imaciation, the subcutaeous tissue is nearly absent; the skin is dry and wrinkled, the facial expression is that of an old man. The skin is at first pale, and later a grayish white, which is characteristic of the condition. The temperature is subnormal like that of a premature infant and the pulse and respirations are slow. His hunger is usually very great and difficult to satisfy; therefore, he behaves as if in

distress, sleeps poorly, and has a weak whining cry. If the infant is fed as much as he will take he is apt to go into collapse, which is very serious and often results in death. This collapse is accompanied by sudden and marked weight loss, a lowered body temperature, a low heart rate and increased circulatory impairment. The stools in athrepsia are not characteristic, and may be of almost any type. The treatment of this condition is partly nursing and partly feeding. If fed too large amounts, he will "collapse" and if fed too small he will die of starvation. It is necessary that the feedings be small at the beginning to determine his tolerance; twenty to thirty cubic centimeters at two hour intervals are usually given. Breast milk is of great importance, but, if it is lacking some food with high protein is best, such as protein or lactic acid milk. When he is able to tolerate it, the amount is increased and the sugar content raised. Two hundred calories per kilogram of body weight may be required before a steady gain in weight is noted. The nursing care consists of protecting him from infections and keeping him warm and dry. Refusals of food, vomiting, loose stools, abdominal distention, and cyanosis are conditions which should be reported to the physician immediately. Subcutaneous and intraperitoneal injections of fluid are given in most cases and blood transfusions are also very effective and beneficial. The convalescence is slow, and they must constantly guarded against infections. Sudden death without apparent definite cause is not uncommon, but, if the infant recovers, he develops into a normal child.

DEHYDRATION

Dehydration, or anhydremia, occurs when the water intake is less than the water excretion. Examples are most often seen in conditions of severe diarrhea, and when vomiting accompanies the diarrhea. It is seen in cases of pyloric stenosis where vomiting is so marked that little food and water is retained. The condition also may occur when food and and water is refused, or when because of coma, the oral administration

of fluid is difficult. The effects of anhydremia and its severity are in proportion to the degree of dehydration. With severe diarrhea the water weight loss may be rapid and extreme. In this case, the features of the infant become sharp, the eyes are sunken and fixed in a stare or rolled up under half-closed lids; the fontanel is sunken. The skin is very dry and has a peculiar grayish pallor. The urine is scanty and highly concentrated, and sugar and albumin in small amounts are sometimes present. The pulse is small, quite often rapid and irregular, and fever is almost always present, sometimes high-103 to 105 degrees F. Restlessness and excitability are characteristic of moderate dehydration, and coma in a greater degree of anhydremia. Convulsions are frequent; acidosis is also quite often present. Acidosis results partly from the failure to excrete substances in the urine, such as acid phosphates, and partly from the formation of acids; chiefly lactic, by incomplete oxidation of food. Urinary products are not excreted because the necessary water to excrete them is lacking. The acidosis developing under these circumstances may be relieved by restoration of the body fluids. If dehydration is due to excessive vomiting, an alkalosis rather than acidosis is likely to develop, because of the large loss of chloride especially hydrochloric acid from the body. When the patient presents the severe clinical picture of dehydration, food is contraindicated, as it cannot be digested and usually only causes or aggravates a diarrhea. The first indication in treatment is to supply water. Even though vomiting is not present, it is difficult to give the child as much fluid by mouth as is needed, and subcutaneous injection is the artificial method used most beneficially. Peritoneal injections are also useful, but smaller amounts are taken by thismeans. When large amounts of fluid are used Ringer's and Hartmann's solutions seem preferable to normal saline solution. These solutions consist of neutral sodium lactate to which has been added the chlorides of sodium, calcium, and potassium. Glucose

solutions given peritoneally cause irritation and distention, so they should be avoided.

THE DEFICIENCY DISEASES

There are five known diseases which result from a deficiency of vitamins in the diet: xerophthalmia, beri-beri, pellagra, scurvy and rickets but, only the latter two will be discussed here as they occur more often.

-SCURVY.-

Scurvy is not a disease of recent discovery; its recognition over the scientific world is associated with the names of Dr. Cheadl e and Dr. Thomas Barlow. It was well recognized and described by Gli san in the middle of the 17th Century. The etiology of scurvy: Age is an important factor, as more than four-fifths of the cases occur between the 6th and 15th months, and one-half between the seventh and tenth months. It has been seen in infants under a month old, however. Previous disease is not a factor of much importance. In 1911, it was known that scurvy was a nutritional disease and that something either lacking in the diet or not the correct diet was the cause of scurvy. It was not then known that it is due to a deficiency of Vitamin C. which is now a well recognized fact.

