desirable supply of proteins. This was particularly the case among the millworkers' wives. The supply of calcium and phosphorus was in the main satisfactory for all groups, whereas the consumption of iron among the smaller children and the women was below the desirable level.

The vitamin A supply showed a very wide dispersion. Starting from a minimum requirement of 2,000 i.u., the supply of vitamin A to the men of all three groups was above this value. The optimal supply of 4,000 i.u. has not been reached by any but a few lumbermen. Only one fourth of the number of the children seemed to have reached the optimal level for their age. With regard to the supply of vitamin B, the minimum and optimum requirement for adults is generally given as 0.75–1.50 mgm. vitamin B per day. The women and children have, on the average, not reached this optimum, and a few women showed a consumption below the minimum requirement. The supply of vitamin C was for all groups in the main above what has been considered to be the minimum, namely, 25 mgm. per day. The mean values for all groups of adults except those for the millworkers' and the lumbermen's wives were greater than 50 mgm., which is generally considered as the optimum. Among the children the supply of vitamin C was only exceptionally below 20 mgm. The mean value was about 40 mgm., but the dispersion was very great. The supply of vitamin C did not show any correlation with age, in contrast to the consumption of vitamin A and B, which increased linearly with age.

In conclusion, it can be said that the diet of our subjects seemed to be relatively satisfactory according to generally accepted ideas.

The women's consumption of food was, however, so small that their intake of iron and of vitamins A and B became rather low. The fact is, however, that the relation between the energy metabolism and the requirement of the different food factors is not as yet sufficiently well known to permit us to draw any safe conclusions concerning the women's nutritional standards. The same is the case in regard to the children's requirement of minerals and vitamins at different ages.

The money value of the food has been computed for all household groups and subjects by adding together the cash outlays for food and the value of the produce received in kind. The cash outlays for food for fourteen days amounted to 48 Sw. crowns for the lumberman's household, 51 crowns for the millworker's household and 71 crowns for the clerical worker's household, which was equivalent to 53, 39 and 28 per cent of the respective cash income. The total value of the food amounted to respectively 75, 58 and 76 crowns.

The cost of the daily food was on the average 1.73 crowns for the lumberman, 1.96 crowns for the millworker and 1.70 crowns for the clerical worker. The cost of food per 1,000 calories was respectively 0.38, 0.52 and 0.65 crowns.

Concerning the children, the food cost for the young children was about 0.90 crowns a day and for the school-children about 1 crown a day. The increase with age was thus inconsiderable. On the other hand, the food cost for the children belonging to clerical workers' families increased from 1 crown to 1.50 crowns. These children enjoyed also a relatively more expensive diet than the children of the manual workers. Thus the price per 1,000 calories for young children belonging to clerical workers'

households was 0.73 crowns, whereas food of the clerical workers' young children cost about 0.50 crown.

These figures might be taken as an expression for the difference in the standard of diets between the household groups in question. The lumbermen's households, where the men as well as the women and the school-children showed a higher food consumption than in the other household groups, lived upon a cheaper diet, which, however, in qualitative respect was not inferior to that of the other groups. Their diet was, however, rather monotonous. The clerical workers' households, which showed the lowest food consumption but the highest food expenses, showed, however, from the qualitative aspect a standard which was only insignificantly higher. Their diet was, however, much more varied, which among other things expressed itself in their choice of dishes and variation in the way of preparing them.

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THE ELM TREE

By ALEXANDER L. HOWARD

THE elm tree, which on account of its peculiar habit of growth has become an outstanding feature of the English countryside, of which the genius of both British and Continental painters have taken full advantage, seems doomed to extinction; the tree is beset by too many enemies. With the breaking up of the large estates there is no one left to preserve it. For upwards of one hundred years no Government has existed in Great Britain which has shown any well-defined interest or devoted any tangible efforts towards reafforestation, and only in the course of the last twenty years, or less, has the subject been given consideration. Even during this period the main effort has been directed towards the financial rather than the national aspect.

