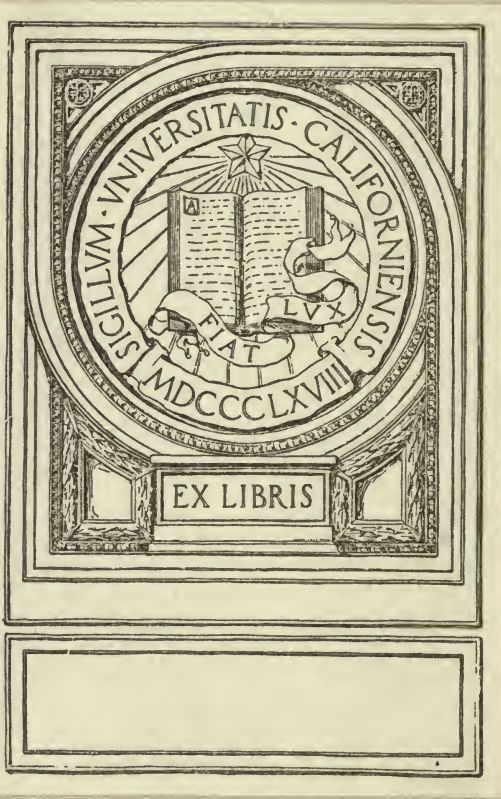
CAMBRIDGE INDUSTRIAL
AND COMMERCIAL SERIES

Agriculture and the Land

By G. F. BOSWORTH


SIGILLVM · VNIVERSITATIS · CALIFORNIENSIS
LVX
FIAT
MDCCCLXVIII
EX LIBRIS

Cambridge Industrial and Commercial Series

General Editor: G. F. Bosworth, F.R.G.S.

AGRICULTURE AND THE LAND

CAMBRIDGE UNIVERSITY PRESS
C. F. CLAY, MANAGER

LONDON
FETTER LANE, E.C. 4

EDINBURGH
100 PRINCES STREET

NEW YORK: G. P. PUTNAM'S SONS
BOMBAY, CALCUTTA, MADRAS: MACMILLAN AND CO., LTD.
TORONTO: J. M. DENT AND SONS, LTD.
TOKYO: THE MARUZEN-KABUSHIKI-KAISHA

Cambridge University Press

AGRICULTURE AND THE LAND

WITH SOME ACCOUNT OF BUILDING SOCIETIES, GARDEN CITIES, OUR WATER SUPPLY AND INTERNAL COMMUNICATION

BY

GEORGE F. BOSWORTH, F.R.G.S.

Cambridge :
at the University Press
1917

GENERAL PREFACE

THE books in this Series deal with the industrial and commercial condition of our country. Of the importance of the subject there can be no doubt, for it is the story of the material side of the life of a great nation. British agriculture is the most enterprising in the world; British manufactures, both textile and hardware, are famed in all parts of the globe; British ships are on every sea and carry for other nations as well as for ourselves; and Britain, through the Banks and Exchanges of London, is the centre of the money market of the world.

It has been well said that material needs cannot be neglected or forgotten with impunity in this world. Just as a man must have bread to eat if he wishes to enjoy life, so a nation needs material prosperity if it is to be of real influence in the world. Industrial and commercial prosperity does not, in itself, constitute greatness, but it is a condition without which national greatness is impossible. Hence, the story of the industrial and commercial condition of Britain is worth telling to our school children, not only that they may rejoice in our country's progress, but, also, that they may realise the responsibilities borne by the citizens of the first of all nations.

G. F. B.

EDITOR'S NOTE

THIS book on Agriculture and the Land gives an outline of the progress and developments of one of the oldest of human arts, more especially so far as our own country is concerned. It is necessary that our school children should know something of the effect of climate on agriculture, of the character of the soil in different localities, and of its suitability for the growth of particular crops, and for the rearing of cattle, sheep, horses, and pigs. These fundamentals of British agriculture are considered in the first part of the book, and then chapters are devoted to Small Holdings and Allotments, to Housing and Town-planning, and to the importance of thrift in connexion with Building Societies and Co-operative Societies. In the later chapters will be found, among other subjects, some account of the Sources and Distribution of our Water Supply, and the various modes of Internal Communication.

Teachers and students who wish to study Industrial and Commercial History in greater detail are advised to use Dr Cunningham's *Growth of English Industry and Commerce*. There they will find full and accurate references to a large number of authorities on all branches of this subject.

G. F. B.

June 1917.

CONTENTS

MAPS AND ILLUSTRATIONS

The illustration on p. 8 is reproduced by courtesy of the Ven. Archdeacon Cunningham; that on p. 49 by permission of the late Prof. T. McKenny Hughes; those on p. 32 and p. 66 are from photographs kindly supplied by Chivers and Sons, Ltd., Histon, Cambs. and Cadbury Brothers, Ltd., Bournville. Cover design based on an illustration in *The Encyclopaedia Britannica.*

1. AGRICULTURE—OUR MOST IMPORTANT INDUSTRY

Agriculture, which at first referred only to the tillage of the land, may now be considered as the science and art of all that relates to the cultivation of the soil, and as such includes the ingathering of the crops, rearing the live stock, the use of farm implements, and the employment of labour.

Agriculture is one of the oldest of human arts, dating from prehistoric times. Some of the earliest agriculturists were the inhabitants of the lake-dwellings of Switzerland, and amongst their remains are the bones of cows, pigs, sheep, and goats. Wheat, barley, millet, and flax were cultivated by these old-world people, and corn-crushers were in use in every dwelling.

The savage, who lives on the roots and fruits he finds ready to his hand, stands on a lower level than the hunter who lives by the chase, while the herdsman leading a nomadic life belongs to a much higher stage of human culture. Civilisation in any full sense only begins amongst men who live in settled homes and who till the soil for their sustenance.

The Aryan race, to which we belong, probably took its name from a word meaning to plough, and was thus distinguished from the nomadic people who did not cultivate the ground. Among the primitive Aryans fields were tilled, grain was raised and ground into meal,

food was cooked and baked, cloth was woven and made into garments, and the use of metals was known.

In the Bible Adam is represented as a gardener, Cain as a tiller of the ground, and Abel as a keeper of sheep. The people of Egypt and Babylonia were amongst the great agricultural communities of the world, and at a later period the Romans practised the leading principles of agriculture. Every civilised country has followed the agricultural methods best suited to its own soil and climate; and every modern nation gives the greatest attention to all that concerns the feeding of its people.

In our own country agriculture is most carefully practised, and its prosperity is of the utmost importance to us. Although the acreage now under tillage is less than it was and the number of farm labourers is decreasing, it is still true to say that agriculture is our most important industry.

There was a time when our country grew enough corn to feed the people, and various Corn Laws were passed to regulate the price of imported corn. In the early years of the nineteenth century, however, the British Isles could no longer grow enough corn to feed the increasing population, and owing to the long and costly Napoleonic wars our statesmen had not given proper attention to the food question. But when the time of peace came after 1815 this question had to be faced, and then Parliament passed a law enacting that no corn should be imported until the price in London was 80*s.* a quarter. This meant that the price of a 2 lb. loaf of bread would be about 9*d.*, and it also meant that the British labourer was near starvation. This high price of corn was good for British landowners and farmers who

could get high rents for the farms and high prices for wheat in all our markets.

It will thus be evident that there was cause for much discontent amongst the working class, and for many years there was a fierce agitation against farmers and landowners. The hostility to the Corn Laws was

Sir Robert Peel

found among the population which had grown up in the large towns. The industrial revolution had transformed Great Britain from an agricultural into a manufacturing and commercial country, and as a result the opposition to the Corn Laws was very bitter. At length, in 1846, Sir Robert Peel carried a measure to abolish

the Corn Laws. By this Act the duty on corn was at once greatly reduced, and was to cease altogether in 1849. The repeal of the Corn Laws did not lead, as was expected, to a very great fall in the price of corn, nor did it result in the ruin of farmers and landlords. Indeed for a long time after the abolition of the Corn Laws it paid farmers to grow corn in Britain.

There came, however, a great change about 1881, and year by year since then the land of England has been going out of cultivation, and the villages are being deserted in favour of the towns. This change has been largely due to foreign competition, for wheat can be grown in Canada, Australia, India, the United States, Russia, and Argentina, shipped to our ports, and then sold in our country, at a cheaper rate than it can be cultivated by our own farmers. And now we buy from abroad not only the greater portion of our corn, but most of our meat, and a good deal of our fruit, butter, and cheese.

The number of people that any country can support depends on its agricultural and commercial resources. Food is man's first necessity, and it is therefore imperative that we, in Britain, should supplement our insufficient food resources by foreign supplies, for if we did not our people would starve. Especially would this be the case if we were defeated in a great war, and to avoid this calamity we keep our navy strong and efficient. Our big steamers carrying the products of all countries to our shores are guarded on their routes by our warships, and so long as this is done we feel that the abundant resources of other countries will supplement our own stock, so that our people may have a plentiful supply of cheap food.

We shall find in the following chapters that British agriculture has a long and progressive history, and as to its prime importance we shall come to the same conclusion as Dr Johnson, who wrote thus in the *Rambler* in 1751: "If we estimate dignity by immediate usefulness, agriculture is undoubtedly the first and noblest science."

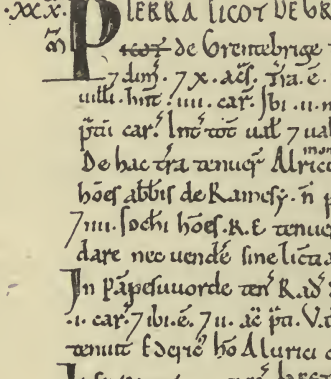
2. THE EARLY YEARS OF BRITISH AGRICULTURE

Before the Norman Conquest, and for hundreds of years afterwards, the greater part of the arable land in a parish or manor was possessed by the lord and the tenants, both free and serf, in the shape of strips or furrows in common fields.

Besides the cultivated land there was always a considerable area of common pasture, sometimes open and sometimes enclosed, and generally a wood in which hogs were fed. In the Domesday Book there are constant references to these woods, and their size may be estimated from the number of hogs that could be kept in them. Thus, in Walthamstow, we find that the woods could provide food for 300 swine.

We shall get a better idea of the land and its value, from an agricultural point of view, if we remember that, in each parish or manor, there was the lord's land and the land held by the tenants. The lord's house stood in the middle of his land, and was the centre of activity for the manor or parish. The manor house was generally built of wood, rarely, in pre-Norman

times, of stone, and stood not far from the village where were the houses of the lord's tenants. Each house stood in a yard and was loosely built of wood, clay, mud, turf, or wattles.



A page of Domesday Book,
giving a list of some of the lands in Cambridgeshire belonging to Picot the Sheriff, A.D. 1081–86

The villagers spent the greater part of their work-day on the open fields of arable land, though it was part of their duty to give so much time to ploughing and cultivating the lord's own land. The arable land of each

manor was divided into three great fields, one being for fallow, one for winter tillage, and one for spring tillage. These fields were generally subdivided into smaller oblong fields of acre or half-acre strips running parallel to each other if in the same field, or at an angle if in different fields. The three large fields were divided by roads or streams; the smaller by narrow ridges of turf called "balks." In some cases there would be thousands of half-acre strips in a parish, and of course some of them would be fertile, some stony, and some useless. It was therefore arranged that each tenant should have his strips scattered over the fields, so that a rough kind of equality was the result.

It will be noticed that no mention of hedges occurs in the above description; they became a later feature of the countryside. The wet lands were drained by ditches, dikes, and runnels; and through the larger fields ran rivulets, brooks, and larger streams, whose banks were covered with rank grass, brambles, and brushwood, and whose running water turned the mill.

Beyond the large fields of the manor would be the woodlands and the forest, thus separating settlements, and making communication of rare occurrence, and in some parts an impossibility. These forests were resorts of dangerous beasts, and the bleak moors which lay interspersed were equally to be dreaded. The common woodland trees were oak, ash, elm, beech, maple, lime, birch, and thorn; the undergrowth was full of hazel, elder, scrub, willow, and ferns.

The pre-Norman system of agriculture was wasteful in many ways. It was a great loss to the community that one-third of the land was fallow in a year; it was a very serious loss that large tracts were never cultivated

Open fields and balks at Clothall, Hertfordshire.

owing to bad drainage; and it was very injurious to the best interests of the tenants that their strips were closely adjoining, so that trespass was frequent, and good ploughing was not possible. Among the other difficulties were the bad roads, which were often mere "ways" and in bad weather treacherous sloughs. This fact, together with the constant seeding of thistles and weeds on adjoining strips made the work of an Anglo-Saxon tenant not very profitable.