The symptoms of the disease, in the early stages are fretfulness, pallor, diminished appetite, and failing nutrition. Pulse and respiration may be increased. The disease is also characterized by a tendency to hemorrhage; the earliest location being beneath the periosteum, especially of the femurs. This pressure causes intense pain and tenderness, and the condition is first noticed in changing the baby's diaper. In addition to hemorrhage beneath the periosteum, which is the most common type, hemorrhage may occur almost anywhere. Blood may be vomited or appear in the urine or stool. Because of the tenderness in the legs, often the leg is not moved, which may result in paralysis. A charact-

eristic posture in advance cases of scurvy is flexion and partial abduction of the thighs, with the infant lying on his back. The pain is so intense that the mere approach of any person produces produces screams of apprehension from the baby, sometimes it is thought that the leg is broken. Other changes are found in the bones besides hemorrhage; bone development is stunted, and a large number of the bone cells disappear. The epiphysis may be separated from the shaft of the bone as the result of a slight trauma. In many cases, the gums show characteristic changes; They become dark and swollen and bleed easily. Echymotic areas appear on the skin and there is usually a slight fever, and the temperature may be even as high as 102° to 103° F. in very acute cases. A mild degree of anemia is constantly present. Scurvy occurs only in those whose diet is restricted abnormally. This is the reason that scurvy is now rare in adults and older children, because most adult diets are abundant enough in vitamin C to prevent the disease. However, in infants, when the diet is necessarily limited more cases of scurvy are seen. If the infants diet is limited to cow's milk in which vitamin C was never present or was destroyed by heat and age, scurvy is the result. As vitamin C is stored in the body, a deficiency in the diet is not noted for several months. The disease is rare in the first six months of life and the highest evidence is in the second six months. If secondary infections do not occur, the prognosis is good, and the cure is one of the most striking in medicine. In a period of from 48 to 72 hours an infant is transformed from a state of extreme irritability and apprehension into one of seemingly normal happiness. This is accomplished by the addition of vitamin C, usually orange juice or tomato juice to the diet. The nursing care includes making the child as comfortable as possible, and doing every thing possible for him at one time, so that he need not be moved more often than necessary. A cradle should be placed over the bed to remove the weight of bed clothes; the nursing care may

of necessity be continued over a period of four or five weeks. The preventive factor in scurvy should not be over-looked. Every mother should know that orange juice or tomato juice should be included in the diet, beginning at about the 2nd or 3rd month. If this is done, scurvy does not occur.

RICKETS

Rickets is another deficiency disease caused from lack of vitamin D in the diet. It is also due to the inability to properly use the calcium and phosphorous in the diet. The inability to utilize the calcium and phosporous is due to a deficiency of vitamin D or of ultraviolet energy. However, in the absence of vitamin D rickets is not so likely to occur if the ratio of phosporous to calcium in the diet is suitable for efficient utilization. Therefore, rickets is less frequent in breast fed infants because of the favorable balance of salts ingested. Cow's milk is not rich in the D factor, even when cows are pasture fed; and the salts in cow's milk are not very well balanced for infants. Vitamin D or ultraviolet energy will prevent and cure rickets, even though there is a disproportion between the salts in the diet.

Dark-skinned races seem to be more susceptible to rickets than light skinned races, especially in negro and Italian infants. This is probably due to the fact that the dark skin filters out ultraviolet rays from the sunshine. The disease is extremely common in artificially fed babies in the temperate zone. It is uncommon in the tropic regions even in the dark skinned and poorly fed babies. It is seasonal and begins to be active when climatic conditions make it necessary for the child to be kept indoors. It's activity usually subsides in the spring when the child is again exposed to sunlight, but the evidence of its former presence may persist. Marked activity of growth occurs in the first two years and to some extent at puberty, and as rickets seems to occur only when growth is active, it is reasonable to say that rickets is more prevalent from one to two years (3rd to 15th month more common-

ly) and late rickets from 12 to 15 years. Rickets seldom occurs in malnourished children, even though the diet and hygiene are poor, because the child is not growing rapidly. And when the growth is more rapid, it is necessary to employ a greater amount of antirachitic measures to prevent the disease.

