GEOGRAPHY AND PLANNING

Geography

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TO

Professor E. W. Gilbert

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PREFACE TO THE THIRD EDITION

The request for a third edition of this slim volume means that it has interested somebody somewhere. In many ways the immediate planning problems of Britain appear to change from one year to another: in 1966 there is strong emphasis on regional planning units destined to absorb the large increases of population within the next thirty years. With this, the re-definition of the administrative units of Britain constitutes a cognate problem. There must be three related orders of planning: national, regional and local, and local administrative units will inevitably serve as basic entities for planning purposes. The large idea is a useful guiding light but the building of a new and better Britain depends on work done in detail, in the field acre by acre and street by street. It is in such work that the geographical basis of planning becomes clear. Having said in a lecture to planners that a river flood plain might provide a suitable site for sports fields, I was aware of angry rumblings from a beefy young man in the front row who said, 'You wouldn't say that if your last five matches had been cancelled through floods.' There is a right and a wrong land use for every acre of Britain, discernible with patient effort; but this discernment involves not only the local, but also regional and national welfare of the country.

August 1966 T. W. FREEMAN

PREFACE TO THE SECOND EDITION

Although it has been necessary to preserve the same pagination, some alterations have been made to bring this slim volume up to date. The work of Dr Beeching on railway re-organization, the recommendations of the Buchanan report on roads, the redrawing of administrative boundaries by the Local Government Commission, the building of motorways, are all likely to influence, in some ways to determine, the development of Britain, even within what is commonly called the 'forseeable future'. One admires the courage inherent in the writing of Peter Hall's *London 2,000* and hopes that in that year many will look at Dr Hall's book to see whether his forecast proved accurate. The present author would like to thank those reviewers who wrote constructively and critically on the first appearance of this book and to express the hope that those reviewers who said what should have been written will themselves write the vastly superior works they had in mind. For there can never be too much discussion of aspects of land use by geographers, economists, planners and others: it is not surprising that societies dealing with land use, such as that in the north-west, find an endless range of topics to discuss.

January 1964 T. W. FREEMAN

PREFACE TO THE FIRST EDITION

Certain problems of physical and regional geography of particular relevance to planners are discussed in this book: no attempt is made to create a brave new world. In the first few years after 1945 there was hope that every town could be built anew, apart from some 'preserved amenities', but the expectations are now less optimistic, for the reckless enthusiasm of youth has been modified into the practical wisdom of the more mature. The closer the planner's study of the existing scene, the more likely is his work to succeed. In the physical chapters some attention has been drawn to the occasional catastrophic element such as floods or unusually high tides, as well as to the permanent need for a close study of physical features as the basis of all regional geography. In the sections on land use in country and town and in the chapter on industrial location an attempt has been made to show that change has been and now is constant. This very fact should itself be a source of encouragement to planners, as it means that their task is to guide a development that is inevitable, to meet social and economic needs as they arise.

As far as possible, this book has been written with the minimum of jargon, so those who look for words like 'ecesis', 'mutualism', 'symbiosis' and 'viable' will be disappointed. It is hoped that people having no professional training in either geography or planning may be interested in some of the material presented here, for the changes of the past and the future in town and country are the concern of every citizen. The debt to the work of the Land Utilisation Survey needs full acknowledgment and much is owed to individual workers whose writings are listed. The local examples used to illustrate various points are drawn to a considerable extent from Manchester and its neighbouring countrysides, but readers elsewhere will no doubt be able to supply local illustrations for themselves.

Grateful acknowledgment must be made to colleagues in the

Department of Town and Country Planning in Manchester University, especially to Professor Clifford Holliday, to Professor W. G. East for suggesting the writing of this book and for the improvements made in it, to the members of the North Western Land Use Society for the stimulus of their discussions, to the friend to whom this book is dedicated, and to Mr. H. B. Rodgers, M.A., Lecturer in Geography in Manchester University, for his conversational companionship on field work, in many unlovely parts of Manchester as well as in some far more attractive scenes. The maps have been drawn by Miss E. A. Lowcock and the text typed by Miss P. M. Billington, B.A., in Manchester University, to whom thanks are due for devoted work. It is usual for authors to say that the errors are their own, but this seems too obvious to deserve mention for, however numerous and kind his friends may be, the author has the temerity to write the book.

August 1957 T. W. FREEMAN

CHAPTER I

THE PLANNER AND THE GEOGRAPHER

PLANNING has an inescapable geographical basis. Though at all times the planner must act within the law, within certain defined if constantly changing economic circumstances, in the recognition that people have certain social needs, he is at all times working on the ground. The planner has to begin with the environment as he finds it. Nothing is easier than to be impassioned about the ugliness of many cities or the ruination of scenic amenities in the countryside, but what changes can be made? Some want restaurants open all night or vivid tropical flowers under glass in city centres: all want less dirt, noise and smoke. In the countryside some want more woods, while others prefer open landscapes. Some people wish to live near their work; others as far as possible from it. As planning is everyone's concern, it is hoped that some general readers may find interest in this book.

An initial question is the relevance of geography to the planner at all. Plainly put, it is essential to the planner's work, for the planner must understand the existing landscape before he tries to reform it, both in town and country. That many planners have little appreciation of such fundamental physical factors as relief is only too clear when one reads in the Greater London Plan 1944 that 'the London region cannot be said to be very remarkable for the possession of dramatic, romantic or noble landscape features'. True, it has nothing like Arthur's Seat, Edinburgh, which would perhaps qualify for the somewhat lurid adjectives employed, but it has interesting 'heights' in Hampstead and Highgate on the north and some fine elevated common lands on the south, not to mention the distant sweep of the North Downs. London's 'heights' are at least comparable with those of Montmartre and Montparnasse in Paris and scenically more impressive than the sandstone ridges of Liverpool.

In many cities slightly elevated sites have been chosen for residential purposes: examples may be drawn from the London area, and from a wide variety of provincial cities, ranging from the use of windswept Pennine slopes for substantial houses in Sheffield, Huddersfield, Halifax or Bradford to the building of nineteenth-century north Oxford on a gravel terrace only 25 ft. above the normal level of the Thames but safely above the flood level at all times. For one reason or another topographical features have closely affected the building of our towns in the past and with exceptions the general rule in housing has been 'the higher the fewer'. And nowhere is this better seen than in Bristol, where the steep ascent from the city centre and the docks leads to the stately squares, crescents and roads of Clifton.

Naturally enough, planning in Britain is concerned largely with the problems of towns or with associated matters such as transport, the location of industry, the exploitation of minerals and the outward growth of settlement from towns into the countryside. It is only through disasters that many are led to consider the processes of geomorphology or the vagaries of weather: in times of catastrophe the possibilities of flood damage by swollen rivers or of tidal breaching of sand dunes and sea walls becomes a matter of common interest. Steadily a river develops its course through many thousands of years and then, as at Lynmouth in 1952, changes it in a couple of hours. Sea walls and sand dunes resist the highest tides for years and then, in a single night, fail to resist a sea 'surge' or rush of water many feet higher than the average as on 31 January–1 February, 1953. Exceptional rains in Norfolk in August, 1912, with a fall of eight inches in twenty hours, broke down bridges and ruined crops: a comparable summer disaster, on 12 August, 1948, caused widespread damage in Northumberland, Berwickshire and East Lothian. Far less dramatic are the minor weather phenomena known to occur, such as the late frosts which ruin the fruit crop, the winter snows that delay ploughing and sowing, the wet summers that spoil cereal harvests, the gales that root up trees and remove slates. The natural processes of physical geography have not ceased to exist because so many townspeople view them with detachment.

Physical factors have influenced the development of towns in

many ways, of which perhaps the most obvious is that the favoured residential areas of large towns are not normally on the east side, as smoke is blown that way by the westerly winds—more numerous in incidence than others. But a large number of factors influence the choice of residential sites, as will be shown on pp. 88–98. On the south-west fringe of the Manchester conurbation the average rainfall is 30 in. per annum, but on the north-east fringe 45 in., added to which the cloud cover is naturally heavier on the Pennine flanks: climatically, therefore, Altrincham is more attractive than Oldham. One of the major problems of planning is the outward spread of towns, already notable but clearly only in its early stages. Can our towns expand without covering good agricultural land with houses (and their gardens) or destroying scenic amenities, or both? If the countryside is threatened, one must know exactly what type of land is to be used for 'development'—to use a planning term. And here valuable service has been done by the two land use surveys of Great Britain, discussed in Chapter IV. But the very mention of land use raises enormous problems. In many countrysides near towns, the spread of suburban villas along roads and even country lanes has been the subject of adverse comment as though the wicked townspeople were entirely to blame. In fact, during the difficult farming years before 1939, many farmers were delighted to sell off their roadside fields to the speculative or private builder. Not unnaturally, some are still glad to sell plots of land along new arterial roads to industrial concerns whose lorries and cars add to a traffic congestion that the new roads were designed to relieve. Economic factors enter complexly with physical factors into the story.

'Desirable' is a word constantly used in advertisements of house property. A location with green fields at the back and good bus services at the front makes a house 'desirable': to the planner it is ribbon development. An elevated site on a ridge or hillside is 'desirable', as it is above the smoke-laden and congested valleys so characteristic of our northern industrial cities. And modern means of communication by car, swift trains and buses, including express services, have made sites 'desirable' which at one time were regarded as far too remote from towns: now, as never before, vast numbers of people have the opportunity of

living several miles from their place of work. No longer is it necessary for the mill-worker to live in a cramped cottage under the shadow of the mill, nor need the miner live beside the pit-head: on the other hand, dockers generally wish to be near the docks and in all cities there are many workers who find a central location convenient.

The 'journey to work' has been the object of various studies: it was the managing and professional classes who first began the movement to outer suburbs early in the nineteenth century by horse-omnibuses (comparatively expensive) and private carriages and later by train. Swift and cheap electric or steam trains in London opened up large parts of the east and north-east to artisan settlement, but in most other places the outward movement came with the spread of tram services, now discarded in most cities, and of motor-bus transport. This phase of change in land use, already marked but only just beginning, has its characteristic expression in the development of the housing estate and the industrial estate, the one a residential and the other an industrial unity. 'Zoning', a word of fashion at one time in planning, raises many problems, not least traffic congestion: in the nineteenth century many were too close to their work, in the twentieth century many are too far from it. But in Wythenshawe, Manchester, 100,000 people are rehoused on an estate so vast that it resembles a new town and new factories are planned which will eventually employ more than 30,000 workers. Social desirability enters into the planning of housing and industry and it can do so because many industries (but not all) no longer tied to locations near a railway or canal, use road transport.

Circumstances change; but the human needs of yesterday are reflected in the landscape of today. The nineteenth-century worker, who had a twelve-hour working day and no means of getting to the factory except by walking, needed to live close to the job—hence the workers' cottages near the dark satanic mills. The farm labourer of the pre-bicycle era lived as near as possible to the farmyard—hence the cottages which, on some big farms of the Lothians, help to make the farm seem like a hamlet. But deeper penetration into the past shows that many ages have left their mark on the rural landscape in the pattern of fields, the arrangement of roads, lanes, grass tracks and footpaths, the

siting of villages and farms. And the study of old houses, workshops and factories makes progress, much needed as so many interesting buildings disappear where industrial towns and villages are rebuilt. Equally, old canals and railways are receiving careful study. Both our countryside and our towns have their existing form through a long evolution in which past ages of planning have left their mark: in varying degrees, the pattern of the medieval, the Tudor, the Georgian, the nineteenth-century gridiron industrial phases are preserved. And similarly in the countryside, the imprint is retained but, as Vidal de la Blache pointed out, from the first settlement of an area men, by their care of animals and growing of crops, change the natural vegetation, and with that its soils, so that the rural landscape is an end-product, moulded by the effects of human activities over many centuries.

Here a disparity between ways of thinking in the Old World and the New arises. American geographers normally speak of 'natural' and 'cultural' landscapes, apparently deriving these words from the indices of topographical sheets which use the term 'nature' for all physical features and 'culture' for all man-made features. But there is a deeper consideration: the 'natural' landscape is one virtually untouched by humanity, still virgin and ripe for pioneer colonization, which transforms it into a 'cultural' landscape. Such a process is well within the memory of living people and may still be seen in progress. In Britain, on the other hand, it is hard to find any landscape that one can regard as 'natural' in the American sense, for even the wildest mountain areas have been grazed by sheep or deer, stripped of their peat, cleared of their forests or afforested or both, seared by the working of mineral veins, tapped for reservoirs and hydroelectric schemes, or crossed by motor roads and footpaths. And once animals graze an upland their selective grazing changes the vegetation and their treading of the soil affects the processes of erosion. The few landscapes which can be regarded as almost entirely 'natural' are in areas like the Cairngorms and comparable remote mountain ranges. A disparity between 'natural' and 'cultural' which means much to the New World geographer means less to his colleagues in the Old World, dealing with a landscape that has a history far more involved.

Leplay, the French sociologist, directed attention to three

main elements of life, Place, Work and Folk, and this fertile idea has inspired Sir Patrick Geddes and many more in their studies of human communities. Consideration of these three aspects must be fruitful: others have evolved similar phrases, for example, food, clothing and shelter as the three prime needs of all mankind, of which only the first is necessary to everyone everywhere. Again, H. J. Fleure, in a stimulating discussion of the human aspects of geography, makes the point that once man has his daily bread, he will in various ways seek the 'good life' through art, education, religion, recreation, social organization: so will civilization become more complex, largely because leisure is available once fundamental needs are met. And in these circumstances the community will include among its members many people who are in no way concerned with primary production, who do not grow food or make implements, but work with their brains or give the world artistic satisfaction. In 'regions of increment', where food can be produced easily—such as the Mediterranean lands or the monsoon fringe of Asia, or again riverine lowlands such as Egypt or Mesopotamia—advances in civilization are made possible by the activities of a social group not living by agriculture but as governors, scholars or artists. Industrialization has made possible the emergence of such a group in society on a larger scale than at any previous phase in human history: increasingly, too, leisure is available for people as working hours become shorter and, on the farms, machines reap, thresh and bind grain and even deliver it in neat packages ready for the cow's attention.

These ideas bring one back to fundamental human problems: they also raise innumerable questions of which not the least is the use of leisure. With that the planner is more concerned than the geographer, but it is clear that no new housing scheme can be successful if it merely provides hygienic homes without the means also to satisfy longings for the good life, ranging from such needs as agreeable exercise to those for adult education. And as hinted previously, the separation of workplace from the homes of the workers, though desirable, may add to traffic problems that are already acute. The second half of the twentieth century is a time of marked population increase and redistribution in Britain. Already many of our major towns have doubled

in area, though they increased only slightly (and not at all in some cases) in population during the inter-war period, 1919–39. It is idle to suppose that all new housing areas can possibly be built on areas of little agricultural value as much of the land near to existing towns is of good quality; it is essential to provide reasonable shopping facilities, quick transport, conveniently located schools, churches, public libraries, baths, inns, sports grounds. But it is futile to suppose that people will behave in a statistically orderly fashion for they will not necessarily play games at the nearest sports clubs, patronize the nearest shops, worship at the nearest churches, or in other ways act like drops of water placed on the edges of a saucer and doomed to roll down to the middle. Considerations such as these have led A. E. Smailes to comment that 'neighbourhood units rarely exist except in the minds of planners', a statement perhaps exaggerated but at least partially true. This matter is discussed on page 21; and it may be suggested here that 'neighbourhood units' represent something already apparent in our towns and that, provided allowance is made for individual choice, the conception of a *focus* is useful.

Some kind of central area is a fundamental feature of all towns: medieval towns had their central cathedrals and churches, their market places, their craftsmen's homes and shops. In a small country town people naturally move to the centre to buy and sell just as they do in a large city. But as towns have grown larger, an increasing proportion of their inhabitants have lived too far from the centre to use it constantly and therefore other groups of shops have been established. This process has been aided by the dual character of town growth: as shown on pages 88–90, houses are built around neighbouring old villages as well as on the fringes of the central town area, and this means that villages become suburbs, still possessing their ancient churches, their old inns (in time greatly enlarged and 'modernized'), and even in some cases their 'big houses'. Many of these villages become 'sub-centres' of the large city, having in some cases as many and varied a range of shops as a country town. Other 'sub-centres' arise, less attractive perhaps in appearance than those in the old villages submerged by town growth, located along a main road in many cases. In some cities such as

Birmingham, shops line main roads for several miles from the city centre, many of them obviously struggling hard to maintain themselves as the houses behind them are pulled down by slum clearance schemes. The success of shops is in part a reflection of the density of population in the vicinity: the large Scottish cities, Glasgow and Edinburgh, have ribbon-like lines of shops along all the major roads leading from the central city shopping area and these outer shopping areas remain prosperous because they have around them flats occupied not only by poor but also by prosperous members of the community. Glasgow, the most densely settled city in Great Britain, is in this respect more akin to continental cities than to those of England.

The conception of a 'neighbourhood unit' owes much to mistakes made in many inter-war housing schemes, where the necessity of providing houses as rapidly as possible led to the building of vast dormitories. The social facilities do not come overnight. Happily, in the case of Wythenshawe, Manchester, and doubtless in similar housing areas elsewhere, fine schools have been built as soon as they were needed: public houses appear almost as promptly. Cinemas on a new estate have to face the competition of those in or at least nearer to the city centre and are not as easily established as public houses; increasingly, the cinema faces the rival attraction of new crazes. Churches, having accommodated their congregations in temporary premises, are generally built some years after the houses; libraries, baths and even, in some cases, community halls are apparently the last amenities to be added. Great irritation may be caused by such problems as a permanent queue at an inadequate post office, or the distance from suitable shops. It was highly unfortunate that in some of the estates half-finished by 1939 many of the amenities were not available—for example, Wythenshawe had no swimming baths: similarly many of its shopping quarters were inadequate: the old Northenden village centre, one of the main places for shopping within the estate, acquired large modern shops only during 1955. And in suburban areas built by private enterprise, the problems were at least equally severe.

Sub-centres are essential to life in the modern city: through the centuries they have grown up by trial and error and have tested their strength as economic units. The planner's desire for

'neighbourhood units' recognizes the need for something more than a convenient arrangement of minor but useful shopping centres in a city: one might cynically comment that at times it appears to be a nostalgic desire for village life among those who have never lived in villages. On the other hand, many villages and small towns, including some drab industrial places in the Pennines or West Durham, have a strongly developed social life, centred around churches, clubs, societies and sporting activities: the authors of a survey in West Durham (noted on p. 184) found that many old mining villages had a range of activities suited to the needs of most, if not all, of the inhabitants. Obviously this type of human need may eventually be met in housing estates, but modern mobility works against assured movement to particular centres. T. Brennan, in a careful study of a large new estate at Wolverhampton, has shown that efforts to create community centres and new shopping quarters have been only partially successful as many people met their needs elsewhere. And modern transport makes this possible: a strong shopping centre in a town near a large new housing estate will attract their residents, undeterred by a short, cheap bus ride. The assumption that a certain number of particular types of shops should be provided in a new housing area in relation to the population is valid only if allowance is made for the attraction of other shopping centres within reasonable distance.

Only one thing is certain—the unpredictability of men and women. It is good that there should be attempts to assess the area served by a market town, provided that one remembers that people may not patronize the nearest: in an article on the relation of town and country in Scotland, J. B. Fleming and F. H. W. Green showed that Haddington's trade rested largely on the needs of the farming community but that the people of the mining villages within the same hinterland went to Tranent. Nothing but local field work can solve these questions and a mere statistical assessment may conceal as much as it reveals. And all this leads one back to the distributional aspect. A country town maintains itself by the trade of its inhabitants and of the rural population in its vicinity: equally an industrial town may draw trade from a surrounding area having a farming population and in many cases also a population engaged in mining or

manufacturing or both. Wolverhampton, according to Brennan, provides shopping facilities used by 300,000 people, almost twice its 1951 population of 163,000. Major provincial cities, such as Birmingham, Manchester, Liverpool, Leeds and Newcastle, draw occasional shoppers from a wide radius and so do the shopping quarters of London. The present pattern of town land-use has evolved through many changes, not unnaturally preserving something from the past but equally conscious of current need and opportunity.

The vast spread of towns through the Industrial Revolution has left a mark that is almost if not quite indelible. Our major towns have seen vast changes within the past century: as shown on pp. 106–107, the population of central areas of large cities began to decline as early as the eighteen-forties, and parts of the city of London earlier, as land was needed for railways, new roads, warehouses, shops, factories and many other purposes. A town is apparently in a permanent state of change: for example 25% of the area of the city of London was rebuilt between 1905 and 1935, and in 1935 these new buildings provided 42% of the entire rateable value.

It was once argued by a geographer that the past hundred years have seen changes as revolutionary as all the preceding ages: this is too great a claim, though railways, motor vehicles and aeroplanes have opened the world to trade and industry on a scale never known before. Electricity as motive power has stimulated a new dispersion of industry not only close to previously existing centres of manufacture, such as London and the coal-fields, but even into remote highland valleys such as Kinlochleven, Scotland. And there are definite indications that a new phase of technological advancement is beginning, unpredictable in its scope but not less revolutionary in its effects. Many of the present problems in the industrial cities of Britain are a heritage from the nineteenth century—of poor housing, inconvenient roads, factories badly sited, tasteless public buildings.

Many British towns are under active reconstruction. Even in the central areas of country towns, old property is being torn down and replaced by shops and flats of modern design. In the larger towns whole blocks of buildings, including old houses, have given way to large new stores, shops and offices: in some places,

such as Wolverhampton, the shopping quarter is being extended and new main roads constructed around the edge of the shopping centre instead of through its heart. But a shopping centre may extend its commerce without any apparent extension of area, largely by pulling down old shops and replacing them by stores built on several floors. The crucial point is not the area covered, but rather the intensity of occupation. In bombed Coventry the new precinct has a vast range of shops, but this city has grown so much during the present century that its pre-war shopping quarter would have needed extension. Having examples of new town centres, such as those in war-ravaged towns like Coventry, Plymouth and (less successfully rebuilt) Hull, as well as the examples of the New Towns, many towns are now planning new centres.

Slow as the process may seem, there are extensive changes in the areas beyond the centres of towns. In the larger places one obvious change is the extension of public buildings such as civic offices and probably technical colleges and centrally placed schools. One expression of the welfare state must be the use of more land for non-residential purposes. But the real social need is for the replacement of the girdle of slum houses around the central shopping and office quarters of many towns, and their replacement by new flats varying in height from one city to another, and even within a city. Tall flats are by no means universally popular in Britain, but without them it is impossible to rehouse in central positions more than a small proportion of the people who were there before: as Mrs. Bessie Braddock of Liverpool put it: 'If you won't go out, you must go up.' In some places the new point blocks look odd: for example, Oldham has point blocks in gleaming white—so far. And there, as in many other towns that have borne the heat and burden of industrialization, thousands of old houses have been torn down and a beginning has been made with the regeneration of the town centre. There, as elsewhere, one can see the first signs of a brighter town life in the most urbanized country of the world.

CHAPTER II

THE PHYSICAL LANDSCAPE

EVERY student of the geography of Great Britain learns the familiar distinction between the Highland and the Lowland zones, based on the age of the strata: in general, the Highland zone is made up of rocks of the Permian and earlier periods, while the Lowland zone consists of younger rocks. This division has been widely followed by writers on subjects other than geography and notably in Sir Cyril Fox's stimulating *Personality of Britain*, where the relationship to archaeological distributions is carefully considered. It also forms part of the first chapter of *Roman Britain and the English Settlements*, by R. G. Collingwood and J. N. L. Myres, and receives careful treatment in A. G. Tansley's classic *The British Islands and Their Vegetation*. Such a distinction, though useful, is the most general of generalizations.

While the older strata of Britain, belonging to the Archaean and Primary periods of the geological sequence, form almost all the major uplands such as the Pennines, the Lake District, the Southern Uplands and the Highlands of Scotland, they also include large areas of lowland, conspicuously on the west side of the Pennines, in the central Lancashire coal-field, in the rich farmlands of Herefordshire and in Devon and Cornwall. Similarly the lowlands of Central Scotland and those renowned for their fertility in Aberdeenshire or around the Moray Firth are floored by rocks of Primary age. In Scotland the great spreads of mountains give place in the western isles to lowlands moulded on ancient rocks, similar in form to the lowlands of the west of Ireland, and equally difficult to use for agriculture. Ireland, in fact, consists almost entirely of 'Highland zone', for only in the north-east are rocks of later date found: all the Central Lowland of Ireland comes within the 'Highland zone' on such a fundamental basis! To complete the irony, the north-east of Ireland

has experienced vast outpourings of basaltic lavas which form uplands of little agricultural value broken—like other uplands—by valleys long since settled by farming communities.

Planners should therefore accept the main generalization on the Highland and Lowland with a caution equal to that of geographers. Nevertheless it is useful, at least as a beginning of thought on the major relief features of the country. In Chapter VII some consideration is given to the major uplands of Britain as national parks where recreational use may be in conflict with other interests. Clearly our uplands are of value not only for their farming, but also as sources of water and hydroelectric power, not to mention forest reserves. As the industrial structure of the country rests partly on the maintenance of road as well as rail traffic, the climatic hazards involved in using vital main roads compelled to cross the Pennines at 1,300–1,400 ft. are obviously of significance (see p. 45). Mountain valleys have been settled as sources of minerals, such as lead, copper and zinc: their streams attracted weavers and spinners first in the domestic and later in the factory stages of industry. The coal-mines of Britain are partly found within uplands, conspicuously in South Wales and in the higher but now largely exhausted parts of the Pennine coal-fields. Mountains, by their very existence part of the national heritage, are by no means a negative element economically: even if the general tendency of the present is for the higher farms to be abandoned, there are other uses of value for such areas, including afforestation.