Early agriculture in England was very rude. The plough was clumsy, draught cattle, horses, and oxen, were small, and the ground was only scratched on the surface. The husbandman, besides the farmyard manure, used marl and lime as fertilisers. The seed was thrown broadcast on the land, and four times the seed sown was considered a fair crop. Nothing was known of winter roots, or of artificial grasses, and so the cattle were starved in the winter, and always small. The corn was reaped by cutting off the ears, the straw remaining on the field, at least for a time, and often permanently, in order to restore the ground. The stock on the land was far more valuable than the land itself; in some cases there is evidence that the stock on a well-tilled farm was worth three times as much as the land.

The first object of the manor was its own support; and the needs of the community were satisfied almost entirely from the ploughing and tilling of the ground, and from the use and increase of the domestic animals. The handiworkers or craftsmen had their special work, but this was for furthering these same needs. Nothing shows more clearly the change that has come over England, when we remember that the artisans, workers

in wood, leather, and metal were, in early times, only of secondary consideration.

In a book written by Aelfric, in Saxon times, there is an interesting passage illustrating the prominence of agriculture in his day. The ploughman, in answer to questions, says, "Oh! my lord, I labour much, I go out at daybreak, drive the oxen in the field and join them to the plough; there is not so fierce a winter that I should dare to lurk at home, for fear of my lord, but, yoking the oxen and fastening the ploughshare and coulter, all day must I plough a full acre. Assuredly I do more; I must fill the ox-bins with hay and water, and bear out the hay and manure." On hearing this, the wise man in the book considers that agriculture must come first because the ploughman feeds them all.

On hearing this the smith says: "Where would the ploughman get his share or coulter or goad, the fisher his hook, the shoemaker his awl, or the seamer his needle except for my craft?" "Very true," says the wise man, "but the ploughman gives us food and drink. What do you give us in your smithy except iron fire-sparks and the noise of sledge-hammers and of blowing bellows?"

The wood-worker now interrupts and says, "Who does not use my art when I work for you houses and many vessels and ships?" To which the smith replies: "Oh! wood-worker why do you say so when you would not be able to make one hole without my craft?" And so the dialogue goes on, but all in favour of the agriculturist, whose work was then of prime importance.

Each village in those early days was self-contained or self-sufficing, that is to say the villagers lived on

what they produced and made the clothes and implements they wanted. Money was almost unknown, and barter was the order of the day, that is, you paid for what was wanted in kind, corn or meat or something that was in your possession.

There are a few special workers on a manor that require a passing notice. The salter prepared by evaporation the salt that was needed to preserve meat, and in the making of cheese and butter. The shoemaker made not merely shoes, boots, and slippers, but also flasks and bottles, reins and trappings, spur leather and halters, bags and purses of all kinds. The smith did all the iron work for the plough, the cart, and the mill, and made fish-hooks, needles, and awls. The wright did all wood-work, besides the heavier work of house building, and the making of tubs, buckets, and vats.

3. THE PROGRESS OF BRITISH AGRICULTURE

The years that intervened between the Conquest and the battle of Bosworth witnessed two great changes so far as agriculture is concerned. The great landowners took increased interest in the development of their estates, and the actual cultivation of the soil steadily improved in character. The great mass of the peasantry from being serfs of the lords of the manors where they had been born, became free labourers, earning daily wages, with power to work for whom and where they pleased. Of course this was a very gradual change, but it is one of the most important in

our economic history, and the Great Plague which first broke out in 1348, is the starting point for a new outlook for the peasantry of our country.

We have to remember then that it is not so much the improvement of agriculture in this period that is noteworthy as the betterment of the condition of the people. The landowners abandoned cultivation of the land on their own account and let their land and stock to tenant-farmers, who, in their turn, employed free labourers. But it is certain that, from the reign of Henry III to that of Elizabeth, no material alteration was made in English agriculture, except in sheep farming, and certainly no appreciable progress.

During the thirteenth and fourteenth centuries the vast majority of the people were continuously engaged in farming. Even the people of the towns, though rising in wealth and importance, still remained to some extent agriculturists, and in any case went out into the fields during the harvest time. It is also thought that the students at the Universities were expressly given the long summer vacation in order that they might return home at this season and share in the labour of reaping and carrying with their other relations. Perhaps the same is also true of the lawyers, whose vacation was equally long.

Nearly as much land was cultivated in the Middle Ages as is now the case in England. Then of course the towns were much smaller and the space occupied by houses was much less than at present. It was necessary to cultivate every available acre for each man wanted a quarter of wheat for his consumption; and at this time wheaten bread was an almost universal article of diet, even among the poorer classes.

Parks and ornamental grounds were then unknown, and the land was ploughed up to the noble's castle and the farmer's homestead. On the South Downs there are traces of former cultivation still to be seen in the ridges and furrows on lands that have not been ploughed for centuries. Wheat was also grown with some success in the northern counties of Northumberland and Durham, where a century ago it was supposed that such a thing was impossible north of the Humber.

One of the chief characteristics of this period is that the processes of cultivation varied little throughout the country; the same kinds of grain were sown, the same kinds of stock kept, and the same sort of labour was required both in the north and the south. The reason for this was that the landowners wished to make each manor as self-supporting as possible. Such articles as iron for tools and horseshoes, or salt for curing, had, in most districts, to be obtained from outside; but, as a rule, everything was done to make the home production sufficient for all the requirements of the simple style of living then customary.

Nowadays we attach great importance to the division of labour, but then its advantages were hardly appreciated. Thus we find that, though some districts must have been best adapted for pasturage, and others for rye or oat-growing, yet there were hardly any parts of the country used for farming on which barley and wheat were not produced, and where all kinds of stock were not kept. In a later chapter it will be evident how differently we manage these things at the present time, and how much greater is our success.

The wealth of England was in the agricultural districts, and the greatest population was in the south and east. If a line is drawn from Norfolk through Reading to Dorsetshire, we shall find the densest population and the greatest agricultural wealth on the eastern side in the Middle Ages. Norfolk was then the richest county, owing not only to the agriculture, but

Lavenham Church, Suffolk

(Lavenham was formerly a centre of the cloth-weaving industry. Its church is one of the finest parish churches in England)

largely to its being a great centre of the woollen trade. Its towns and villages were the homes of Flemish weavers and other foreign workmen, and the fine churches of Norfolk and Suffolk remind us of the wealth and piety of its people at this particular period. Among the other rich agricultural counties were Middlesex, Oxfordshire, Bedfordshire, Kent, and Berkshire, while

Oxen ploughing at Windrush, Gloucestershire

(Oxen are still used for ploughing on the Cotswolds, in Sussex, and in other parts of England)

poorest of all were the modern manufacturing districts of Lancashire and the West Riding of Yorkshire.

Under the primitive system of agriculture that then prevailed, the people lived on unwholesome salted food during half the year; cattle were starved during the same period, and as a result disease was common in man and beast. Scurvy was prevalent, and leprosy was common. The unclean habits of the people added to the unhealthiness of their lives. Few people lived beyond fifty, when they were old. Plagues of terrible deadliness attacked the people, and swept off a large percentage of the population; and scab in sheep devastated whole flocks and imperilled one of the chief sources of English wealth.

We will close this chapter by a reference to the Black Death, a disease of fearful destructiveness, which devastated England during various years, but especially in 1369. Chaucer and Langland both call it the Pestilence, and the havoc it made in the population far exceeded that made by any similar scourge recorded in our history. Towns were stripped of their inhabitants. It is stated that it slew 100,000 in London, 50,000 in Norwich, and proportionate numbers in other large cities, and probably one half of the whole population of our country was carried off by this fearful visitation. The work of death went forward into Scotland, and eventually to Ireland, so that the whole of the British Isles was terror-stricken.

It is not necessary to dwell further on the ravages of the Black Death, but we must refer to the economic consequences. It led to the Peasants' Revolt, and the whole system of farming was revolutionised. The scarcity of labourers caused the rate of wages to be

increased; the large estates were broken up into smaller farms; and free play was allowed to the new tendencies of the age so that in course of time better relations existed between masters and men.

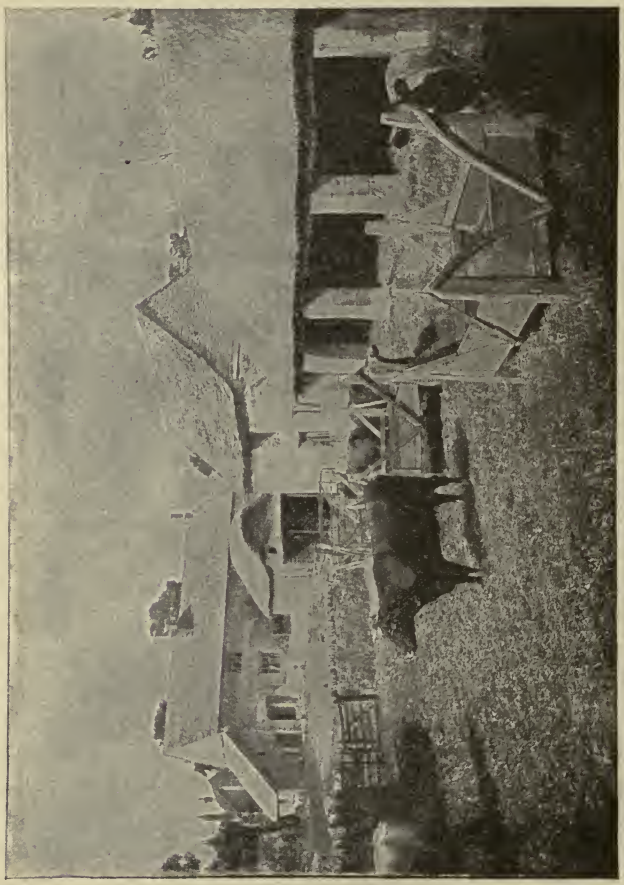
4. THE DEVELOPMENT OF BRITISH AGRICULTURE

British agriculture has gone through very varied experiences of prosperity and depression. The Tudor period seems to mark a transition time when new ideas on the land and its cultivation took hold of men's minds. The year 1534 was notable in the annals of agriculture, for there was then issued Fitzherbert's *The Book of Husbandry*, which is considered to be the first English treatise on the subject. In queen Elizabeth's reign there were other writers, the chief of whom, Tusser, wrote the *One Hundred Good Points of Husbandry*. From these and other books of a like nature we learn about farming in Tudor times.

It was then that the old three-field system was giving way to large, independent holdings; and perhaps even more important was the conversion of arable into pasture land, when large areas too were fenced off into sheep-walks, for wool was then needed for the cloth industry. These and other changes resulted in the migration of the rural population and considerable discontent.

We must also remember that the Reformation was the cause of much economic change. A large amount of land that had been held by the monasteries went

into new hands. The monks had been old-fashioned in their methods of farming; the new owners introduced



A Cotswold Homestead

improvements and turned away the old labourers. The poor people had hitherto received much charity from the monasteries, but now they had to seek relief elsewhere.

An old rhyme runs:

> Hops, Reformation, Bays, and Beer,
> Came into England all in one year.

This puts the changes rather crudely, but there is a good deal of truth in the statement that the Reformation was associated with much that was new in agriculture. Hops were brought in and cultivated early in the sixteenth century; hemp and flax were then common crops; hedges were becoming general in Scotland and Ireland; and potatoes were introduced into England in 1586. In farming, men were finding the value of manuring the soil; and sand, lime, seaweed, and the sweepings of the London streets were all used for this purpose.

In the seventeenth century further progress was made in the agricultural industry. Farmers then began to use horses more and oxen less for ploughing. Iron had become cheaper, and, as a result, agricultural implements were better. The union of England and Scotland led to an increase of population, and a demand for better food. Yet in many ways there was much to do so that our country might be better cultivated and produce more food. A good deal of land still remained either forest, moor, or undrained marsh; and as yet there were no root crops for the winter feeding of the cattle.

Milton in *L'Allegro* gives us a charming glimpse of rural life in his time, as the following extracts will show:

> Some time walking, not unseen,
> By hedge-row elms, on hillocks green,
> Right against the eastern gate
> Where the great sun begins his state,
> Robed in flames and amber light,
> The clouds in thousand liveries dight.

While the ploughman near at hand
Whistles o'er the furrow'd land,
And the milkmaid singeth blithe,
And the mower whets his scythe,
And every shepherd tells his tale,
Under the hawthorn in the dale.
Straight mine eye hath caught new pleasures
Whilst the landscape round it measures:
Russet lawns and fallows gray,
Where the nibbling flocks do stray,
.....
Meadows trim with daisies pied,
Shallow brooks, and rivers wide.