It is interesting and instructive to contrast the labour and pains taken by those who preceded us—Virgil, Pliny, Evelyn and others—to ensure a plentiful supply of trees with those feeble efforts which are practised to-day. For upwards of two hundred years few foresters have studied the means of the reproduction of elms, or the dangers imminent to the young trees, although we have possessed the knowledge of every kind of device, with explicit instructions as to how to plant, rear and establish them.

Although the life of the elm may be sustained for upwards of six hundred years, and it is rarely struck by lightning, it is very liable to be blown down. The roots, travelling horizontally, will not hold down their weight. At an earlier age than other trees the elm is apt to become rotten at the heart. The tree is a prey to elm bark disease, which is very destructive; and what is worse, man has been very cruel and unkind to it. As an example of disease, the beautiful avenue of elms in Windsor Park has been condemned as beyond recovery. The wood, although ill-considered and costing less than that of most hardwood trees, is, nevertheless, extremely useful, and indeed more generally employed than is commonly known.

There are about twenty species, of which only

two are prominent in the United Kingdom—the common elm (*Ulmus campestris*) and the wych elm (*Ulmus montana*)—with perhaps nine or more hybrids or varieties. Whether the common elm or its varieties have been introduced or are indigenous to Great Britain is in doubt, but it seems generally accepted that the wych elm is indigenous.

The common elm was largely planted by our forefathers as roadside trees and avenues, and has become especially prominent in our hedgerows, while the latter has been extensively cultivated around the stately mansions and in parks throughout the country.

Boulger says of the wych elm :

"Though more abundant to the north of the Trent, it is, wherever it occurs, less distinctly a hedgerow tree than its congener, though its name *montana*—the Mountain Elm, which seems to have been applied to it in very ancient times, is not very appropriate."

Strutt says in his "*Sylva Britannica*" that the common elm is indigenous to England, and we hear that the Romans made a practice of feeding their cattle on its leaves—a use which would probably surprise the extravagant farmer of a later age.

Evelyn, in his "*Sylva*", says of the Dutch elm, which he terms *Ulmus Hollandica* :

"was brought from Holland about the beginning of the reign of King William, and was employed in forming hedges in gardens ; but that taste being now justly exploded, the tree is no longer noticed in this country."

Evelyn states that

"the Wych Elm [which he calls] *Ulmus campestris*, is the only species that grows in Great Britain, the rest being varieties."

Other authorities do not appear to agree with him. As regards his statement that the Dutch elm "is no longer noticed in this country" his opinion may have been well founded in his time, but to-day great numbers of Dutch elm (*U. major*) are to be found in the woodlands, gardens and parks of the landed gentry and municipalities. Of late years the wood of the Dutch elm has been sought in preference to either that of the common or the wych elm, but it is doubtful if in general it serves so many useful purposes as the wood of the latter.

As has been seen, according to Elwes the common elm is termed *U. campestris*, the name originally given by Evelyn to the wych elm. Elwes quotes as follows :

"John Harrison, nurseryman at Cambridge, plainly means *U. campestris* by the English Elm, in his New Method, 33 (1766): 'That which we call the English elm, is peculiar only to the southern part of this island, where it grows wild in hedgerows : there is not a trace of that kind to be seen in the northern counties, but what has been planted within seventy or eighty years ; and these are either in avenues or some plantations near gentlemen's seats.'"

Elwes also gives an account of a very remarkable elm at Huntly Manor, Gloucestershire, the seat of Mr. B. St. John Ackers, which has a watercourse running through the middle of the root. He says :

"Mr. Ackers tells me that if you put a ferret into the root on one side, it can pass through and come out on the other, which shows that the butt is partly hollow, though the tree looks sound and is about 100 feet high. It is difficult to explain the origin of this curious freak."

According to Boulger the common elm is *U. surculo'sa*.