In all such considerations, the planner is led to an investigation of slope, and to a detailed contemplation of features seen in very small areas. The delimitation of major physical regions has its value if supplemented by other lines of enquiry: of these, not the least rewarding is the study of the various surfaces of erosion, or peneplanes, so liberally represented in the landscape. The origin of these features is controversial though they were developed during long phases of erosion—of some form—during the Tertiary era. Not of necessity level, they may provide gently sloping surfaces of large extent: it is possible for an area of complex structure to acquire smoothness of outline during a prolonged period of erosive activity, though certain rocks may prove so resistant to erosion that they stand out as marked hills,

ridges, or more humbly but none the less decisively as knobs of rock. At this point one may perhaps suggest that too much has been made of the phrase 'old hard rock': rather should the emphasis be placed on the resistance to weathering displayed by rocks of varying composition. And an old rock is not of necessity hard, except in school text books.

Peneplanes, or erosion surfaces, have been recognized at a number of levels, notably 200 ft., 400 ft., 600 ft., 800 ft. and 1,300–1,400 ft. Work on Cornwall and Devon, south-west and west Wales, on Lancashire, on Scotland, that is in the western part of the British Isles, shows that the altitudes named are widely represented: they are equally well seen in Ireland. Whether there are two distinct surfaces, at 200 ft. and 400 ft., or one surface related to some past change of sea level is obviously a fascinating problem for the expert: in some areas there is a fall from *c.* 800 ft. to 600 ft. and a rise to 1,000 ft. which raises similar problems. All observers, however, even if blessed with little geomorphological understanding, can see for themselves such features in the landscape. Travellers through Devon, Cornwall, south-west and west Wales easily become aware of the deep valleys cut into the peneplane surfaces, which terminate in many miles of impressive cliffs. In a study of central Scotland, A. G. Ogilvie showed that two main peneplane levels appeared, of which the higher at ± 900 ft. is in places so level and so ill-drained that peat-bog has developed. The lower peneplane, at ± 400 ft., is drained by streams in gorges that are narrow incisions in the general surface. This is not the whole story but it will perhaps serve to indicate a line of thought somewhat obscured by the emphasis on highland and lowland mentioned earlier.

Structures of post-Primary origin in the greater part of the English lowland have a complex physical history, but regional geographers have found interesting correlations between geomorphological features, woodland, agriculture, type of settlement, and mineral deposits. The South Downs, for example, where the chalk appears at the surface uncovered by any later deposits, were characteristically open sheep walks, and, to a less extent, still support sheep. This present land use is due to the removal of trees and the prevention of their return . . . 'left unpastured', says A. G. Tansley, the Downs 'would develop into

oak or sometimes beech forest'. The North Downs have extensive areas of soils derived not from the chalk but from later deposits which support natural woodland. Simple correlation with periods, or with such descriptions as 'chalk downs', is unlikely to lead one to much truth. Before proceeding further, one may comment that while erosion surfaces are recognizable by careful inspection of landscapes such as those named, the main key to understanding is a geological and geomorphological study sufficiently detailed to reveal possible physical reasons for the present agricultural land use.

Glaciation has powerfully influenced the landforms of the British Isles. Most dramatically seen in such features as the deep valleys of the Lake District, or of the Scottish Highlands, its main significance for agriculture lies in the widespread deposition of drift which may range from light sands to heavy clays and may even, in some mountain areas, consist entirely of heavy boulders, some of which weigh several tons. Associated fluvio-glacial deposits are due to deposition by meltwaters in phases of ice decay: they include some deltas of sandy material and a variety of other relics, many of which form light soils. Both the composition and the depth of these deposits vary widely: in some landscapes the drifts form hummocky ground with numerous hollows, some of them filled with ponds, such as those so frequent in much of the Cheshire lowland. Not all these, however, are of natural origin, for some have been made for cattle-watering and others are 'marl-holes' originally used for extracting marl to fertilize light soils. Similarly, it is probable that many of the flatter areas of Cheshire are the beds of lakes formed in late glacial times. Some glacial forms are markedly distinctive, such as the drumlins (Irish, little hills) which occur in England north of Carnforth in the approaches to the Lake District, and in Scotland still more widely, conspicuously in the Tweed valley, in the south-west (Galloway) and in the Clyde basin.

Regional variety of scene owes much to the presence in Britain of so wide a variety of rock types. Obvious contrasts are seen in the Pennines, where limestones may form pastures marked out by stone walls or even bare pavements seared with cracks made by steady widening of the joints—here alone is vegetation found, sometimes below ground level but reaching up

to its climax type as ashwoods. Such areas, normally dry and streamless, contrast with those parts of the Pennines formed from a wide range of sandstones and clayey rocks, which have a vegetation consisting of heather and allied species in dry places and various sedges and rushes on damper sites. Flat summits such as Kinderscout, 2,088 ft. at its highest point, are covered with peat-bogs. A change in vegetation may be indicative of a change in rock type, but few contrasts are more obvious than those between Pennine limestones and sandstones.

Planning survey demands a close study of physical features, much more thorough than that given by map inspection with contours at intervals of only 50 ft. or, more rarely, 25 ft. Gradients of excessive steepness, such as the 1 in 4 slope of some drumlins in Glasgow, offer difficulties for building and for the inhabitants, but gentler slopes may provide attractive housing sites. There does not appear to be any agreed standard of steepness which makes building undesirable, though many of the 'sieve' maps eliminate any area with a slope steeper than 1 in 10, especially if it has a north-west aspect. But those familiar with towns of the Pennines, Rossendale or the South Wales valleys will know that there are some steep streets hard to negotiate with vehicles; there are also many hillsides so steep that they cannot be used for building at all.

PHYSICAL FEATURES AND TOWNS

Town sites have been widely studied by geographers: here it is intended only to take a few examples in relation to physical features. London in Roman times was entirely on the north bank of the river, on dry ground above the wide flood plain of the Thames, now greatly confined by wharves and embankments. But it soon became significant that here the river could be crossed with comparative ease. Similarly, the first Manchester (apart from a brief Roman phase) grew on a sandstone bluff near the Irwell opposite a growing Salford on the other side of the river. A crossing place was a natural site for a town, in some cases for towns on each bank. Some fine defence sites were chosen for towns, such as Chester, on a sandstone bluff overlooking the

Dee valley and commanding the routes into Wales, having also its river port, or York, placed high above the Ouse and approached by roads along morainic ridges. Even Wigan has its historic church and market place on a hill above the lowlands the old site commands: in Shrewsbury, a meander of the River Severn almost encloses the old town. Medieval town builders not unnaturally looked for a site which could easily be defended according to the strategy of the time. None of those so far named has any marked difficulty in expanding over neighbouring lowlands.

Edinburgh possesses a fine natural site for a city somewhat monumental in appearance (and excessively so on Calton Hill). The medieval site was the crag-and-tail ridge extending for one mile—the Royal Mile—from the Castle Rock to the Palace of Holyrood: in itself, the castle is of no architectural merit but its setting is magnificent. As the population expanded, so the valley to the south was used for tenements and the Old Town became filled with crowded closes in the former gardens of the great houses. When the bridges were built to the 'New Town' on a ridge north of and parallel to the Royal Mile, and to the ridge to the south on which the University stands, the city broke its bounds, and spread north to join the port of Leith, and south to the edge of the Pentland hills. Regrettable as some of the development has been, the city owes much to its position on six ridges between the mountains and the sea. Even so, it shows many man-made physical features, of which the most interesting is the Mound in the centre of Princes Street, made of earth taken from cellar excavations, piled up during the building of the New Town. Glasgow's site is different, but not less interesting: the bridgehead of the Clyde, the city first grew on one of its numerous drumlins, having flat land available for docks and industries beside the river and its tributaries.

Of Sheffield, R. N. Rudmose Brown commented that 'No city has a more beautiful site: scarcely any city has a more dreary appearance.' The main valley of the Don sweeps through the city towards Rotherham, receiving the tributary waters of various valleys, all of them closely packed with factories and houses: the city centre is on the lower part of one of the ridges which ascend to the Pennine moors and has some fine suburbs

on the higher slopes. The mountain valleys had the initial advantage of water-power from swiftly flowing streams, and the Don valley provided sites for large steelworks, roads and railways in a city difficult to approach except by tunnelling. Unfortunately houses are mixed up with industrial premises in a typical Victorian jumble, and the smoke from both types of property causes fogs which blanket the lower parts of the city (on which see pp. 46–7). Sheffield is not the only Pennine town with high-lying suburbs: Bradford, Halifax and Huddersfield are comparable.

'The higher the fewer' is an old tag that might well be applied to housing. Equally significant is the wish to avoid industrial areas. Perhaps the most interesting case of a choice by level is given by Oxford, where the long tongue of north-side suburbs stretches along a gravel terrace above the flood level of the Thames: the poor houses, little lower in altitude, have occasionally suffered from flooding. In London many favoured suburbs are on relatively high ground, including such ridges as those of Hampstead and Highgate, or of Harrow, while on the south a number of high-lying suburbs have had at least a period of prosperity. Subject to the long-established custom of suburbs to spread 'farther out' similar phenomena are seen in other cities of which three Yorkshire examples are given above. In Manchester the suburban areas now most favoured are on the outer Cheshire edge of the conurbation, in Bowdon, Altrincham, Cheadle Hulme, Cheadle and Gatley, with a further penetration into the rural scene at Wilmslow and Alderley Edge; on the north side Prestwich is a prosperous housing area, lying on high ground between Manchester and Bury. Site selection by altitude is shown in north Manchester where many of the valleys are industrialized and the interfluves developed as suburbs: on the south, at Altrincham, for example, many of the suburban houses are at an altitude of 150–200 ft. and the poorer houses are on the lower ground. But as so little elevated ground is available, all types of property are found on low-lying sites. Only to a minor extent has there been a suburban spread into the flanks of the Pennines, scenically having inherent attractions, but marred by industrial haze and a smoke pall from the conurbation. Distance from the main industrial areas has also affected the settlement pattern in Leeds, which has its main suburbs on the north side,

on ground rising to 500 ft. Equally fine ridges on the west are covered with back-to-back houses. There is no general rule, though it is reasonably clear that an elevated site is likely to be valued, and so too is immediate or close access to the countryside, obviously an asset likely to waste soon in most large towns.

Mining towns and villages in South Wales have a number of special problems, of which the greatest is the congestion imposed by the narrowness of the valleys and the steep sides of almost all of them. The few remaining valleys that have escaped industrialization show how attractive the area once was, with oak-birch woods clothing steep hillsides and a stream of pure water, instead of an inky fluid, tumbling down with smooth stretches and rapids alternately. A canal, one or more railways, a road and a few streets of houses fill up most valleys from side to side, though some have houses at higher altitudes or in some tributary valley. In spite of heavy declines of population, in many places by as much as one-third since 1921 (as in Rhondda M.B., 164,000 in 1921, 100,000 in 1961), much re-housing has been necessary and land has been required also for new industries; some of these are placed on derelict land reclaimed for the purpose. Flat sites, suitable for the modern type of factory, are so few in these valleys that the trading estates have of necessity been placed on the fringes of the coal-field, at Treforest in the Taff valley, Bridgend and Hirwaun, in the depression between the Cynon and Neath valleys. For many years, refuse from the mines has been carried up hillsides to tipheaps on the plateau.

River valleys in towns may become either a main scenic attraction or the leading eyesore belt. Naturally attractive for transport and for industry, river valleys may give excellent sites for docks, such as those of London cut between the great meanders of the Thames. But it is unfortunate that some towns cannot, or do not, use their river frontage as an amenity as for example in Paris: London has its north-side embankment and has at least made a beginning with the redevelopment of the south bank. In most northern industrial towns the river valleys, clogged with factories, roads, railways and houses, seem beyond immediate redemption; among smaller towns, Derby has an attractive riverside park and walk on a cleared site. Stockport has a line of old factories along the Mersey which recalls Blake's

line on 'dark, satanic mills', but a traffic problem has been partially solved by building a road over part of the river; not far away is a nineteenth-century industrial suburb on the floodplain, Portwood, which confirms the views of those who do not favour house-building on floodplains.

COASTS

England and Wales has 2,751 miles of coasts; although many people think first of cliffed coasts with sandy coves as scenically attractive, J. A. Steers has suggested that any unspoiled part of the coast, whether cliffs, dunes, salt marsh or estuary, should be regarded as good natural scenery. The lure of sandy coves is well known, so much so that Steers, after a full survey, commented that 'nearly every sandy cove in Wales and south-western England, where bathing is reasonably safe, is wholly or partly spoiled'. On the other hand, a shingly or rocky foreshore is rarely spoiled by building, largely because such shores, though not less beautiful, attract neither bathers nor children. Many miles of coastline of this type are visited by comparatively few people except those who enjoy walking along the shore for its own sake. In fact long stretches of coast are virtually untouched, for example in Cumberland, the Furness district and even Lancashire, in the Lleyn, Cardigan Bay, Pembrokeshire, North Devon and North Cornwall, the south coasts of these counties with Dorset, a good deal of Essex and Suffolk, the marshlands of North Norfolk, parts of the Cleveland coast of Yorkshire, and of northern Northumberland. This list, given by Steers, is by no means exhaustive: in addition there are, for example, stretches of the East Riding of Yorkshire coast and of Lincolnshire. And there are numerous examples of coastal areas quite near to seaside resorts which have few, if any, disfiguring shacks or houses. On the other hand, the Lincolnshire coastline from Cleethorpes to Skegness, a distance of thirty-four miles, has more than a hundred holiday camping sites, capable of accommodating 20,000 people: here, as on similarly popular coasts, some control is necessary.

Coastal towns frankly exploit the advantages of the situation which gives them their prosperity. They may be elegant, with

Regency architecture, as in Brighton; they may be garden cities, as in Southport or Bournemouth; or they may be crowded with small houses, as in Blackpool. They may have a penchant for the attraction of a retired population, as in Colwyn Bay, or live more on holiday-makers attracted for a day or a fortnight, as in Llandudno: the remunerative 'tripper' is a rough diamond perhaps, but still a diamond. Each town has its own policy and will mould its appearance accordingly, but all have a linear extent along the shore much greater than the spread inland, though some have spread inland considerably of recent years, partly because all the space near the shore is already occupied and partly through the desire of residents to avoid the crowds. Among the seaside resorts are a number of pleasant towns; the threat to the amenities of the coast lies rather in the building of shacks, bungalows and the addition of caravan sites or holiday camps. None of these is necessarily undesirable, but haphazard growth brings the problems so clearly seen on the south-east coast where, Steers comments, 'a comprehensive scheme of development after the 1914–18 war could have controlled growth. It would have been possible to give as much pleasure to those owning or renting houses in the area as they enjoy now, and infinitely more to those who merely visit it for the sake of a seaside holiday.'

Disfigurement of the fine Magnesian Limestone coast of Durham, which has deeply cut and well-wooded denes, by coaltips, shafts, winding gear and mining villages, may perhaps be justified on economic grounds. It is not suggested that the coast should be an uninhabited museum of natural scenery, rather that haphazard development is wasteful of land by its creation of derelict areas. Steers indeed writes of Camber, on the coast near Rye, that 'it is surely to the national advantage to have a big and properly planned holiday town that will cater for large numbers, rather than to allow the small but painful eyesores that spoil Winchelsea and Pett Level'. And incidentally, this applies to much more of the coast. Dungeness has a large number of bungalows built at intervals along roads never completed and Peacehaven is too well known to need mention. On the Sussex coast, the road from Portsmouth to Seaford has 'almost continuous . . . unsightly ribbon development'. Good houses, if wrongly placed, may spoil coastal scenery: what

would look well on a suburban road in Weybridge does not harmonize equally well with a setting on a downland cliff. Even so, a few stretches of unspoiled coast remain, including Beachy Head and some of the Downs between Folkestone, Dover and Deal.

All coasts are the seaward end of a countryside varied in quality and, in England and Wales, there is a clear difference between the smooth outlines of the Channel and east coasts and the more intricate pattern seen in Devon and Cornwall and much of Wales. The scenery of the shores between Flamborough Head and the North Foreland is gentler than that of large parts of the south and west. Yet A. G. Tansley's appreciation of the beauty of the South Haven peninsula, a patch of land immediately south of Poole harbour, is well worth quoting . . . 'a magnificent curving, sandy shore with a series of fine sand-dunes passing into heath, and behind not only salt but also freshwater marshes with various types of vegetation and young developing woods'. Here the beauty lies in the immediate scene, the interest in the types of vegetation. At Borth, on the west coast of Wales, a crudely built holiday village by a sandy beach occupies a shingle ridge and part of a fine hillside. Extensive marshes drained by clear rivers lie inland : beyond are the lines of hills stretching deep into Wales. A few miles north, in the Dovey estuary, the scenery is of outstanding beauty, having smooth waters, wooded hillslopes and the apparently endless mountains beyond. Similar features mark the Mawddach estuary and others less well known. Morecambe Bay is set off by the fine views of the Lake District mountains, to the climber the most alluring scene in England, but Tansley notes also the interest of the immediate scene with its 'salt marsh, sandy patches, outcrops of rock and little woods here and there'. Part of the attraction of the coast of North Wales lies in the nearness of Snowdonia, happily made a national park (see p. 166).

For some, the long ramifying inlets of drowned river valleys are of particular interest. In Devon and Cornwall roads and some of the railways wind through valleys to reach such inlets as the Taw (with Barnstaple), the Torridge (Bideford), the Camel, the Fal and other rivers flowing into Carrick Roads, Plymouth Sound and Salcombe harbour. Milford Haven, in Pembrokeshire, is an excellent example of a long ramified drowned

valley (ria) and one of the country's finest natural harbours, if one of the least used. Such areas, which have obvious possibilities for sailing and other water sports, are undoubtedly in need of planning protection. Varied as the coastline is, the cliffs still provide the major attraction for walkers, especially if there are coves and bays at intervals of a few miles. The old coastguard paths of Pembrokeshire and Cornwall have now been incorporated into a long footpath that makes the coastal strip in effect a national park (see p. 163): less well known, perhaps, but not less interesting is the Gower coast west of the Swansea suburbs, fortunately available to walkers. Particular attention must be given to the beauty spots visited by large numbers of people, such as the Lizard where much damage has been done to turf by cars; here, as elsewhere, the provision of car parks is by far the lesser of two evils.

Erosion of coasts occasionally causes alarm in newspapers, but on some coasts the effects are marked, notably in Holderness, where the loss averages about 2 yards a year, and elaborate defences are needed to preserve such seaside towns as Hornsea and Withernsea. Estimates made for 1852–89 by a British Association Committee showed that the rate of loss varied along the coast and was apparently greatest to the south (Holmpton 273 ft. in thirty-seven years compared with 182 ft. at Hornsea). T. Sheppard, in 1912, estimated that if the rate of loss had been consistent from Roman times a strip of land 2½ miles wide had been removed along 34½ miles of coastline, in all 83 square miles; his calculation of annual erosion, at 7 ft. 1 in. per annum, was rather higher than that of the British Association Committee. Another estimate is a loss of 34 acres a year, which means that one square mile of Yorkshire disappears in nineteen years, though some of the material is thriftily brought back by the sea, and part of it has formed Spurn Head, which has probably grown within the past four hundred years.

Far more important is the reclamation of land around the Humber, a river laden with mud and silt brought in by the tide as well as by its component streams; it is thought that most of this material comes from Holderness. This silt and mud settles in sheltered places, finally rising high enough for saltmarsh plants to grow. When this happens the accumulation of silt is

fostered and the reclamation of the marsh is foreshadowed. Considerable areas near the Humber have been added to the land by embankment through the centuries: one estimate is 29 square miles but other figures are lower. On the south, or Lincolnshire side of the river, there has been some gain of land by reclamation, but there are signs of erosion from Mabelthorpe to Skegness. In the Wash, which apparently receives silt from the tidal drifts along the Lincolnshire and Norfolk coasts, it is estimated that at least 70 square miles has been added since Roman times. Here the process of silt deposition may be seen in the salt marshes outside the bank, which usually becomes a grass marsh in ten years; after another twenty-five years of controlled silt deposition, an outer bank may be constructed and the land prepared for agriculture. Any such proposal as the reclamation of the entire Wash area would be far less effective, for it would merely provide large areas of very poor sandy soil, at very great expense. Controlled deposition of silt gives some of the richest soils in the country. Indeed in a rather different if comparable form it still continues on 'warp' lands near the Humber and the lower Trent, where silt-laden waters have been deliberately led on to lands by controlled flooding and the water drained off, leaving the fertile silt behind.

Illustrations have been drawn from the east coast as they indicate clearly the complex and changing relation of land and sea. But such cases as the silting of the Dee to the detriment of Chester as a port are also well known: less well known, perhaps, are such areas as the mudflats of Solway Firth or the wide shallow estuaries to the south of the Lake District, which have a fine turf of almost pure fescue, some of which is sold for bowling greens and golf courses. Excellent sheep pastures, they are rarely covered by the tide. Similarly large parts of Romney marsh, now consisting of rich grassland, have been reclaimed since Roman times. Particular plants may accelerate reclamation: of these a notable example is *Spartina townsendii* or rice grass which, first observed on tidal mudflats in Southampton harbour in 1870, has spread widely both there and in Poole harbour since 1899 almost to the exclusion of other plants. The tufts join up and catch the mud so that cheap reclamation is made possible, and in some places it is planted with that purpose in mind.

There is no general estimate of the possibilities of land reclamation and a note of caution must be given. In Chapter III attention is drawn to the occasional catastrophic element in weather with some recent examples: areas likely to be affected include reclaimed marshes below the level of the exceptional tide. Where such areas are used for housing, as on Canvey Island, severe distress may be caused. While therefore the possibility of adding to the agricultural land surface is one to be considered by planners, it is a subject to be approached only with expert advice. It is in part a natural process in which *Festina lente* may prove to be the quickest and most effective method of achieving good results. So far in this chapter the case of reclamation for agricultural use has been considered. But many areas have been reclaimed for dock-building or for industrial sites, as at Liverpool, Cardiff and Hull, or in the Essex marshes east of London. In such cases the deposition of waste can provide relatively quickly a site of some value, especially as many modern industrial plants require level sites of considerable extent.

For Scotland, A. G. Ogilvie suggested that some 63 square miles of reclaimable land exist, of which 29 square miles is on the east coast and 24 square miles on the south coast, from Solway Firth to the Mull of Galloway. This takes no account of possible losses by coastal erosion. The 1911 Royal Commission noted that in the period between revisions of the Ordnance maps, generally some forty years, the net gain of land was about 4,000 acres: this did not, however, include most of the Atlantic seaboard. It was not possible to say how much was due to natural accretion, nor how much to reclamation: some of the work had been done by private proprietors. Perhaps the most notable of the possibilities is the addition of land along Solway Firth, described as 'one of the areas of British sea that is moving rapidly to extinction'. There have been in the past reclamations of some extent here and Ogilvie makes the cautious comment that 'with due precautions it would appear that the valuable grazing and crop lands of Dumfries and Galloway may be notably extended'. In 1929 H. M. Cadell showed that in the Forth valley, over four square miles of land had been reclaimed from the eighteenth century onwards: the river course was straightened and improved and some good agricultural land made.

In the second half of the nineteenth century, new land was made for docks and for industry at Bo'ness and Grangemouth, partly by slag dumping. The experimental planting of *Spartina* in 1914 and 1918 was only partially successful, possibly because the grass is near or beyond its climatic limit. Since 1921 the Forth Conservancy has been responsible for the river and for reclamation schemes; on dumping, Cadell comments that it is 'far better public policy to dump the daily supply of rubbish down where it makes new and useful ground rather than to empty it over land that is already useful'.

CONCLUSION

In this chapter no attempt has been made to give a complete survey of physical features, but rather to show some of the ways people are affected by such features, and have in fact reacted to their existence. Although four-fifths of the British people live in towns, their life is influenced both by those factors discussed in this chapter as also by climate and weather (Chapter III). Problems of government arise through such necessities as the provision of water and sewerage, both of which could probably be better organized on a regional rather than a local basis: had there been such a regional scheme, it is unlikely that Liverpool would draw part of its water supply from a reservoir near Bolton. In fact, many of the great cities, such as Manchester, supply water to a number of other local authorities. In London the creation of one Metropolitan Water Board proved essential to the existence of the community at all. But cases are known where towns have built expensive sewage systems rather than combine with other authorities, and there are also cases of housing developments made unduly expensive by the failure to consider the cost of such necessities. The use of rivers near London for domestic water supply obviously raises difficulties for authorities whose natural outlet for sewage appears to be the Thames or the Lea. In such cases, and in land drainage as a whole, the necessity is for a national plan, regionally organized, in the interest both of the rural areas and of the towns.

CHAPTER III

CLIMATE AND WEATHER

THE official Climatological Atlas defines climate as 'the summation of weather over a long period of years'. It has also been defined in various other terms, such as 'average weather', but normally in the British Isles a period of at least thirty years is regarded as an adequate sample; for example, 1901–30 was chosen by the International Organization as a standard period for the whole world. An earlier period, 1881–1915, was used in the Book of Normals, and closely studied in E. G. Bilham's excellent *Climate of the British Isles*. Here it is only possible to mention some of the problems of weather and climate, and to refer those interested to some of the books on the subject, especially Bilham and the somewhat lighter but nevertheless learned work by G. Manley, *Climate and the British Scene*: one merit of these works is that they have excellent bibliographies, which include the copious literature available in meteorological journals and, to a lesser extent, in geographical journals. Some of the articles and notes may prove of special value to people in particular areas: for example, a reader in East Anglia might well be interested in the remarkable fall of 25–26 August, 1912, which wrecked bridges, ruined crops and caused widespread if temporary distress in an area on the drier side of Britain.

