

compost the droppings of the sheep are applied to the soil round the tree. Even in the first year the trees begin to bear plentifully. A well looked after lemon tree may even fetch up to Rs. 50 per year but this is exceptional. The application of the vegetable compost and the droppings of the sheep is done every year. A tree on an average yields from Rs. 10 to Rs. 30 per year and there are about 1000 lemon trees here. The average sale price of lemons is annas ten per 100.

Kinds :—There are two kinds; one kind possesses a hard rind and the other a smooth skin. The former variety keeps longer, is easier for transportation and is also better in quality than the latter.

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*** Vitamins in relation to milk.**

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Recent researches have shown that the diet of the human organism cannot be met entirely by an adequate supply of protein, fat, carbohydrates, inorganic salts and water. It is now established that in addition to these necessary constituents, certain unidentified principles known as accessory food factors must also be present in what is called "deficiency diseases." These accessory food factors are known as Vitamins. Their function seems to be to promote growth and maintain health. From the time of Leibig the great German Chemist, to the time of the discovery of vitamins, it had been established that the nutritive value of food, apart from its digestibility depended on its contents of protein, fat, carbohydrates and mineral salts. This discovery of vitamins has already displaced the theory of calories, which was fondly held by the old scientists. The famous reformers of diet believed that the nourishing value of food was in direct proportion to the amount of heat it generated within our bodies.

It was in 1906 that Professor Hopkins made some experiments which showed that rats could thrive if they were fed only on a well proportioned diet of protein fat and carbohydrates in a pure form. In Nature rats and other animals feed not on chemically purified food, but on all sorts of animal and vegetable

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material, very far from pure chemically. Among the impurities there must be something necessary to the adequate maintenance of life. The few drops of raw milk, far too little to have any nutritive value in the ordinary sense added to the chemically pure rations made all the difference to the rats. Professor Hopkins took two sets of rats A and B of about the same age and size and fed A with the isolated constituents similar to those that can be obtained from milk viz, protein, fat, sugar and mineral salts and B with the same substances plus a minute quantity of fresh milk. The rats belonging to A series lost weight and showed decided pathological symptoms; those belonging to B series steadily gained in weight. On the 18th day the diet was reversed so that now A was getting the little extra milk and B had its cut out. Almost immediately A began to gain in weight and B to lose in weight. The milk added was about $\frac{2}{500}$ of a pint. The isolated food stuffs yielded energy in quantity more than necessary to satisfy all calorific requirements. The chemical composition of the whole milk did not materially differ from the chemical composition of the constituents isolated from milk. This shows that something must be present in exceedingly small quantities since the addition of a few drops of milk made such striking change. This something was called by professor McCollum as Vitamin. This he believed to be an "Amine" or compound derived from Ammonia by replacing the hydrogen with one or more alcohol radicals. Again as it was found to be essential or vital to growth, he called it a vitamine. But further research in this direction revealed that it was not an Ammonium compound got by the replacement of one or more hydrogen atoms by alcohol radicals. But still it is called by the original name vitamin with the last letter e dropped.

Vitamins like electricity are known more because of their effects than from their composition. The exact chemical composition of vitamin is still to be discovered. Some are of opinion that vitamins like enzymes are mere catalysts which influence chemical reaction without themselves undergoing any ultimate change. Others think that they are in the nature of hormones, the active substances which are present in the various internal secretions such as in thyroid and adrenals and that they probably stimulate activity in the cells. Others consider that their function is to supply certain chemical groups to the body and which the body itself cannot manufacture. Again, some assert that all the vitamins contain carbon, hydrogen and oxygen.

This discovery attracted the attention of a great number of scientists. With great enthusiasm, they set to work and within another year two more vitamins, different from McCollum's Vitamin were discovered. To distinguish these Vitamins, the first discovered, McCollum's was named vitamin A and the subsequent two were called B & C vitamins. Again, afterwards, it was found that A vitamin was a combination of 2 different vitamins. Hence the second and new vitamin in this combination was called vitamin D. Again, very recently a fifth vitamin different from the preceding four, has been discovered. The new one is called vitamin E. Thus five vitamins A, B, C, D and E, have been discovered so far.

Each of these five different vitamins has a separate function in the upkeep and growth of body. Again, definite proportion of these vitamins is essential for the proper and safe keeping of health. The absence or disproportionateness of one or more of these has been proved beyond all doubts to be the causes of a few common, but none the less serious diseases. These diseases are called deficiency diseases and a few of them frequently met with are Xerophthalmia, Beri Beri, Scurvy and Rickets.

Vitamin A is found in abundance in milk, butter, codliver oil, yolk of egg, liver and kidneys of animals and green parts of plants. It is quite soluble in fat and is not affected by heat up to 200° C, when decomposition sets in. The complete absence or serious disproportionateness of this vitamin in our diet will cause Xerophthalmia, a dry red and itching ailment of the eyes, always accompanied by an appreciable inflammation. The chief function of the vitamin A seems to be to promote growth in young and immature children and protect health in the adults.