Further on in the same poem we get some idea of the lighter side of rural life:

Sometimes with secure delight
The upland hamlets will invite,
When the merry bells ring round,
And the jocund rebecks sound
To many a youth, and many a maid,
Dancing in the chequer'd shade;
And young and old come forth to play
On a sunshine holiday.

When we come to the eighteenth century we find improvement in every direction. Farmers began to grow turnips in rows and afterwards swedes as field crops. They had learnt from the Dutch the value of improved winter crops, and it was soon found that the turnip had doubled the productiveness of land. The Dutchmen were then the seedsmen of western Europe, and English agriculturists learned from them not only the value of winter roots but also the policy of cultivating clover and artificial grasses. The effect of all these improvements was that the numbers and quality of cattle and sheep increased, for the agriculturists

could find them food in winter and keep them in pretty good condition. Before winter roots were discovered, surplus cattle and sheep were killed in November, and salted for winter provisions. This bad system was not only injurious to health, but it was a great hindrance to agricultural progress.

The latter part of the eighteenth and the early years of the nineteenth century witnessed the enclosure

An old farmhouse, near Wheathampstead, Hertfordshire

of millions of acres of waste land, common land, and open-field farms. During this period the great land-owners set examples in improved agriculture and estate management, and British agriculture then assumed the leading position, which it still maintains in spite of foreign competition and other difficulties.

The nineteenth century may be divided into several very distinct periods of alternating prosperity and

depression. The early period was one of great activity, and farmers became rapidly rich and wages advanced. Wheat fetched as much as 126*s.* per quarter, and farmers began to use improved implements. It was then that iron ploughs were first introduced. The Corn Laws were repealed in 1846, and the following period of twenty years was one of great agricultural prosperity which had followed a time of great depression.

A long period of agricultural adversity ensued, and lasted into the twentieth century. Year by year less wheat was grown, and while over 3,000,000 acres grew wheat in 1880, only 2,170,000 were so cultivated in 1915. Owing to bad seasons, the decrease in prices of agricultural produce, and other causes, there was a considerable movement of the rural population into towns. This movement has not yet ceased, and the problem to solve is what inducements should be offered to agricultural labourers to remain on the land.

The Board of Agriculture and the corresponding Boards for Scotland and Ireland are now at work to stimulate our farmers in all their work. Reference will be made in another chapter to the work of these Boards, but here we may remark that great improvements are being made in agricultural practice and in the development of the live stock industry.

The latest advances in agriculture are mainly due to chemical science and machinery. The chemist has been a great benefactor to the farmer by the gift of artificial manures, by the analysis of artificial food, and by the examination of soils. Many of our counties have their own agricultural colleges where the scientific pursuit of agriculture in all its branches is encouraged,

and where the students are taught how to get the greatest possible amount of nutritive matter out of the soil for man and beast, and how to get this of a uniformly good quality

During the Great War, especially towards the end of 1916, British agriculture passed through a severe crisis. Owing to the sinking of ships by German submarines, there was a great decrease in food imports from abroad, and thousands of our farm labourers were taken into the army. Their places were filled by women and children, and in some cases by German prisoners; but it became evident that these were not efficient substitutes. In face of these and other difficulties a new president of the Board of Agriculture was appointed, and he nominated a committee of expert agriculturists to advise him on questions arising in connexion with the increased production of home-grown food. This committee inspired confidence among British farmers, and met their most pressing wants with regard to labour, fertilisers, cattle food-stuffs, etc.

In the early days of 1917 there were schemes on foot for utilising waste land. Parks were ploughed for growing cereals and other food products; and in thousands of parishes allotments were freely set apart for the growth of vegetables. The wages of farm labourers were increased, and every effort was made to keep up a good supply of food. Agricultural machinery of all kinds was set in motion, and hundreds of motor tractors were distributed throughout the country.

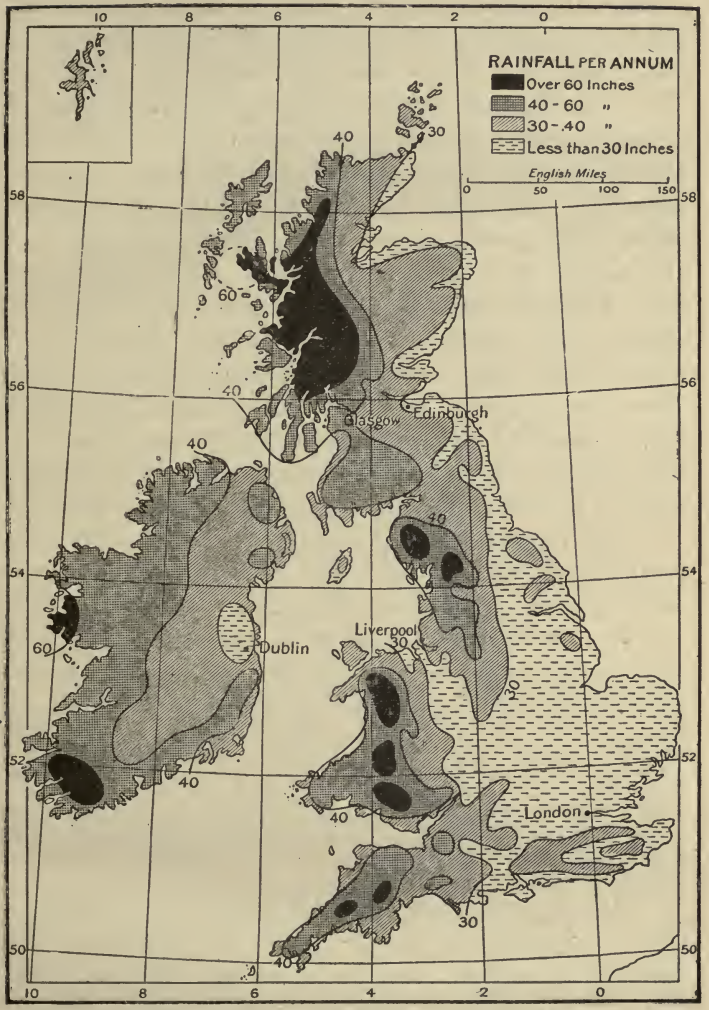
A Food Controller was also appointed, and it was his function to fix prices for certain food commodities and to regulate the amount consumed. It was recommended that 4 lbs. of bread and 2½ lbs. of meat

would be a proper allowance for each person per week. It may be noted that bread was being sold at 11*d.* per loaf, or about twice the price that it fetched before the war.

5. THE EFFECT OF CLIMATE ON AGRICULTURE

It is generally accepted that the character of the vegetation of a country depends mainly on the climate and the nature of the soil. The mountainous parts of Britain are much colder, have a higher rainfall, and are more exposed to wind than the lowlands. Further, the soil is poor, for the rocks are hard, and do not weather into rich soils. For these reasons neither crops nor trees can there be grown much above sea-level. As a general rule it is true that the hilly parts of the United Kingdom are mainly uncultivated, for the altitude controls the climate, and the nature of the rocks controls the nature of the soil. Besides the barren hilly parts there are areas of boggy and sandy ground which are not cultivated.

Although the British Isles are situated in the northern part of the temperate zone, they are favoured as regards climate. They are to the north-west of Europe, and rise above the waters of the north-east of the Atlantic Ocean. A country near a great ocean has a more equable climate than one far from the sea; and as the prevailing winds blow from the warmer parts of the ocean, it will be seen that the British Isles have an equable and mild climate and are well suited to the growth of plants that thrive in temperate regions.



Rainfall Map of the British Isles (after Mill)

At all seasons of the year our prevalent winds come from between the south and west, and when they reach our shores they are laden with moisture. The western mountainous portions of our islands have a heavy rainfall, but on the other side of the mountains the air becomes drier, and thus as we travel east the plains are clear and dry. Of course this has a great effect on the nature of the plants grown. In the west the plants are those requiring dull, rainy conditions, while in the east are those which thrive in a clear, dry climate. In the former regions plants run to leaf; while in the eastern regions their fruits develop under drier and sunnier conditions of climate. In other words, the west and the upland regions are the grass-lands of our country, while the plains and the eastern regions produce the grain and fruit that we require.

It is important to remember that, in winter, the temperature of the British Isles varies little from north to south, but decreases from west to east. This explains the fact that while grass grows at all times of the year in the western portion, the cold winters stop its growth in the east and in the uplands. In the summer, however, the east is warmer than the west, because the cooling action of the sea is not so active; and at the same season the south-east of England is the warmest part of the British Isles, and the north-west of Britain is the coolest.

Thus it comes about that the counties in the south-east of England are those most favourable to the ripening of cereals. Above a certain altitude, even where the rainfall is sufficient, the summers are too cold for cereals to ripen, and the highest parts of the British Isles are either bare or covered with poor

grass, heather, or bracken. In some parts of the west great peat-bogs or mosses occur where the water accumulates in the hollows.

When we speak of the cultivated portion of our country we mean those parts that are under crops and also the area of grassland used for pasturing animals. About 60 per cent. of the United Kingdom is cultivated, the remainder being scanty mountain pasture, heathy land, sand, bog, or bare rock. In each of the four countries the proportions of cultivated land vary considerably. About three-quarters of England and Wales are cultivated, about three-fifths of Ireland, and only a quarter of Scotland.

Scott, in *The Lay of the Last Minstrel*, aptly describes the surface and vegetation of his native land in these lines:

> O Caledonia! stern and wild,
> Meet nurse for a poetic child!
> Land of brown heath and shaggy wood:
> Land of the mountain and the flood.

Taking the United Kingdom as a whole we find that the greatest part consists of pasture land, which forms about three-fifths of the cultivated portion, or a little more than a third of the total area. The reason for this widespread pasture area is found in the moist, equable climate of our country, and as a consequence the characteristic appearance of its surface is its general verdure. Of course this was not always the case, for in early times Britain was covered almost from one end to the other with forest, of which now there are only small remains.

6. OUR CORN CROPS, ROOTS, AND FRUITS. WOODS AND FORESTS

The area of the British Isles is a little over 120,000 square miles or 78,000,000 acres; but about one-third of this is occupied by the mountains of Scotland and Wales, and the bogs of Ireland, which cannot be cultivated on account of the poor soil and inclement climate. Of the cultivated area the greater part has a rotation of crops—cereals, roots, and grasses. The chief corn crops of the British Isles are oats, wheat, and barley, and the chief root-crops are turnips, potatoes, and mangolds.

The chief cereal crop is oats, which being able to stand cold and wet weather much better than wheat are more commonly grown in most parts of the country. Indeed, in parts of Scotland and Ireland oats are the only grain that is cultivated. The barley that is grown in the British Isles is not very much used for food, but is sold to brewers and distillers for the making of beer and whisky. Barley requires less sun than wheat and is more widely distributed than that cereal.

Wheat requires rich soil, abundant summer sunshine, and little rain, in order to ripen well, and as these conditions prevail largely in the south and east of England, we can understand why it is the most important English cereal. The farms of Yorkshire, Lincolnshire, and Essex produce one-fourth of all British wheat, and the yield sometimes approaches 40 bushels an acre. Much of the wheat grown in England is winter wheat, that is wheat sown before

winter, for the wheat plant is so hardy that it can stand the winter temperature. Not nearly enough wheat is grown to satisfy the demands of our people, and every year large quantities of wheat and flour are imported from abroad. On an average Britain imports four times the amount of wheat it produces in one year, and the countries from which we obtain it are, in order of importance, Russia, Canada, United States, India, Argentina, and Australia.

The fact that we can obtain wheat so cheaply from abroad has led to a diminution of the area of wheat land in this country. Thirty years ago the area of British land under wheat was nearly twice what it is at the present time. Great changes have taken place in the cereal-producing areas of the British Isles. In Great Britain the land under cereal crops has been reduced by one-tenth in twenty years, and in Ireland by one-fourth. Not long ago half the cereal area in England was sown with wheat and only one-fifth with oats, whereas now two-sevenths are wheat and three-sevenths oats. The proportion of land under barley has been fairly constant for a long period.

After the corn crops, the cultivation of potatoes, mangolds, and turnips is the most important. The potato, introduced from America at the end of the sixteenth century, is one of the staple root crops. The acreage under potatoes in Ireland is larger than that in the whole of Great Britain, but they flourish in East Lothian and Fife in Scotland, and in the east and west of England.

A great addition to the agricultural wealth of our country was made in the seventeenth century when the cultivation of roots was introduced from the

Netherlands. There is now a much larger area in Scotland under turnips than in Ireland, and the acreage of turnips and swedes in Scotland is about one-half

Flower farming, Scilly Isles

that of England. Turnips are of special value in cattle and sheep-rearing regions where they form an important item in the feeding of those animals in winter. They are grown in most English counties outside the corn

area, and especially in Norfolk and East Yorkshire, and in Scotland, in Berwickshire and East Lothian. Mangolds and swedes are chiefly grown in England, and the area of their cultivation is extending year by year.