Exceptional conditions occur frequently. In 1962–3, the winter was unusually severe, as the cold weather began immediately before the Christmas of 1962 and continued with few breaks until the last days of February. Snow fell on every day of January, mostly as showers, though there were blizzards in south-west England, south Wales and the Border country with drifts. In February the sea temperature fell to 32°F. from the Thames estuary to Holland, and ice formed on the sea from east Sussex to the Thames, with ice floes at London Bridge. Ice covered the sea

halfway from Greenland to Norway, a condition not known since the seventeenth and eighteenth centuries. From December to February, central England had the coldest conditions since 1740, and the snowfall was the heaviest for 150 years, with the ground covered for 60 days. These unusual conditions caused chaos for travellers and widespread domestic troubles such as frozen water supplies and burst pipes. They mark an interruption of the supposed climatic amelioration of north-west Europe. A monthly weather forecast has been provided in Britain from the autumn of 1963, following an American precedent: in the first three years this forecast has generally been depressingly successful. Many local authorities have taken precautions against conditions like those of 1963.

Study of climate is impossible without reference to weather, which is what is experienced at any one moment of time. At a meteorological station a comprehensive series of readings is taken daily, normally at 9 a.m. and 9 p.m., including pressure, wind, temperature, rainfall, snow, thunder, humidity, sunshine, fog and visibility and cloud; all of these data can be measured statistically, with some reservations on thunder though voluntary observers are supplying data to a central organization. Fully equipped meteorological stations are not numerous, but for rainfall there is a vast amount of supplementary information from recorders with rain gauges placed in private gardens, schools, parks and reservoir grounds. The Climatological Atlas and Bilham's work show the fascinating possibilities of mapping the distributions: each includes the records of particularly interesting rainfalls over a short period, such as a single day or two following days, or the depth of snow during the severe storm of Christmas 1927. For planners, it is impossible to stress too strongly that the exceptional occurrence is worthy of close study: three points are of primary significance.

First, the average rainfall for any station may rarely or never occur. A series of figures for Belfast (University) shows that out of eighty years, over two-thirds had 90–117% of the average (two, one must admit, had the exact 100%!) and the extreme deviation was 33% more and 33% less than the average. From a much wider study, G. Manley has stated that 'over the country as a whole it appears that at most stations the driest

year can be expected to have about 60% of the normal rainfall, the "wettest" 150%' taken over a period of a hundred years.

Second, the variations for shorter periods, such as a week, a fortnight or a month, are naturally much greater. Even in the wettest districts this has been known, for example when north and east winds prevail; in February, 1947, no precipitation whatever was measured at Glenquoich, in the wettest part of the Scottish Highlands, and there was a similar drought in Borrowdale in February, 1932. In August, 1947, no rain at all was recorded in an extensive area of the west of Scotland. The Climatological Atlas includes a series of maps showing the mean percentage deviation from the average for 1881–1915: for the year, this ranges from 8% in the extreme west of Scotland (in the Islands) to more than 15% in parts of the English Lowland: Ireland has a range from 6% deviation in north-west Donegal to 12% in the south-east coast of Co. Wexford. It has been said that the less the rainfall, the greater the variability, and this statement is at least relatively true: in consequence a marked deficiency in the drier areas of England, notably the Thames estuary, may be serious. The maps for January, April, July and October show deviations of from 25%–40% and more, even 50%, with the greater range in the drier parts of Britain, such as the English Lowland. Individual months have a vastly greater deviation from the mean and naturally the effects on agriculture, or on water-power schemes, or on reservoirs, may be noticeable (see p. 158). The dry Augusts of 1947 and—to a lesser extent—of 1955 may be regarded as unusual, for the chance of a rainless May has been calculated as far greater than a rainless August.

Third, there are fluctuations of climate over a series of years which may, if continued, raise problems such as fuel supply, methods of house construction, or the distribution of food. Workers on the history of climate have shown from varied evidence that there were a number of cold winters in the later seventeenth century, some notably warm summers, for example, about 1772–83, and a cool series from 1809 to 1818. More recently, since 1930, there has been an appreciable increase in the temperature of spring, summer and autumn, but during this time there have also been some notably cool summers such as those of 1954 and 1956. And one may recall the remarkably cold

winter of 1946–7, when snow covered most of the country from mid-January to mid-March. If it be true that there has been a recent amelioration of our climate, in spite of the known exceptions, there may in the future be a series of years when harder conditions will prevail, and the consequent increase in the demand for fuel may raise problems of coal supply. Evidence of any marked change in rainfall over a long period is dubious, but Bilham stated that in 1909 there began a series of wet years which lasted to the early nineteen-thirties, broken by the record dry year 1921 when the lovely green pastures of Cheshire were brown and large cracks appeared in the fields. In 1933 there was a dry summer, but since then a variety of conditions have been experienced. Correlation between climatic trends and economic history has tempted various writers: Manley, for example, has noticed in the Pennines 'the tell-tale abandonment of old reclaimed intakes wherever the annual rainfall approaches 55 in.' and suggests that many of the enclosures were made late in the seventeenth or early in the eighteenth century when the rainfall may for a time have been lower than at present. Such speculations are interesting, but climatic fluctuation, if operative at all, was probably only one of many factors then favourable to an extension of settlement in the Pennines. And no absolute climatic limit can be set, for crops of hay are gathered from Lake District valleys with a rainfall of as much as 100 in. per annum, especially from the well-drained fields that visitors to upper Borrowdale may see for themselves. The last farm, at Seathwaite, has an average rainfall of 122 in. (but 185 in. on adjacent fells; see p. 45).

Underlying all the emphasis on climatic fluctuations lie two main factors. First, the British Isles receive winds from various sources: the depressions of such frequent occurrence are due to the meeting of sub-tropical and polar air over the Atlantic and moving in varied courses across western Europe. In winter these depressions are normally much stronger than in summer though turbulent conditions may occur at any time. Anticyclones in winter are generally due to a westward spread of continental conditions, with dry cold air, over the British Isles, and are naturally experienced more in the east than in the west. Summer anticyclones are due primarily to a northward spread of sub-

tropical air which on occasions fails to reach more than a limited area, sometimes in the form of a wedge of high pressure between two depressions. A winter anticyclone may give persistent cloudy and overcast skies with fogs over cities but there may also be long periods of dry, sunny, cold weather. Summer anticyclones may be responsible for fine dry periods in summers such as those of 1933, 1947, 1955 and 1959: on occasions they may cover the whole of the British Isles, as for example in June, 1925, when no depression centre approached within 250 miles of our coasts. There are many unexplained features of our climate, such as the northward prevalence of anticyclones during spring, which gives the island of Tiree in the Southern Hebrides an exceptionally favourable sunshine record during May. These considerations lead to a second point: the long-term fluctuations are known to be associated with the movement of air masses of tropical, polar and continental origin, but these differ in extent from one year to another. Some researchers, in efforts to explain the vagaries of our climate, have noted the oscillations of the glaciers in Iceland and Norway and the icecap of Greenland: others have considered the effects of occasional violent volcanic eruptions discharging vast quantities of dust into the atmosphere. Study of the fascinating history of climate since the Ice Age makes the possibility of changes during a lifetime seem at least credible.

Possibly some who have read so far may be sufficiently interested in the mechanism of climate and weather to study the subject further: books of all types, many of them eminently readable, are available (see p. 179). There may be some able to keep a rain-gauge and supply the Meteorological Office with data: although there is a fine network of rainfall records, many more are needed, especially for the development of microclimatology, an aspect of science familiar to every gardener who learns from experience where particular plants thrive or fail, and applicable to areas such as valleys with interesting results. In the remainder of this chapter four main topics will be treated: first, the relation of climate and physical features; second, climate, weather and crops; third, the catastrophic element, and fourth, town climates. Each is clearly of great human significance.

CLIMATE AND PHYSICAL FEATURES

It is commonly said that for every 300 ft. of ascent there is a fall in temperature of 1°F.: the station maintained on the summit of Ben Nevis (4,406 ft.) from 1885 to 1904 gave a mean annual temperature of 32°F., compared with 48°F. at Fort William (171 ft.), a loss of 1°F. for each 270 ft. The monthly mean temperature ranged from 25°F. in January to 42°F. in July, a typical tundra regime, with snow lying on an average of 215 days a year, including twenty in May but only nine from June to September. But no one is required to live on the top of Ben Nevis though snow is a weather phenomenon of significance throughout Britain. Manley has shown that the average number of days on which snow or sleet has been observed to fall in lowland situations ranges from less than five in south-west Cornwall to thirty-five or more in Buchan, Caithness, the Orkneys and Shetlands. On the west coast, snow falls on 3 or 4 days only in the Scilly Islands, but on 25 at Stornoway, compared with 15 on the Thames Estuary and 34 at Aberdeen. Many falls are ephemeral, but snow lying in the morning may be expected on 10 to 20 days a year in much of the English Midlands, with many more days in the uplands, ranging to fifty or more in the Pennines and Southern Uplands of Scotland to a general minimum of one hundred in the Scottish Highlands. The map in the Climatological Atlas shows that all round the coasts snow is less persistent than inland, due to the moderating influence of the sea.

Most townspeople regard snow as an unmitigated nuisance and a challenge to the Corporation to show its efficiency by speedy removal. But the townsman's mentality may well have spread to the countryside for in the winter of 1954–55 one read of north of Scotland farmers receiving supplies of food from the air, instead of using bags of meal. (By contrast, the farmers on Inishbofin, off Co. Galway, keep a bag of meal for the times in winter, commonly as long as a fortnight, when no boat can reach the island owing to high seas.) Rarely does snow interfere with railway traffic, though there are cases, even on main lines, of blocked tracks and of trains held up for some hours or longer. Interference with road transport is much more serious: in 1947,

there were considerable periods when traffic was impeded between Stamford and Grantham, only 400 ft. above sea level. And there are difficulties on several famous main roads, as most of the considerable snowfalls at levels over 1,000 ft. are accompanied by drifting. Most motor traffic can proceed through 10–12 in. of snow, and snowploughs can deal with 1 ft. efficiently, but if the depths are greater gangs of men must dig cuttings, possibly more than once. Drifts develop mainly in hollows, for example on the Shap road (A6) slightly to the south of the summit where there is a steep drop. Cuttings are also a danger, for example on A628 from Sheffield to Manchester, which has a summit level of 1,460 ft.: in the moderately severe winter of 1954–5 this road was blocked for five days. G. Manley has estimated that in the north and east Pennines roads at 1,000 ft. will be blocked for 7–10 days with snow lying for 30–35 days, but that in the Central Pennines at the same altitude snow will lie for perhaps 25 days. At 1,500 ft., an altitude almost reached on the Scotch Corner–Brough road, a main route from London to Glasgow, drifting may take place—in default of clearing—on 20–30 days a year. Narrow walled roads are snow-filled with drifts all too easily, and some sunken Pennine roads keep snow patches long after it has disappeared elsewhere. Icy roads present a graver danger on some routes, especially some of the long descents from the Pennines.

Only a small part of our precipitation comes in the form of snow except in the higher mountains. The amount of rainfall received over the British Isles bears a clear relation to altitude on a preliminary study but a more subtle relationship on closer investigation. The rainiest places appear to be just east of the summits of Snowdon, Scafell Pike, Ben Nevis and its neighbours: Glaslyn (2,500 ft.) on Snowdon has a computed average of 198 in., the fell near Seathwaite in the Lake District 185 in. and the area to the immediate east of Ben Nevis 175 in. Bilham suggests that around the headwaters of the River Garry, Inverness-shire (Sgurr na Ciche, 3,140 ft.), the average fall may exceed 200 in. All these mountains have a westerly location and it is probable that the amount of precipitation in the Central Highlands, including the Grampians and the Cairngorms, is scarcely half these western totals. For the Peak District of Derbyshire some

interesting new material has recently been given by Dr. Alice Garnett, who states that on Kinderscout, a plateau over 2,000 ft. high with a maximum elevation of only 2,088 ft., the rain varies from an average of 54 in. at the south-west corner to 63 in. at the north and that in the Ashop valley, at 1,000 ft., the fall is 62 in., dropping rapidly to 40 in. down the valley. There is here a sharp fall within a short distance: Black Hill (1,908 ft.), north of Kinderscout, has 62 in., but Barnsley, less than twenty-five miles away, only 25 in. The decreases from Buxton (50 in.) to Chesterfield (30 in.) in much the same distance is also notable, but less marked. These Pennine uplands are of immense significance as water-gathering grounds but, as hinted on p. 158, the rainfall differs markedly from year to year. Ladyclough Moor (1,720 ft.), for example, has had January falls ranging from 2·3 in. to 15 in. The Pennine reservoirs vary widely in appearance and, as noted on p. 169, the hydroelectric schemes of Scotland can be maintained only with the aid of large storage reservoirs.

Physical features may so affect local climatic conditions that certain districts become favoured residential enclaves. The Manchester conurbation lies in an embayment with the Rossendale hills to the north and the Pennines to the east: the annual rainfall ranges from *c.* 30 in. in the south and south-west, at Altrincham, Wilmslow and Cheadle, to 45 in. at Oldham. The cloud cover not infrequently increases from the south to the north-east and the most favoured suburbs are on the higher ground to the south, especially at Bowdon and Hale (*c.* 150–200 ft.) and Alderley Edge (*c.* 300–500 ft.) with Cheadle Hulme and Bramhall (*c.* 250 ft.). But the attractions of these areas are derived only partly from climatic factors. In some Yorkshire towns, such as Sheffield, Huddersfield, Halifax and Bradford, suburbs are found to an altitude of 800–1,000 ft., well above the valleys where the natural propensity to fog is accentuated by industrial smoke. A. Garnett has noted how, in Sheffield and Rotherham, cold air settles down into the main Don valley corridor so that on some days, especially under anticyclonic conditions, a murky grey or yellow pall screens the valleys, sometimes to 450 ft. or even higher, while the hillside suburbs are bathed in continuous sunshine. On the other hand, in Sheffield as in the other suburbs named, to quote Dr. Garnett, 'the outer and elevated suburbs

may have weeks of partial and protracted snow cover when the centre of the town is entirely clear. The shortened duration is in part of artificial origin, but differences in altitude account very largely for the contrasts.'

Many local features of weather and climate, well known to farmers and other outdoor workers, prove to have a scientific basis where statistical material is available. The inhabitants of Rickmansworth (182 ft.) would perhaps be surprised to know that the night temperatures are virtually the same as those of Braemar (1,112 ft.) for their main experience is of the much warmer daytime temperatures, as reference to Table I shows. The average daily maximum at Rickmansworth is higher in all months than that at Rothamsted at 420 ft. on the plateau, but the night climate is almost the same as at Braemar, one of the coldest inhabited places in Britain. In June, 1935, the extreme minimum at Rickmansworth was 28°F. but at Rothamsted 41°F., and the contrast between the number of ground frosts is remarkable. The draining of cold air into valleys has been noted in various places, though Rickmansworth may be an extreme case, partly because cold air is ponded behind a railway embankment and partly because the sandy, porous soil both gains and loses heat easily. It is not improbable that the effects described are confined to a small area, far smaller even than the town of Rickmansworth. In a somewhat different environment, the Peak District, A. Garnett has shown that 'inversions of temperature' occur especially in times of gentle air movement of an anticyclonic type. The boldly incised valleys become filled at night with the very cold air that drains from the neighbouring plateaus: at such times the Edale, Ashop and Hope valleys may be 10–15°F. colder than places a few hundred feet upslope. These inversions may last for 12–14 hours during late spring and summer but in the winter may last for several days and nights so long as the appropriate anticyclonic conditions are maintained.

CLIMATE AND VEGETATION

The effect of climate on vegetation is a subject of such immense scope that here it is possible only to deal with a few

Table I—CLIMATIC FIGURES FOR BRAEMAR, RICKMANSWORTH AND ROTHAMSTED

	Jan.	*Feb.*	*Mar.*	*April*	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*	*Year*
Average monthly temperature													
Braemar 1912–47	34·0	34·6	36·6	40·9	46·5	51·8	55·4	54·2	49·7	43·8	37·8	35·3	43·3
Rickmansworth 1931–35 ..	36·6	37·1	39·9	45·1	51·3	57·9	61·9	60·9	55·5	47·6	41·6	37·7	47·8
Rothamsted 1931–35 ..	37·9	37·9	41·1	45·5	51·3	58·1	62·3	61·3	56·3	48·7	42·8	39·1	48·5
Average daily maximum 1931–35													
Rickmansworth	44·5	46·0	51·4	55·7	63·2	70·7	75·2	74·7	67·3	58·0	49·6	44·6	58·4
Rothamsted ..	42·7	43·2	48·5	52·3	59·3	66·5	71·0	70·0	63·5	54·7	47·5	43·1	55·2
Average daily minimum													
Braemar 1906–35	29	29	29	33	37	42	46	45	41	37	32	30	36
Rickmansworth 1906–35 ..	29	29	29	33	40	43	47	47	43	37	32	30	37
Rothamsted 1931–35 ..	33	33	34	39	43	49	54	53	49	43	38	35	42
No. of nights with ground frost in 1935													
Rickmansworth	26	21	28	20	15	2	4	6	6	20	23	25	196
Rothamsted ..	12	9	17	9	6	0	0	0	0	5	14	16	88

For a fuller range of statistics see Bilham, E. G., *The Climate of the British Isles*, especially pp. 299–300, and Manley, G., *Climate and the British Scene*, especially pp. 304–5.

main points. In the first place, all vegetation is influenced by the soil in which it grows and in turn moulds and changes this soil by its own processes of growth, decay and regeneration. Taken fully, these considerations belong to the science of ecology, for which the classic work on these islands is A. G. Tansley's *The British Islands and Their Vegetation*. Ecologists have shown that for each area there is a 'climax association', which is the vegetation ultimately developed in the natural state. This is a matter of speculation over almost the whole of Britain as the 'reclamation' of land for farms, the destruction of forests either by cutting or by grazing heavy enough to prevent natural regeneration, or even the encouragement of movement in sand dunes by the tread of numerous visitors, prevents the natural development of vegetation. The direct human effects, such as agriculture, are obvious enough: a less clear, but nevertheless decisive, influence is seen in the growth of bracken in some mountain valleys due, according to E. Wylie Fenton and others, to the removal of heavy-footed cattle from such rough pastures in favour of sheep. Bracken, however, can become dominant only on slopes sheltered from violent winds, and dies out on hilltops. Controversy is frequent on the wisdom of using the marginal lands of Britain for pasture or for forestry up to a limit that must bear some relationship to the altitude naturally reached by trees under the prevailing climate.

Woodlands show clearly the effect of climate, for on the western shores fully exposed to sea winds the buds on the windward side may be killed so that the tree has apparently been bent in a direction away from the sea wind. There was once an influential Irishman who regarded the failure to grow trees on the west as a proof of British spleen, but the whole western seaboard, where under full conditions of exposure, is an environment unsuited to trees from Cornwall to the Hebrides and Shetlands, and similarly on the western coast of Norway. Inland, where shelter is available, trees flourish and the upper tree limit rises from sea level at the coast to 600 ft. or so a few miles inland and eastwards, as the mountains become drier, to as much as 1,500 ft. and even 2,000 ft., for example in the Rothiemurchas forest north of the Cairngorms. For planners, one can only

give the warning that before an area is allocated for forestry, the factors of climate and soil should be studied as carefully as those concerned with present land use (on which see pp. 69–71).

Agriculture shows in its variety an adjustment to climate worked out through centuries of experience. Some extreme manifestations of weather, of a catastrophic type, are considered below (pp. 51–3), but the ordinary range is in some ways of greater interest. During the cold spell which lasted from the middle of January to mid-March in 1947, much of the country had temperatures which never rose to the normal mean monthly minimum for the season: the unusual cessation of agricultural activity caused alarm, fortunately mitigated by a dry warm summer. The main crop-growing areas of Britain are in the drier east and recent studies of the relation between water supply and loss through evaporation appear to confirm the view that hay may be a poor crop in the drier years because the soils may dry out in high summer. No such difficulties arise in the west, or in Ireland, where the greater rainfall (over 30 in. on the average) is naturally suited to the growth of grass and of crops such as potatoes and oats. This relationship between water supply and its loss is now dignified with the name of evapo-transpiration, but while its assessment provides useful data, opinions differ about the best method of making the measurement. From open tanks, the evaporation in the British Isles is estimated at approximately 16–18 in. per annum, rising to 20 in. or more in the south-east and falling to 14 in. in the Hebrides and in Co. Donegal. There may therefore be a risk of drought in some seasons, especially in the south-east of England and to some extent also in East Anglia, though dry harvest periods are welcome, particularly for cereal crops. On the other hand, market gardening may need occasional irrigation, now increasingly practised in many areas.

Local protection from sharp winds has long been known to gardeners, and especially to owners of walled gardens built from the seventeenth century onwards. Many accounts are given of apricots, peaches and even grapes that will ripen under the protection of a high and warm red-brick south-facing wall: in the milder coastal areas of the south and south-west, the effects of protection may result in growth during a large part of the year.

Indeed, along much of the Irish coast from Dublin (in some seasons) round the south to Co. Cork and away northwards to Co. Galway and even beyond, grass may need cutting throughout the year. It is in such places that Mediterranean exotic plants do well (they figure in advertising photographs of south coast resorts), and in the case of the arbutus at Killarney, far better than in their native environment as they have no summer drought to endure and so grow into strong trees instead of small shrubs. Much has been made of 42–43°F. as a temperature at which growth 'ceases', and the areas of semi-permanent vegetative growth in the British Isles appear to correspond with the incidence of this January isotherm. It is certainly an interesting experience to visit Killarney in December and see the rich growth of grass and to appreciate the evergreen vegetation. In such areas it is possible for cattle to graze outdoors through the whole year with rare interruption. On the other hand, it is by no means clear that the figure of 42–43°F. should be treated with quite its present veneration, for individual plants, including cultivated crops, differ widely in their tolerance of weather conditions.

THE CATASTROPHIC ELEMENT

Catastrophes are now officially recognized to exist; in the Report of the Ministry of Housing and Local Government it was stated that on 29 November, 1954, parts of Pembrokeshire were subjected to an 'unusually severe gale' in which some roofs were completely blown off, others damaged and hundreds of chimney-stacks collapsed. A technical officer was sent to co-ordinate the building resources available to arrange for repairs; in all the damage was estimated at £400,000. Gales, officially winds of more than 38 miles per hour, are felt mainly on the Atlantic west coasts, and average 38 at Lerwick, 48 at Stornoway, 31 at Blacksod Point, Ireland, and 25 at Scilly, but only 9 at Liverpool and 4 at Tynemouth, though the average is 16 on Dungeness. On the west coast of Ireland, thatched roofs are weighted down with ropes and heavy stones and on some of the newer houses the tiles are cemented into position.

Melting snow may cause widespread flooding, as for example

when the 'great thaw' took place on 16 March, 1947, after snow had covered the ground for two months. The flooding was severely felt in the east of England in the lower parts of the Ouse, the Trent and the Yorkshire rivers draining to the Humber; several of the Fenland rivers broke their banks and the Don overflowed near Doncaster—in fact a large area of the flat lowland of Yorkshire was covered with water and even at York there was a high flood. At Selby in East Yorkshire and at several places in the Fenlands the railway lines were cut. Unfortunately the period of melting, which was swift, coincided with high tides so that the floodwaters could not easily reach the sea. It is not possible to prevent such catastrophes in themselves: the problem lies in making appropriate provision for the repairs and for the people driven from their homes.

Far more serious was the flooding on the east coast (and in Holland) in 1953, which drew from one geographer the comment that 'the occasional short term operation of violent forces accomplishes in a very short time an inordinately large amount of geomorphological work'. In all, some 322 square miles was flooded and 307 people were killed. Wind was the cause of a violent 'surge', which is defined as 'a water movement, which is quickly generated and whose effects are soon over'. In this case, on the night of 31 January–1 February, the surge travelled southward along the east coast, later turned and moved northwards along the coast of the Low Countries: it was accompanied by high winds, especially in Scotland, where the record speed of 121 m.p.h. was recorded at Costa Hill, Orkney. Some of the winds damaged forests in north-east Scotland and there was the worst gale on record in the North Sea: the tides were far higher than expected, for example at King's Lynn 31 ft. instead of 23 ft. An experienced observer at Lowestoft spoke of waves of a size and volume he had never seen before in the North Sea, and stated that a cliff of sand 40 ft. high had been driven back 40 ft. overnight and a cliff 6 ft. high pushed back 90 ft. Fortunately there was little damage in the Wash area, as none of the rivers was in flood, though at Hunstanton the promenade was destroyed. But serious flooding occurred along the Thames Estuary, especially in Canvey Island, where the buildings are below 15 ft. O.D. The storms of 1897 were apparently as severe, but very few

houses then existed on reclaimed salt marshes or tidal flats: the only remedy for such disasters is to help the natural accumulation of beaches, dunes, shingle ridges and salt marshes, and to maintain walls and other forms of defence.