Authorities differ as to the origin of the term 'wych', sometimes spelt 'witch', and it has been sometimes, especially in the south, called 'wych hazel', the word 'hazel' having been applied probably owing to the fact that the leaves resemble those of the hazel, while the name 'wych' may have been taken, as Dr. Prior thought, from the early English 'hwæcce', the French '*huche*', a chest, our modern 'hutch', the wood of this tree having been used for these purposes.

Boulger refers to the origin of the name wych elm, and quotes Turner in his "*Names of Herbes*" (1548) :

"Vlmus is called in greeke Ptelea, in englishe an Elme tree, or a Wich tree, in duche ein Vlme baume, or Ylmen or Rust baume, in frenche Orme",

the latter name 'rust baume' being the common name by which the wood is known in those countries where it is used more extensively than here, namely, Austria and Hungary, to which reference will be made later.

The habit of the two trees differs widely, the beauty of the common elm being in its unusual and distinctive manner of growth, forming somewhat the appearance of a series of rows of green sprays, one above the other at intervals ; while the habit of the wych elm is majestic and stately, the branches adorned by deep green leaves, which spread in graceful sweeps from the noble crown, descending often to the very ground beneath. The foliage again varies : in the early spring the common elm displays tender shoots which are almost of a purple colour, turning later to a vivid green, and changing in the autumn to a golden tint, while those of the wych elm hold their dark green colour throughout. A very graceful specimen of this tree may be seen in full vigour by the wide road across Rotten Row, in Hyde Park, London.

The Cornish elm, named by Evelyn *Ulmus sativa*, and by Elwes *U. stricta*, must not be overlooked. It will not compare with the common or wych elm for beauty or majesty. While it may perhaps be suitable for avenue trees for towns and villages, since the trunks or branches are not so apt to break away, it has otherwise little attraction. Of all the species we have, the wood of the Cornish elm is the nearest approach to that of the Canadian rock elm (*U. racemosa*) ; but perhaps while it is useful for a great number of purposes, it is not so suitable for boat boards as the wych elm.

While the timber of the elm has been the least costly of any hardwood obtainable, and consequently has been in large demand, the uses for which it has been employed have been greater than of any other British-grown hardwood. For the making of coffins immense quantities have been consumed. In the days of wooden ships it was used for keel pieces and in places where it would be in contact with the water, being eminently suitable for both these purposes. The builders of a modern ship, built in 1928, made use of an oak keel piece, bolted to the iron keel by iron bolts, measuring three feet long by three quarters of an inch in diameter. The ship being hauled up for repair, the keel in September 1943 revealed that while the iron bolt was perfectly sound in that portion which had not been in contact with the oak, twelve inches of the rod where it was in contact was entirely disintegrated by the action of acid. An experienced shipwright gave it as his opinion that had the keel been made of elm the iron would have remained sound.

Elm was used in earlier days for water pipes, and only quite recently such pipes were taken up in

Tottenham Court Road and Euston Road, London, and found to be perfectly sound, although they had been in use for more than a hundred years. Some of the actual pipes were exhibited at the Royal Institution a few years since.

Immense quantities have been absorbed for boxes for tinplates, and for seats of chairs and benches, for which elm is admirable. It is used by barge-builders, wheelwrights and for the making of boxes and wagons.

According to Boulger :

"Gerard tells us that formerly longbows were made from the wood of this species, and its tough bark was made into ropes."

Both the Dutch and wych elm are highly esteemed for boat boards, the latter being preferred. It is used extensively for rubbing pieces for the sides of wharves and piers, where its tough grain provides resistance to blows, and its durability under water is exceptional; for the wooden walls of farm buildings, and houses, and has been employed for floorings, but its use for the last-named cannot be recommended. Formerly it was used for chests and partitions for storing all kinds of farm produce and utensils; and for steps and staircases in buildings of all kinds, but for this use it has fallen into disrepute, as the wood will expand and contract with the changes of atmosphere, and is liable to the attack of fungus and beetle. In country places it has been used for pews and seatings in churches, but is generally found severely damaged by lyctus and zestobium beetles.