One of the earliest symptoms of rickets is head sweating, and, in general, the signs are those of softening and swelling of the bones. Soft spots found in the skull are called craniotabes, and the anterior fontanel is late in closing. There are deformities of the spine and chest, and sometimes of the forearm. The rachitic rosary, which is the appearance of knobs at the junction of the ribs with their cartilages, is a common symptom of rickets. This same type of swelling occurs at the wrists and ankles. The head of the infant seems large and is square shaped. The muscles are weak and flabby, which delays the physical development of the infant; sitting, standing, and walking occur later than in the normal child. The abdomen is very large and protrudes. It is often that rachitic deformities of the pelvis in a female baby cause difficult childbirth in later life. One of the symptoms that is likely to be noticed by the mother is the late appearance of teeth, because of the faulty calcium distribution. Other symptoms are constipation, enlargement of the spleen, an increase in the size of the liver, and the laxity of the ligaments about the joints. The great importance of rickets is the deformities it produces, and its influence on infant mortality is due to the rachitic infant's poor resistance to infections. The prognosis, for instance, of a baby with a complication of bronchopneumonia is very poor.

Rickets can be prevented, and if mothers were properly instructed in feeding habits, there would probably be no rickets. Every infant should receive codliver oil, especially in regions where sunlight is insufficient. With the possible exceptions of the extreme southern and southwestern parts, every infant should receive codliver oil from

October until April or May. It is very important that mothers realize the significance of omitting this substance from the diet. The dose should be at least one teaspoonful daily, and is most successful when given with orange juice. The baby should be exposed as much as possible to the sunlight, but this should not be done so that sunburn occurs. That is, he should not be allowed to remain in the sunlight for too long periods of time. Exposure of the ultraviolet ray lamp has proved of late years to be a quick and efficient method; this should be done at least three times a week if this means is used. Sometimes orthopedic appliances or operations are necessary when rickets leaves a marked deformity of the legs and spine. In caring for an infant suffering from rickets, the nurse must be able to give the child a course in heliotherapy. This consists of giving him sun baths, and it is important that these be given with the utmost care, so as not to subject the child to burns and chills. The child should gradually become used to the air and sunlight and be properly draped to prevent drafts, before these sunlight treatments are entirely successful. Of course, as has been stated codliver oil is given as a treatment as well as a preventive measure. Some authorities believe that is best taken (in children from one to two years of age) by offering it in a spoon or medicine glass, and in a pipette or medicine dropper for infants. One good method in infants is to give it in about an ounce of 50% orange juice. In the acute stage of the disease, when the legs are soft, care must be taken that the child does not try to stand up, as a deformity is likely to result. It is also important that he be lifted gently so as not to produce a deformity of the chest. Every effort must also be made to protect the child from falls, because his bones are very subject to fractures.

The orthopedic deformities of rickets are changes in the structure of the bones. Normal ossification is absent, the epiphysis of the

long bones becomes enlarge, and a soft and spongy structure is formed in place of a firm compact bone. The prominence of the spine is increased in the dorsal and lumbar region. This may have been caused by the child's lack of normal muscular development which delays standing and walking, and forces him to lay for long periods in a sitting position. Sometimes he is even unable to hold the spine erect when sitting. The deformity of the legs may be either bowlegs or knock-knees, both of which conditions are caused by lack of normal resistance and strength in the long bones of the leg. Often this condition is caused or made worse by the parent's insistence that the child walk, not realizing his condition. Flat-foot is also a common deformity of rickets, because the weak muscles of the foot are unable to hold the arch in the normal position. The method of treatment consists of building up the general health, giving corrective exercises, and fitting the child with braces in the case of bow-legs or knock-knees. If he is over four years of age and the corrective treatment has not been carried out, a closed fracture or osteoclasis, or an open fracture or osteotomy is performed.

LATE RICKETS

Sometimes bony changes are evident in older children, and these changes are similar to those occurring in infantile rickets. The similarity is in the bone deformities, and in the amounts of calcium and phosporous in the blood. This condition is sometimes referred to as juvenile osteomalacia. This is probably caused by a diet deficient in minerals, or by a lack of sunlight. Late rickets differs from infantile rickets in that the former is associated with a stunting or cessation of growth. Late rickets is sometimes observed in association with chronic nephritis, and is called renal rickets. Phosphates collect in the blood and tissues due to the nephritis, and as a result of this the amount of calcium in the blood decreases. In most of the cases of late rickets, it is difficult to find the underlying cause, and while a high

milk, high vitamin diet is beneficial, a complete cure cannot be effected until the cause of the abnormal metabilism has been removed.