Vitamin B is water soluble and is stable till a temperature of 120 C when it begins to decompose. It is found in yeast, pulses, in outer coverings of wheat, barley oats and rice, in Carrots, Onions, Tomatoes and in many other fruits. Polished grains are bereft of vitamin B. This is a point to be noted by all the rice eaters. When they consume polished rice, they are excluding not only the most nutritious part of the grain, but an important vitamin as well. The scientists after a series of experiments on

monkeys have found out that vitamin B is also very essential to growth. One set of monkeys were fed on a diet rich in other vitamins, but wanting in vitamin B. Another set of monkeys equal in age and size were given a diet rich in all vitamins including B. After a few weeks, the first set grew thin, lost weight, played little and before 3 months became quite weak and miserable, but the other set increased in weight were more playful and were found very strong. Then the experimenters stopped the deficient diet and substituted one rich in B vitamin and within a week the monkeys were found recovering their original strength and energy. Any deficiency in this vitamin will cause Beri Beri. The symptoms of Beri Beri are, pains in the limbs, swelling of parts, extreme weakness and paralysis of legs. Final stage takes the form of a general paralysis which is usually very quickly followed by death. In the last stage there is difficulty in breathing. The patient can neither walk nor move his arms and his heart may become seriously affected. This disease is believed to attack the people on a diet of polished rice. In about the year 1890 a Japanese training ship with 176 men on board set out for a voyage of 9 months. During this time, their diet being rice, 169 cases of beri beri developed. Of these 25 died. Soon after another ship with a similar crew set out over the same route. This time the crews' diet was radically changed. Rice was reduced and milk and meat substituted to increase protein. During this time only 14 cases of beri beri developed. This was then considered as being due to protein deficiency but subsequently it has been proved that the disease is not due to protein but to vitamin deficiency, that the type of the rice used by the Japanese is deficient in water soluble B and that an addition of milk and meat supplied the necessary vitamins. The polished rice is the cause of Beri Beri, as has been already stated. The rice should contain its pericarp (outer covering). Most of the gentlemen present here will ask me why they are not developing Beri Beri, although they have been eating polished rice ever since their childhood. The only explanation is that they are getting B vitamin from some other sources, such as Onions, fruits, vegetables etc.

Vitamin C :—is almost only found in the leafy vegetables and juicy fruits which are well exposed to sun. This is found in abundance in fresh fruits especially in limes and oranges. It is soluble in water and is easily lost when heated. This is tolerably stable when the containing fruit is acid to a large extent. But it

should be borne in mind that if it is mixed with or taken after an alkaline substance, the acid is neutralised and the vitamin destroyed at once. By storage also vitamin C is lost. People who do not eat fresh green vegetables and fruits and who eat only boiled or sterilized food lack from this vitamin and suffer from Scurvy. The symptoms of Scurvy are great fatigue, headache, disinclination for exertion of any sort, change of complexion to a pallid dusky hue. Small haemorrhagic spots appear round the hair follicles of the legs and patches like bruises of varying size appear on the skin. Often gums are affected. Soft spongy swellings sprout up between the teeth and are followed by ulceration and haemorrhages of the gums. The teeth become loose and may fall out. Unless the progress of the disease is arrested by a timely change of diet, it ends fatally. This is absent in dried fruits and vegetables.

Vitamin D is fat soluble and it exists in milk. In Cod liver-oil, it is found in combination with vitamin A. The function of D is to promote the assimilation of minerals particularly calcium and phosphate. For this reason it prevents rickets in children and Osteoporosis wasting away of bones in adults. It is known that the assimilation goes on at a greater degree with direct sunshine. The ultra violet rays of the sun when they fall on our skin, are said to penetrate into our tissues and produce there this vitamin. In 1919, an experiment conducted on children suffering from rickets at Vienna, proved that exposure to sun light or ultra violet rays was a sufficient remedy without the addition of this vitamin to the diet. Dust particles absorb these extra violet rays and hence any person affected by rickets should go and live in a country seat. Exposure to sun has therefore a beneficial effect upon the upkeep of our health. A lack of this vitamin leads to rickets, which is mainly a disease of bone: the symptoms are, the head of the patient enlarges and becomes flat, the bones grow irregularly and remain soft leading to permanent distortion and deformities. The disease is generally found among children.

Vitamin E:—The last vitamin E is the most recently discovered and no detailed information about it has yet been pronounced. The best known source of it at present is milk and an oil extracted from the sprouting green of wheat. This is also fat soluble. Deficiency in this vitamin lowers the reproductive times capacity, some producing complete sterility.

After knowing the important and marvellous effect of vitamins people will be anxious where they can get these useful commodities. Vitamins are abundant in nature, but the greatest pity is we destroy them by boiling, sterilizing or by special treatment of our food stuffs. Vitamins are the products of vegetable growth and are found in vegetables only. It is mainly due to the presence of vitamins that the vegetarian diet is superior to non-vegetarian diet. Vitamins found in animal organisms are supplied to the animals through their vegetable foods. Commodities which are rich in Vitamin will be in great and increasing demand and their prices will go up in the near future. Commodities which we now exclude from articles of food will have to be included in the food list while some others which are now included will have to be excluded. As has been already stated the absence of any one vitamin is said to cause deficiency diseases. One vitamin cannot replace another and all of them are required for the maintenance of orderly balance between the constructive and destructive cellular processes. All vitamins are more or less susceptible to heat. Of the five water-soluble C seems most susceptible and water soluble B least.