Rain may cause grave problems, of which one of the most spectacular was the Lynmouth floods of 15–16 August, 1952, when the river carved out a new channel through the village. Owing to exceptionally heavy rain on the night of 15–16 August, probably over 9 in. in the area of greatest fall, all the Exmoor rivers rose sharply: the Lyn rivers, which drain some 38 square miles, rose quickly and in the late evening were flowing down Lynmouth High Street and rising at 2 ft. each hour. In all, the floods caused twenty-eight deaths, and destroyed seventeen bridges as well as damaging many walls and roads. A small swollen river can do immense damage: the flood of the River Eye on 12 August, 1948, destroyed seven main-line railway bridges and a tall pillar of the railway viaduct near Eyemouth. On this day, rainfall had averaged 3 in. in much of East Lothian, with consequent flooding, and in parts of the Tweed basin there was as much as 6 in. of rain. One effect noted by A. T. A. Learmonth was *sheetwash*, that is removal of soil, of as much as 3 in. on slopes from 5–30°: it is certain that more damage is done by sudden soil erosion, either by sheetwash or by the initiation of gullies, than most people appreciate. There is a need for the further study of such occurrences, and also of the behaviour of rivers (especially small ones likely to be drastically changed by unusual rains, such as the Lyn and the Eye), and especially of local climates. Learmonth makes the interesting comment that the remedial work was quick but not planned as a whole as it came under two county authorities, Berwickshire and Northumberland!

TOWN CLIMATES

Centres of large towns are normally at least 1°F. warmer than the open countryside, due to the retention of heat by the brick and stonework of buildings, and partly to the fact that the very presence of the buildings prevents free radiation from the ground at night. Similarly, high winds are impeded: E. G. Bilham quoted figures for 1935 showing that in this year there were only 13 hours with winds over 24 m.p.h. at South Kensington, compared with 95 at Kew Observatory, and 371 at Croydon aerodrome. High winds in towns cause such destruction that this relative scarcity is fortunate. So far the town climate sounds desirable, but one must remember that official statistics come from the interior of Stevenson screens, and not from the sensations of workers in hot streets with the tar just beginning to liquefy. And loss of sunlight is a further adverse factor: according to Bilham's statistics, three central stations in London, Bunhill Row, Regent's Park and Westminster, have 83% of the sunshine recorded at three country stations. The loss is most severe in winter, for January had less than half the sun hours of the country stations, but June 94%. Three stations in suburbs, however, Hampstead, Kew and Enfield, had 94% of the sunshine in the country stations, ranging from 78% in January to 99% in June. Undoubtedly the position has improved, for in 1881–5 the central stations of London had in winter only 20% of the sunshine recorded at Kew. Much of the improvement is due to the reduction in number of coal fires: those who do not live in cities such as Manchester may be surprised to learn that even there the sun shines brightly in summer.

Four stations in Manchester have produced some interesting results, noted by G. Manley. Of these, Oldham Road (191 ft.), a mile and a quarter from the Town Hall, in an open yard surrounded by houses, is best known for its sunshine record, almost a third below the surrounding country. Whitworth Park (125 ft.), in a small park near the University, had daily mean monthly minima ranging from 36° in January to 54° in July, with extreme minima from 25° in January to 46° in July: at Oldham Road the average monthly means are 1·7° above, and the extreme minima

2·7° above Whitworth Park. On the other hand, Burnage, a modern garden suburb, has its extreme minima 2° below and Barton airport, in an open situation, 5° below Whitworth Park. The differences at Oldham Road and Barton represented the prevailing difference of temperature on clear, quiet nights between a city station in a densely built-up area (Oldham Road), in a small park, and in the outer suburbs. Due to the blanket of smoke, the central areas of towns lose sunshine in the winter when it is scarce, but are warmer at night, and probably during the day also.

In Manchester a smokeless zone has been established in the centre of the city, covering the central business quarter, which includes few residential premises. There are other smokeless zones in new housing areas within the city and in some of the suburbs, but progress is slow. Even though the wind carries smoke for many miles, blackens the sheep on the Pennine moors and makes a sooty deposit on the trees and shrubs of gardens in the outer suburbs, the merits of a smokless zone are considerable. In December 1963, the author stood on the top of the fourteen-story residential block of Manchester University: to the north, the atmosphere over the central city area was far less thick with smoke than that over the southern suburbs.

Awareness of the amount of smoke over large towns is dulled by the familiarity of its presence: someone living in the country may observe it far more than those in town all the time. But if one stands at the end of a street of artisan houses on a calm day in November, the smoke from numerous domestic chimneys makes a grey-black filmy curtain over the scene. That the coal fires of household grates are the main contributors is undoubted, for a summer city atmosphere can be clear and even pleasant. Factory smoke emission is controlled by law, but many institutions are heavy contributors to atmospheric pollution. In one city known to the author (not Manchester) the three worst offending chimneys were those of a university, a first-class hotel and an expensive club. And in another town, the local hospital discharges large quantities of black smoke from its central heating plant, and from several other chimneys connected with stoves and fires in the wards.

CHAPTER IV

RURAL LAND USE

ANY student taking a university course on Town and Country Planning will probably discover that the problems of towns receive far more consideration than those of the countryside. Under British conditions, this is natural if not entirely defensible as at least four out of every five of our people are working in towns, though living to a considerable—and increasing—extent in suburbs. Probably as many as 85% of the population depend directly on work in towns, or on industrial enterprises that are non-agricultural, such as coal-mining or iron ore extraction in places which are technically 'rural' in the sense that they are outside urban districts or boroughs. And there is also considerable suburban settlement in villages close to towns, or in groups of houses beyond the administrative boundaries of towns. This is not, as many people assume, something new, for the whole process of growth in our towns has involved both the addition of houses in neighbouring villages and along roads, new and old, beside existing towns. Noted in the informative footnotes of the 1851 Census, it was given impetus by the building of railways. But it has become a national problem due to the decay of thousands of timeworn houses in cities, the acknowledged need to give townspeople better living conditions than their forbears and the vast increase of mobility given by motor transport.

Discussion of these problems not infrequently leads to a battle between the defenders of town and countryside. If all the townspeople of Britain were organized as a political force against the country people, their voting power would sway every decision on such problems as 'overspill'. Happily this is quite unthinkable. But the irony of the situation is that in a county like Cheshire, with 1,368,000 people, only 208,000 (15%) live in rural districts, and many of these work in neighbouring towns or even reside in

suburban areas not yet absorbed into the towns from which their people came (see Fig. 1). Nevertheless three-quarters of Cheshire is under rural government and less than one-tenth of its area is covered by towns with their suburbs. But the increase of 9% in its population from 1951–61 indicates a spread of housing clearly visible to those who know the county, and the rural increase of 11% is due to overspill from the towns: the two rural districts least affected by this movement show a tiny increase (Nantwich, + 0·1%) and a decrease (Tarvin —0·9%). It is nonsensical to regard the whole of Cheshire as under the immediate threat of urban expansion. But what could happen in the English countryside is revealed by Jean Gottmann, in his book on 'Megalopolis'. In the United States, a belt of country six hundred miles long, from Boston to Washington, and of varying width, is town, suburb, or 'rururban', that is neither town nor country yet partaking of the qualities of both. The shopping quarter located in the countryside, the group of houses on a former farm, the old farmhouse taken by a city man, the fields reverting to forest are typical. No doubt there are areas of Britain to which the term 'rururban' could be applied with justice, but this is exactly what most planners want to prevent. On the other hand, there has recently been a spirited defence of suburbanization in its modern 12-to-the-acre form from the Wye College Department of Agricultural Economics, on the financial argument that food of more value is grown in the partially cultivated gardens than on the farmland 'consumed' by housing departments. This important material is discussed further on pp. 66–8.

Is there, or should there be, an urban fence? Some are of the opinion that rigid demarcation of territory that is under town as distinct from rural control can only lead to friction, and on occasion some small urban districts have been transferred to the rural districts around them, as in 1953 when Axminster (2,675) became part of Axminster R.D. The general trend is for towns to seek, and less frequently acquire, extensions of their territory as *Lebensraum* for housing, with the result that many towns have within their bounds several square miles of agricultural land. Not all of this is of necessity potential building land but the problems of an expanding town can be more easily met if its boundaries are widely drawn. At least there can be no doubt

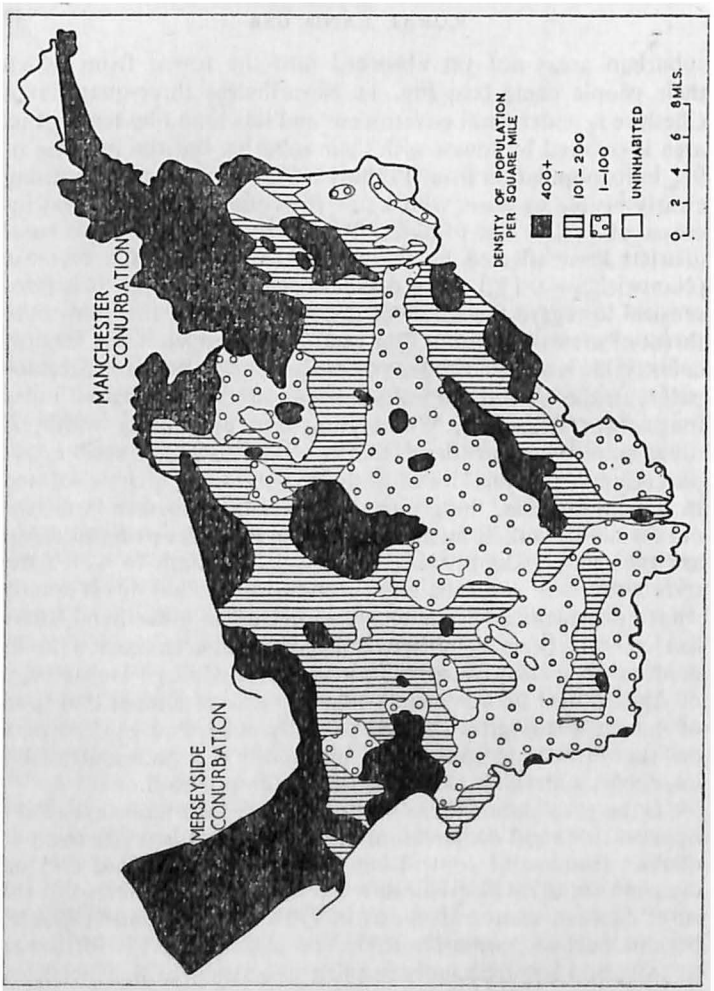

FIG. 1A. *Cheshire: Population density*

The only uninhabited land of any extent is in the Pennines and most of the rural areas have 1–200 to the square mile. Towns and their fringes have over 400 to the square mile, as in the conurbations, Northwich and district, Nantwich and Crewe.

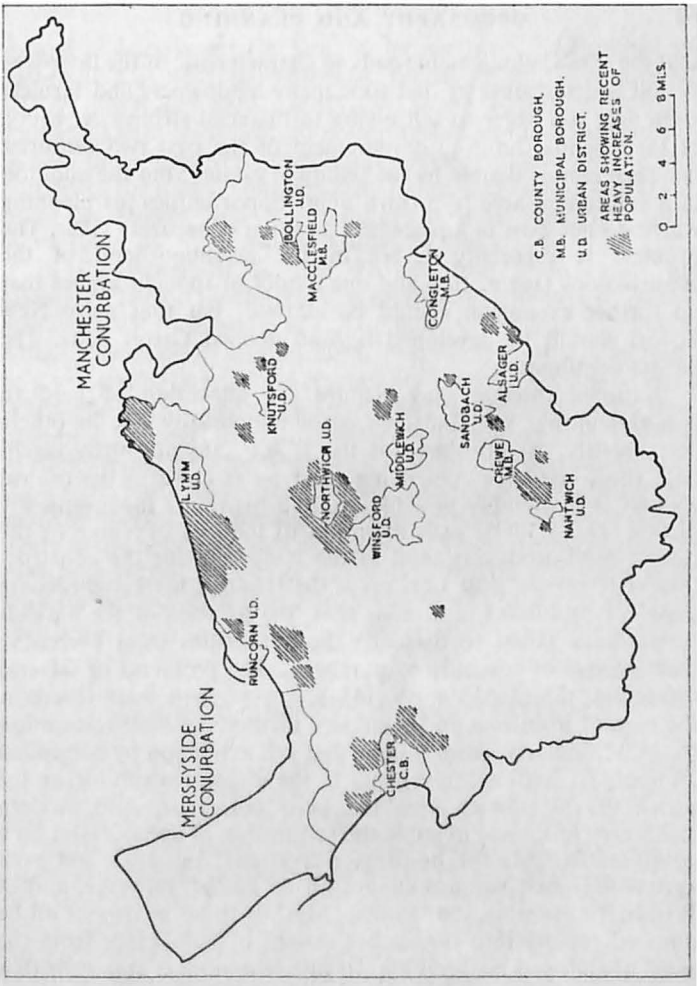

FIG. 1B. *Cheshire: Recent changes*

The main extension of settlement outside the defined towns is in a few villages where a number of houses are occupied by townspeople. Some farm houses are converted into residences for wealthy people from the towns. Around Chester, Northwhich, Runcorn, and at Carrington (east of Lymm) there are new housing estates.

that the sprawl along main roads so characteristic of the inter-war period is disastrous: at that time many landowners and farmers were only too eager to sell owing to financial stringency. Much of the essential housing development of the past two centuries has been made possible by the selling of estates; but the addition of a substantial area to a town offers opportunities for planning which do not exist in a piecemeal addition of separate villas. The problem is especially severe in the neighbourhood of the conurbations (see p. 104) and one school of thought argues that no further expansion should be allowed, but that more New Towns should be developed beyond defined Green Belts. The debate continues.

National interest may require the allocation of land to non-agricultural use, in some cases temporarily but in others permanently. Aerodromes for the R.A.F. are obviously essential: those used for civil flying must be as close to the central area as is reasonably possible—indeed many are inconveniently distant. Dr. Willatts calls attention to the loss of 'some of the richest food-producing land in the Kingdom' for the construction of reservoirs near London in the 'Thames market-gardening plain' of Middlesex, and adds that 'the protests of the agriculturists have failed to dissuade the authorities from exercising their powers of compulsory purchase'. The problems of mineral extraction, discussed on pp. 145–8, are perhaps least severe in the case of ironstone under modern methods of land restoration (p. 145): similarly, there is hope that salt extraction by controlled pumping (p. 146) will not result in the disastrous subsidence for which the Northwich area has been notorious. And modern machinery has made possible the restoration of derelict land on a considerable scale for housing, recreational purposes and even agriculture. Past wounds cannot all be healed, however, and at Wigan, for example, the famous 'Alps' of tipheaps cannot all be dumped rapidly into the flashes caused by subsidence from the same abandoned coal-mining. In justice one must comment that both the coal flashes of Wigan and the salt flashes of Northwich are now being used for dumping of waste. The task is to see that the use of minerals continues with as little damage as possible to the agricultural life of the countryside. Theoretically it may be practicable to raze derelict mining villages in Durham to the

ground and reconvert the land to agriculture: the problem of coal-mining is that movement is inevitable as the centre of activity moves, eastward, for example, in the Yorkshire, Nottingham and Derby coal-field, or southward in the Lancashire field. In both these, however, agricultural activity continues to the very borders of the mines, conspicuously Lancashire, as workers travel from the houses built a generation or more ago near older mines (see Fig. 7, p. 139, the Mansfield area).

In the remainder of this chapter, four main topics are discussed. The first is the work of the land use surveys of Britain associated with the names of L. D. Stamp thirty years ago and of Alice Coleman in its current form. The Stamp survey culminated in *The Land of Britain* and the county reports, all rich in basic information. This leads to many other problems, of which three have been selected: these are the loss of agricultural land, the use of submarginal land for forests, and finally the rural community. Each topic raises wide issues for discussion and no doubt some of the opinions here expressed are controversial. Much could be made of the point that vast numbers of English people are townsmen only of one or two generations' standing and show some wish for contact with the countryside, or at least for a garden of their own.

LAND USE SURVEY IN GREAT BRITAIN

The great enterprise begun in 1930 by Dr. L. Dudley Stamp resulted in the publication for almost all Great Britain of maps showing land use on the scale of 1 : 63,360; and also of maps on the scale 1 : 625,000 showing land classification, types of farming, grasslands of England and vegetation types of Scotland; of ninety-two county reports (5,800 pages) which appeared from 1936 to 1946; and finally of L. D. Stamp's volume *The Land of Britain: its Use and Misuse* in 1950. In addition, a number of articles were published in geographical and other journals. Fundamentally, the idea was quite simple—to organize 'a field-to-field survey of the whole country, covering every acre, and recording its use and then of preparing a report or description of the work'. This was already

recognized as a basic principle of rural regional survey but organizing genius was needed to make it nation-wide. From one source or another, Dr. Stamp managed to find workers who would take the whole of a 6 in. Ordnance Survey sheet (delineating an area of 24 square miles) or one of the four parts into which it was divided: they were provided with a scheme of work essentially simple but capable of refinement and sub-classification. Further, all workers were encouraged to add marginal comments on any features of particular interest.

Surveyors were asked to note six categories of land: (1) forest and woodland (F); (2) meadowland and permanent grass (M); (3) arable or tilled land (A); (4) heathland and other forms of rough pasture (H); (5) gardens, allotments, orchards and nurseries (G); (6) land agriculturally unproductive, used for buildings, yards, mines, cemeteries (W); the seventh letter (P) was used for water. The accuracy of the observations was checked by experienced surveyors, and an office check was made by comparison of the margins of sheets completed by different workers. Woodlands were of many types, from fine plantations to patches of poor scrub: some indeed were transitional to category 4, such as the scattered trees found on many steep slopes of the Pennines or the Scottish hills. Under meadowland and permanent grass, the warning was given that rotation grass should be included as arable: this led to some difficulties in Scotland and Wales (and vastly greater troubles in Ireland) where fields are left in grass for several years and then ploughed for a short term of years. Category 4, rough pasture, was generally easy to distinguish, especially as it is indicated on the 6 in. maps, but land near the upper margins of farming was not infrequently seen to be declining into this category from an improved grassland state. In places, however, the converse was found.

Gardens, the fifth group, included orchards, nurseries and allotments: this symbol is universal for housing estates as well as for other suburbs of most towns in England and Wales and the essential point was to separate the houses with gardens from those with backyards. Some compromise was necessary in towns where the artisan houses erected shortly before the 1914–18 war have tiny front gardens but backyards in the rear. Similarly in Scotland, the shared gardens of residential squares came out in

this category but the houses under (6). Many fascinating problems arose. Is a market garden a garden, or a field to be included under the arable category? Happily in some parts of the country, such as parts of the Fenlands, Kent and Middlesex, the Survey was given sufficient data to show such areas by a special symbol. If an orchard is used as a meadow or for field crops, should it come in the garden category? Here again special symbols provided some solution, and workers were invited to note the marginal case by using the initials G(M) or G(A). Sports grounds normally come in the grassland category: not unusually sheep may safely graze on rugby pitches during the off-season.

Though air survey can now cover whole counties within a few hours, the true land use study lies in the detailed investigation of the countryside on foot, for only so can one note such details as the slow advance of rushes, bracken or gorse into a field reverting to rough pasture, the condition of drainage, the standard of cultivation, the upkeep of walls, the division or union of fields, and many more pertinent details of the rural scene. The new survey associated with Miss Coleman includes many more categories of land use than that of L. D. Stamp, and the sheets are published on the 1: 25,000 scale. Grassland includes fields with rushes or scrub; arable land fields of cereals, ley legumes, roots, green fodder crops, industrial crops and fallow; market gardening includes nurseries, allotments, flowers, soft fruit and hops as well as vegetables. For orchards, observers are asked to record whether the ground is in grass, arable cropping or market gardening. The urban and industrial use of land is also subdivided, with categories for commercial and (dense) residential, houses with gardens, newly built-up areas, and even caravan sites: and there are four main divisions for industry, manufacturing, extractive, tips, public utilities. On the maps so far published the type of industry is shown when possible. Transport receives recognition as a land use type, as well as open spaces and derelict land, of which there has been a growing awareness since the 1939–45 war. Observers are also asked to note particular types of crops and vegetation in areas of heathland, moorland and other rough land. The value of this survey lies in its analysis of the land use in a Britain greatly changed from that of the 1930's, a time of depression in agriculture, of piecemeal and even in some places un-

planned suburban growth. The fieldwork plan asks for more skill in the observers, apparently with success, for which at least part of the credit is due to improved geography teaching.

The general move is away from the difficult margins of farming, especially in remote districts, but this is by no means universal: in the farmed areas of the industrialized Pennines, for example, the strong local demand for milk and eggs has made profitable upland farms that, if situated in remote valleys of central Wales, would have been abandoned long ago. One upland area showing the retention of such farms is Rossendale, having in its valleys a string of industrialized settlements such as Bacup, and on its north side Burnley and a number of other manufacturing towns. Egg production under present conditions has proved the economic salvation of many farmers who before 1939 were not conspicuously prosperous. All this leads to the consideration that economic as well as physical factors affect the fate of the land: before the 1939–45 war, many observers noted sharp contrasts between neighbouring farms, due partly to the ability of the inhabitants.

During and since the 1939–45 war the economic strength of agriculture as an occupation has made possible all kinds of improvements on farms that were once down-at-heel—but that is not to say that the whole countryside is efficiently farmed. It is, nevertheless, far more productively farmed than it was thirty years ago. What remains is diversity of practice in areas apparently homogeneous in their agriculture: one man may specialize in battery hens, another in deep litter, a third may follow older methods, and the relative proportion of a farm sown to crops will be influenced partly by personal choice as well as by the physical characteristics of the soil. Market gardening is a highly individualistic pursuit. Miss June A. Sheppard has given a fascinating account of twenty-seven market gardens set up by Dutchmen near Hull since 1932, when a tariff was imposed on imported vegetables: they have brought new methods of forcing crops under Dutch light frames. Recently an Honours student of Manchester wrote a thesis on a compact area near the city having sixty-five market gardens on rich land with a long tradition of intensive fertilization: each one was in some way different from the others in its production. Some sold their produce in

Manchester, some in other towns: some dealt in cut flowers as well as vegetables: some sold their produce at the door, others in local retail markets or in the main Manchester market, and one specialized in viola growing and breeding for the whole country! Several farmers had found field rhubarb profitable during the war, but less so afterwards. Perhaps this survey covered a group of people who, though neighbours, were marked individualists yet it may have some point. When interviewed, each gardener appeared convinced that he was doing the best possible thing with his land.

It is to such considerations, and to many more, that land use study leads. Most of the Land Utilisation Survey county reports include a survey of the physical features, including climate and weather, and not a few deal thoroughly with the agricultural history of the areas considered. It was also usual to give particulars of a number of specimen farms—perhaps one should say typical farms, though individual practice differs widely. In some reports, the effects of local seasonal demand for dairy produce or vegetables was clearly seen, and in others the effects of marketing schemes or buying agencies was demonstrated. Every coloured 1 in. map by the Survey provided more information than any geographer possessed before. This became recognized as of national significance when war conditions made home food production vital, though the national importance of the work was no less real in peacetime. As the world population rises, it becomes increasingly clear that no nation can afford to neglect its agriculture. Great Britain has many areas of highly efficient farming but the production of crops and stock could be improved still further, and this point, constantly argued by the Survey officials, is proved beyond doubt by the fact that the agricultural production of Britain has increased by 60% since the nineteen-thirties and is still rising. Obviously, good land (and the Research Maps Office of the Ministry of Town and Country Planning regarded 48% of all the agricultural land in England and Wales as 'good') should if possible be retained for agriculture. Some 5% is first class land, in all some 1,693,000 acres or 2,645 square miles: of this, nearly half is in the Fenlands and therefore not likely to be threatened for building purposes, though some of the rest is close to London, in the

famous market-gardening strip around Worthing, or in south-west Lancashire, in all of which residential development, even industrial growth, may not be easily prevented. The new Coleman Survey is providing detailed information of great significance.

THE LOSS OF AGRICULTURAL LAND

No possibility exists of rehousing everyone on land of poor quality nor has it been the practice in the past. The case of Middlesex was discussed on p. 60: in the Lea valley, which runs through the east of Greater London, the land use includes sports fields, gravel workings, arterial roads and railways, large factories, reservoirs, housing and greenhouse horticulture. Many of the greenhouses are now abandoned, partly because it is hard to find workers locally: on the other hand market gardening has increased in the upper Lea valley towards Ware and Hertford. Much of the valley lies within the Green Belt, though it is hardly an untouched agricultural area but rather one in need of careful redevelopment for recreational, industrial and even residential uses.

Private gardens are used for lawns, flowers and shrubs, pathways and drives, sheds and garages, and food crops, including fruit as well as vegetables. In a survey of gardens of suburban London by R. H. Best and J. T. Ward it was found that approximately one-fifth of the space was occupied by houses, both on council and private estates. From this and other surveys, it appeared that some 14% of the garden space was used for vegetables on the average: but as in the modern estate only one-half of the land is used for houses and gardens—the rest for schools, industry, roads, public buildings, parks and other essentials—the proportion of total area used for food growing is 7%. L. D. Stamp noted from a survey of Hampstead Garden Suburb, estates at Sanderstead and Bellingham, Welwyn Garden City and Bude, that 'broadly speaking . . . in the modern garden suburb or garden city or open type of village and town the amount of land, even under war-time conditions of intensive cultivation, actually under fruit, vegetables or flowers ranges between 9% and 16% of the total area'. Stamp related the

cultivated land to the whole area; Best and Ward to the garden area only. Stamp, unlike the other workers, included flowers with crops. If one assumes that some of the flowers not grown at home would be raised commercially, land is saved by the efforts of amateur gardeners. But even without the inclusion of flowers, a case can be made for the defence of private gardens as agricultural economic units.