SPASMOPHILIA

A condition somewhat associated with rickets is tetany, or spasmophilia, which means a tendency to convulsions. The term spasmophilia has been restricted to a condition found in rachitic infants. The term tetany is used in a broader sense, and includes spasmophilia and similar conditions due to other causes. Some types of tetany occur in adults and older children. This condition is brought about by disturbance of salt metabolism, especially sodium and potassium, which are nerve irritants. Nerve depressants are calcium and magnesium. Tetany appears whenever these two groups are disturbed sufficiently to cause either a low calcium or high sodium content. Infantile tetany is found only in the presence of rickets, though the external evidences of rickets may not be striking. In all instances of spasmophilia the blood calcium is found to be low, which is in contract to rickets, where the calcium is about normal, but the phosporous is low. The symptoms of this disease are general convulsions, laryngo- spasm, and contractions of the hands and feet. Usually all three of these symptoms are not present in one infant; one may have convulsions, another laryngo-spasm, and another carpopedal spasm. The spasm of the larynx causes a respiratory crow and resembles the whoop of whooping cough. These spasms occur in short attacks, and, although they are alarming, death rarely results from asphyxia. Between these attacks, the infant appears to be in his normal state of health. The feet and hands assume a characteristic position in carpopedal spasm; the fingers are held stiffly, slightly flexed at the knuckles; the thumbs are stiff and held straight inside the palm, and the wrist is slightly flexed. The feet are held in a somewhat similar position. This spasm may persist for days at a time or recur at intervals. The diagnosis is made by certain signs of nervous irritability. Chvostek's sign is made by tapping in front of the ear

where the branches of the facial nerve lie. A quick contraction of the muscles of that region is a positive response. Trousseau's sign is made by placing a tourniquet for about 30 seconds or more on the middle of the upper arm; the test is positive if the hand assumes the position of corpal spasm. Erb's sign is made by applying an electrode over a nerve to determine the amount of electric current necessary to produce a muscular contraction. The electrode is usually applied to an arm or leg, and if a contraction occurs with less than five milliamperes of current, there is evidence of increased irritability. The disease is occasionally encountered in the fall of the year, but is most common from January to April, as is also true of rickets. An infant with spasmophilia or tetany may appear to be in excellent health, but the slightest cause, or even no apparent cause at all may tend to cause an attack of laryngeal spasm or convulsion. The prognosis of the disease is fairly good. Deaths occurring from it are not great, but one is unable to tell which will or will not die. So when tetany is diagnosed, it is necessary to be able to carry out certain emergency procedures. When death does occur, it is usually due to suffocation from larynogospasm or cardiac failure. Whereas calcium and magnesium are nerve depressants, they have just the opposite effect on cardiac muscle; therefore, the low blood calcium in tetany causes cardiac depression.

The treatment for this condition could be the same as for rickets, but, this treatment may have to be used for several weeks, before improvement is noted. As the manifestations of tetany could not be allowed to continue for such a long time, other measures are resorted to. Acid-producing salts, such as calcium or ammonium chloride, administered orally in doses of ten to fifteen grains, four or five times a day, produces the result desired in approximate 12 hours. These salts are believed to act by increasing the ionization of the calcium that is already present in the blood. This medication should be given until the slower

measures have become effective. If a very immediate result is desired, one dose of calcium chloride may be given intravenously or magnesium sulphate, 10 to 15 grains intramuscularly. Chloral hydrate, 5 to 10 grains given per rectum, is a reliable drug for controlling convulsions. All food should be withheld for about twenty-four hours. Calcium bromide and calcium chloride 10 grains every four hours may also be used. The associated rickets is treated with codliver oil, sunlight or ultraviolet light.

NUTRITIONAL ANEMIA

Anemia may occur at any age and from many different causes, and the clinical symptoms are primarily the same regardless of cause or age of the patient. The anemia of infancy, however, is different from that in adults for two reasons. One of these is the occurrence of nutritional anemia, and the other is the type of reaction some infants have to severe anemia from any cause. Nutritional anemia is that resulting from a long-continued diet low in iron, or iron and copper. This variety is encountered almost exclusively in infants. It responds rapidly to iron administration, but sometimes blood transfusions are necessary to aid recovery. Some infants with severe anemia, whether nutritional or from other causes, react in a manner not observed in any other age. This reaction is commonly called von Jaksch's anemia or syndrome. The characteristic features in addition to anemia, are enlargement of the spleen, an increase in the white blood cells, and the presence of nucleated red cells in the blood. A large number of these babies die from some infection; otherwise, eventual recovery can be expected.