Owing to the decreased cultivation of cereals the area of cultivated and permanent grass has grown in proportion. Of course there have always been large areas where the land is almost entirely covered with grass, such as the western mountain regions of the British Isles. In these districts, as a rule, the grass forms permanent pasture; but in other parts of our country grass is found either as meadow land or coming in rotation with other crops. A good deal of this cultivated grass is used for hay, but not so much in Scotland, where the cool and rainy summers have an adverse influence.

Of the less important crops, flax and hops are the most important from an industrial point of view. It has been noticed as an interesting coincidence that the area growing flax in Ulster is approximately equal to that planted with hops in England. The flax grown in Ulster is not sufficient for the great linen industry of the north of Ireland, and therefore large quantities are imported from Russia. Hops are cultivated chiefly in Kent, Surrey, and Sussex, and, to a lesser degree, in Hereford and Worcester.

The cultivation of fruits on a large scale is steadily increasing, and Cambridge, the south-east of England, Devonshire, and the basins of the Severn and Wye are famed for their orchards and fruit farms. In Scotland the middle part of the Clyde valley is one continuous fruit garden. Market gardens are profitable in the neighbourhood of large cities, and they abound near

London in particular. The Channel Islands and the Scilly Islands also cultivate fruits and flowers very extensively, and steamers from the former to Weymouth and Southampton, and from the latter to Penzance bring this produce to the English markets. Attempts have been made to introduce into our country the cultivation of tobacco, sugar-beet, and other industrial

Gathering the strawberry crop, Histon, Cambridgeshire

plants, but hitherto without much success. Experiments have been sanctioned for tobacco to be grown on about 300 acres in England and Ireland. Sugar-beet is being cultivated in Norfolk, Suffolk, and Essex, but large farms and the extensive use of machinery are necessary to obtain paying crops from the soil.

We must now refer briefly to the woods and forests of the British Isles. In early times Britain was covered

with forest land from end to end, and timber was the natural material for building. The earliest industries were the tanning of hide with the bark of trees, and the smelting of iron with charcoal. As late as two centuries ago the centres of iron-making were still in the forest of Arden in Warwickshire, and in the Weald of Kent and Sussex. Although only small portions of these primeval forests remain, several of the more recently

Epping Forest. Typical Forest Scenery
(Pollarded old Hornbeams in Honey Lane Vale, High Beech)

wooded districts have many trees. A quarter of the timber plantations of England are to the east of Wiltshire and to the south of the Thames, mainly in Hampshire, Sussex, and Kent. The densest plantations in Scotland are found in Kincardine, Aberdeen, Elgin, and Nairn, and it will thus be seen that the largest woods are in the driest hill regions of the islands. Such trees as the oak, beech, elm, ash, alder, and maple

flourish in the plains and fertile lands, and in the northern and higher regions they give place to the pine.

A striking change came over the countryside when the forests were cut down. Stone and brick took the place of timber in building, and the half-timbered houses in the Weald of Kent and elsewhere are an interesting reminder of the period of change from one material to the other.

A passing reference may be made to the deer forests of Scotland. Of these there are 198 with a total acreage of 3,369,936, and when the Sutherland "clearances" took place, about 15,000 people were compulsorily emigrated. These wide areas are fit only for grouse moors and deer forests, and one might walk for miles over these so-called forests and never see a tree.

7. BRITISH CATTLE, SHEEP, HORSES, AND PIGS

In the last chapter we referred to the fact that in recent years the area devoted to wheat has steadily diminished. The same is true of other crops, the result being that more and more arable land is being converted into permanent pasture, for many farmers are finding it more profitable to give increased attention to stock-rearing and dairy-farming. For example in 1880 there were in England 13,000,000 acres of arable land and 11,000,000 acres of permanent grass; whereas in 1914 there were 10,000,000 acres of arable land and over 14,000,000 acres of permanent grass. This is very important to remember, and we must also bear in

mind that the distribution of domestic animals is largely determined by the distribution of grass lands.

The richest pastures are found in low-lying regions, particularly in those districts where the rainfall is high, and from what has been said about British climate we are not surprised to find the chief cattle-rearing districts in the rainy lowlands of the west. Reference to government returns shows that cattle are most important in Ireland, and in the counties of Cheshire, Somerset, Ayr, Renfrew, and Wigtown. In the lowlands, therefore, it is meadow now that takes the place in rural life formerly occupied by forest; and the location of the cattle-rearing districts is an excellent example of the control of occupations by climatic conditions.

There are many native breeds of cattle in our country, but by far the most important is the "Shorthorn," which, originating in the north of England, is now the most widely distributed at home, and is also of world-wide renown. The "Shorthorn" adapts itself easily to any climate, soil, or condition of management, and is suitable for milk-producing or beef-producing purposes.

The Jersey cattle are so named because they were originally bred in the island of Jersey. They give very rich milk and are excellent dairy cows. The "Guernsey" cattle are something like the Jersey breed; indeed, "Jerseys" and "Guernseys" were formerly known as "Alderneys," from the fact that Alderney was the general shipping place to England and France from the Channel Islands. The "Sussex" cattle are red in colour, and were once bred for the butcher and for purposes of draught. In recent years their milk-giving

powers have been developed. The Welsh cattle are big, black cattle, and are commonly bred for beef. The cows, however, give good milk. The "Red Polled" are hornless cattle chiefly found in the eastern counties. They not only give much milk, but are also good beef animals. The "Ayrshire" are the chief dairy breed of Scotland, and give excellent milk, specially suitable for making cheese. The "Kerry" cattle are natives of Ireland. They are very hardy and are good milkers.

Red Devon cow

It will be noted that the breeds already named are milk cattle; we will now briefly consider the well-known beef breeds. The "Herefords" are so named because they have been bred chiefly in Herefordshire. They are generally red in colour, and as they easily fatten they are good beef cattle. The "Devons" are associated with Devon and Somerset, and the adjoining counties. They vary in colour from a rich dark red

to a chestnut. They fatten very easily and yield fine beef. Devonshire cream is a special local preparation from the milk of the Devon cow, and has a wide renown. The "Aberdeens" and the "Angus" were originally two distinct breeds, but they are now combined and classed as "Aberdeen-Angus." These cattle are hornless and are named after the county of Aberdeen. The best beef that comes to market is Scotch beef, and is from this famous breed of cattle.

The chief sheep-rearing districts are controlled by natural causes. Sheep do not require the same rich pasture land as cattle. They are much hardier and can thrive on scantier fare; and although the hilly parts of the British Isles are too cold and wet for ordinary crops to ripen, there is often enough grass on the hill-sides to feed sheep. So we find most sheep in hilly districts like the Downs, the Cotswolds, the Chilterns, Wales, and the Cheviot Hills. Ireland possesses more cattle than sheep because of its rich low-lying pastures; while Scotland has seven times as many sheep as cattle because its grazing grounds are chiefly scantily-clad mountain slopes.

In our country the sheep is bred for the sake of its wool and for its flesh. The great wealth of Britain in the Middle Ages was to be found in its vast flocks of sheep, and the wool went chiefly to Flanders, whence cloth was exported to England. An export duty on wool was then one of the main sources of English revenue, and in token of this the Lord Chancellor still presides in the House of Lords seated upon a woolsack.

Among the famous breeds of English sheep we can mention only the most important. The "Leicesters" are bred in the rich level pastures of Leicestershire;

the "Cotswolds" are an old and well-known breed of sheep reared on and in the neighbourhood of the Cotswold Hills; the "Lincolns" are one of the old native breeds, and recently a Lincoln ram was sold for 1000 guineas; and the "Kentish" or "Romney Marsh" are bred on the rich tract of grazing land on the southern coast of Kent. The "South Down" sheep are bred on the close, short pastures and chalky soil of the Sussex Downs, and supply small, tender, and juicy joints. The "Cheviots" are found on both sides of the hills that separate England and Scotland. They are very hardy and their wool is straight and close set to enable them to stand the cold climate. The counties of Oxford, Hampshire, Shropshire, and Suffolk are all famous for their breeds of sheep, each of which has its own characteristics.

Horses are chiefly found in the drier parts of the British Isles, on less hilly ground than the sheep. In England, Yorkshire, Cambridge, Norfolk, and Huntingdon are the chief counties for horses; in Ireland, Down, Wexford, Louth, and Dublin; and in Scotland, Fife and Linlithgow. The horses of our country are of four kinds or classes. The thoroughbreds are for racing; the hunters for riding or hunting; carriage horses for light draught; and Shire horses for heavy draught.

The thoroughbreds and hunters are reared in many parts of England and Ireland. The "Hackney" is a breed of horses that may be trained for either riding or carriage work. They are bred in Norfolk, Cambridge, Huntingdon, Lincoln, and York. The Shire horse is the largest of the work-horses, and is used for drawing heavy vehicles, the plough, and other farm implements. Among the best-known types of the Shire horse are the

"Cleveland," the "Clydesdale" and the "Suffolk," the last being the smallest in size but an excellent worker. Locally the breed is known as the "Suffolk Punch."

Some reference may now be made to the ponies, many of which are well-bred and in great demand. The native breeds of these small animals include English, Dartmoor, Exmoor, New Forest, Welsh, Highland, and Shetland ponies. It will thus be seen

Exmoor ponies

that they are found in the less fertile and more rugged parts of our country.

We may now pass to the consideration of pigs, which in early times were the most numerous of British domestic animals, feeding on the beech mast and the acorn in the extensive forests all over our land. Great droves of pigs were attended by swineherds in the glades, as they are to-day in the forest lands of the Balkan States. There are now nearly ten times as

many pigs in Ireland as in Scotland, although the two countries are about equal in area and population. In England there is only one head of swine to about every fifteen people, whereas in Ireland the ratio is one to three. The pig in Ireland is, in some districts, almost a domestic companion.

Our native breeds of pigs are of several classes. There are the Large, Middle, and Small White breeds which are indigenous to Yorkshire, Leicester, Cambridge, and Suffolk. Then there are the Black breeds of Suffolk and Essex, and those of Berkshire; and the Staffordshire pigs, one of the oldest breeds known as the "Tamworth."

8. THE BOARDS OF AGRICULTURE. SMALL HOLDINGS AND ALLOTMENTS

In some of the previous chapters we have traced the history of the agricultural industry in our country, and we have dealt with the crops and livestock. We will, in this chapter, refer first to the Boards which have the oversight of all that relates to British agriculture, and then to the establishment, in recent years, of small holdings and allotments.

The Board of Agriculture and Fisheries for England and Wales, to give the full title, was established in 1889, though it had predecessors, the first of which was created in 1793. It is under the Lord President of the Council and has most important functions to discharge, such as the collecting of statistics relating to agriculture and forestry, and the publication of information relating to these subjects.

The inspectors of this Board visit districts where swine fever, sheep scab, etc. are prevalent, and report as to the best means of stamping out such diseases. The inspectors also attend at our ports and see that foreign animals are free from disease before they are landed. The Board is also responsible for orders for muzzling dogs to prevent rabies, and for the destruction of animals where necessary.

The Board of Agriculture has been doing excellent work by its publication of leaflets specially suited for farmers. It inspects colleges and other institutions that deal with agricultural research, and gives grants to aid such work. Many of our counties have one or more centres where agricultural education is provided and where the best instruction is given on all that relates to the land and its cultivation. Here the students are informed about the choice of seeds, the use of fertilisers, and the destruction of insects and weeds. The best types of implements and machines used on the land are described, and the latest particulars are conveyed as to the breeding and feeding of live stock, and about dairying.

The Board of Agriculture gives information relating to railway facilities and rates, so that farmers may get their crops to market quickly and cheaply, and also particulars of markets at home and abroad. Forestry is another subject that comes within the province of the Board, and, in recent years, a good deal has been done in other directions, especially with regard to the fisheries around our coasts. The Board is also responsible for the upkeep of Kew Gardens and has control of the Ordnance Survey which is charged with the mapping of our country.

Scotland has its own Board of Agriculture which was established in 1911. It has a chairman and two commissioners, and does similar work to that of the English Board. It is specially concerned with agriculture, forestry, and other rural industries of Scotland, and collects and prepares statistics and information on these subjects. Besides making enquiries, experiments, and researches, it promotes agricultural co-operation and organisation.