Best and Ward confirm the common observation that gardens are used primarily for recreational purposes. There is no need to stress the benefits to health and the amenity value of gardens: even during the war (Dig for victory!) most families preserved part of their ground for grass and flowers. Economic factors perhaps account for the finding of Best and Ward that the area under food crops on council estates was more than double that on private estates (21% and 9%) and there are obvious reasons why 'the largest areas under food crops were found in gardens on lighter soils, irrespective of inherent fertility'. The controversial point is whether the gardens of an 'average' housing estate produce more food than the agricultural land they replaced. Assuming that they are built at ten to the acre on 'better-than-average' farmland the value of output is much the same: for example, such farmland may yield produce to the value of £45 per acre at farm-gate prices, while the vegetables and fruit will be worth £42 per house-plot acre. Put more simply, this means that the part of the garden cultivated need only give produce valued at £4 a year to be equal to the area of field replaced, assuming that the garden crop is costed at retail prices and the farm crop at the return to the grower. A few rows of early potatoes and green vegetables and some soft fruit will be worth this minimum sum. Best and Ward suggest that if densities are high, little space will be available for crop-growing, for extremely small gardens are given primarily to flowers and grass, as anyone familiar with the pre-1914 artisan terrace houses will know. Rarely, except in wartime, are front gardens used for vegetables. Taking the official forecast that 500,000 acres (probably an under-estimate) will be required for development in the 'foreseeable future' (about twenty years), of which approximately one-half will be for housing, a saving of one-quarter by tightening housing densities would result only in the preservation of about 50,000

to 60,000 acres, combined with the reduction of the domestic garden to a size at which no vegetables will be grown.

The inevitability of allocating some farmland to housing is now generally recognized. For many years the produce of agriculture has been rising at about 3% per annum through the intensification of farming by a diminishing, though increasingly skilled, band of workers. There is, of course, no reason why any householders should grow vegetables unless they wish to do so: even if no one grew a single potato or cabbage on his new plot of ground, the loss is small in relation to agriculture as a national economic enterprise. Again, one leaves aside the social arguments in favour of the modern housing estates compared with the concentration of people at high densities in multi-storey flats: one also leaves aside here the high cost to local authorities of building such flats. The author's purpose is merely to show that the case made by Best and Ward, working not as townsmen but as agricultural economists, appears to be very strong, and realistic in a country which has four-fifths of its people in towns.

During and after the 1914–18 war, the cultivation of allotments became popular, and most of the writers of planning books and reports favoured the provision of plots of ground for gardeners as a matter of social policy. There are in England and Wales 100,000 acres of allotments, of which a small proportion (8%) are unoccupied: allowing for uncultivated space in paths, sheds, hedges, fences and other uses, there are some 80,000 acres of ground under crops. A number of estimates suggests that the value of the food raised is £300 an acre, and probably much more—indeed some estimates, including one from the secretary of the National Allotments and Gardens Society, put forward figures up to £560 per cultivated acre, and even more. As allotment holders are normally a select group of keen gardeners, these figures seem credible; one enquiry in Somerset revealed that the average time spent annually on each allotment (*c.* 350 sq. yards, one-fourteenth of an acre) was 156 hours. For comparison, one may note that the average return per acre for market gardening land is £110.

To sum up, it is inevitable that some agricultural land must be taken for rehousing, and wherever possible land of moderate or poor quality should be used. All the arguments against the

allocation of rich market-gardening and orchard country to housing hold good and the work of Willatts on Middlesex (see p. 181) therefore commands particular respect. But the planners have to find land somewhere, and may feel frustrated by the apparently universal excellence of agriculture around the cities and towns whose people need new homes. Some indeed have argued that the very excellence of the land close to some cities is due to the demands of the consumers, whose trade has stimulated improvement: the people of the countryside should therefore try to meet the city's present needs. The problem is not easy: it would, for example, be deplorable if an area like Epping Forest were allocated for building purposes. Heaths, forests and commons are needed for amenity purposes in and around our cities and to the author it seems that rehousing on the scale needed can be achieved only by using some land of good quality, but not necessarily the best quality. To him, as probably to others, the work of Best and Ward is practical and reassuring.

FORESTS AND SUBMARGINAL LAND

One of the many lessons taught by two world wars is the value of forests as a national resource. The whole development of agriculture has meant the removal of trees, though those growing in hedgerows, in large fields used as pastures, or in windbreaks beside farms, add much to the charm of many landscapes. Aesthetic opinion is divided: as noted on p. 163, Wordsworth deplored the addition of conifers in the Lake District, though others find pleasure in the varied colours of modern forestry plantations, and H. L. Edlin, in his delightful book *Trees, Woods and Man*, draws attention to the splendid woods beside the Tay from Perth to Blair Atholl, 'nearly all . . . artificially planted, over the past two hundred years, with exotic conifers that were supposed to look so out of place in our landscapes'. No one claims that large areas of farmland should be cleared for tree planting so it is to the rough pastures and old woods that the forester naturally turns for his sites. Many of the old woods were used for game, and most are in poor condition: indeed, some agriculturists think that many of the small woods in agricultural areas might well be removed to

provide new fields. Patches of ancient woodland on steep hill slopes, never cleared and presumably left throughout history in their natural state, may be suitable sites for new plantations, with some parts of the 18,775,000 acres of rough grazing, which occupies one-third of Great Britain: of this 13,011,000 acres is in Scotland, 3,813,000 acres in England, 1,906,000 in Wales, the rest in the Isle of Man. About 7% of Great Britain is at present under forests, but an increase is certain.

Tree planting has long been associated with noble families who used part of their estates to make woods, many of them introducing trees not native to the environment. Conifers have flourished in the south of England, and beeches in the eastern lowlands of Scotland. It was as recently as 1899 that the Office of Woods, Forests and Land Revenues began afforestation and the Forestry Commission was founded only in 1924. Within the next fifteen years, to September, 1939, the Commission established 230 new forests covering 655,000 acres (over 1,000 square miles), of which more than half had been planted. The present aim is to obtain at least 5,000,000 acres of well-managed, fully stocked and productive woodland, almost three times the present area of 'productive high forest'. Some of this, perhaps as much as 1,000,000 acres, will come from woods now unproductive, and the rest from rough hill lands, moors and heaths. Should this be achieved within the next forty or fifty years, it might be possible to supply one-third, or even more, of the home timber requirements instead of 15% as at present. Already the Forestry Commission has established seven Forest Parks: in England, the Forest of Dean; in Wales, Snowdonia; in the Cheviots, both in England and Scotland, the Border Park; in Scotland, Glen Trool in Galloway, Argyll near Dunoon, Glen More on the north side of the Cairngorms, and the Queen Elizabeth Park, between Loch Lomond, Loch Ard and the Trossachs. Not all the area included can be forested, and access is provided for visitors who can see the aesthetic and economic value of forestry. These must not be confused with the national parks, discussed on pp. 160–7.

Not all the rough pastures should be used for tree planting. If a sheep farmer in Snowdonia, the Lake District, the Pennines or any other upland area, has a few fields of improved pasture and a few thousand acres of hill grazing, the case for retaining the

existing use of land is strong. The Lake District has valleys such as Langstrath off Borrowdale where a string of sheep farms still exists, as well as valleys such as Ennnerdale where forests have replaced the former farms. But as L. D. Stamp and other workers have shown, there are many farms so isolated that they are difficult to reach at all in bad weather. Not unexpectedly, he reports 'a definite flight of population from the inaccessible or relatively inaccessible tracts', with examples drawn from remote valleys of Wales, especially from the Black Mountains, as well as from 'the Highlands of Scotland where so often the only trace of once extensive cultivation in one of the remoter valleys is the graveyard of the former settlement'. Under modern conditions, services such as electricity and piped water are naturally desired, with reasonable transport to schools and villages. If the farmstead is abandoned and the rough pastures left unused, then the way may be open for redevelopment as a forest reserve. On pp. 158–9 attention is drawn to the value of many uplands as sources of hydroelectric power and water, uses that may in places be combined with afforestation.

Having considered some of the many aspects of rural land use, one inescapable conclusion emerges—as in the past, so in the future, change is inevitable. No doubt the rich arable lands of East Anglia and the Fenlands, or the fine dairy pastures of Cheshire, will remain much as they now are : it would be fortunate if one could hope as firmly that many of the fruit-growing areas of Kent and Middlesex were equally likely to remain. But by some means land must be found for an overspill from our major cities, either in new towns or in extensions of existing towns that will take over land at present farmed : discussions, at least, have taken place in which towns as distant as Nantwich, Cheshire, have been mentioned as possible receivers of people from London. And in Lancashire, even Garstang, between Lancaster and Preston, has been mentioned as a possible new town for migrants from the Manchester and Merseyside conurbations. On the other hand, there is every ground for the expectation that the intensification of agriculture will continue. And finally, the possibilities of forestry are considerable, especially in those areas least attractive to farmers under modern conditions.

THE RURAL COMMUNITY

Numerically the agricultural community represents only some 15% of our whole population, and probably less: in any case, it is only part of the 20% of the national population living in rural districts, which include some substantial suburban areas not absorbed into the town from which their population came. One indication is given by the Ministry of Labour figures, which give 947,000 for 1961 as the number employed in agriculture (including about 20,000 each for forestry and fishing), under 4% of the whole, compared with 1,178,000, 5·5%, in 1948. There also live in the countryside a number of people providing services, such as shopkeepers, smiths who have in many cases become repairers, and a dimishing number of clergy, schoolmasters and others: in addition a number of retired people choose to live in the countryside. The book on country planning by members of the Agricultural Economics Institute at Oxford (edited by C. S. Orwin) pointed out that in the area of 24 square miles which they considered,

> 'the little water-mills are most of them derelict. The twenty-two smiths, wheelwrights and saddlers of forty years ago are reduced to half a dozen. . . . Changes in farming practice, too, wire-netting and stakes instead of hurdles, or the electric fence instead of either; enamelled iron for all the wooden dairy utensils—have put certain craftsmen out of business altogether . . . industries such as milling, malting, tanning, and so on, now centralized, are likely to remain so.'

In short, the countryman is more dependent than ever on town suppliers and services.

Nevertheless, there is evidence that the number of country dwellers who are not directly employed on the land is considerable. Some writers say that it is as much as half the total over much of the country but unfortunately most of the arguments are based on figures for rural districts rather than parishes. S. W. E. Vince, for example, notes that the 'primary' agricultural population approaches 50% in East Anglia, Lincolnshire and the East Riding, and in the Fens over 60%; eight rural districts of the Fenlands had

55% to 75% of their population in agriculture, which gives a weighted average of 64%. Vince also states that the main London–York railway line 'can be regarded as marking the frontier of eastern rural England'. In fact it becomes yearly more difficult to distinguish the farm population, as to an increasing extent there is movement from rural areas either to work in towns or to industrial employment in villages or isolated enterprises. C. S. Orwin and his colleagues favour the settlement of factories in the countryside, partly because it would restore a better and in many ways a traditional balance between agriculture and industry. Further, they wish to see the villages strengthened in numbers: one notable development has been the addition of groups of new houses beside many villages from which workers can go either to farm or factory as they wish. Realism compels one to note that agriculture can remain prosperous with a declining labour force, though not, of course, if the decline continues to extinction. An example given is of a farm of 1,200 acres in Worcestershire, where from 1920 to 1935 the area of 'market crops' was increased from 65 to 250 acres but the staff declined from 35 to 30 men, and the number of horses from 50 to 6, thanks to the use of machinery. At one time, conspicuously in the first twenty years of this century, smallholdings were regarded as a desirable addition to the rural landscape but the general result is 'long hours of toil for a poor reward' according to Orwin, though to some the independence is attractive.

Big farms have several economic advantages such as large-scale production, bulk purchase and scientific management, but the farmer who has too much land to work himself or with the aid of his family and too little capital to buy labour-saving machinery may find life difficult. In 1945 there were in England and Wales 363,000 farms, of which 68,000, of 1–5 acres, are mainly large gardens and grounds. Holdings of 5–20 acres now number 88,000 and have been a declining element for the whole period in which statistics have been available. Even the 68,000 farms of 20–50 acres show a decline in numbers (from 73,000 in 1885), but the number of farms of 50–100 acres, at 60,000, and of farms of 100–300 acres, at 65,000, has changed little. There are only 12,000 farms of more than 300 acres and few really large ones, for example only 334 of over 1,000 acres in England and none in

Wales. One fascinating subject on which little work has been done is the boundaries of farms, past and present: Stamp records investigations in the Midlands which suggest that there has been some consolidation of farms with scattered fields into more homogeneous and economic units, but there is also contrary evidence: for example, isolated fields cut off by railways still remain attached to the original farm despite difficulties of access. In the Vale of Evesham market gardening has developed strongly since the first railways were built, though there is some earlier evidence of vegetable growing: two thirds of the holdings are of less than 5 acres and almost all of less than 50 acres. Each holding consists of a number of fragments, which gives the farmer a variety of soils and shares out the risk of damage by frost.

All study of rural land use leads one back to the farm and the farmer, to the fields, gardens, rough pastures and forests, to the isolated farmstead and to the village. The main problems for the planner appear to be four.

First, farming must remain a vital industry in British life: it is now showing an expansion in production that few people foresaw thirty years ago. This connotes the constant recognition of the value of home food production, and given a rising standard of living the demand from the towns is likely to increase. Stamp mentions that during the depression years many market gardeners in the north of England found it hard to sell their produce, as large numbers of people could only afford maincrop potatoes and cabbage: even now there may not be a large demand for asparagus, but at least growers can expect to sell a variety of crops. The marked success of the vegetable canning industry and the production of frozen foods should also be noted: one can enjoy vegetables out of season at a reasonable price.

Second, all land, of whatever quality, should be efficiently used and the planting of forests on submarginal areas appears commendable to many people. But much of the plantable land is used for grazing, and may be hard to acquire for afforestation, especially as the government gives assistance to hill farmers. And the efforts of the National Parks Commission to preserve scenic amenities in the form of open country may conflict with the

wishes of the Forestry Commission. Many people in Britain do not favour the planting of trees so that mountain valleys look like those of Bavaria. But nothing arouses more heat than 'to plant or not to plant' and the present author remains neutral. Thrift is represented by the Scots farmer: 'Be aye planting a tree, Jock. It will be growing while thou art sleeping.'

Third, the provision of services such as piped water and electricity in rural areas can remove the stigma of inferior living conditions from the countryside. In Britain, as in western Europe generally, the countryman is no longer willing to accept a standard of amenity far below that available in towns.

Fourth, the aesthetic aspects should be considered. There are now ten national parks in England and Wales, and numerous other areas under the care of the National Trust, especially in Scotland where so far no national parks have been established, though there are several national forest parks. It is not only in such areas that scenic amenities need to be preserved, but also in less spectacular countrysides loved by the people who know their fields, farms and villages. This need is recognized partly by the designation of certain areas, in all covering over 2,000 square miles, as 'of outstanding beauty' (see p. 168). Recognizing the inevitability of change, one may hope that the changes will be fortunate.

CHAPTER V

ASPECTS OF TOWN GEOGRAPHY

WHAT is a town? Many efforts have been made to define a 'town' but even the *Oxford English Dictionary* takes refuge in the phrase 'a considerable collection of dwellings, etc. (larger than a *village*)', or, historically, a 'collection of houses enclosed by a wall or hedge'. No longer are our towns so enclosed: in most cases they invade the countryside so that there is a transitional belt that is neither completely rural nor completely urban. If the planners ever succeed in making neat edges to Birmingham, Hull or Manchester, they will at least make it possible to say where the town ends and the countryside begins. A visit to many historic Dutch towns makes one realize that the medieval town had its clear identity within its walls and canals—that is, its defences; so had York, Chester and many more—within their walls. Long recognized as towns, such places have been for generations centres of trade, of defence, of religion, of education and of craftsmanship. A town is recognized as a town by what its people do and by the attraction of people from the countryside, without whose visits the town as a market centre could not exist at all. It is clear that towns do not exist by accident but rather because they provide certain services.

GENERAL FEATURES

Reduced to the simplest elements, towns have four main features. First, they provide trading facilities for the people of the country; second, they have craftsmen such as builders and garage mechanics (even wheelwrights), tailors, shoemakers, dressmakers, watch repairers, opticians (some of whom have gone through standardization); third, they include among their population men

and women providing professional services such as banking or education, with various forms of social welfare; fourth, they may have factory industries though this is not essential to the existence of a place as a town. Until recently many holiday and residential towns eschewed industrial growth and many loved and historic places never had anything that could be called a factory, except for a mill beside the river. And it may be added that the inconspicuous market towns of countrysides hardly touched by industry —if at all—may prove to be more permanent than industrial centres housing scores of thousands who depend on coal, iron ore or other resources that will be exhausted in time or even on industries such as cotton, wool, or shipbuilding that may be disastrously affected by changes in trade. But this argument must not be pushed too far, as some market towns have sunk into virtual oblivion and some industrial towns have been deliberately revived by the introduction of new industries either through the enterprise of their citizens or by government action or, ideally, by both means. In the history of a town, there are almost as many changes and chances as in mortal life itself.

No two towns are identical: and the known individuality of each has led various writers to attempt what is called a 'functional classification', based normally on an analysis of the occupations of its people. This gives a key to the situation, for, as R. E. Dickinson has said of western Europe and North America, 'a town is a compact settlement engaged primarily in non-agricultural occupations'. This is hardly true of the agricultural 'village-cities' of Hungary, or of South Italy and Spain, where many farmers live in cities and go from them to labour in their fields which may be several miles away. In a study of East Anglia, Dickinson showed that none of the places generally recognized as market towns had more than 30% of their working population on the land. It is of the essence of a town's life that it meets the needs of a countryside: in this the gently flowing life of the small market town differs little from one country to another. But in its commerce, each town will differ according to the nature of the countryside it serves: a town placed in the poorer districts of the west of Ireland cannot possess the commercial strength of a town placed in the richly farmed districts of East Anglia or the east of Scotland. To some extent the relative strength of a town reflects the buying power of the

farming community as well as of its own residents—a large number of whom depend directly or indirectly on the trade of the farmers. In the case of a shopkeeper, the relationship is obvious, but solicitors, estate agents, auctioneers and even doctors may depend largely on rural custom.

So far the town has been considered mainly as a market centre for the countryside and this it must clearly be: the market town has its hinterland, its urban field, its service area, its market area, to quote only four of the numerous terms devised by writers to define the area from which its trade is drawn. This area, though known to exist, is hard to define: F. H. W. Green used bus services to indicate the area from which a town draws its rural trade, with interesting results, and Dr. H. E. Bracey, in Wiltshire, investigated the use of towns for various types of shopping, including occasional purchases such as electrical goods, radios and furniture, and for professional services. R. E. Dickinson used information acquired from auctioneers to map the market areas of East Anglia in 1931, and for one major centre, Bury St. Edmunds, showed the extent of the countryside from which sheep, pigs, cattle, eggs and poultry were drawn to the market. In Ireland, J. P. Haughton produced a map showing the area through which local newspapers printed in small towns circulated, and for Altrincham, a Cheshire market town that has become also suburban to Manchester and industrialized, H. B. Rodgers attempted to define its 'sphere of influence' (clearly something of wider scope than trade alone) by finding out the areas from which cattle and garden produce are drawn to its weekly markets, the area from which retailers of manufactured commodities come to its markets, the zone in which the trading areas of some of the town's major shops terminate, the areas in which members of the local Agricultural Society reside, and the circulation area of the local newspaper. Altrincham appears to have a trading area that covers part of the adjacent countryside and part of the suburban districts on its north side, that is towards Manchester: the outer limit of its attraction was most readily defined where the unbridged Ship Canal is a clear dividing line. And there are many more studies of the same kind.

It may well prove that the problem here can be solved only by detailed studies of particular towns and of the country around them. Bus services do not provide the *deus ex machina* in this

problem, for people find their way to town by many means such as their own cars, station wagons, bicycles, horses and carts, and even in some areas trains. Newspaper circulation areas may change with the enterprise of an editor or they may become artificially controlled by a powerful syndicate able to buy up all the local papers. It is, however, well worth while to study bus services and the circulation of newspapers, as well as the records of shopkeepers' deliveries or the trade of auctioneers—who, within the author's experience, not infrequently have an acute knowledge of the economic geography of a countryside. One thing is clear—people from the country go to town, but not necessarily to one town only: and on the way to town there may be a village that has at least a grocer's shop and probably some kind of a general store where various daily necessities and possibly even household goods may be bought. The wives of farmers near a town will buy everything there: the wives of farmers several miles away will buy many things in a village . . . and in some cases it is not easy to decide what is a village and what is a small town.

Working from an intimate knowledge of rural economy, A. W. Ashby has analysed the buying habits of its people. Sweets and tobacco will be bought in a village or small town up to three miles away and food, including bread, meat and groceries, up to eight miles away. Household equipment will normally be bought in small towns up to ten miles from home, or in larger towns occasionally visited; working clothes will be bought in small towns, children's clothes and 'better' clothing for adults in larger towns when possible. But for what Ashby so shrewdly terms 'display clothing' women will go fifty to a hundred miles, generally to a large town where, as Dickinson has shown for Leeds and Bradford (especially the former), occasional purchases will contribute substantially to the upkeep of certain shops.[1] In the same way, expensive jewellery, good furniture or carpets, may be sought from the larger stocks in the big towns while cheaper lines may be bought in towns nearer home. In all shopping surveys, women are considered first, but men will go far for some need associated with their farms or their recreations.

In the life of the countryman, the first place significant to him

[1] Some years ago a general store in Leeds arranged special excursions by train from places over thirty miles distant.

will be the village; here is the inn, the parish church and non-conformist chapel, the Women's Institute, and possibly sports clubs, as well as one or more shops. Beyond lies the small market town, where common necessities are bought by all and everything bought by the poorest families who rarely, if ever, go beyond it to the large centres. These towns are generally the headquarters of the rural district councils as well as urban districts: in them petty sessions are held. Here too there are secondary grammar schools drawing pupils from the countryside, and in some cases facilities for technical, commercial and adult education. Solicitors, doctors and dentists and several banks provide professional and commercial needs: so too do the auctioneer and estate agent. The country town will in most cases be the headquarters of the Methodist circuit and may be the centre of the Anglican rural deanery, though these generally cover a much larger area than the Methodist circuits and in many cases they are named after some historic church in a village. In the town there may be a choral society, a debating club as well as a variety of sporting organizations and, in vigorous places, a surprising variety of clubs and societies which from time to time will organize concerts, dances, whist drives, shows of produce, according to their financial needs. It is right that the country town should have an attractive influence for the people of the rural areas not only for trade but also for leisure interests, though not to the exclusion of all activities in the villages.

Economic and social factors determine the existence of market towns: they exist because 'essential services must be performed for the surrounding land'. Christaller has graded the towns of south Germany into seven groups, according to population, distance from one another and service area in square miles: at the bottom of the scale, there are villages of 1,000, on the average 4·5 miles apart, serving an area of 18 square miles; next come places of 2,000 people, 7·5 miles apart, with a service area of 54 square miles; third, small towns of 4,000 inhabitants, 13 miles apart, serving an area of 160 square miles. The excellence of Christaller's theory should not conceal from us its rigidity: granted that in an essentially rural area the farmer may have within a short distance a village, a town of a few thousand people, and beyond this a still larger town which may be the county centre, each rural area

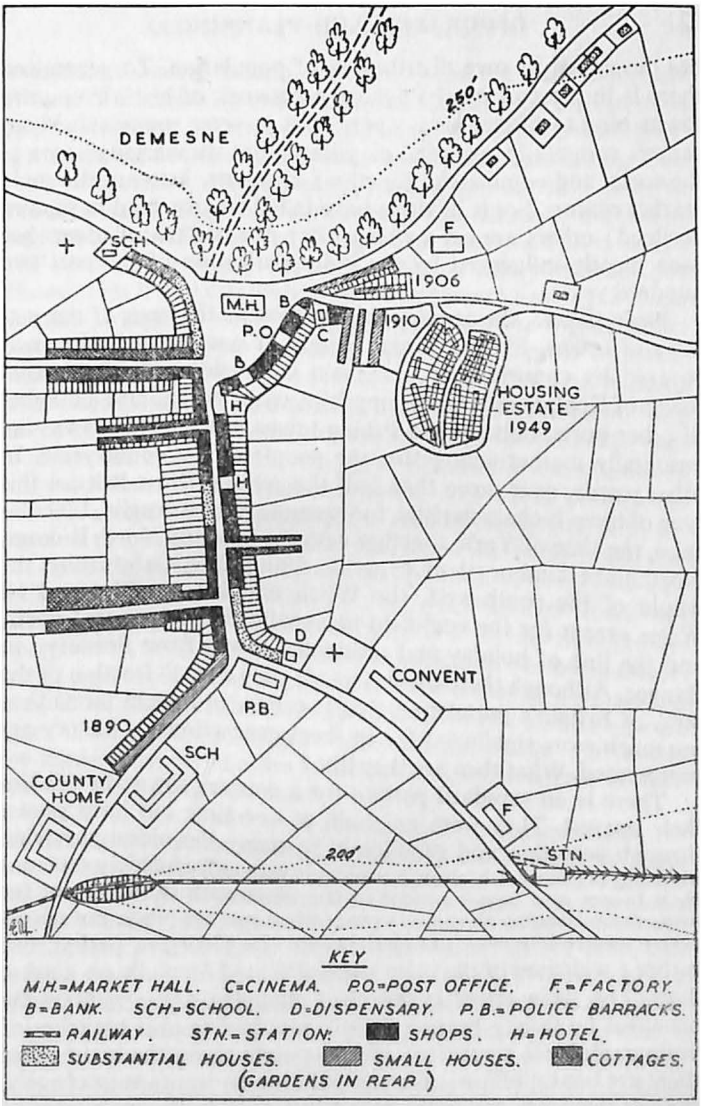

FIG. 2. *An Irish country town*

Ballydull has 2,000 inhabitants and was built in 1802 by the Earl of Slowtown. The main street has shops, two hotels, houses and two banks. There are two schools, Roman Catholic and Protestant, two small new factories (1937 and 1962) and the old workhouse (1840), humanely transformed within, now the County Home. The railway was closed in 1961.

has developed its own distribution of population. To generalize, there is in most of rural England a network of historic country towns nine to fifteen miles apart, and in some areas subsidiary centres commonly regarded as villages but discharging some of the social and commercial functions of towns, between the main market centres. Some of these have failed to grow and have even declined; others are on a rising tide; our pattern of towns has been greatly influenced by the industrialization of the past two hundred years.