DIABETES MELLITUS

In this conditon, the body is unable to utilize sugars. The sugar collects in the blood and then overflows into the urine. This inability is believed to be due to a functional inadequacy of an internal secretion of the pancreas, which is insulin, and is compensated by a suitable extract which is usually insulin or protamine in the proper dosage.

Digestion and absorption of food are not impaired. Normally, sugar that is absorbed is stored as glycogen or converted into fat, and small amounts are constantly being burned to furnish energy for the body. In this disease the ability to store, convert and burn the absorbed sugar is impaired, or lost. This is the reason that the sugar accumulates in the blood, and when the amount reaches a certain level, which is called the kidney threshold, sugar appears in the urine. The onset of the disease is usually gradual, and in it's early stages may present no symptoms. Sugar may be discovered in a routine specimen of urine. It is not a very common disease during childhood, but it is more serious at this age than in adults. The usual symptoms as the disease progresses are excessive thirst, loss of weight, excessive urination and hunger. If the urine has not been tested for sugar and a diagnosis not made, the child sometimes goes into coma, before the cause is suspected. In severe diabetes certain acid bodies, acetone, and diacetic acid is excreted in the urine as well as sugar. The diagnosis is arrived at after repeated examinations of the urine and the finding of sugar, and, also of sugar in the blood.

One moleculr of dextrose must be burned for each two molecules of fatty acid in order to oxidize fats in the body. When sufficient dextrose is not burned, the fats are not oxidized completely and the formation of ketone bodies-acetone, diacetic acid and oxybutyric acid results. If these substances are neutralized they are less toxic and are more readily excreted in the urine. Their chief harmfulness lies in the fact that some of them are acid, which requires neutralization and thus removes base from the body. And this loss leads to a state of acidosis, which is the usual cause of death in a diabetic patient. When diabetes is untreated, the diabetic child continues to lose the ability to utilize sugar, and such factors as infection, adolescence, nervous exhaustion and excessive carbohydrate intake tend to aggravate the condition. Sooner or later acidosis and coma intervene and the child dies

unless emergency treatment is applied immediately. Untreated diagnosis in the young runs a more rapid course than in adults, and is also more fatal. If the disease is properly diagnosed and treated by diet and insulin, if necessary, this child is as healthy and has the same life expectancy as any other individual. In fact, many diabetics are in a better physical state than the average non-diabetic individual, due to the thought and care given to their diet.

The finding of sugar in the urine is not in inself evidence enough to be certain of a diagnosis of diabetes, because there are a few individuals who have a low renal threshold for sugar or renal glycosuria, but who have a perfectly normal metabolism and blood sugar. But with repeated findings of glycosuria together with positive blood sugars, a positive diagnosis can be made. To successfully treat diabetes, it is essential to work out a diet sufficient for the child's needs and which he is able to utilize with showing sugar in the urine. Because more calories are needed in the child's diet to allow for growth, this problem is more difficult. The discovery of insulin was especially beneficial for diabetic children. Before its use the life duration for a child was seldom more than two years, but now the outlook is much more hopeful. There are several methods of computing diets for diabetics, but it is always a necessary factor to determine the sugar tolerance. This is done by complete starvation for a day or two until the urine is free of sugar and then by adding gradually carbohydrate foods until sugar appears in the urine. A diet may then be planned containing protein, fat, and carbohydrate, which does not exeed the tolerance in substances producing sugar. One authority believes that the sugar tolerance test is useful only for diagnosis, and not for determining the amount of sugar which may be given to a diabetic. This test consists of administering 50 grams of destrose solution by mouth, and examining the blood and urine before and at hourly intervals afterward. The diabetic will exerete sugar and

have a high blood sugar value, whereas a normal individual will not. One method of treating diabetes is to reduce the diet until sugar disappears from the urine, and then increase the food gradually, giving larger amounts of fat and protein. A child should have at least one gram of protein per pound body weight and 35 to 40 calories per pound. Fat supplies a large amount of the calories of a diabetic diet. It may be given in amounts of from two to three times the weight of protein. Insulin is employed when enough calories cannot be given to supply the needs of the patient. In preparing a diet the percentage of carbohydrate, protein, and fat in raw foods must be known and the portions used must always be weighed.