The Agricultural college, Cirencester

Ireland has a Department of Agriculture and Technical Education which dates from 1899. It is controlled by a president, vice-president, and fourteen members, and works on similar lines to the English and Scottish Boards. Among its special points are the encouragement of poultry breeding, and development of schemes of instruction in horticulture, bee-keeping, butter-making, etc. The improvement of Irish agri-

culture in recent years has been most marked, and reference has been made in the previous chapter to the great work of cattle-rearing in Ireland.

There was a time when the rural population of Britain exceeded the urban population, but during the last half century there has been a steady exodus from the country to the town. This change is not wholly for the good either of the people or the land, and it has been the effort of statesmen in recent years to restore the people to the country by offering them opportunities to settle there and gain some direct interest in the land.

During the first half of the nineteenth century thousands of acres of commons and waste grounds were enclosed in Britain, depriving the rural labourer of the privilege of grazing his cow, pig, geese, etc., free of charge. This was one of the causes that led to the depopulation of the rural districts. Now the tendency is to offer Small Holdings and allotments that may be rented from the County Councils, and the Act that was passed in 1908 has produced very satisfactory results.

A Small Holding is defined as an agricultural holding of from one to 50 acres; and of such farms, 11,000 have been let by various County Councils to small holders who are now cultivating about 180,000 acres of land. Besides this work of the County Councils a good deal of land has been let for the same purpose by private owners, and the Co-operative Small Holdings Association has sub-let about 8000 acres of land. Among the counties, Norfolk easily takes the lead with its Small Holdings, and is followed by Cambridge, Isle of Ely, Bedford, Somerset, and Worcester.

The general application of the word allotment is to

the system of dividing a field into small lots, to be cultivated by labourers or cottagers in their spare time and on their own account. The size of allotments is usually about a quarter of an acre, but varies considerably in different localities. Goldsmith writes in *The Deserted Village*:

> A time there was, ere England's griefs began,
> When every rood of ground maintained its man:

and this has reference, probably, to the general use of allotments by the rural labourers before the poet's time.

At the present time about 34,000 acres are divided into allotments, which are cultivated by 130,000 individuals. Spade cultivation is, of course, generally adopted on these allotments, which are among the most highly cultivated lands in their several districts.

9. THE LOSS AND GAIN OF LAND IN BRITAIN

The area of the British Islands varies from year to year owing to two facts—coast erosion and the reclamation of land from the sea. In neither case is the loss or gain very great in one year, and at times the one seems to balance the other. But reviewing a long period we have striking evidence of large areas being engulfed by the sea, and of extensive tracts being won from the sea. We have only to look at some old maps of parts of our east coast to notice the change in the outline of the counties bordering on the sea; and we can read in old books and documents of disastrous

floods and of the patient work of man in embanking rivers and protecting the sea coast from erosion.

An authority on this question of coast erosion says, "Every year we lose a tract of land the size of Gibraltar....In the last hundred years a fragment of our kingdom as large as the county of London lies buried beneath the sea....For hundreds of miles on the English coasts are buried once prosperous towns and villages and mighty forests, where once roamed the red deer, inclosed in lordly parks, and assuaging their thirst in lakes long since vanished."

So serious was this loss of coast that a Coast Erosion Commission was appointed in the early years of the twentieth century to consider the question. It appears that before 1866 the Commissioners of Woods and Forests had the management of the foreshore, but under the Act of 1866 the rights were transferred to the Board of Trade, who found that it was necessary to preserve every yard of land in Great Britain. Owing to want of funds the Board of Trade have not undertaken any considerable work to defend the coasts, but they prevent the removal of shingle which at one time threatened to denude the coast, and they refuse sanction to works which would have a similar effect.

In 1906 the Coast Erosion Commission found that the east coast of England had suffered most from loss of land. In Yorkshire especially, from Bridlington for a distance of at least 30 miles, the coast line had been greatly affected. In Norfolk there had been much destruction, notably at Cromer; in Essex, near Clacton; whilst in Kent, at Herne Bay, at St Margaret's Bay, near Dover, and at Folkestone, considerable attention had to be given to the question of erosion.

Referring again to Yorkshire, it is stated that there are no fewer than twelve buried towns and villages along its coast. Seaward of Cromer in Norfolk there was a village called Shipden, but it has long ago sunk into the sea. The cliffs east and west of Cromer are constantly wasting; sometimes landslides occur and hundreds of tons of earth fall to the beach.

Along the Suffolk coast there is hardly a coast town which has not suffered seriously in consequence of the inroads made upon it by the sea. The greater part of Walton has been washed away since the time of the Romans, whose strong fortress has quite disappeared. The sea destroyed ancient Dunwich; the remains of most of its churches are strewn about the ocean bed; and the ruined church and some remains of a Norman chapel are all that remain of a town which formerly returned two members to Parliament. The same wasting force is at work between Lowestoft and Gorleston, and a hamlet named Newton has entirely disappeared.

Essex has not fared so badly as Norfolk and Suffolk, but in recent times Harwich and Walton-on-the-Naze have decreased in size owing to the encroachment of the sea. At Clacton cliffs are crumbling away in many places, and a few years ago several hundred acres of land were ruined by the great flood.

In Kent the most serious losses of land have occurred in Sheppey, at Herne Bay, Reculver, and Whitstable. The cliffs on the north of Sheppey are being destroyed at a rapid rate; the church of Minster, now near the coast, was in the middle of the island in 1780. The famous Goodwin Sands are said to have formed part of the mainland in Earl Godwine's days.

According to history this portion of Godwine's estate was overwhelmed by the sea in 1099.

Further evidence of the loss of sea-coast is abundant, but we will make only one other reference to this subject. In our literature there are many allusions to the lost tract of land which lay between Land's End and the Scilly Isles, and which is named Lyonesse by poets and novelists. Camden, an old annalist, writes:

Teignmouth; the coast line and sea wall

"Land's End once undoubtedly stretched far to the westward. Mariners have no doubt of this from the rubbish they constantly draw up. In the utmost rocks of this promontory, when they are bare at low water, appear veins of white lead and brass."

We must now turn our attention to the large tracts of land which have been won from the sea within historical memory. Since the Romans first began to

protect certain parts of England from encroachment by the sea, some large tracts of land have been added to Norfolk. In the east the whole of the marshland area of the Broads district was once a large estuary, and the reclamation of this land was probably the work of the monks of St Benet's in Saxon times.

A great deal of Essex land that had been overwhelmed by the sea has been regained, especially along the Thames estuary. There land which was once under water has been won from the sea by the unceasing toil of man. It is worthy of remark that this work was accomplished in several instances by foreign engineers, notably those from Holland and Flanders. Vermuyden and Joas Croppenburg are two names worthy of remembrance, for they reclaimed marshlands and embanked Canvey Island in the Thames.

Cambridge is a county which has been drained and embanked so that large tracts of fenland are now profitable farmlands. Acts of Parliament for draining the Fens were passed during the reigns of Elizabeth and James I, and in the reign of Charles I a Dutch engineer, Vermuyden, already mentioned, undertook to drain the great level, for which he was to receive 95,000 acres of land. The fenmen, however, were prejudiced against foreigners and would have none of him. His contract was annulled, but his plans were adopted and completed by Francis, Earl of Bedford, who with thirteen other gentlemen took up the venture and in 1630 signed an agreement at Lynn, known as the "Lynn Law." Owing to disputes the work was interrupted, and was finally completed by a new company formed by William, Earl of Bedford, son of Francis mentioned above, from whom the "Bedford

Level" takes its name. So Vermuyden's scheme was carried out, rivers were altered and turned about, and new cuts were made to the sea. The country was divided into the North, Middle, and South Levels, crossed by large straight drains into which smaller drains, guarded by sluice doors, emptied themselves.

In the Fens. Returning from work

Windmills were erected to lift the water to the higher level, but now steam pumping works have taken their place, and soon the picturesque old mills will be a matter of history.

In Kent there is a very extensive district known as Romney Marsh which has been won from the sea.

The work of reclamation was probably begun by the Romans, and continued by the Saxons. As a result of these and other efforts, Romney Marsh has now an area of about 45,000 acres, and affords splendid pasturage for the cattle and sheep that are reared in great numbers.

Dungeness, running almost due south, gains accumulations of shingle so rapidly, that it is said to have extended seaward more than a mile within the memory of persons now living. The shingle deposit covers an area of 6000 acres, having a height of about 5 feet above high water, and the triangular promontory has a base of 6 miles with a length of 3 miles.

10. CO-OPERATIVE SOCIETIES. CO-PARTNERSHIP

In this chapter we are going to deal with co-operation and co-partnership, and we shall do well to recognise from the first that the underlying principle in each case is that workmen should have a direct interest in the prosperity of the trade in which they are engaged. This interest is created by the workmen owning the whole or some part of the capital which their industry requires. Everyone admits that the relations between employers and employed should be of the most friendly character; and any scheme that removes antagonism between masters and men must be for the good of the community.

From our point of view co-operation means the association of work-people for the management of their own industrial interests in stores, workshops, or

other undertakings, and then for an equitable distribution of profits among those who earn them. In our own country co-operation has succeeded best in distribution, that is, in the form of co-operative stores for the supply of the wants of workmen's families. These co-operative stores have done excellent work among the artisan class, and as both capital and labour are provided by the same individuals, there is no antagonism between employers and employed.

The advantages which co-operative stores offer to their customers are undoubted, and it is probable that the principle of ready-money payments, which is the main cause of the success of these stores, will become general in other branches of trade. A co-operative store relies for its success on the ready-money principle, and the prices of goods sold in such a store are less than those charged in an ordinary shop because no bad debts are made, and there is no need to spend money on advertising.

The co-operative movement really began with the foundation of the Rochdale Pioneers' Society in 1844. It was started by 28 workmen with sufficient capital to buy only one chest of tea and a hogshead of sugar, but its success was so steady and rapid, that by 1857 it had a membership of 1850, a capital of £15,000, and annual sales of £80,000. As all subsequent co-operative societies have been founded on this model, we may profitably consider the leading principles connected with their management.

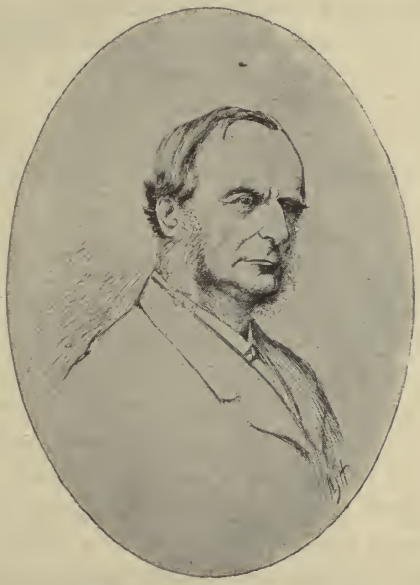
Any one may become a member of a co-operative store on paying an entrance fee of one shilling, and members may pay up their shares by small instalments. Shares are usually £1 each, and one or two of these

shares is all the capital a member is required to hold. The maximum share capital of any person is limited to £200 and the interest must not exceed £5 per cent. All goods are sold at retail prices, and purchasers receive checks and vouchers corresponding to the amount spent on goods. Every quarter or half-year these vouchers are paid in, and then the surplus of receipts over expenditure is divided among members. Each member has one vote, and the members elect a committee for the management of the business.

The co-operative movement has been so successful that there are now more than 1500 societies in the British Isles, the membership is over 3,300,000, and the sales amount to £165,000,000. In a recent year the total profit of these societies was no less a sum than £17,000,000. Co-operation is one of the established institutions of our country, and its importance is recognised by statesmen and economists. Although it is mainly a workmen's movement, it owes much to the guidance of men of other classes especially to Robert Owen, and to Charles Kingsley and Frederick D. Maurice.

The leading departments in these stores are associated with grocery and provisions, but there are generally such other departments as baking, corn-milling, cabinet-making, boot-making, tailoring, and dress-making. Then there are English and Scottish wholesale societies for the manufacture of all kinds of goods which they supply to the various retail stores. The idea of co-operation has affected other interests, and there have been established co-operative fire and life insurance societies, and co-operative societies in connexion with the buying and farming of land.

The great merit of the co-operative movement is that it has been a very real training for developing the intelligence and business character of the workmen. It has taught them thrift, foresight, self-control, and the value of combination for common ends; and it has opened up a hopeful future of peaceful and successful efforts.



Rev. Charles Kingsley

We may now turn to a short consideration of co-partnership which has been carried out, in several instances, with great success. Co-partnership is an effort to improve the relations between capital and labour, and thus to prevent strikes. We all know how much harm strikes have done, and at times they have

seemed to threaten our commercial greatness as a nation. Strikes are the result of distrust between employers and employed, and represent an effort on the part of the labourers to improve their condition. Strikes will not be prevented by discouraging trade unions, but they may be avoided by co-partnership.