Nevertheless, the country market town is the basis of our network of towns. Even in Great Britain, if one excludes the areas covered by conurbations, the main coal-fields, and the coastal towns of Kent, Sussex and Hampshire, with perhaps also a number of other ports, holiday and fishing towns, most of the towns are essentially market centres for the people of the countryside. In other words, over more than half the area of Great Britain, this type of town is characteristic, for example in East Anglia, Lincolnshire, the Vale of York, together with the East and North Ridings, Northumberland north of Tyneside, Hampshire, Oxfordshire, the whole of the south-west, the Welsh marcher counties and all Wales except for the coal-field areas with their associated ports, and the line of holiday and residential towns from Prestatyn to Bangor. Although these towns include only a small fraction of the 80% of Britain's population that is urban, in human terms they are much more significant for in them generations of history are represented. What then are they like?

There is no standard pattern for a country town: in this lies their interest. They were not built at one time but have grown through accretion and rebuilding. In many the oldest surviving building is the parish church, unless it was unfortunately replaced by a larger and better model in the nineteenth century; not far away from the church there is generally a market place, not necessarily square if it was planned before the Georgian period, but rather a widening of the main street still used for stalls on market days. The main street is the chief shopping area, traditionally occupied by family businesses but now having also branches of various multiple stores: at several points along the main street there are banks, offices, cinemas and even nonconformist chapels, though these are generally found just outside the main part of

the town. A central location is normal for the main hotel but the various licensed houses are dotted through the streets, each apparently having its particular following. It is easy to distinguish the nuclear area of the town which, apart from innovations such as new shopfronts, may remain little changed for fifty years or more and may even preserve over shops the names of the people who founded them a century or more ago; many a firm in such a town proclaims proudly on its notepaper, advertisements and billheads that it was established in the eighteenth century. Beyond the main streets the country town is complex: it will generally have a nineteenth-century town hall, one or more cinemas, schools, including a grammar school (probably in a new building on the edge of the town), a cottage hospital and various political clubs. But the greatest complexity is found in the housing: near the centre there may be fine Georgian houses close to crumbling cottages, some of them extremely poor. At various periods the town has spread along the roads, for even the houses close to the centre have spacious gardens at the rear. In many cases the coming of the railway stimulated the building of houses on one particular side of the town: in short, the market town has extended itself gradually, commonly without any marked growth in population. And the most recent additions are housing estates to replace some of the wretched slums behind the main streets and the modern homes of the town's middle-class population who no longer live over the shop, or—with exceptions—in the houses now made noisy by the heavy traffic which the streets of such towns were not designed to carry.

Typically, the country town is a trading, commercial, professional and to some extent a social centre. In many of them some industry has been added, of which milling was once so characteristic as to be almost indigenous. In Nantwich, Cheshire, for example, salt-working ceased in 1856, the glove-making concern, which gave the 'Nantwich gauntlet' to the trade, went in 1863, and the boot works in 1925, but various old factories were sold for clothing manufacture, which is now the chief industry of the town. At Sandbach, another Cheshire town, engines are made and a domestic salt industry flourishes not far away: Witney, in Oxfordshire, has its famed blanket industry. Many of these industries are not located where they exist for any particular

geographical reason but because someone of enterprise chose to establish a factory in or near the town: and in some cases war evacuation brought a factory to a country town. As shown on pp. 132–3, there are many industries that can be established almost anywhere and may give useful employment in small towns. At the same time, it is hard to believe that 'light industries' can possibly be established everywhere, still less that every country town can have, or should have, an occupational distribution similar to the national average.

In Britain modern industries were well established in many areas before the railways came and to quote J. H. Clapham, writing of conditions in 1886 compared with forty years previously: 'Most industries had expanded in and from their old headquarters. The cotton areas: the coal areas: the wool and worsted areas: the endlessly varied industrial areas of the Birmingham country and the London area were bigger and denser.' Even so the railways helped to revive many of the historic centres of Britain, for example Norwich, Cambridge, York, Carlisle, Oxford, Exeter, Gloucester, Chester, which began a period of growth due in part to their increased accessibility: all of these were already major market centres and all except Cambridge are now cathedral cities. As in Germany, the railway's coming helped to stimulate the growth of some existing towns—but not necessarily of industries: in Cambridge, for example, the modern industrialization came only from *c.* 1870, but in Oxford, apart from a few light industries, it came still later, conspicuously when Morris Garages began to assemble parts of cars in 1912. But from the building of the railways to the city in the middle of the nineteenth century expansion was noticeable: in 1851 Oxford had 27,000 inhabitants, but in 1901, 45,000—and in 1961, 106,000. The population of Cambridge grew from 28,000 in 1851 to 95,000 in 1961; it has managed to remain a market and University town almost unspoiled by industry. Comparison between these two great University towns shows how largely chance has entered into the story: in 1865 the Great Western Railway proposed to build a carriage and wagon works at Oxford in spite of offers of sites at Reading, Abingdon, Banbury and Warwick.

THE EXPANSION OF TOWNS

If a town has manufacturing industry, attractions for holiday-makers, residential schools and universities, then its trade will grow with its population. The modern 'hierarchical' systems of town classification belong to this present age, in which transport as well as commercial and administrative centralization favour the growth of large cities such as London or Paris as well as of smaller ones such as Cardiff or Bordeaux. And some such places owe almost all their present significance to modern transport and industrialization. Cardiff in 1841 had only 10,000 people but grew to its present quarter of a million as railways penetrated the mining valleys and coal was brought to its steadily expanding port. Now that the export of coal has declined, apparently with little immediate hope of revival, other industrial activities have been found and are being anxiously sought: but meanwhile Cardiff has become the capital of Wales. An even more interesting case is Bournemouth (154,000 in 1961), where growth was slow until the railway was built to the coast in 1870: by contrast Brighton (163,000 in 1961, with Hove 236,000) has a far longer history reflected partly in its Regency buildings. Cardiff, Bournemouth and Brighton have all become strong shopping centres.

Each town has its distinctive character but there are obvious dangers in the application of a single label, such as industrial, commercial, residential, holiday, to any place, as most have a variety of functions, even though one predominates over others. When the compilers of the 1851 Census considered the relation of town and country, they found three main categories deeply entrenched in English life: first London, at all times supreme in size, significance and activity; second, the country market towns placed at intervals of nine to fifteen miles from one another; and third, the larger towns of the provinces, many of which were county towns and cathedral cities, such as Gloucester, Worcester, Chester, Lincoln or Norwich. But the 'manufacturing' towns of the north and of the west Midlands were already a well-established element in English life, even though many of them had no ancient nuclear area recognizable as a town centre. Nor had they old charters, though some had the beginning of town administration in local

health boards or town improvement commissioners. Then, as indeed now, the mining or mill 'village' of some thousands of people presented a problem: though numerically it had the quality of a town, had it any other claim to be so regarded?

The Census of 1851 was undoubtedly cautious and conservative in its definition of towns: even so, it draws attention to the fact that more than half the British people lived in towns (10,556,288 compared with 10,403,189 'in the country'). Several countries have gone the same way since, but Britain was the first to experience this phenomenon of population distribution. Seen here in the early railway age, it was partly the fruit of accelerated transport, for many towns received a sharp impetus to growth once they were reached by a railway. On the other hand, much of the earlier growth was stimulated by the construction of river navigations, canals and turnpike roads: several rivers were 'improved' for navigation during the seventeenth century and in the early part of the eighteenth century so much more was done that by 1724, it was said, some 1,160 miles of English rivers were open to navigation and, apart from the mountainous areas, most of the country was within fifteen miles of a navigable waterway. Canal construction began with the Sankey navigation (1755) and the Duke of Bridgewater's cut from Worsley to Manchester (1759) and a large number were constructed during the following seventy years. Early in the eighteenth century, roads were so bad that travellers from Newcastle to London would go by sea if possible, but through the century, especially after 1750, more turnpike roads were built, particularly to serve the growing industrial areas.

Canals, river navigations and turnpiked roads were built primarily to carry coal and other merchandise: although planned to go where trade existed, they stimulated the growth of new trade. In the Pennine textile areas, many new mill villages grew beside the canals and navigations as well as by the turnpiked roads, and much of the industry left the remote workshops on the hills for the valleys where it still survives. Similarly the vastly intricate network of canals in the Birmingham and Black Country area carried raw materials for the factories built beside them. One could give numerous examples of factories placed beside rivers and canals, such as the lines of mills in Yorkshire or the ribbon of works between Manchester and Oldham now connected

by side streets to a parallel line of houses along the old turnpike road. To some extent railways reinforced the pattern of industrial growth, for many lines followed the same valleys as the canals, though fresh ways were opened also by the numerous and in some places actively competing railways. More and more, as industry developed, houses were built to supply a rising demand for accommodation. Apart from a few builders of 'model cottages' near their mills, such as the Wedgwoods of Etruria, the Greys of Styal, the Salts of Saltaire or the Ashworths of Hyde, the builders were speculators operating in a seller's market. The French writer, H. Taine, spoke eloquently in 1874 of the Manchester area:

> 'In the bronzed sky at sunset a strangely-shaped cloud hangs over the plain: under this motionless covering are hundreds of chimneys as tall as obelisks . . . then endless rows of buildings, and we enter the Babel of bricks. . . . What wretched streets! Through the half-open window may be seen a miserable room on the ground floor, sometimes below the level of the damp pavement.'

Taine had seen the infamous 'cellar dwellings' of Manchester, all long since cleared, but he was scarcely cheered by the then outer streets of the city, of which he wrote:

> 'The black street is paved with iron slag; the low red-tiled roofs stand forth in lines against the prevailing grey sky; yet each family dwells apart and the fog it breathes is not too impure. These are the select, the happy few.'

As industry grew, so the social problems of the major towns became increasingly severe, and cholera epidemics served to focus attention on the need for public health legislation. But it was not only in the newer industrial areas that such problems were found, for many small, historic towns were equally liable to such disasters, especially through the inadequate and at times contaminated water supplies, or defective sewerage. The present administrative definition of towns grew up from two main needs: first, the representation of the major towns in Parliament, met partially by the Reform Bill of 1832 with its definition of parliamentary

boroughs which were in some cases identical in boundaries with the municipal boroughs, and second, the need for safeguarding public health, treated in a series of laws from 1842 onwards. The latter made a number of local boards which in time became urban sanitary councils, and eventually dropped 'sanitary' from their titles but not from their responsibilities. Even so, it has never been easy to say, under English conditions, what is a town and what is not. The 1851 Census writers saw that London, the cathedral cities, the market towns were clear entities : similarly Manchester, Birmingham, Leeds or Sheffield were places recognizably towns. But the industrial settlements around mills, or the mining 'villages', were far less capable of definition, especially as in many of them houses had been added in a haphazard manner, depending on the sale of land to some builder who ran up a row or two of cottages. To this day such areas have had varying fortunes in the administrative division of the country. Some 'urban districts', conspicuously in the Yorkshire coal-field, are not towns at all, but merely a few square miles occupied mainly by a farming community studded with mining villages, of a few thousand inhabitants, at intervals of a mile or so from one another. Other mining villages, equally populous, are under the control of rural district councils, and at no time has there been an effective national survey of the limits of town and country under government auspices.

THE SUBURB

Where does a town end and the countryside begin? A sharp line can be drawn in some places, but the frontier is generally blurred. And this is no new problem. Defoe, writing more than two centuries ago, spoke of the English passion for living in country surroundings at Clapham, Hampstead, Highgate and other places not then engulfed by the metropolitan spread. Taine in 1874 said that the 'city man does his utmost to cast his city skin ; he strives to have his country seat and country surroundings at the outskirts . . . having round him a piece of park or a garden as a relaxation from the artificial life of town and of business'. Study of the mid-nineteenth-century Census volumes shows that all the villages within a radius of ten miles from central Manches-

ter on the south were already attracting city residents, especially after the railways made daily travel easy. Taine, on visiting Bowdon ten miles from the city centre, and still on the fringe of the conurbation, spoke of its vast park 'opened to the public by the Earl of Stamford with magnificent trees, fine turf and herds of tame deer lying amid the ferns'. (It is still so.) But he adds 'a walk through the quarter of the rich is depressing. Ten, fifteen, twenty houses in succession have been built in the same style . . . the trim lawns, the small gates, the painted fronts, the uniformity of the compartments, make one think of painted menageries, of neat play-things.' And the wealthier houses sprouted 'capitals, Grecian pillars, railings, Gothic roofs . . . copied from divers ages and places'. A severe view, perhaps, but recognizable of many outer suburbs of major cities: what has happened is that the wish to escape from the city has spread steadily through society, and the need for garden space has been recognized since 1919 by the building of modern housing estates. Suburbs attracted the rich, later the merchant and professional classes, and finally the artisans.

Most English cities have spread outward in suburbs rather than upward in flats, though London has an increasing number of flatted dwellings. For several decades the inner parts of towns have lost population and the outer parts gained. But there is not a growth in concentric circles, as many of the 'growth maps' prepared for English towns have shown. Indeed these commonly show that long before 1918 there were two main tendencies, ribbon growth and the expansion of outlying villages. A small town commonly has a string of houses for its wealthier residents along the main roads leading from it: some of the worst cases of ribbon development are found on the margins of country towns, but the phenomenon is not less prevalent in the larger cities. The suburbanization of outlying villages and towns pre-dates the railways; in Manchester, for example, the first local omnibus, from Market Street to Pendleton, ran in 1824 and by the middle of the century there were sixty-four services, running to such districts as Ardwick, Rusholme, Broughton, Cheetham Hill, Eccles, Harpurhey and Newton Heath. The gradual growth of suburbs has left its mark in a wide variety of housing types, doubtless familiar to readers who, like the author, have passed much of their lives in the suburbs of large towns. In many cases, suburbs

have aged gracefully; the trees planted seventy or more years ago are now in full maturity and the gardens enriched by the care of generations. Taine's description of Bowdon belonged to a time when many of the more regrettable architectural effulgences were only too obvious: now they are partly hidden by trees. But Taine failed to notice that Bowdon has two other features regarded as favourable for settlement—a slight elevation above its surrounding areas (200 ft. over 100 ft.!) and a sandy subsoil. It is by no means uncommon for favoured suburbs to occupy higher ground, especially drier ground, and Lady Chorley's entertaining book *Manchester Made Them* shows how the wealthy gradually occupied 'the hill' at Alderley Edge, leaving the lesser breeds on the flatter ground 'below'. And one could give examples from London, Leeds, Bristol (Clifton), Bradford, Newcastle upon Tyne, and other cities: places like Hull, having no elevated ground, appear to lack some of the natural site attractions of towns with more varied topographical features.

Some of the older towns have houses, still occupied, dating back to the Tudor period, and fortunately some gracious eighteenth-century houses are still retained as dwellings. In towns, the tradition of building terraces survived into the nineteenth century, especially in the single-fronted tall town houses that have so frequently, but fortunately not universally, been allowed to decay, or saved only from such a fate by their transformation into offices and institutions. A walk through Bloomsbury conjures up a picture of a stately but comfortable 'life of the Squares', once inhabited by capable citizens whose presence is recorded here and there: the houses are now used for offices, clubs, boarding-houses, hotels, nursing homes, departments of London University or flats, rather than as homes of single families. And over the whole area, dwarfing even the British Museum, towers the inter-war administrative block of London University. Although terraces and squares are regarded as dignified elements in a town, much admired for example by such a discriminating writer as Rasmussen, they have obvious disadvantages for the residents. The kitchen premises are on the ground floor, or in a basement, with the main reception rooms on the hall floor, commonly approached by a flight of steps, and the bedrooms on two higher floors: in some cases the drawing-room is on the first floor also. In the days

when Mrs. Beeton wrote on household management (1861), a household with an income of about £300 a year had two servants, and those with £1,000 annually at least four servants: it was for such households that town terrace houses were built. In a true terrace, the back garden is accessible from the front only by going through the basement, though some terraces have a lane at the back with a mews; many of these, in the West End of London, are now expensive *pied à terre*. A piece of social history dealing partly with a London mews is given in *Britannia Mews*, an entertaining novel by Margery Sharp. In favoured localities, rooms built for the coachman of Victorian times may now house the descendants of his employers. And artisan cottages, once sold for a few hundred pounds, become 'bijou residences', sold for as many thousands. But the converse is true: indeed many former town houses have become infested tenements.

Semi-detached houses developed from terraces in the nineteenth century, especially from the eighteen-forties. Many of the older semi-detached houses in London and provincial cities are surprisingly large, some with as many as fifteen to twenty rooms, on three floors with a basement or a series of cellars. A large number are double-fronted, with three main living-rooms, a good kitchen, on the ground floors, and four spacious bedrooms above. The single-fronted house has only two main living-rooms, but a variant in and around Manchester is a house double-fronted facing the street and one room wide at the back, joined to a house single-fronted to the street and two rooms wide in the rear.

Detached houses have two main ancestors, the big house and the lodge or cottage. The nineteenth-century industrialist, having prospered, established his family in a spacious home surrounded by an acre or more of grounds: in doing so, he copied the manner of living of the gentry and showed initial signs of the desire to replenish the peerage which became marked later on. Some of these houses are still occupied by families not unlike those who built them a few generations ago, but many are turned into flats, or transformed into offices, hotels or institutions of immense variety. When the National Coal Board was established, some newspapers began a campaign about the seizure of 'palatial mansions' for offices, but offices had to be found. Schools, universities, training colleges, monasteries, convents, hospitals, convalescent homes,

old people's homes, remand homes, borstals, open prisons, and many other institutions have acquired these discarded mansions, using them as the nucleus of steadily expanding blocks of buildings. In many cases such developments have been far more fortunate than the driving of suburban roads through the grounds or the conversion of an estate into an industrial area: one instance of the latter is Trafford Park (p. 148), or the vast chemical works at Winnington, near Northwich, where the old house still survives amid the modern works. In summary, one could say that the need for institutions has at least preserved many fine old houses which otherwise might have decayed (as indeed many have), but it is unfortunate that so few have been used for small art galleries, museums or convalescent homes, and the grounds as public parks. The very considerable attractions of those so used in cities make the point all the firmer: in Manchester, for example, there are several branches of the central art gallery in former country houses, including Wythenshawe house and park given to the city by Lord and Lady Simon when the building of Wythenshawe began. But so many chances have been missed, and mere statistical calculations of the amount of open space needed to each thousand persons ignores the point that accessibility is crucial, especially to the housewife with a young family, or to the old.

All these types of suburban houses belong mainly to the nineteenth century: all were planned in days when domestic labour was available in abundance, and regarded as a necessity rather than a luxury. There is a regrettable tendency among some planners to regard all such areas as 'obsolescent', a word which perhaps commands attention by its very ugliness. The study of town land use, including the suburbs, done by the practical method of walking through them, has suggested to the author (and possibly to others) that much of their attraction lies in the inheritance of houses from various periods surrounded by matured gardens with fine trees. It would be unfortunate if all the Bloomsbury squares were replaced by buildings, however handsome, of the types recently added or if all the houses were removed merely because so many of them are no longer residential. But the use of old houses as industrial premises and the gardens as storage dumps and garages is a temporary expedient

indicative of the decline and fall phase of a one-time suburbia. In large towns the number of small 'factories', many employing only a dozen people or even less, is very large. A planner investigating part of Hull, where a few such concerns were known, found almost a hundred! And the author, with H. B. Rodgers, found a great variety in the square mile around the University of Manchester, including not only the expected clothing workshops and small specialist engineering factories, but also such unlikely trades as the making of cylindrical drums for wallpaper patterns and the manufacture of scenery for theatres.

No period of housing has left a greater mark on our towns than 1919–39 when everything combined to foster what is commonly called 'urban sprawl'. The indiscriminate use of this term is to be deprecated if it implies a supercilious approach to an inevitable development: the modern standards of housing can be provided only by a considerable extension of the area occupied by townspeople. The great change in housing dates from the Tudor Walters report of 1918, which laid down a standard of not more that twelve houses to the acre, on which the housing estates of the inter-war period were built. Flats house rather more people to the acre, though in Manchester the standard is ninety habitable rooms to the acre, which would mean eighteen or twenty families. In London, Glasgow and other cities, however, higher densities are allowed. Including space for roads, gardens, public open spaces, schools, churches, commercial premises and various public facilities, the density per square mile in new housing areas works out at not more than 10,000, which is less than half, even less than one-quarter, that found in the congested quarters of cities—the very areas scheduled for slum demolition. Even if these areas are rebuilt in flats, there remain many people who must be moved to outlying housing estates. Six wards in central Manchester had, until the post-1945 phase of slum clearance, 41,000 dwellings at a density of 40–48 to the acre: in such areas the population is certain to be reduced to half within a generation or two. Indeed, the 1951 Census showed that many industrial boroughs of London and the artisan quarters of other cities had declined in population by as much as 50% since 1931. And there was a further loss, of 10–20%, from 1951–61, in the inner boroughs. A factor forgotten, or at least inadequately realized, is

that the number of households is increasing at a far higher rate than the population, so that even a town stationary in numbers may acquire a large number of new houses over and above those essential for the resettlement of people in poor dwellings.

All political parties are committed to a rehousing programme on a substantial scale. In 1955, the annual report of the Ministry stated that 850,000 houses, 6·5% of the whole, were unfit for human habitation and that 378,000 were to be cleared within the following five years. Of these, one-quarter were in the Manchester and Merseyside conurbations, with many more in the north of England, notably Tyneside. In fact, from 1956–61, 317,500 dwellings were removed under slum clearance schemes, and 901,000 people rehoused. Within these years, most of the new houses have been provided by private builders: for example in 1961, 170,000 out of the 269,000 new flats and houses were privately built. During the inter-war period suburban homes were provided for the artisan population in such numbers that the farmlands within city boundaries were engulfed, and the rural aspect of suburbs obliterated. For a suburb to be changed in character by 'loss of amenity' was no new thing: many houses built in Georgian or early Victorian days on the fringes of cities were in time surrounded by the stark rows of houses built for the industrial population. The suburban home had come down the social scale: in the eighteenth century it was the resort of the gentry and the wealthier members of society, in the nineteenth of a wider circle including many commercial and professional people of quite moderate means, unable to keep their own carriages but using the (relatively expensive) horse buses before the trains opened the suburbs to a growing middle class. In the twentieth century certain suburbs, but definitely not all, were opened to a far wider circle, including the very poor, by trains, trams, electric transport in London, and finally—far more effectively—by motor buses. The greater the income, the greater the choice of locality available, even in the nineteen-fifties. Over a century ago Mrs. Beeton advised as follows:

> 'The neighbourhood of all factories of any kind, producing unwholesome effluvia or smells, should be strictly avoided. Neither is it well to take a house in the immediate vicinity of

where a noisy trade is carried on, as it is unpleasant to the feelings, and tends to increase any existing irritation of the system . . . a gravel soil is superior to any other, as the rain drains through it very quickly, and it is consequently drier and less damp than clay, upon which water rests a far longer time. A clay country, too, is not so pleasant for walking exercise as one in which gravel predominates. . . . The aspect . . . should be well considered . . . a house with a south or south-west aspect is lighter, warmer, drier, and consequently more healthy, than one facing the north or north-east.'

As there was undoubted site selection in the growth of nineteenth-century suburbs (see p. 30), large areas were left free for post-1918 development. To the planned housing estates was added a vast amount of private and speculative building, especially from the late twenties, when the first wave of local authority building was spent. The range of private building was wide: at one end of the scale houses were constructed which differed little from those of the housing estates, except that as cars became cheap a garage was commonly provided, but at the other end of the scale large houses were built which were occupied by the same type of wealthy merchants and others who, a century earlier, occupied mansions or semi-mansions in grounds. Commonly these houses had gardens of an acre or more: in one case known to the author, no doubt typical, a large decrepit mansion was pulled down and its grounds of six acres divided into two plots, on each of which a lavish modern house was built, designed to be labour-saving, and run with a small domestic staff, and one or two gardeners.

Inter-war housing has left an indelible mark on our cities. Rarely, except in a few housing schemes, were terraces built; rather, the 'semi' ruled supreme, with its two main living-rooms, good kitchen and three bedrooms. When built as a detached house, this type acquired a forlorn and undignified air, unless the architect had designed the house one room deep, in which case its length gave an impression of exterior dignity. The larger detached houses are architecturally far more pleasing, and often attractive to the eye, especially as they were generally planned in relation to the garden around them. But what the modern house normally lacks is space, partly because the average size of family

has diminished to one or two children and no provision is made for a resident domestic staff. English towns show an interesting contrast with Dublin, where large numbers of modern suburban houses are built with four or five bedrooms to accommodate the larger familes of a predominantly Catholic city. One cannot resist the comment that in consequence Dublin's suburban roads are more attractive in appearance than in England. This statement, however, does not involve approval of all the recent housing in this enchanting city.