Insulin is an especially prepared extract of pancreas, and when injected enables sugar to be burned in the body. It is standardized in units, each unit being able to utilize 2 grams of sugar. It is given by hypodermic, one to four times daily, about 15 to 30 minutes before meals. The dosage must be in proportion to the amount of carbohydrate, protein and fat in the diet, or an insulin reaction is likely to occur. The symptoms of an insulin reaction are nervousness, tremors, irritability, perspiration, anxiety, hunger, and sometimes convulsions. Death sometimes occurs in severe cases. These symptoms can be allayed by the administration of orange juice, which may be repeated. If further treatment is necessary 50% glucose is usually given intravenously.

The nursing care consists of first, helping both the parents and child to appreciate the significance of a restricted diet and the use of insulin, and of restricted exercise which is necessary to maintain a permanent gain. The food must be made attractive so that the child will be willing to eat, as it is important that all weighed food for diabetics be eaten or else complemented with some other food. All food that the child cannot have should be kept out of sight and never mentioned. Stories, quiet games, and a general atmosphere of contentment aid in successful recovery of the child. Frequent baths and massaging must be employed

to keep the skin in good condition. As the urine is irritating, the genitals must be cleansed after each voiding. These patients are very susceptible to any pyogenic infection, so any break in the skin must be watched carefully. Insulin should be given between the subcutaneous tissue and the muscle; sometimes, in an emergency, it can be given intramuscularly, intravenously, or even intraperitoneally. It is usually given according to the diet and amount of sugar in the urine before one, two, or all three meals, and 15 to 30 minutes before. The amount given is based on the number of units necessary to keep the urine sugar free upon the given diet. This is done by collecting a 5 cc spec. of urine 15 minutes before the insulin is given, and also in most cases, as ordered by the doctor, a 24 hour specimen. The diet is ordered by the physician and is based upon the caloric requirements of the child, considering his need for protein, the necessary fat, carbohydrate and protein relation and the glucose tolerance of the child. The child must be under continuous supervision so that he does not take food that he should not have. His co-operation should be won and voluntary self-control taught.

CELIAC DISEASE

Celiac disease is a term applied to a chronic functinal disorder, of which the main characteristic is an inability to absorb fats and to utilize the more complex carbohydrates. Bulky stools of frothy and semi-liquid character result from the ingestion of a customary diet; the stools are composed chiefly of unabsorbed food. The continuous failure to absorb a sufficient amount of food leads to failure of growth and malnutrition, very often of an extreme degree. As the food deficiency involves not only the total energy, but, also most of the individual factors essential to health, a nutritional edema and vitamin deficiency disease is likely to become evident. In celiac disease, the colon is markedly dilated, and this is the chief cause of the protruding abdomen, which is so characteristic of this condition. If fat

is fed in usual amounts, a large proportion appears in the stool even though most of it has been split by the digestive enzymes. Starches are not converted into simple sugars, which can be absorbed, but are fermented by the bacteria, and is excreted as such in the stool. By feeding fats or complex carbohydrates, the diarrhea that is already present is aggravated. The cause and pathology of this disease are definitely known, but it responds satisfactory to dietary management. Fats and carbohydrates should be eliminated from the diet, as they are not tolerated. The food must, however, be adequate in protein, vitamins and mineral salts so as to meet the nutritional requirements. An initial diet for a child of two to three years should be as follows: 30 ounces of skimmed boiled milk. 2 or 3 egg whites, one ounce of cottage cheese, one ounce of seived liver, 6 to 7 ounces of dextrose, 8 ounces of strained orange juice, 8 ounces of seived tomatoes, beef juice, and one or two teaspoons of cod liver oil. The dextrose can be given as 10 or 20% in orange juice. As the condition improves, and the child's ability to utilize food increases, other foods should be added. Protein milk has too great a fat content to be well tolerated in severe cases. Bananas have been used with good results in this condition, due to the invert sugar which they contain when fully ripe. This sugar is readily absorbed. But, if bananas are fed, they should be baked, because they do contain some starch, but, if they are fed in considerable amounts the bulk of the stools is definitely increased. It is usually desirable to place some form of abdominal binder on the child, as the abdominal wall is very lax and the abdomen is so protruding.