There are combinations among employers as well as among men, and a "lock-out" is really a strike of the masters. There comes a time when the men make some demand for shorter hours or for higher wages, which the employers refuse to grant. If the men persist in their demand, the employers throughout that district discharge all their workmen. Their gates are closed, and work is at an end, until one or other of the parties gives way, or until some compromise is agreed to by both parties.

Co-partnership has been of great value in overcoming this antagonism between capital and labour, and every employer who has given it a fair trial in his own business finds that it brings him greater profits. In one instance a colliery company had suffered great loss owing to frequent strikes, and it was resolved to try a partnership between capital and labour. The proprietors converted their business into a joint-stock company, in which they kept two-thirds of the shares, offering the remaining one-third to the men employed in the mines. These shares were quickly taken up, and thus a workman, even if he owned only one share, was a partner in the business. The company was managed by directors, one of whom was a workman. When the profits on capital were over 10 per cent. it was agreed that half the balance should be distributed as a bonus, each workman receiving a sum in proportion to the

wages he earned during the previous year. This scheme worked with great success, and gave a stimulus to the workmen, who felt that it was to their own interest that they should be industrious, efficient miners.

If co-partnership were generally adopted, strikes would be avoided and loss of money prevented. The workmen would no longer look on their employers as enemies, but would give their best energies, feeling sure that they themselves would be directly benefited by their own labour.

11. CAPITAL AND LABOUR. WORK AND WAGES

The President of the British Association told its members in 1915 that "the duty to work, the right to live, and the leisure to think are the three prime necessities of our existence, and when one of them fails we only live an incomplete life." Now he might have added to the first of these prime necessities that the duty to work implies a reward for labour, in other words, that wages are paid because work is done. This was stated long ago by St Paul in his memorable words, "The labourer is worthy of his hire."

This chapter will deal briefly with work and wages, and the relations between capital and labour. We all know that the greater number of men and women have to work for their living, and the wages given for this work vary very much, according to the time, the place, and other circumstances. But all kinds of work and all rates of wages are controlled by certain laws which never change.

It is a well-known fact that in every trade there are different rates of wages for different kinds of work; indeed two men may be paid different rates for the same kind of work. Thus a carpenter is paid more than a farm labourer, although the latter may work longer hours than the former; and it often happens that of two mechanics working on the same job, one will receive higher wages than the other.

Now to understand why these things happen we have to bear in mind that work will be paid for only when there is a demand for it. Then work which can be done only by a few people will be paid for at a higher rate than work which can be done equally well by a large number of people. These two rules about work are of the utmost importance for all who have to settle the way in which they are to get their living. It is not enough to work hard and to work well in order to earn a living; a man must consider whether what he is learning to do is what somebody else wants done. If that class of labour is not wanted, then the worker will never get his living by it.

Nearly every one can do easy work, but only a few can do work that is difficult, or disagreeable, or dangerous. And so it comes about that the more difficult, or disagreeable, or dangerous the work may be, the higher will be the wages. This is because the work can be done only by a few people, and so they are better paid for this work than those who do work which can be done by a great number of people.

A little thought about these rules will help us to understand the low wages earned by agricultural labourers. Hand-work is generally paid for at a lower rate than head-work, because there are more people

who can do the former well. Sometimes we know that hand-work is more valuable than head-work, and then of course it is better paid.

When we try to find out the value of a man's work we must also take into account the expense and trouble he has been put to in learning how to do it. An engineer has gained his skill after years of study and at a great cost. He therefore commands a high salary for his services which many employers require, but which few men can give. The agricultural labourer, on the other hand, is doing what thousands of other strong men are able to do; and, as the demand for his labour is great and the supply of labourers is also great, he gets less wages than the engineer. The price of labour depends on the laws of supply and demand, and not upon whether the work can be done with the hand or the head.

The money given by a master for his servant's labour is called wages. The labourer tries to get as much as possible in exchange for his labour, and the employer tries to obtain labour as cheaply as possible. Of course there are exceptions to this rule, but employers and workmen may be considered as the buyers and sellers of a commodity. Employers want labour, and workmen want to sell it. If there is a great demand for labour, employers will raise wages to keep their labourers, and if there is little demand for labour, the wages of the labourers will go down. In other words we say that wages are controlled largely by competition; and as competition has never acted very powerfully among agricultural labourers their wages have been low.

A farmer, like all employers, must have capital to carry on his business. This capital is the result of

saving and sacrifice, and may take the form of money, land, houses, machinery, stock, learning, experience, or some special accomplishment. The farmer, before he begins to farm, must have a certain amount of money which he is prepared to spend upon the farm and to use for his own wants, until the time comes when he gets the return upon his work. The sum of money which he must have at the beginning is called his capital, and he uses this capital, or part of it, because he hopes to get profit on it, just as a man who puts money into a bank expects to get a certain rate of interest on it.

It will now be understood that whatever is made out of the farm is divided into two shares. One share goes to the farmer as his profit on his capital, and the remainder goes to the labourers as their wages. In each case the share of money comes out of the profits on working the farm, and not out of the capital; and in order to obtain the profit it is necessary for the farmer and the labourer to co-operate. It is by the co-operation between capital and labour that the best work is done; and this was shown in the previous chapter, where it was explained how much co-operation has done for the artisan class.

The conditions of labour are improving, and although many agricultural labourers are practically bound to the soil on which they work they have freedom to transfer their labour to another district; they have the possibility of rising to a position of greater comfort; and they may rent an allotment or a small holding.

12. BUILDING SOCIETIES—THEIR WORKING AND ADVANTAGES

Building societies are based on the co-operative principle and have proved of the greatest benefit to the artisan class and the lower middle class. Primarily they are established for the purpose of enabling their members to obtain house property by periodical subscriptions; but they also afford facilities for safe and profitable investment and thereby encourage thrift.

The first English building society was formed at Greenwich in 1809, but the oldest existing society is the Chelmsford and Essex, which dates from 1846. The growth of building societies is one of the features of the nineteenth century, and marks a new stage in the development of self-respect in the wage-earning classes of our country. Directly a man has bought his own house or some other property, he feels he has a stake in the country, and takes a pride not only in local but also in imperial affairs.

The encouragement of building societies was largely owing to the Act of 1836, which declares that it shall be lawful to establish such societies for the purpose of enabling members to erect and purchase dwelling houses, which shall be mortgaged to the society until the amount borrowed shall be fully repaid with interest. The Building Societies' Act of 1874 enlarged the scope and powers of building societies, and as a result there has been a great increase in this excellent work in all parts of the British Isles. There are nearly 1700 building societies in the United Kingdom, and the total member-

ship is about 630,000. The money lent on mortgage is upwards of £62,000,000, the share capital is £47,000,000, and the deposits amount to £16,000,000. The average yearly amount advanced by these societies is £9,000,000, and the yearly profit is £4,000,000. These figures testify to the importance of the work of the building societies, and there is no doubt that in future years they will play a still larger part in the welfare of our country. Some of the largest building societies are centred in London, but there is no county which has done so much as Yorkshire in establishing so many flourishing institutions, especially in Halifax, Bradford, and Leeds.

There are two great classes of building societies, the terminating and the permanent. As the latter are largely in the majority and the former are gradually decreasing, we will consider the work of a permanent building society which is founded on a very simple basis. Money is collected in various sums, mostly small, from large numbers of people, and lent to others who borrow for purposes of building or buying house or other property. It will thus be seen that a building society has two classes of members—investors and borrowers.

First, we will consider the investors, who may be either shareholders or depositors. We will suppose a member chooses to invest some money in the shares of the society. For this purpose he takes a share of the value of £25, and he may pay this sum in full upon joining, or by monthly subscriptions of not less than half-a-crown. When the share has been completed the dividend on it is sent to the shareholder half-yearly; but before the share is fully paid up the dividend is added to the credit of the member half-yearly.

Generally a small entrance fee of about 1*s.* per share is charged, and the dividend varies, but may be about £4 or £5 per cent.

Building societies also receive deposits or loans from members or other persons, but the amount owing at one time must not exceed two-thirds of the value of the property that has been mortgaged by the members. Thus a building society will receive deposits in sums varying from £1 upwards for any period, at an agreed rate of interest. As a rule the rate of interest to depositors is less than that paid to shareholders, and when members wish to withdraw either the whole or part of their deposits, they must give notice of perhaps a month, according to the rules.

Now let us turn to the borrowing department of a building society, for it is on the character of the advances made to borrowers that the success of its members depends. We will suppose that a man wishes to buy a house worth £300 for his own occupation, and has managed to save rather more than £100. Now it is obvious that he wants at least an advance of £200, and for this purpose he applies for a form on which he gives various particulars relating to the property. He then returns this form with a fee, and the property is carefully surveyed by the agents of the building society. If the property is worth taking over the applicant is advised what advance can be made. We will suppose that £200 is advanced and that the borrower is willing to repay this sum with interest at 5 per cent. in 14 years. This means that every month for 14 years the borrower will pay a fixed sum of £1. 13*s.* 8*d.*, and then at the end of that period the house will be his own property. In most societies borrowers have the option

of paying off any larger sum each month, and thus securing an earlier release of their property.

There are certain law charges payable by a borrower, but on an advance of £200 they should not exceed £4 or £5, and when the deeds are released on the redemption of the mortgage a further small charge of perhaps a guinea, or less, is made.

A little consideration of the above figures will show the great advantage of building societies to thrifty people. Instead of paying rent to a landlord the borrower of the above money has been putting a monthly sum away for the purpose of buying his house, which thus becomes his property in 14 years, when he has neither rent to pay nor repayments to make. It has become his own freehold or leasehold on which he has henceforth only to pay the rates and taxes. This illustrates the first sentence of this chapter which said that building societies are based on the co-operative principle. They should never prove a loss to their members, but rather a substantial gain, for the sum advanced is always less than the value of the property mortgaged to the society.

13. HOUSING AND TOWN PLANNING. GARDEN CITIES

There was a time when the rural population of our country was greater than that in the urban districts, but now the reverse is the case and every year sees a large increase in the number of people who inhabit our towns. In England and Wales about 28,000,000 live

in towns, and about 7,000,000 in rural districts, or to put it in another way there are four times as many people living under urban conditions as under rural conditions of life. This shifting of the people from country life to town life necessitates changes in every direction. The boundaries of towns already large are extended—thus we get enormous areas such as London, Glasgow, Liverpool, Manchester, and Birmingham, with teeming populations ranging from 7,000,000 to 1,000,000. To meet the increase of people new streets and roads are laid out, and thousands of new houses are built not always of the most desirable type.

People who live in towns as well as those living in cities should have houses that are sanitary and with sufficient accommodation for all family purposes. In far too many cases the country cottages fulfil neither of these conditions, and the town houses and cottages for the artisan classes are mainly built in long monotonous rows. These dwellings are all of one pattern, and their walls of yellow brick and roofs of dull slate are certainly not artistic, and their inmates too often take little or no pride in such houses. These town houses and cottages have very little garden, in general only a back yard, and thus the dwellers in them lose the pride that one ought to feel in making the surroundings of the home beautiful and attractive.

Fortunately there are many parts of our country where some of the houses and cottages are well built and good for the eye to rest upon. In the High Streets of some of our older provincial towns, such as Chester, the houses and shops are of varied design, and as they are built of suitable materials, each one seems to reveal the character of the builder. Some of our villages have

The Rows, Chester

cottages that have grown beautiful with age, and being in the midst of delightful gardens, we at once realise how sadly our present-day cottage architecture is behind that of two or three hundred years ago.

This question of the housing of the artisans and agricultural workers has long engaged the earnest attention of our thinkers and economists, and from the time of More who wrote *Utopia* to that of Morris who wrote *News from Nowhere*, all kinds of plans and suggestions have been made to improve the homes and surroundings of the working class. In More's *Utopia* we have this contribution on the planning of cities: "The streets be appointed and set forth very commodious and handsome, both for carriage, and also against the winds. The houses be of fair and gorgeous building, and on the street side they stand joined together in a long row without any partition or separation. The streets be twenty feet broad. On the back side of the houses through the whole length of the street, lie large gardens inclosed about with the back part of the streets." Here then we have an early reformer advocating fair and gorgeous houses, having large gardens, and standing in broad streets.

During the last fifty years men's minds have been given to devising modern Utopias for the working class, but it is only here and there that the work has been done successfully on a large scale. All social reformers know of the evils arising from people having insanitary and insufficient accommodation, and they advocate that workers in factories should have some of the advantages of outdoor village life, with opportunities for the natural and healthful occupation of cultivating the soil. Thousands of people are at present

compelled to live under conditions which are not creditable to our civilisation, for they are housed in close, dirty, evil-smelling lanes and courts, where they are strangers to fresh air and sunshine, and without opportunity for healthy recreation.