Throughout Austria and Hungary it has been largely employed for interior house decoration of all kinds, and held there in great esteem. Of late years it has been in demand for high-class work in panelling, etc., in London and elsewhere, being specified by well-known architects. It is doubtful whether the high cost of manufacture, the difficulties arising in seasoning, and its uncertain behaviour after completion, warrant its continued use. In this direction the wood of the Dutch elm was found more satisfactory than of either wych or common elm, both the latter giving trouble.

Elm burrs, carefully selected, as many are too faulty for use, have provided, nevertheless, a limited quantity of most attractive specimens for ornamental woodwork, and a good elm burr will compare favourably for such work with any other kind of wood which can be employed. Elwes mentions many notable examples, and during the last twenty years elm burrs have been in great demand and have commanded high values. Probably the greatest quantity absorbed in one effort was the decorative woodwork for the S.S. *Queen Mary*, where hundreds of flush doors were faced with elm burr, also the dado panelling of the main staircase, the panelling of the main hall and the writing rooms. Some of these burrs were exceptionally fine, the colour varying from a golden to a deep reddish-brown, but always attractive. Whereas in general the work stood well, a certain number of the flush doors cracked and blistered. The very unusual strain on any wood subject to the changes of atmosphere and climate of a sea voyage, and especially that of the Atlantic, suggests that an elm burr which has been found to stand wear and tear in the ordinary way is scarcely the best medium to be employed for ocean-going ships.

A Frenchman, Bernard Palissy, in the sixteenth century, said :

"I have often wished to make a list of the arts which would cease if there was no longer any wood, but when I had written down a large number of them, I found there would be no end to the enumeration, and, after due consideration, I came to the conclusion that there was not even one trade which could be carried on without wood."

Fortified by the Act of Parliament which made it a capital offence to cut a tree down, confirmed by Elizabeth in the sixteenth century, for nearly two hundred years planting of trees was encouraged and practised throughout the country. Science applied to forestry was not thought of, nor were scientific methods employed. Can we rise to the occasion, recognizing to the full the disastrous consequences of delay, following scientific methods and instituting and carrying on a wide embracing measure of re-afforestation?

G. M. Trevelyan has said :

"In matters of amenity (the) Government in our island is by long tradition heartless and witless. In old days this did not matter, because then landlords were able to beautify the country-side with country houses, parks, avenues, gardens, well-kept agricultural estates, and above all with plantations or old English forest trees". . . as they seldom will today.

and further :

"It (the Government) should charge itself with a generous policy of planting the slow-ripening forest trees of England. The State will still be there in time to come to enjoy their financial value, and the English people will still be there to enjoy their beauty. The Government ought to charge the Forestry Commission with this policy on a large scale."

Those of our legislators who reach a position of power over the destiny of the country should recognize the alarming situation. England without her woodlands could no longer maintain her people.

It is a curious thing that although the planting and care of trees is little thought of, our people—men, women and often children—have always displayed the utmost interest, and even a possessive attitude towards the old trees which have been familiar to them from their youth upwards: the former of these two strange characteristics has no doubt insensibly continued from the time when the British were tree worshippers and practised only the religion of the Druids. The latter, however, should be more seriously considered, because it is evidence of a valuable instinct which wiser Governments might have seen and fostered. Illustrating the foregoing, an elm tree in a village in Hertfordshire displayed a large burr which the Lord of the Manor sold. When the men came to fell the tree the villagers prevented them. By order of the Lord of the Manor the men returned in the small hours of the morning, whereupon the villagers set the tree on fire and destroyed it, rather than their cherished tree should pass into the hands of a stranger.

Since the time of Evelyn (*circa* 1660) successive Governments, while neglecting the subject of forestry, have continued to tax more and more heavily those few owners of woodlands, without the least regard to the well-being of the community. A contrary policy, wisely followed, even had it only been adopted throughout the last fifty years, would by now have provided a revenue for the remission of taxation, instead of increasing the already heavy burden.