Dental Caries.

Dental Caries or tooth decay is primarily a nutritional disorder. If the diet is complete with all of the known essentials in adequate amounts, sound teeth will not become carious, and teeth already soft will become hard and any dental decay present will cease.

Even if the dental hygiene is poor, these events will take place. It is true that bacteria and their products play a prominent role in producing dental caries, but this factor is of little importance if the teeth are kept hard by means of an adequate diet. This does not apply to caries in individuals who have uncontrolled diabetes mellitus, chronic nephritis, hyperparathyroidism or other conditions which disturb calcium metabolism. So, in general if a child is given a diet adequate in protein, carbohydrate and fat, content and mineral salts and vitamins, his teeth should be kept in good condition. But in addition to this he should be taught good dental hygiene.

Simple Goiter

Simple goiter is a nutritional deficiency disease because it is dependent on an insufficient intake of iodine. It is particularly common in region where iron is deficient in soil and ground waters. When there is great iodine deficiency, goiter may occur at any age. With a moderate deficiency of iodine, goiter is likely to develop only at times of metabolic stress, such as at the time of puberty in girls. It is far more frequent in girls than in boys, but it may be prevented by a sufficient iodine intake. If the thyroid is already increased in size, any further progress is stopped and a decrease to normal size is noticed, if iodine is administered. Only small amount is required for the normal functioning of the thyroid gland. The maximum storage capacity of the adult thyroid has been estimated at about 2 grains, and the average content at 10 to 15 mg. The gland begins to hypertrophy only when the iodine content falls below 0.1%. 5 to 10 grams of iodine weekly has been advised as a desirable amount in goiter prevalent regions. The methods of administering the iodine are in iodine rich foods, in iodized water supplies, in iodine medications, and in iodized salt. So, the importance of goiter lies in the necessity of prevention, by a sufficient amount of iodine taken.

SUMMARY OF NUTRITIONAL DISEASES.

In summing up the knowledge we have concerning the feeding and care of infants and children, and nutritional disturbances and diseases of them, we see that the preventive measures are the more significant.

Especially is this true of the deficiency diseases, such as scurvy and rickets. These diseases are caused by the lack of Vitamins C and D respectively. If the infant is fed orange juice and cod-liver oil, beginning at about the second or third month of life, both of these diseases may be prevented. An important factor in the prevention is the instruction of the mother to initiate these substances into the diet at an early date. Simple goiter is caused by a deficiency of iodine in the diet, and may be prevented by the addition of iodine in some form to the diet, especially in regions where the soil is lacking in iodine.

Diabetes Mellitus is caused by a functional inadequacy of the Isles of Langerhans in the pancreas to secrete insulin. This disease is not preventable, but, if it is recognized and treated in time, the life span of the diabetic child is about the same as of a normal child. On the other hand, if it is not diagnosed and treated, the symptoms will progress until a diabetic come occurs, death not uncommonly results. The urine of the child should be examined at intervals to ascertain the presence or absence of sugar, so that if diabetes is apparent, early treatment may be instituted.

Care should be taken in feeding infants so that they will be subject to the least amount of vomiting. As swallowed air causes vomiting, the infant should be held after feeding in a position that permits eructation of the air. This may be aided by patting the baby gently on the back. Restraint from handling the baby too soon after feeding, the presence of a comfortably tight abdominal binder, the correct nipple, if the baby is artificially fed, and feeding within the limits of the infant's digestive capacity are good measures to use to prevent

vomiting. In colic, an important factor is gas formation, which may be either swallowed air or bacterial fermentation. If it is caused by the former, it should be eructated, and if by the latter, it is a good plan to reduce the sugar in the feeding.

Constipation, diarrhea, and malnutrition, are conditions due to faulty feeding. If the infant is fed too large amounts or the normal feedings are given when the child is ill, diarrhea results, and malnutrition is due to under-feeding. That is, the child has not been taking a diet abundant in all the substances essential for life and growth. Dehydration results from either results from an insufficiency of water or a loss of water due to diarrhea or malnutrition.

It can be seen, then, that most of the nutritional diseases of infants and children may be prevented by proper diet and hygiene, which should be started early in the infant's life. Nurses must at all times be ready to instruct mothers in the consistency of a proper diet and its importance for the health of the child. Instruction in preventive treatment of these diseases permits our modern baby to live a healthful child life, and grow into a healthy adult, both mentally and physically.