One of the most notable of the modern garden cities was founded by Mr Cadbury on the Bournville Estate outside Birmingham. The project was well considered

Bournville

and the planning of the village carefully thought out in advance. It was laid down that there must be no crowding of cottages on the land, that each house must have its own garden, and that no building must occupy more than one-fourth part of the plot on which it stands. It was arranged that the houses should stand well back from the roads, which should be planted with trees, and that a large area should be set aside for parks and recreation grounds.

On these lines Bournville came into existence and now there are 923 houses with a population of 4000. The houses are well designed and the gardens are laid out by the estate gardeners. The schools and public buildings are attractive, and the Village Council, a voluntary body, has accomplished a good deal of useful work.

The success of Bournville is beyond question. The rural surroundings, the attractive appearance of the houses, and the absence of monotony, all have their influence in promoting a healthy and cheerful life for the people. The death rate per 1000 for England and Wales is 13·9, for Birmingham 14·5, and for Bournville 5·5; this fact is a striking testimony to the healthiness of the community in this model village.

We will now turn our attention to another garden city, on a larger and more ambitious plan. In 1902 about 4000 acres were bought at Letchworth, near Hitchin, in Hertfordshire, and here it was decided to found a town in which the evils of overcrowding and insanitary areas could never occur. The name for the town was decided by vote, and Letchworth (Garden City) is now one of the foremost of the new developments in town planning. There are 1761 buildings in Garden City and the population is 7912.

Perhaps the chief feature in Garden City is its rural setting in open fields. Two-thirds of the whole area of the town are devoted to farms, orchards, parks, and small holdings, and a rural belt surrounds it. The streets of the town are spacious, having greensward and trees on either side, and the houses with their gardens are quite a joy to the happy dwellers in them. The inhabitants are tradesmen, mechanics, manufacturers with their staffs, and London

business men; and these people are able to enjoy life and do their work amid the best surroundings. Right in the centre of the town is the chief open space, Norton Common, which is 70 acres in extent; and in no case is it far to get to the corn fields and pasture lands that surround Garden City.

We have not space to name other model industrial villages, and can give only a passing reference to

Open-air School, Letchworth

Saltaire in Yorkshire, founded by Sir Titus Salt in 1853, and to Port Sunlight in Cheshire, founded in 1887 by Sir W. H. Lever, now Lord Leverhulme. In each case these model villages were founded for the housing of the employees of the firms, and they have been a decided success in giving these people suitable homes.

In the early years of the twentieth century the attention of Parliament was directed to this question of housing and town planning and as a result an Act

was passed giving facilities for this purpose. The Town-planning Act is in operation in Birmingham, Sheffield, Portsmouth, Winchester, and Bournemouth, and extensive housing schemes have been carried through in London, Liverpool, and elsewhere. A scheme for the establishment of a Garden City on land belonging to King's College, Cambridge, at Ruislip-Northwood in Middlesex was adopted in 1911, and there it is proposed to devote two-thirds of the estate of 1300 acres to building and one-third to open spaces. A Garden City of 1000 acres at Knebworth in Hertfordshire, and one at Wavertree in Lancashire, are in progress, and in all parts of the country municipalities and councils are proceeding steadily to carry out the recent Town-planning and Housing Act.

14. EMIGRATION AND ITS CAUSES. IMMIGRATION OF ALIENS

The population of the British Isles in 1911 was 45,370,530, and in 1921 it will probably reach 50,000,000. Although the census is taken only once in every ten years it is not difficult to estimate in any year the population of our country, for we know the number of births and deaths which are duly registered, and we are in possession of facts that enable us to calculate the number of emigrants who leave and the number of immigrants who enter our land. This chapter will deal with this going and coming of people from and to the British Isles, with the consequent effect on the condition and progress of our country.

In the modern sense of the word emigration means the departure of persons from a thickly-populated country to settle in one with an abundance of uncultivated land. It is opposed to colonisation which meant to make the first settlement in a new land, such as was done in Tudor and Stuart times. Modern emigration really began in 1815 when 2081 people left our shores to become citizens in other lands. Now we know in recent years the number of emigrants has amounted to hundreds of thousands and there seems every probability that this number will grow as our population increases. It will be well to note in passing that in the country which people leave they are called emigrants or wanderers out; in the country in which they settle they are called immigrants.

Now perhaps it will be interesting to enquire why people leave our country, in other words, why should this movement of people take place. There have been periods when some of our people have been discontented owing to religious troubles and then Holland or America offered them a new home. Social and political disturbances caused the Irish to emigrate in large numbers to the United States and elsewhere. The gold discoveries in Australia, California, and Klondyke caused the emigration of thousands of people who went to those countries in the pursuit of wealth. The development of the resources of Canada and the United States was responsible, and is still, for the loss of hundreds of thousands of our people who have gone to those countries where the population is not so dense, and where the chance of getting profitable employment is greater than in the British Isles. Besides these larger causes of so many leaving the country there

are others of a minor or exceptional character, such as the ill-fated Darien Expedition in the reign of William III, the potato famine in Ireland in 1846–48, and the Welsh settlement in Patagonia in the early years of the twentieth century.

Some of our possessions offer many inducements to attract suitable settlers, and give, in some cases, free, assisted, or reduced passages. The classes of people required in Britain-overseas are chiefly farm labourers, female domestic servants, mechanics, and farmers with capital. In 1913, 77 per cent. of our emigrants went to British possessions, and in that year 241,997 people of British nationality left our shores for all parts of the world, but mainly for British North America, United States, Australia and New Zealand, South Africa, and India.

We can now pass to the second part of this chapter, viz. immigration, and in doing so we may first consider the meaning of the word alien in connexion with this subject. The citizen of one state, when resident in another, unless naturalised, is an alien. Thus a Frenchman who resides in Britain is an alien, but if he becomes naturalised he is then a British subject. An alien may become a naturalised British subject after five years' residence in our country, on application to a Secretary of State. The Crown has also the right to grant letters of naturalisation. A British subject who becomes naturalised in a foreign state becomes an alien to Britain, unless he makes a declaration to the contrary. The laws relating to aliens in our own country have been gradually strengthened; and there is no doubt that we shall be much more careful in the future than in the past as to the class of immigrants we welcome to our country.

When the Great War broke out in 1914 aliens of military age belonging to enemy countries were interned, and rigid supervision was exercised over those who were allowed to retain their liberty in the British Isles.

The policy of all civilised countries is to encourage immigrants of the right sort, and to discourage the undesirable, such as paupers, feeble-minded, diseased, drunken, and illiterate. In some of our Dominions the laws relating to alien immigration are much stronger than our own, and Australia puts a poll tax of £100 on Chinese and coloured people. One of our recent Acts forbids immigrants to land from ships except at ports, where immigration officers are stationed, whose leave must first be obtained. The total number of aliens in the British Isles is about 300,000, and of this number London claims nearly one-half. In 1913 1822 aliens were refused admission to our shores owing to want of means, ill-health, or some other cause; in the same year 1971 aliens were in our prisons, and 311 aliens were expelled from our country.

There is no doubt that in past centuries our country has gained materially from the influx of aliens, and it is worthy of note that in most cases these immigrants have reached our shores to escape punishment, or persecution on religious or political grounds. The Jews at all times have sought an asylum in our country, and in the Plantagenet times they came as money lenders from Lombardy and elsewhere, and settled in London at Lombard Street, which is still the centre of the banking community. In the later years of the nineteenth century and the beginning of the twentieth there was a great inrush of Jews from Poland, Russia,

Silk-weavers' houses in Church street, Spitalfields
(Note the wide attic windows)

Rumania, and Germany. Unfortunately these were mainly of the destitute class and settled in the East End of London.

The Flemings, a most admirable body of aliens, settled in England in Plantagenet times and introduced the woollen industry; and the Huguenots, from France, in the seventeenth and eighteenth centuries brought

Italian Quarter, Hatton Garden, London

over the silk industry to enrich our country. In Tudor times skilled Italian artisans came to England and did much to improve the decoration of our public buildings. The Dutch sent us their engineers in Stuart times to embank our sea-coasts and drain our fens; and during the closing years of the eighteenth century many of the French fugitives sought our

shores for safety against the tyranny of the Revolution.

It will thus be seen that our population is composed of people of all nationalities, and London is probably the most cosmopolitan of capitals where all races, religions, and languages are represented. It has been said that the Londoner of to-day is either a recent immigrant from the country or from abroad, or else he is a hybrid of the most intricate ancestry.

15. OUR WATER SUPPLY—ITS SOURCES AND DISTRIBUTION

The water supply to a community, whether gathered together in a small village or in a crowded town, is of first-rate importance, for on its good quality and constant supply depend largely the health and happiness of the people. In old times kings and communities made artificial channels and conduits to convey good water in large quantities to important towns. The aqueducts of the Romans were amongst the most magnificent of their works, and the fine supply of water which modern Rome has to-day is obtained through the four aqueducts now in use, of which three are ancient.

The sources of the water supply of any place are springs, rivers, wells, and lakes. Springs may be found near a town at sufficient height to supply that town by gravitation, but if not sufficiently elevated recourse must be had to pumping. Wells in almost all cases demand the use of pumping power. The spring and the river are natural supplies; the lake may

be natural, or the artificial reservoir which stores the rainfall from a gathering ground.

As a general rule springs and deep wells produce water that is not harmful to health; a river supply is influenced by the character of the gathering ground, by the spring water which flows into it, and by the condition of the districts through which it passes.

The New River, Clissold park

River water is rendered drinkable by being stored in reservoirs and then being pumped on to the filter-beds, where it is cleaned and rendered fit for drinking.

When the water has been filtered it is conveyed either by gravitation or by pumping to every house in a particular area. The distributing mains vary in size from the large arterial mains down to the smaller ones supplying streets, or the still smaller pipes which

convey the water to each house. There are two systems by which water is supplied to districts, viz. the intermittent and the constant. The intermittent is a system wherein the water is turned on to a district for a certain number of hours each day that will be sufficient to fill the cisterns or other receptacles with which the houses are provided. On the constant system the cistern may be dispensed with altogether, and the water obtained direct from a tap on the service pipe.

Now having considered the general mode of obtaining water for our large towns and cities, we are able to appreciate the labour and expense in conveying water to some of the particular districts we shall now describe. If we begin with London, we find that the ancient city and the many parishes now comprised in the modern county arose on sites where a supply of good drinking water could readily be obtained from natural springs and brooks, or by means of wells. The earlier settlements were made on tracts of gravel and sand, and the growth of London was long regulated by the distribution of these water-bearing areas. The first conduit for the supply of water to London was that of Tyburn, which was completed in 1239, when water was conveyed in leaden pipes to the city. After a while wooden conduits were used, and it is no uncommon thing to find them, when some of the London streets are opened.

With the growth of London it was found necessary to go farther afield for water for the citizens, and early in the seventeenth century Sir Hugh Myddelton cut the New River and supplied London with an abundant quantity of excellent water from the river Lea, from springs in the chalk, and from deep wells sunk into the chalk.

From the close of the seventeenth century and onwards to 1855, companies were formed for taking water from the Thames. As late as the beginning of the present century there were eight London water companies, each of which supplied a section of the Metropolis. In 1902 an Act was passed which called the Metropolitan Water Board into existence and brought the water companies to an end. The present

Thirlmere: before the enlargement of the lake

Water Board supplies a population of more than 7,000,000 persons, and delivers a daily average of 224,000,000 gallons. The whole of this water is obtained from the Thames and the Lea, and from various springs and wells in the locality. The water is stored in enormous reservoirs in all parts of the large area served by the Water Board. The water mains have a total length of over 6000 miles, and the water they convey to the vast population is of a very high standard of excellence and purity.

While London draws its water supply from its immediate neighbourhood, some of our great towns have had to go scores of miles away to get their water. Glasgow has an aqueduct 35 miles long from Loch Katrine from which it can draw from 50,000,000 to 100,000,000 gallons daily. The works were begun in 1855, and after completion in 1860 were much enlarged in 1895. Their total cost has been £3,000,000.

Thirlmere at the present day

Manchester has an aqueduct bringing its water from Lake Thirlmere in Cumberland. The length of the line is 96 miles and the cost has been £4,500,000. The daily supply to Manchester is not less than 50,000,000 gallons.

Another aqueduct of great magnitude was constructed in 1881–92 for the supply of water to Liverpool from the river Vyrnwy in Wales. The waters of the upper Vyrnwy have been impounded for this purpose;

and when the new supply was laid on, there was an artificial lake of 1121 acres holding 12,000 million gallons of water. The retaining wall is 100 feet high and is sunk 60 feet below ground. By the track the water follows the distance is 68 miles from Liverpool.