Road patterns in suburbs appear in some instances to have been more successful on the drawing-board than on the ground. There are two extremes, neither bad in itself—the gridiron and the geometrically curving types. The former spread through many of the older suburbs, as for example south Manchester where the ground was virtually flat and presented no obstacle to this type of layout. Nor did a topographical barrier necessarily prevent the gridiron planner from going ahead, for example in Glasgow, where a magnificent but difficult site for a large town, a series of drumlins, has been used in places for a gridiron pattern of very steep tenement streets. Unfortunately the maze-like patterns of modern estates, with their cul-de-sacs and other much-praised features, have not necessarily proved as satisfactory as was originally hoped. Georgian planners saw the merits of the long straight street, the blocks of houses, the squares and the like, but with these they mingled streets on a curve, circular or elliptical 'places' and crescents, and above all they related their building to the detailed topographical features. In any new development of a suburban area the need is for a road pattern of variety appropriate to the physical features.

Alarm is caused by the potential needs of land for housing. The figures quoted on p. 94 refer only to immediate need activated by current slum clearance. A deeper problem is the removal of all sub-standard houses, including for example all back-to-back houses, and the steady replacement of the houses, dating chiefly from the second fifty years of the nineteenth century, that are in the later stages of their period of usefulness. And, as shown on pp. 105–15, land will be needed, and is already being used on a generous scale, for purposes other than housing, such as new roads, aerodromes, sports grounds, factories, schools and uni-

versities. In a careful analysis of the past loss of agricultural land, R. H. Best has shown that the net loss of farmland to all other uses in England and Wales from 1900–50 was about 7%: the urban area had increased by 80%. Some 60,000 acres a year of farmland was taken for housing in the 1930's, of which a great deal was thankfully sold by the owners during times of agricultural depression. Since the 1939–45 war the net loss of farmland to urban uses, which covers buildings, general constructional development and sports grounds, has averaged 38,200 acres, approximately 60 square miles, a year, virtually the same annual loss as that for 1927–59 but far less than that of the 1930's. Some land has been provided by service departments, chiefly in the immediate post-war years, but this is now of minor account. Hopes of settling immigrants to new homes on land of negligible or minor productivity have proved vain, not least because the farmland in the vicinity of towns and cities has in many places acquired great fertility by its profitable position near a market. Inevitably there are pressures favouring town expansion, notably the increase in population and number of households, the availability of public and—especially—private transport, and the increasing affluence of large numbers who use it to find more spacious living conditions. The loss of farmland from 1950–2000 (some of it for forestry) may well be greater than in the first fifty years of the twentieth century (see also pp. 66–9).

Alarm and despondency need not be caused by these estimates. It might be possible to rehouse millions in sky-scrapers, or at least in twelve-storey dwellings such as those in Birmingham, at Duddeston and Nechells where a site of 8 acres has 372 two-bedroom and 24 one-bedroom flats, 48 to the acre with 153 persons. These proved very costly, at £2,510 a dwelling (1950 prices, now approximately £4,000), but the whole site had a density of 128 persons per acre, compared with 115 in the houses previously existing. The Birmingham city architect points out that overspill from the Redevelopment areas is created not by the space requirements of the residential units themselves, but by the need for open spaces, new roads and other essentials. If light, air, gardens, playing space, schools with spacious grounds, are to be the birthright of every citizen of Britain and not merely of the wealthy who have enjoyed such privileges for generations, then the cost in land

must be faced. Agricultural land provides both the playing-fields of Eton and those of Slough; derelict land, reclaimed and covered with grass, may provide the playing-fields of Darlaston or Ebbw Vale. The suburb is now the potential home of all classes, except for those—also of all classes—who from necessity or choice must live in the inner parts of cities. Once the slums are cleared, and towns cleaned up by smoke abatement, there is every reason to believe that city flats will be attractive to many people for their comfort and convenience.

CONURBATIONS

At no stage in history has there been a civilization so thoroughly of the town as Britain of the mid-twentieth century. In 1961, out of 46,072,000 people in England and Wales, only 9,202,000, in effect one-fifth, lived outside areas defined as towns; even so, the area under town administration is only 14% of the whole. Scottish figures are not exactly comparable, though some 73% of the population live in settlements of over 1,000 people. Two-fifths live in the seven major conurbations officially defined at the 1951 Census; almost one-quarter live in towns of more than 50,000 people and one-fifth in smaller towns in England and Wales. In Scotland 46% of the population live in towns with 50,000 people or more and 27% in smaller towns. But another 8–10% live in urbanized rural (landward) areas.

The conception of the conurbation was due originally to Sir Patrick Geddes, and was inspired by a contemplation of Lancashire. 'Here,' said Geddes, 'far more than Lancashire realizes, is growing up another Greater London as it were—a city-region of which Liverpool is the sea-port and Manchester the market, now with its canal port also; while Oldham and the many other factory towns, more accurately called "factory districts", are the workshops.' In short, Geddes saw the whole of South Lancashire as a human region largely urban in character: he adds, speaking of its towns: 'Constellations we cannot call them; conglomerations is, alas, nearer the mark, but it may sound inappropriate, what of "Conurbations"?' The seven conurbations distinguished in *Cities in Evolution* were not identical with those of the 1951 Census, but

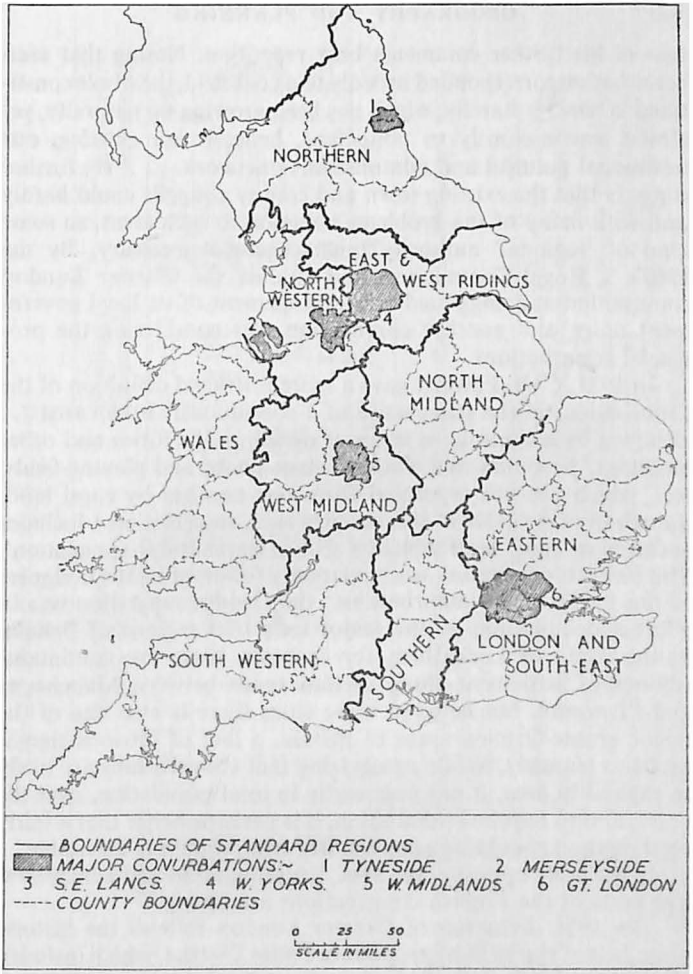

FIG. 3. *Standard regions and conurbations*

In 1946 a new scheme appeared and in 1951 the conurbations shown above were officially recognized. Except for the use of Riding boundaries in Yorkshire, and for the inclusion of part of Derbyshire in the North-western S.R., county boundaries were used. The 'North Midland' S.R. is oddly named, and the Southern S.R. is curiously shaped. The 1961 Census gives returns for the conurbations as defined in 1951: they are in need of re-definition.

two of his further comments bear repetition. Noting that each conurbation corresponded broadly to a coal-field, the whole constituted 'a new Heptarchy, which has been growing up naturally, yet almost unconsciously to politicians, beneath our existing, our traditional political and administrative network. . . .' He further suggests that the existing town and county councils could hardly deal with many of the problems common to such areas, so some kind of 'regional' authority might become necessary. By the 1960's a Royal Commission had studied the Greater London conurbation and suggested a re-arrangement of its local government units, and another commission was considering the provincial conurbations.

In 1931, C. B. Fawcett gave a more restricted definition of the conurbation 'in the strict sense of a continuously urban area. . . . occupied by a continuous series of dwellings, factories and other buildings, harbours and docks, urban parks and playing-fields, etc., which are not separated from one another by rural land, though in many cases in this country such an urban area includes enclaves of rural land which is still in agricultural occupation'. The Fawcett conception was apparently followed by the designers of the 1951 Census conurbations; the Geddes suggestion was in effect a delimitation of the major industrial regions of Britain. In the south of Lancashire, for example, there are continuous ribbons of settlement along various roads between Manchester and Liverpool, but between these cities there is also one of the major arable-farming areas of Britain, a fact of obvious significance to planners. While recognizing that conurbations are likely to expand in area, if not necessarily in total population, over the years, and to require re-definition, it is perhaps better that a fairly rigid method should be adopted. But compromise is inevitable.

In the table opposite, the area, the population and administrative units of the English conurbations are shown.

The 1951 definition of Greater London follows the historic precedent of the 1829 Metropolitan Police District, which included all parishes within a radius of twelve miles from Charing Cross, together with others that were partly or entirely within a fifteen-mile radius. In 1946, the Police Act modified the Greater London area to include the areas added at various times to existing boroughs and urban districts. The County of London was defined

Table II. ENGLISH CONURBATIONS

	Area (sq. miles)	Administrative units 1961				Population (thousands)			Increase or decrease %	
		C.B.	M.B.	U.D.	Total	1931	1951	1961	1931–51	1951–61
Greater London ..	721	3	39	23	66*	8,215	8,348	8,171	+1·6	−2·1
Manchester ..	329	7	15	29	52‡	2,427	2,423	2,427	−0·2	+0·2
West Midlands ..	268	6	9	9	24	1,933	2,237	2,344	+15·7	+4·8
West Yorkshire ..	480	6	7	20	33	1,655	1,693	1,703	+2·2	+0·6
Merseyside ..	148	4	3	5	12	1,346	1,386	1,386	+2·6	—
Tyneside	90	4	3	6	13	827	836	852	+1·0	+2·0
Total ..	2,086	30	76	92	200	16,403	17,009	16,884	+3·1	−0·2

* This figure includes one rural district, Elstree, but does not include the City of London nor the 28 Metropolitan boroughs of London county.

‡ Disley rural district is within this conurbation.

The decline in the Greater London conurbation is due to the continuing outward movement of the population: from one census to another the decrease of population in inner, and ultimately in outer, suburbs, has been noted. A factor of current significance is the decline in the average size of household. Within the Greater London conurbation there were 2,659,000 in 1951 and 2,720,000 in 1961 (+2%), and within the same area and period the number of private dwellings increased from 2,138,000 to 2,477,000 (+16%). The population in the northern conurbations changes very little, though the figures for Merseyside do not include Kirkby U.D., which had 3,100 people in 1951 and 52,200 in 1961. Obviously the Merseyside conurbation needs to be re-defined; so do others.

A

FIG. 4. *The Manchester conurbation, 1888 and 1966*

As the towns of the conurbation expanded, they absorbed the rural districts, that is the non-urban parts of the Poor Law Unions. Compared with the 1888 map that for 1955, unaltered to 1966, seems simple, yet there are fifty-two separate administrative districts, more than in any other provincial conurbation.

in 1888 as 'the area covered by the Metropolis Management Act of 1855, which was served by the Metropolitan Board of Works and the Commissioners of Sewers': historically, this inner area had developed by the accretion of parishes for which records of deaths were collected from the late sixteenth century. From 1931–

B

51, the County of London lost 1,049,000 inhabitants (24%), with declines in central boroughs reaching 54% in Shoreditch, 56% in Stepney, 53% in Poplar, 49% in Finsbury, 46% in Bethnal Green, and even 36% in Holborn, 30% in St. Pancras, 22% in St. Marylebone and 24% in Westminster. Inner boroughs south of the river also lost heavily; for example, Southwark 43% and Bermondsey 46%. The decline in the centre, first noted over a century ago, has been seen farther and farther away and the Outer London area had 5,000,000 inhabitants in 1951 (+31%, 1931–51):

its population did not pass the million mark until the eighteen-eighties, but doubled by 1901. Heavy increases due to the outward movement of population and industry, and the notable settlement of new industry in districts around London (see p. 117) are reflected in the expansion of places such as Woking and Chertsey in Surrey, Romford and Hornchurch in Essex, Chesunt and Chorleywood in Hertfordshire. Between 1951 and 1961, London county declined by 4·6% to 3,200,500, and declines of over 10% were recorded in Bermondsey (−15%), Bethnal Green (−21%), Holborn (−12%), Southwark (−12%) and Westminster (−13%): only Hampstead, Kensington, Stoke Newington and Wandsworth increased. And from 1951–61 Outer London's population declined to 4,977,000 (−0·5%).

Provincial conurbations have a large number of separate administrative units: in the South-east Lancashire or Manchester conurbation there are still more than fifty, in spite of continued amalgamations. Though now closely built-up, this area has a number of distinct industrial towns that have managed to remain unabsorbed by their larger neighbours: for the past hundred years there has been a steady encroachment southwards into Cheshire, primarily residential but also to some extent industrial. The West Midlands conurbation is readily divisible into three parts, first Birmingham, a city that has steadily enlarged its bounds by absorbing neighbours; second, two large suburban areas, Solihull and Sutton Coldfield, which together house 168,000 inhabitants (1961); and third the Black Country which has twenty-one separate boroughs and urban districts occupied by a million people. West Yorkshire has major towns in Leeds, Bradford, Huddersfield and Halifax, but in this conurbation there are numerous small towns and stone-built industrial villages. The towns interlock with one another in places, and there are classic examples of ribbon development along the roads, yet the rural environment is seen to a greater extent than in any other conurbation. Merseyside is different again: sharply divided into two by the Mersey it has, like the Manchester conurbation, found many of its favourite suburban sites in Cheshire. Tyneside, the smallest of the conurbations, is a reasonably compact entity on the ground, but its thirteen administrative units zealously guarded their local rights in 1937 when a Government Commis-

sion recommended the creation of a new borough of Tyneside. The 1958 Royal Commission recommended the creation of four major units with a consultative council for the whole area, but in 1966 the government appeared to favour one authority for the whole of Tyneside.

CHANGING LAND USE IN A TOWN

No town is unchanging in its life and buildings. A small country town firmly embedded in its countryside, seeming almost to have grown out of it, may alter little from one generation to another, but even there new houses will be built, some of them to replace old cottages in alleys and back streets near the town centre; new shops will be added with modern shop fronts that other traders will copy; and the number of local government offices will steadily increase through the years. Some country towns have hardly changed in population for several decades and, as shown on p. 82, these small trading towns placed at distances of nine to twelve miles apart have for centuries been an essential feature of English life. Some of them are little more than villages, but others have attracted industries at various times, especially recently. Historical study has shown that a country town may have had a variety of industries at different times: others have been almost without industry, except normally for milling.

Industrial activity is the most obvious stimulus to town growth. Without its factories, Reading might have remained a comparatively small town, perhaps the size of Newbury, and Oxford would not possess its large industrial suburbs. There is no geographical reason why biscuits or light engineering goods should be manufactured in Reading rather than Hertford, nor is there any geographical reason why the Morris motor works should be placed in Oxford rather than in various other towns. In fact the University authorities successfully resisted the attempt of the Great Western Railway Company to build carriages and wagons at Oxford in 1865, so Swindon acquired them. In Swindon, industry dominates the town and is frankly accepted, even welcomed; in Oxford it is obvious rather in the heavy traffic and overcrowded pavements of the city's streets than in factories close to Carfax. Historic towns which have become industrialized at

east may retain some semblance of their former appearance, but the textile towns of Lancashire and Yorkshire, or the mining villages of South Wales, clearly proclaim the source of their living in their mixture of mills or collieries with nineteenth-century housing.

Houses cover the greater part of every town and the expansion of residential areas has for nearly forty years been a major problem of land use. It is not sufficiently realized that the number of households is increasing: in the Manchester conurbation, with a virtually stationary population (p. 101) from 1931, the number of dwellings increased from 600,600 in 1931 to 738,400 (+22%) in 1951 and to 819,300 in 1961 (+11%). As the sharing of houses diminishes, and as families become smaller, even a community of stationary or declining population requires more houses and flats for its people: consequently some towns now cover almost double their previous built-up area but show little increase, or even none at all, of population. And as two-fifths of the houses of Tyneside, and one-third of those in West Yorkshire, are of three rooms or less, it is clear that great changes are still to be expected and hoped for. According to the 1954 Slum Clearance returns, 43% of the houses[1] in Liverpool, 33% of those in Manchester and 16% in Birmingham were unfit for habitation: not all of these have since been cleared.

The removal of houses from congested city areas, and their replacement by blocks of flats, is now an accepted policy everywhere, already visible to anyone who wanders round the inner areas of our major towns. Unfortunately this process in action leaves such large areas in a temporarily waste condition that many casual observers think that all the displaced can be locally housed: as slum clearance areas commonly have as many as 150 persons to the acre, the flats that replace them must generally have lower densities (but see p. 97). The removal of slum houses is by no means a recent development only, for London, Birmingham, Manchester and other cities have possessed powers to remove houses for several decades. Under the Manchester Police Act of

[1] These figures are taken from Slum Clearance (England and Wales), Ministry of Housing and Local Government, H.M.S.O., 1955, Cmd. 9593. Although this report is interesting, each estimate of 'unfit houses' is locally made, on no defined standard. In some cities the problem is understated. But not by a politician who recently delighted an audience in Manchester University by saying, 'In Glasgow 400,000 people live in ONE ROOM!'

1844 the building of back-to-back houses was prohibited, though such dwellings were not made illegal by national legislation until 1925. In Manchester back-to-back houses were transformed into 'through' houses, mainly from 1885–1914. But although there were some fine pioneer efforts, slum clearance was only in its early stages. The initial onslaught on poor housing came not from social service, but through the expansion of town centres, the demand for land to build railways or to widen roads, or the need for factory sites. It was the economic rather than the social motive that caused many spectacular early clearances of slum property.

City centres normally have what has been called a 'dead heart', that is, an area with comparatively few residents, except those in hotels, hospitals, police stations or other institutions. In London the City, an area of approximately one square mile, had in 1961 less than 4,767 inhabitants, of whom nearly two-fifths are in institutions and the rest mainly in flats: before 1850, the same area had some 130,000 inhabitants. In the centres of Manchester, Leeds, Birmingham, and other cities, a similar decline has been reported: in London it was noted before 1821, and in other cities between 1841 and 1851. The declines were noted in the Census volumes as due to the demolition of houses to build factories, warehouses, public buildings, or for new roads and railways. A guide-book writer in Manchester wrote in 1842 that Mosley Street had ceased to be residential but was given entirely to business premises. The changes were seen first along the streets of the cities and more gradually in the quarters behind them as warehouses, shops and offices expanded. Part of this movement has been described as first 'living over the shop and then over one's means in Alderley Edge', or similarly fashionable suburbs.

Even in city centres, it is sometimes possible to find a few houses that have survived with little change from the early nineteenth century: some of them are still used as houses, notably in parts of London. Even so, much of residential Mayfair was transformed during the inter-war period; its houses were replaced by vast blocks of flats, luxury hotels, showrooms, offices and shops. For a century and a half the land use of London has been changing sharply; and a not dissimilar metamorphosis is seen in the provinces. The larger houses have in some towns been turned into offices or even—as in St. John Street, Manchester—into non-

residential surgeries and dentists' consulting rooms. Less fortunate is the fate of large houses turned into factories or tenements. In Birmingham the small jewellery and gun workshops occupy old town houses, now being replaced by flatted factories, and in Manchester large houses are used in the textile trades. And a similar change of use will be noted in other cities: in Liverpool, for example, the town houses have become tenements or, more suitably, parts of the University. But in Edinburgh, on the other hand, there are still many thousands of people living from choice close to the heart of the city. Much depends on local circumstances and some English cities have groups of large houses, built successively on the former suburban edge, of which some are factories or warehouses and a few are put to good institutional use, but the worst are hideous tenements with abandoned gardens.

City growth sets in motion a whole chain of circumstances which involves constant change. Railway builders met opposition in many of the smaller towns: in Cambridge, for example, the station is two miles from the town centre and in Oxford the station is well beyond the edge of the city at the time when it was built. But growing industrial towns of the nineteenth century welcomed the railway for its commercial value, and as the stations and their associated storehouses and yards were expanded, so hundreds of houses were pulled down on land too precious to be used for residential purposes. London, Birmingham, Liverpool, Manchester, Leeds, all had houses demolished for this reason. In some of these cities, inspection of the houses surviving just outside the areas of demolition will reveal that the railways were an instrument of slum clearance. And some of the roads were carried through former slums. In London, for example, Shaftesbury Avenue and Charing Cross Road cut through the notorious Seven Dials district in 1867, and in Leeds, New York Road cut through a Jewish ghetto of great poverty.

Railways have been a vital influence on the growth of many and perhaps most of the larger British cities: built mostly between 1825 and 1850, they were a magnet for industry at a time of great commercial expansion. For many factories, a site beside a railway was a decided advantage, and many riverside areas traversed by the railways were filled up with works intermingled with houses. Much of the earlier suburban growth of the larger cities, con-

spicuously of London, was made possible by the building first of steam railways and later of electric railways. And seaside towns, such as Brighton and Scarborough, grew rapidly once they were provided with railways, and some, like Blackpool and Bournemouth, owed their growth almost entirely to their stimulus. A characteristic of many towns is an artisan suburb around the main railway station, as at Oxford and Cambridge; in some towns the streets close to the station became shopping centres owing to the obvious trading advantages. There is no inevitable relationship between railways and the growth of the towns they serve, but one thing is certain—the effect of railway building on our towns was profound.

Motor transport has also been an effective agent of change in the land use of towns. Provision for the more rapid and efficient movement of vehicles is now counted a major objective of planning, and almost every Sketch Development plan includes one or more ring roads designed to prevent congestion in the heart of a town. This idea is by no means new: in Dublin, for example, the north and south circular roads were planned in the eighteenth century, and still survive as useful rings round the main part of the city. In London, the 'New Road', represented by Marylebone, Euston and Pentonville roads, was built in 1756–7, and as W. A. Robson has pointed out, the nineteenth-century road-building of London was far more effective than that of the twentieth century, which has the Aldwych–Kingsway scheme as its main early work (1900–5). Some continental cities, notably Paris, were fortunate enough to possess a series of walls which, having served their purpose, could be pulled down and replaced by ring roads. Much of the best road-building in our cities dates from the nineteenth century, but there are also many excellent examples of inter-war road-building, such as the ring road of Leeds or the Queens Drive of Liverpool, both of which date from the nineteen-twenties. And the great Wythenshawe estate of Manchester, begun in 1929, was planned on the assumption that almost all the movement of people would be by road, as it had no expectation of useful railway services: its main roads are designed for swift traffic and include some of the finest parkways of the country, unfortunately still incomplete.

It is often complained that an arterial road, once built, attracts

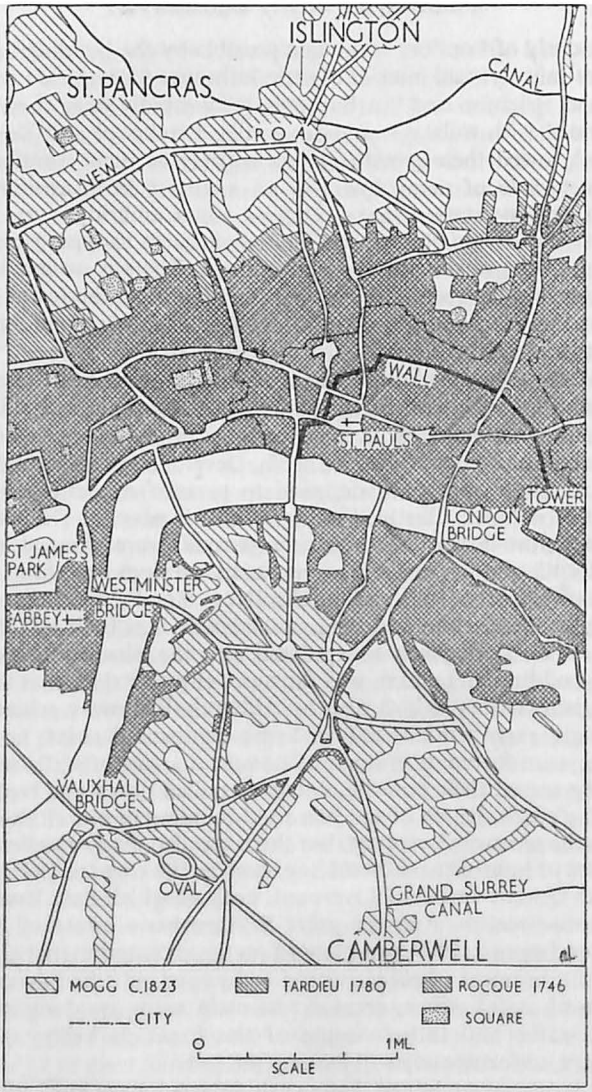

FIG. 5. *London 1746–1823*

This map is based on three maps and shows the marked expansion from 1780 onwards, and the clear attraction of the 'New Road'. The squares of the West End and of Bloomsbury remain a valued feature.

houses, industries and even whole suburbs, and that within a comparatively short time a road built to solve traffic problems has been instrumental in creating new traffic problems. The magnificent East Lancashire Road from Liverpool to Manchester has an increasing number of factories beside it at various points; the examples of the Great West Road, or of the main Cambridge Road, or the road to Southend, and others out of London are equally striking. In fact the new road has always been attractive to new industry and to housing: from the seventeen-fifties the existence of the 'New Road' on the northern fringe of Bloomsbury and Marylebone was a stimulus to building developments northward, and a naturally attractive location for four of the main railway terminals of London. But under modern conditions of lorry, van, bus and car movement, the major road still attracts the industrialist. The new motorways have neither factories nor houses beside them, but are expected to draw industry to neighbouring areas.