The following substances do not contain any vitamins, Tea, Coffee, Cocoa, Chocolate tinned meat, honey, jam white fish, skim milk, meat extracts, malt extracts, white wheat flour, polished rice, pea flour, white corn flour, mustard powder, tapioca, sago, lard, olive oil, coconut oil, linseed oil, margarine from vegetable etc.

So far, we have been dealing with vitamins in general. Now let us consider the importance of milk as a diet of vitamins which the title of this paper claims. Milk is an easily digestible food containing all the nutrients and an adequate quantity of mineral salts. The protein of milk is rich in amino acids specially suited for the nourishment of the human system. These special nutritive values of milk are nothing when compared to its marvellous dietetic value as a vitamin supplier.

A convincing proof of the importance of the vitamins in milk has recently been furnished by the result of an investigation extending over 4 years which has been conducted by Dr. H. C. Corry Mann, on behalf of the Medical Re-search Council of the

United Kingdom. Some 200 boys have been fed continuously in groups on concentrated diets. They all received a basic diet, which by itself was enough to satisfy the appetite of growing boys but some of them received in addition a pint of fresh milk daily, other rations of sugar, of butter of water cress, of casein or of vegetable margarine. It was found that the boys who received the basic diet only had an average annual gain in weight of 3.85 lb. per boy and an average annual increase in height of 1.84 inches. Those who received milk in addition to the basic diet gained on the average in the year 6.98 lb. and 3.63 inches in height. Those who had the other ration put on varying intermediate growths of weight and height. In case of all the additional rations including the milk the calorific value of the extra food was practically identical. It is thus clear that milk has specific qualities as a food which are not to be accounted for by the ordinary assignment of the calorific content. Milk contains all the vitamins except B. But C which is very unstable is lost when milk is subjected to heat. Heat affects the vitamins A, D and E in milk to some extent but a fair amount will be still available, if it is not heated to a very high temperature. It is therefore advantageous to take milk in a fresh unheated condition. As a lesser evil, if milk has to be boiled to prevent disease like tuberculosis, the Vitamin C which is lost should be replaced. The children fed on sterilized milk develop scury and they must be given lemon or orange juice to supply vitamin C which is lost by sterilization. If cows are kept in clean and sanitary condition and tested periodically by a Veterinarian there is no need to pasteurise or sterilise milk. Owing to this important question of conserving vitamins, sterilization of milk is now going out of practice and in some countries even pasteurisation has been stopped. In Norway, in addition to sanitary method of milking, the milk bucket, at the time of milking, is filled with a layer of ice in its outer jacket and the milk is strained and bottled, immediately after it is drawn. The low temperature prevents bacteria from infecting the milk and there is no loss of vitamins. As vitamins are required by all people young and old and as most of the vitamins are found in milk, milk should form an item of diet and it should be consumed unheated as far as possible. An addition of fresh fruits and vegetables will supply other vitamins which are lacking in milk. To enjoy the full benefit of vitamins, the diet should be consumed uncooked. Cooking lessens or destroys the value of most of all foods. If one

is to advocate such a course, I am afraid, there will be a revolution among people, as it is not possible to change their habits all on a sudden. But a real attempt may be made to give up unnecessary cooking and treating of food. As an example, lime fruits when consumed fresh are a source of vitamin C, but when pickled that valuable property is lost. All the refined articles of food, have less dietetic value than their crude forms from which refined products are made. Every diet should include fresh milk, fruits and vegetables and it is worthwhile for a man to expose himself to bright sun for some time daily.

In future it is quite likely that some more vitamins are discovered and a host of diseases traced to their absence. Doctors will very rightly attribute every disease to the lack of one vitamin or another and it is up to you to satisfy the vitamin requirements of your system and lead a happy and healthy life.

Work in the Tamil Villages Some Experiences.

(CONTRIBUTED).

“India is the land of Agriculture and 80 per cent of its population live by tilling the land—” How often has this been said, often with great emphasis, when anybody pretending to be interested in India’s development, pleads for improvement in agriculture—as the first item for consideration. There it begins and there it ends. Few try to go deeper than this and obtain at first hand a knowledge of the actual conditions and behaviour of the average ryot in the different parts of country, to see how he yields and co-operates with us for any improvement we may endeavour to achieve. It is easy to say that we should improve the agriculture of the land, ameliorate the socio-economic conditions of the ryot population and so on and so-forth, but it is only those who actually work in the field that can know the manifold but peculiar difficulties one has to experience before any thing can be achieved. The experiences narrated here though not too many are quite significant and may seem important as well in connection with our efforts to improve the village and its agriculture. How much of an uphill task, this introduction of improved methods of agriculture is, for a prosperous rural population, will be well evident from these seemingly trivial observations.