Birmingham gets its daily supply of 11,000,000 gallons from the Elan and Claerwen in Radnorshire, 78 miles away; and Derby, Leicester, Sheffield, and Nottingham have a combined water scheme to draw their supplies from the Derwent in Derbyshire. There two great reservoirs having a capacity of about 4000 million gallons have been constructed, and the whole scheme is estimated to cost £6,000,000. Birkenhead draws its water from the river Alwen in North Wales, and Stockport goes to Hayfield in Derbyshire.

The towns we have mentioned are some of the largest in our land, but if we had space we could show that throughout the British Isles every effort is made to secure a plentiful supply of good water to every person.

16. INTERNAL COMMUNICATION—(*a*) ROADS, RAILWAYS, AND TRAMWAYS

The internal trade of our country is carried on by road, railway, and canal. Roads are not usually employed for long-distance traffic, but are used to distribute goods brought by rail, canal, or sea to the nearest station or port. Roads, however, form a primary element in the material advancement of a nation, being necessary to the development of the natural resources of the country. Although canals and railways

have, in modern times, superseded to some extent the common highways, roads still retain their importance, and the improvement in motors is giving rise to a new traction traffic. Indeed, the necessity for widening and improving our main roads has been entrusted to the Road Board, which has expended considerable sums of money for this purpose.

It is interesting from a historical point of view to trace the gradual development of our roads during the last twenty centuries. The Romans were great constructors of roads, and regarded them as of first importance for conquest and for the maintenance of their empire, which was ultimately intersected by roads. Their roads were almost invariably in a straight line, and so substantial was their construction that they have in some instances borne the traffic of 2000 years without material injury. In Britain the main lines of Roman roads were four. Watling Street represents the old route from Kent to Chester and York, and northwards in two branches to Carlisle and Newcastle. The Fosse Way ran from Bath to Lincoln. The Ermin Street led from London to Lincoln, with a branch to Doncaster and York; and Iknild Street went from Norwich to Dunstable and thence to Southampton.

The Roman roads gradually fell into decay and for centuries the highways of our country were in a bad state. For the most part they were mere horse-tracks and were usually impassable in winter. Even in the neighbourhood of London, in the early eighteenth century, the roads were so bad that in wet weather carriages sometimes stuck in the mud. In the middle of the eighteenth century some attempt was made to improve the roads and make them suitable for carts,

waggons, and carriages. The stone was simply thrown on the surface, and the roads were then left to manage themselves. Towards the end of that century a change for the better was made in the condition of the roads, and later on Telford and Macadam were appointed to superintend the improvement of our highways. The Highlands of Scotland were opened up by the roads made by General Wade in 1725, and much attention was paid to Irish roads after the potato famine of 1846.

View on the Great North road. Codicote village

Down to quite a recent period many of the roads were kept in repair by means of turnpike tolls, but the whole expense of maintaining our highway system is now in the control of the county and other local authorities. In 1909 a Road Board was formed for the improvement of roads, and the money for this purpose is obtained from duties on motor spirit and part of the duties in respect of carriage licences.

The early years of the nineteenth century saw the greatest improvements in locomotion, and in 1825 the first steam railway in England was opened between Stockton and Darlington. The period since then has been a railway-making era, and the improvements in locomotives have been going on constantly, leading to increased speed at a smaller cost of fuel. Railways now form a close network over the coal-fields and commercial districts of the kingdom, and penetrate the less densely populated regions as trunk lines with a few branches. In 1850 there were less than 7000 miles of railways in the United Kingdom, and during the next twenty years the mileage was more than doubled. Now there are nearly 24,000 miles open for traffic, of which over 16,000 miles are in England and Wales, about 4000 miles in Scotland, and 3500 miles in Ireland. Although these lines are worked by many companies, the gauge is uniform, and so a truck of goods may be sent through without reloading to any part of the country.

Railways compete with canals for the transport of goods on the plains, while in the more mountainous districts they are practically the only means of carrying on trade. London is naturally the centre of the railway system of the country, and from it important lines radiate in all directions. The Scottish lines radiate from Edinburgh and Glasgow, but they connect with the great English lines at Berwick and Carlisle. In Ireland the railways radiate from Dublin.

The routes and efficiency of railways are affected by the surface features of the country. Thus the Pennine Chain forms a serious hindrance to communication between the populous districts of Lancashire and Yorkshire, and three tunnels upwards of three miles

long pierce that chain, one being more than 1000 feet above sea-level. Between Manchester and Carlisle a height of 916 feet is surmounted at Shap Fell, and the watershed between the Ribble and the Lune is crossed at 1250 feet above the sea. In South Wales serious hindrances to communication are the steep ridges lying between the populous coal-mining and iron-working valleys.

George Stephenson's Engine

In the Southern Uplands and Highlands of Scotland the railways wind about to obtain the easiest routes. In the former region the railways rise to altitudes of 500 feet to above 1000 feet, while in the Highlands a height of nearly 1500 feet is reached by the Central Railway.

The superficial configuration of Ireland affects the railway routes rather in the great windings of the lines than the heights they reach. The most serious deviations from the direct route are those due to the highland

country on the adjoining borders of Tipperary, Waterford, and Cork.

There are many water obstructions to railway communication, and the most noticeable of these are the estuaries of the Thames, Severn, Mersey, and the Humber in England; the estuaries of the Forth and Tay in Scotland; and that of the Barrow in Ireland. There is a railway tunnel under the Thames, and the Severn tunnel, 4½ miles long, joins Bristol and Cardiff. A tunnel connects Liverpool with Birkenhead; and the Britannia tubular bridge crosses the Menai Strait. In 1890 a bridge was opened to cross the Firth of Forth at Queensferry, and the Tay Bridge has spanned the estuary since 1887. In Ireland the estuary of the Barrow was bridged in 1906, thus bringing Waterford into direct communication with the east coast of Ireland.

Some separate reference is necessary for the railways of London. The Metropolitan and District Railways, and the various Tube Railways are worked by electricity and are amongst the busiest railways in the world, conveying a large part of the commercial population of London to and from the metropolis daily.

Another development in recent years has been the opening of tramways and light railways. The former are now laid in nearly all our large towns, while the latter are opening up some of the country districts. Some of these lines are worked by public authorities, while others are worked by companies which have raised the necessary capital for the purpose.

During the Great War the Government found it necessary for military purposes to take over the railways of the country. Thousands of eligible

railway men went into the army, their places being filled, in many instances, by women. For some time there was little disturbance of passenger and goods traffic, but towards the close of 1916 it was decided to close many railway stations, to reduce both the passenger and goods traffic; and to raise the cost of travelling by 50 per cent. These drastic changes, which took effect on January 1, 1917, were recognised by the public as being military measures of great importance to the success of our armies, and on the whole they were found to give rise to little inconvenience.

17. INTERNAL COMMUNICATION— (*b*) CANALS

We may now proceed to consider the canal system of the British Isles. There is no need to go into details with regard to the antiquity of canals, but in passing we may note that they were constructed in Egypt, China, Assyria, and India long before our country had emerged from the most primitive conditions. The earliest canals in England were the Foss Dyke and Caer Dyke in Lincolnshire, both of which were constructed by the Romans and afterwards improved in the twelfth century. The Foss Dyke is still navigable. The first important step in canal navigation was the opening of the Aire and Calder canal towards the close of the seventeenth century.

The great development of canals in England was, however, in the last quarter of the eighteenth century

and was mainly due to the energy and resources of the Duke of Bridgewater and the skill of the engineer, James Brindley, who designed and carried out several of the earlier canals, commencing with the Bridgewater canal, completed in 1772. The new canals were at first objected to by farmers as diminishing the quantity of land available for cultivation; but in spite of this they were a great advantage to the community for the

The Grand Junction canal near Hemel Hempstead

conveyance of coal and all other heavy goods, besides manure, lime, and other necessaries for the land. A great number of canals were constructed between 1788 and 1805, and the last inland canal was completed about 1834. Then they were superseded by a faster and easier means of conveyance, although the canals remain serviceable for heavy goods when speed is not desired, and in various parts of England the barges

still have a considerable traffic, especially in coal, bricks, and hay. A Royal Commission was appointed to go into the whole question of canals and waterways, and a report was issued in 1907. There are signs of the revival of the canal system owing to the fact that the carriage of heavier goods is cheaper by water than by rail.

In the United Kingdom there are 4673 miles of canals and the yearly revenue amounts to £2,680,700. Some of the old canals are now derelict, whilst 120 miles of canals have been converted into railways.

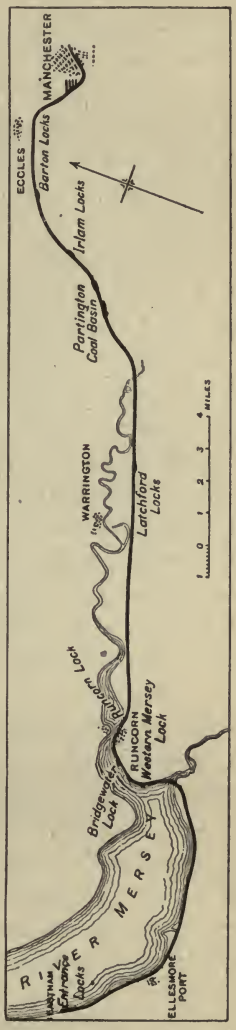
A canal may be defined as an artificially formed channel filled with water, and though it generally denotes a channel used for navigation, it is also applied to channels used for drainage and irrigation. In this chapter we refer only to navigation canals, which are level still-water channels solely constructed as waterways for vessels, just as roads are for vehicles and railways for trains. A canal is generally wide enough for two of the largest-sized barges to pass easily. The bottom is made flat and the sides have slopes of $1\frac{1}{2}$ to $2\frac{1}{2}$ feet per foot; but through towns the side walls are often vertical to save space and provide quays. The depth of most of the canals ranges between $3\frac{1}{2}$ and 5 feet.

Of all the British canals the Manchester Ship Canal is the largest and most important, and it is estimated that the area directly affected by it is inhabited by more than 10,000,000 people. It was begun in 1887 and completed in 1894, after an expenditure of nearly £17,000,000. It has a total length of $36\frac{1}{2}$ miles and forms the commercial highway for many large and important towns in Cheshire and Lancashire. The

canal starts in deep water at Eastham, on the left bank of the Mersey, above Liverpool, and ends at Trafford Bridge in Manchester. The Ship Canal is in several sections and has five sets of locks. It is provided with 133 miles of railway connected with all the great railway systems; it is lighted by electricity, and fitted at the docks and wharves with powerful hydraulic and electric cranes and elevators to facilitate loading and unloading. There are tugs to assist large steamers to navigate the canal, and a boat can come up from the sea on its own steam in about eight hours.

Until the formation of the Manchester Ship Canal the Gloucester and Berkeley canal was the biggest in England. It is 18 feet deep, and can carry ships of 1200 tons up to Gloucester, which is distant 16 miles from Sharpness, where ships of 5400 tons can be docked.

The Aire and Calder Navigation Canal is 9 feet deep, and on it steam-towage with a train of barges has been successfully carried out. The Caledonian



Sketch map of the Manchester Ship Canal

Canal, with a depth of 17 feet, crosses Scotland, and gives a passage for vessels of 300 tons. The surrounding district is, however, sparsely populated, and as the canal does not open communication between any large centres of trade, it is now mainly a route for tourists. The Crinan Canal, 12 feet deep, provides a short cut across the peninsula of Kintyre for vessels of 160 tons; and the Forth and Clyde Canal has a depth of 10 feet. The other canals in Great Britain are for the conveyance of goods by barges, and the most important connect the Thames, the Severn, the Trent, the Yorkshire Ouse, and the Mersey in England.

Ireland is much better suited than England or Scotland for the development of a good system of waterways. Yet the canal system of Ireland is not particularly good. The population is sparse, there are no large industrial towns in the interior, and much of the farm produce is unsuitable for carriage by canals. The Grand Canal is the most important; its main line goes due west to the Shannon, and brings Dublin into touch by water with Limerick and Waterford. The Royal Canal goes from Dublin to Mullingar and thence to the Shannon.

One of the results of the Great War was seen in the fact that the Government, after taking over the railways of the country for military purposes, decided, in 1917, to exercise similar control over the canals. It is, therefore, probable that these neglected waterways will be more largely used for the purpose of supplementing the work of our railways, not only in war time but in time of peace.

INDEX

CAMBRIDGE: PRINTED BY
J. B. PEACE, M.A.,
AT THE UNIVERSITY PRESS