Motor-bus services have given thousands of people in the countryside easier means of contact with towns than they possessed before. Before the petrol age, the farmer went to town once a week and left his horse and trap under the care of an ostler in a stable yard attached to an hotel: now he travels in his car, or by bus. Even small towns need a considerable amount of parking space, found in some only with difficulty, and in towns having a large number of bus services some form of bus station is necessary. But these are normally far less elaborate in conception than railway stations, and more economical of space, partly because they are generally built on a limited area of cleared land somewhere near the town centre. Just as the railway stations a century or so ago were in need of land for initial building and later extension, so today the bus stations present a major problem. Apart from the obvious need for parking space and pens for patient queues, there are offices, waiting rooms and—not invariably—refreshment rooms. The garages need not be adjacent to the bus station, but these too are space-consuming, though in many cases they are housed in former tramway sheds. Modern Ordnance Survey maps show the location of bus stations in towns; many of them are placed at some distance from any of the railway stations and they are at least duplicated in a number of towns. The difficulty lies in the acquisition of space in a town already

built-up, but in some the clearance of slums, or of other old property, has provided a site. In Leeds, for example, slum clearance during the nineteen-thirties opened up a large central area for various purposes, including a bus station as well as factories, warehouses, and seven-storey blocks of flats. Similarly in Hull, a city that saw many changes of land use before it was ravaged by bombing, a slum area was cleared immediately beside the main railway station, giving an ideal integration of bus and train services for the traveller.

Commercial premises and local government offices are normally found in the centres of towns and are competitive in their demand for space with facilities for entertainment and shopping. Banks, insurance offices, and—to a lesser extent—the offices of estate agents, are usually able to acquire good sites in a town centre but they are generally regarded as 'dead points' in a shopping street. In some towns, traders complain that banks occupy too many good corner sites. In cities, there is normally a quarter devoted exclusively to such offices, and having within it shops catering primarily for workers in the streets around them, such as stationers, tobacconists, cafés, barbers and men's outfitters. A development widely observed is the expansion of local government offices, as well as of branch premises of national ministries; for an increasing number of services are administered by civil servants. The effect in many towns is the addition of large and generally handsome blocks of new Council offices, some of them placed in gardens to form a definite civic centre. There can be no doubt that the addition of stately buildings has mitigated the ugliness of many Victorian-built cities, and much good has been done also by officials of the Parks Departments who have maintained flower-beds and displays of plants in tubs in our towns. An amenity which, some thirty years ago, was reserved for festivals, has now become virtually permanent.

Colleges and schools have become increasingly avid for space. There is the greatest possible contrast between the new primary schools of modern housing areas and the congested premises on two or even more floors, seen in cities: every new school has the equivalent of the playing-fields of Eton. For young children, the school must be within easy walking distances; grammar schools have a wider choice of location and many have been moved from

city centres to new premises in suburbs. Technical colleges and art schools are normally located close to the town centre, and it is convenient that it should be so as a large proportion of their students come from their day's labour in works, shops and offices, or depend on buses and trains to bring them to their classes. The author has a recollection of a visit to Bolton Technical College, a fine new building on a slum clearance site on the fringe of the central part of the town where many hundreds of students were taking widely ranging courses. And there are scores of similar examples of the right institution in the right place. But the case of university location is rather more complex. Since the 1939–45 war, the student population has trebled in England and Wales, and every university is in the throes of a building programme: consequently the university environment provides an excellent setting for the study of changing town land use.

Each university has a different range of building problems. Some, indeed, appear to have no major problem of space at all: the new universities of the 1960's, such as Brighton, York, Lancaster and Essex, have, like Keele, sites on former private estates. In Oxford and Cambridge, the main problem of town land use is the reconciliation of amenity with modern transport and the addition of new buildings. Of the modern foundations, Durham is fortunate in its possession of the Castle, of a number of old houses near the Cathedral, and in the siting of its newer buildings close to the small city. Far greater problems are faced by London University: the demolition of houses in Bloomsbury is felt by many to be a process that should not be allowed to continue indefinitely, even if many of the houses are no longer residential but offices of almost every imaginable type of organization. Are these Georgian houses, not all of good quality, a wasteful use of valuable sites? Comparable problems exist in Edinburgh, where the famous George Square is now largely occupied by the university, mainly with the original façade. In Liverpool, former residential property in Abercromby Square has been acquired for university use but the extensions at Leeds have involved the demolition of several streets of nineteenth-century houses. Manchester University has built its way forward through a quarter which a century ago was selectly suburban, but gradually submerged by the advancing tide of poorer houses: it is a clearly

marked 'blighted belt' of the city. Large new buildings overlook squalid slums, including the tenements that are the last sad destiny of the large house unwanted by the people for whom it was built. It would be possible to multiply examples: enough has been said to establish the point that the land use changes are considerable.

From one generation to another, a town develops and changes. There have in the past been many notable planning enterprises, such as the Georgian New Town of Edinburgh, the estate planning of Southport to make a kind of seaside garden city, or the planning of Dublin roads by the Wide Street Commissioners in the eighteenth century. In London, the inner residential areas from Bloomsbury to St. John's Wood and Mayfair were designed by estate planners having wide and intelligent views of what a town might be. Unfortunately the attempts to plan quarters for the artisan population were less fortunate, partly because the need for housing came so rapidly from the eighteen-forties as the town population increased. The wealthier members of society moved out to suburbs when the neighbourhood changed; in time, this suburban movement became possible for all classes of society. But it was not widespread until after 1919, though presumably it is by no means complete.

It is impossible to reconcile the statements, often made by the same person, that the towns must not be allowed to grow any more and that everyone must be given decent living conditions. Estimates of 'overspill' are discussed on pp. 96–8. The key to the problem of living conditions is that people's essential needs must be met. Of these, the most crucial is a decent house or flat, not yet available for a substantial proportion of the population in many cities and—less obviously but equally seriously—smaller towns as well. The second requirement is convenient shopping arrangements and access to recreational facilities: in this type of provision, some of the earlier inter-war housing schemes were deficient though more care has been taken in later enterprises. Third, travel to work must be efficiently organized so that if a man wishes to take a job several miles from home (as many do), he can go and return without strain. And lastly, it must be understood that the standard of amenity expected, indeed required, by the population is rising steadily. Readers of Arthur Morrison's *A Child of the Jago* will know what conditions once were in some of

the worst parts of east London; the obverse of the picture is the Lansbury estate. There must be a residential East End but, as shown on pp. 102–4, many of its boroughs have lost over half their population since 1931.

Two types of population decline are characteristic of large cities in England: of these, the longer-established, noted first in London before 1821, and in other places about twenty-five years later, was due to the need for land for social, commercial and industrial uses, or for communications. The second movement dates primarily, but not exclusively, from 1919 and is due to the clearance of slums combined with the reduction in the average size of a household from four to three persons. In places the outward movement was accelerated by the destruction of property. If the nineteenth-century landlord fattened on slum houses ('safe as houses'), his grandson has little chance of doing so. In such areas, shops lose their customers and may even close down, churches cease to attract congregations and are converted into factories or warehouses, and large areas are waste land pending flat development. A walk through inner Manchester, Leeds, Birmingham, Hull, the East End of London, or Southwark, will show the vast changes now taking place.

And there lies the opportunity. In Manchester the extension of the university now in progress, with the rebuilding of other colleges, notably for art and music, will eventually result in a campus over a mile long terminating near the city centre. Hundreds of derelict houses have been, or will be, removed to make this possible. Within the campus there will be residential accommodation for several thousand students: already some study bedroom blocks have been provided. The whole enterprise is one contribution to the much-needed modernization of the city. But this can be done in a variety of ways. In Birmingham, fine new roads, new flats and factories are to surround the central business district, which the university has now left completely for its suburban site in Edgbaston, where playing fields are visible from some of the buildings. One may hope—if with limited confidence—that the architects of new university buildings will seize with wisdom the opportunities now presented to them.

CHAPTER VI

SOME PROBLEMS OF INDUSTRIAL LOCATION

RECENT AND CURRENT TRENDS

NO DOUBT there are still schools where children are shown a map of coal-fields and another of densely populated areas side by side, and an obvious correlation is drawn between them, followed by some short and occasionally embarrassed discussion on the other major concentrations of people not on coal-fields, such as Greater London or Merseyside and such large towns as Hull, Bristol, Plymouth, Southampton and Portsmouth, with perhaps a mention of the fact that Birmingham itself is not on a coal-field even though there are mines not far away. Explanation of the 'causes' of a town's successful growth has defeated many people: Birmingham's success, for example, has been ascribed to good communications, the existence of iron, coal and wood for charcoal, an invigorating climate, the centrality of its position in England, the foresight and business acumen of its citizens and even to a strong Nonconformist tradition of hard work and thrift. One industry after another has decayed and others have developed here as elsewhere, but in Birmingham success has been virtually continuous. In all industrial areas, the threat of competition has been constantly feared: in the eighteen-nineties the merchants of Liverpool tried to prevent the building of the Manchester Ship Canal as they thought that their cotton shipping would go past the Mersey. In fact comparatively little cotton came to Manchester by the Canal, but many other products were brought in. And Merseyside has, in recent times, profited by the notable developments at Ellesmere Port whose earlier industries were placed beside the Shropshire Union Canal: but whose later growth, especially from 1922, is in part associated with the vast oil-refining industry at Stanlow on the Ship Canal.

Economic history has an unpredictable course. But a trend of vast significance within the past fifty years has been the expansion of industry in the London area and in the West Midlands, both of them, one must note, having a long manufacturing tradition, but able to profit especially from the increasing demand for the products of light industry, alike in the home and export markets. Powered in many cases by electricity, factories placed in these areas have many other advantages. They were made welcome: during the inter-war period there was a strong campaign to attract factories to Birmingham and district, and many areas around London were put to industrial use, including old War Department sites. Both areas had much to offer, including level land suited to the modern horizontal factory layout, good water supplies, adequate transport, proximity to major markets and suitable labour. A survey made in 1933 showed that three-quarters of the factories in the north and west of Greater London had appeared since 1918, and that of 627 enterprises 243 had come from the congested inner districts of London and 232 were entirely new firms. From 1932 to 1935 there was a net increase of 311 factories in Britain, but an increase of 378 in Greater London and—partly allied to this—of 50 in the Eastern Counties, notably in Essex close to the Thames estuary. Despite all the efforts of Birmingham and other towns, there was a net loss of four from the Midlands, but this was small in comparison with the (net) loss of 99 from the north-west, of 54 from the north-east and of 29 from Scotland. In the early nineteen-thirties, new factories were rarely established in areas of chronic unemployment; it was then social welfare workers who had apparently wild ideas such as manufacturing tweeds at Brynmawr, which would now surprise nobody. And housing presented no major problems. The first wave of post-war housing schemes was spent by the nineteen-thirties and the speculative builder was only too eager to provide cheap homes on easy terms guaranteed by the building societies, with the result that such towns as Slough were sought by migrants from South Wales, from Durham and Northumberland, from Scotland and from other areas well known for their high unemployment figures.

No 'southward movement of industry', as such, ever took place, except in isolated instances such as the removal of Ford to

the Thames estuary at Dagenham from Trafford Park, Manchester. On the other hand, industrialists opening new factories were attracted by sites near London or in towns within easy reach of the great metropolitan market and its ports, notably in the new trades, such as electrical and radio goods, gramophones, patent foods and many forms of light industry, especially in engineering. At Slough there is a large factory labelled with three words, 'Light Production Limited', and it is such factories that have been expanded markedly during the past fifty years. Other examples could be given: not untypical is the rise of an aspirin-making concern at Slough from a workshop to the occupation of a vast factory, and there are many more success stories of earlier date, such as the growth of biscuit-making from a small shop in Reading to a factory with as many as 6,000 employees, or the development of two widely known industries at Maidstone from grocers' shops. Of these, one, producing toffee, grew slowly from 1876–1910 and then rapidly after the 1914–18 war, and the other began when a grocer's assistant in 1889 made baking powder and bun flour and set up a factory with an initial capital of £100.

The real trouble was that the older industrial areas found themselves facing a period of stability, or even of decline, due especially to the diminution of the export trade. The pre-war Development Areas chosen were Clydeside, West Cumberland, the North-east and South Wales with Monmouthshire, and in 1946 the Wrexham area and South Lancashire (based on Wigan and St. Helens) were added: a government survey of 1948 showed that in these six areas, all of them on coal-fields, 820,000 persons were unemployed in 1932, 38% of the whole labour force and twice the national average. And in spite of heavy emigration these same areas had 323,000 unemployed in 1939, or 13%, out of the national total of 906,000, or 7% of the total labour force. In Jarrow and Merthyr Tydfil, nearly three-quarters of the workers were unemployed during the early nineteen-thirties, and as late as 1937 Merthyr had an unemployment rate of 42% and Rhondda and Pontypridd of 33%. The areas most in need of new industries were the areas least attractive to industrialists under *laissez-faire* conditions: the first major government help came in 1929 with the industrial derating by which factories were charged only one-quarter of the rate, but there is evidence from Tyneside that this

measure was of little help to towns such as Jarrow, where the rates in 1935–6 were 19*s.* 6*d.* compared with 13*s.* 10*d.* in Wallsend and 9*s.* 6*d.* in Newburn. And the high rates in such places as Merthyr Tydfil were notorious.

THE MAJOR INDUSTRIAL AREAS OF ENGLAND AND WALES

In the memorandum of the Royal Geographical Society to the Royal Commission on the distribution of the Industrial Population attention was drawn to the existence of what became known as a 'coffin-shaped area' including Greater London, the West Midlands, the Lancashire and Yorkshire manufacturing districts and the areas between, including those centred on Nottingham, Derby and Leicester. Highly generalized maps appeared in various places, as well as some of a more satisfactory character. The general conclusion was stated in these terms:

> 'The major pools of skilled and semi-skilled labour are to be found within an axial belt covering approximately 14,500 square miles, or 39% of the total area of England and Wales, which runs from Greater London in the south-east to South Lancashire and the West Riding in the north-west. Outside this belt there is a small general scatter in the county and market towns (where however a relatively small expansion of industry would obviously lead to competition for labour) and there are secondary concentrations isolated alike from the axial belt and from one another, notably the Northumberland and Durham coal-field region, the West Cumberland region, and the South Wales region—in fact the Special Areas.'

Many criticisms have been made of this general statement, some of which ignore the fact that it is merely a generalization not intended to be taken literally. It owes much to some earlier work of C. B. Fawcett in which he drew attention to the marked growth of population, between 1921 and 1931, in the Greater London area with the south-east, and in the West Midlands. The intervening area between these two concentrations of population emerged

quite clearly in the maps presented to the Commission, and attention was drawn to this by A. E. Smailes, who likened the axial belt not to a coffin but to an 'hourglass' or—one cannot help adding—an egg-timer (except that the halves are not of equal size—but this was not meant to be taken literally either!). This hourglass has 'its axis running through London and Manchester and its waist about Northampton' . . . 'extending across central England from the Severn to the Wash coasts, there is a tract of rural country, only sparsely sprinkled with towns . . . recognition should be given to the presence in the central Midlands of Northampton and the other footwear manufacturing towns and modern industrial developments at Rugby, Bedford and Corby'. Another older but still interesting conception came from H. J. Mackinder, who wrote of the belt of country between the Severn and the Wash, which serves as a passage or borderland between Metropolitan England and Industrial England: under present conditions, the industrialization of this part of the country, and the outward suburban spread of population—especially from London but also from the West Midlands and its outliers such as Coventry—is a movement to be watched carefully.

Northwards from the Birmingham district there are continuing signs of an interlocking of industrial and suburban communities. Eighty miles separate Birmingham from Manchester but along certain routes one is never far from industry: to the north of the Black Country, in Cannock Chase, the coal-mining is pushing deeper into the concealed measures, and there are significant industrial activities, with some expansion, at Stafford. A. G. Powell has drawn attention to the marked growth of population since 1931 in the villages between Birmingham and Leicester; and the threat of what has been usefully if not euphoniously called 'conurban linkage' is seen northwards to Nottingham and Derby, cities which along some roads are joined by ribbons of houses and industrial premises. From Nottingham northwards to Leeds and the Aire valley towns, one is never far either from industry or from mining, which continues to press eastward into areas recently entirely agricultural. On the other side of the Pennines similar trends are to be seen. To the north of Stafford lies Stoke-on-Trent, now showing a distinct industrial spread to the south and possessing, at Stone, an outlying pottery town. The Stoke

coal-field extends northwards to Biddulph, which is separated only by a few miles of countryside from Congleton; happily there is a distinct rural gap between Congleton and Macclesfield, but northwards again there are outer suburban developments, partly from Manchester, at Prestbury and Poynton. While it is an exaggeration to say that there is any immediate danger of a line of buildings all the way from Birmingham to Manchester, the signs are clear: the threat of continuous building over the shorter distance from Birmingham to Leicester seems far more immediate.

The 'coffin-shaped belt' or the 'hourglass' modification of it, is a fruitful idea. It was accompanied by a sieve map in which the areas not immediately (*sic*) suitable for industry were marked off in black on the same outline map: these included areas unsuitable because of their surface relief, or having a scanty population, or poor accessibility from any major city. It may be that the importance of good communications was exaggerated, especially as more and more traffic goes by road, but the interesting result was that the area regarded as suited to industry was surprisingly small. There are in fact numerous dense clusters of industry and settlement, such as the Manchester conurbation, separated by the Pennine moorlands from the West Yorkshire conurbation which, for reasons discussed on p. 129, is an interesting mixture of industrial settlements and farming areas. Again, the Cheshire lowland remains predominantly agricultural in spite of industry at Chester, Crewe, Sandbach, Congleton, and the salt towns, conspicuously Northwich. Similarly although the whole of south Lancashire from Oldham to Liverpool is commonly regarded as 'urban' and has continuous ribbons of settlement connecting one town with another, yet part of one of the richest agricultural districts of England is within its confines.

Coal-fields are no longer the attraction for industry that they once were. Indeed the main areas of recent industrial expansion are not on coal-fields at all: of the new towns in England only the two in Co. Durham are to house miners, and even these are to be places where a wide range of industrial employment is made available. Corby, in Northamptonshire, depends primarily on ironstone mining and steel-making, but although its main interest lies there for the present, it may well need other industries in time. At Scunthorpe, Lincolnshire, the town of 67,000 inhabitants

(1961) has at present so much employment available in its steelworks that it draws workers from a wide area (see p. 145): this is not a 'New Town' in the official sense. All the other new towns of England are in the metropolitan region: widely defined, that is within a radius of sixty miles from London; their inspiration is clearly drawn from such earlier experiments as Letchworth and Welwyn and their purpose is to assist in the removal of people from London, but with the advantage that their removal is complete, and their work available close to their homes and not twenty-five miles away, at least in theory.

The Development Areas, formerly called 'depressed' and 'special', were established under the Special Areas Act of 1934, of which the aim was to help large industrial regions in which over a third of the working population were unemployed. The main areas were West Cumberland, North-east England, South Wales and the Clyde valley, but the Distribution of Industry Acts of 1945 and 1950 gave the government wider powers of assistance. Under later legislation, of 1958 and 1960, the government acquired the power to assist in providing employment in places with high and persistent unemployment, whether in the development areas or not. Within some areas of high unemployment, such as Scotland and the north-east, policy appears to be moving towards the creation of industrial 'growth points', having a strong concentration of work for people from a wide area. These growth points lie within industrial areas of some size, in effect economic regions rather than individual towns, and may themselves prove to be a magnet for settlement in new towns or expanded and rebuilt towns already existing. And such growth points may, indeed certainly will, attract workers from the overcrowded areas of the big towns, especially Glasgow where rehousing is only possible with a substantial reduction of the fantastically high population density. The creation of new opportunities for employment in such towns as Bletchley, Thetford and Haverhill is part of a social service which provides opportunities of healthier living for people from London, but these places are not traditionally industrial: the creation of growth points in the north-east or in Scotland provides similar opportunities, but within an area having a mining or general industrial tradition where land is available though now in agricultural use, or in some areas

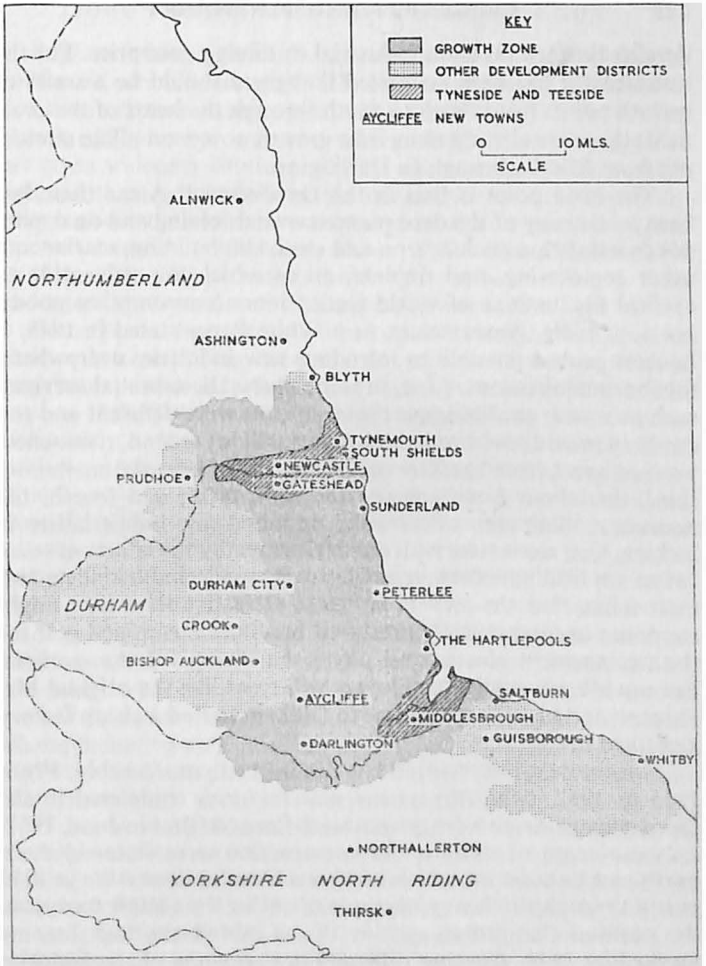

FIG. 6. *Development Districts and the projected growth zone in the North East*

Based on material in *The North East: a programme for regional development and growth*, Cmnd. 2206, 1963, this map shows that the main growth is to be in the east of county Durham, with Tyneside, Tees-side and their marginal areas. Advantages of the growth area will include an improved road to Tees-side, Sunderland and South Shields, the motorway incorporating or replacing the A1, the port facilities of the Tyne and Tees, and the industrial momentum already possessed by Tyneside and Tees-side.

derelict through previous industrial or mining enterprise. For the north-east it has been suggested that there should be a series of growth points from north to south through the heart of the coalfield: there are already numerous growth points on a line stretching from Middlesbrough to Darlington.

The main point is that in the Development Areas there has been a lessening of the dependence on coal-mining and on capital goods industries, such as iron and steel, shipbuilding, marine and other engineering, and tinplate, all of which are vulnerable to cyclical fluctuations of world trade: more 'consumption goods' are now made. Nevertheless, as a White Paper stated in 1948, it has not proved possible to introduce new industries everywhere, for four main reasons. First, in some places the essential services, such as water, gas, drainage and transport were deficient and too costly to provide even were it always possible; second, remoteness was too great from markets or the sources of essential materials; third, the labour force was not the right type; and fourth, the necessary minimum of amenity required by industrialists is lacking. One must view with amused sympathy the efforts of some towns or trading estate councils to persuade industrialists and their wives that the area is far more attractive than they might suppose: one expensively produced brochure mentioned golf for the management classes and physical training for the workers. But not all prospective employers will react like the original Mr. Ferranti and his wife who came to Oldham to find a cheap factory and liked it.

Government intervention has diminished considerably. From 1945 to 1952, two-fifths of the new factories completed in the Development Areas were government-financed, but in June, 1952, only one-tenth of those under construction were state-aided. In north-east Lancashire, which became a Development Area in 1953 partly through the heavy unemployment in the cotton recession, the position changed so quickly that a labour shortage became marked by 1954. Another difficulty is that some of the factories in the Development Areas are outlying branches of great concerns, likely to be reduced in strength in the event of trade stringency: but this is only part of the general uncertainty that besets all commerce. And one feature of the trading estates is that normally the factory space is rented and can therefore be vacated easily.

Regional planning of industry may prove to be the solution of the future, and Fig. 6, page 123, shows an attempt to define an area where expansion may be expected. On Merseyside the marked growth of the motor industry, with government encouragement, has given welcome employment, the more so as the birthrate is high and the new labour force abundant. Nevertheless unemployment is above the national average so Merseyside remains a Development District. In Furness, also a Development District, the problem is to attract new industries to replace declining metal trades into a remote area with poor communications.

Some places have attracted a surprising range of industries, perhaps less surprising on closer inspection. Doncaster with its neighbours, Adwick-le-Street and Bentley, had 128,000 inhabitants in 1961, 21% more than in 1931, about four times as many as in 1901 (*c.* 32,000). Here alone, between Leeds and Sheffield, has any substantial increase of population been seen recently. Doncaster is an historic market town, formerly on the Great North Road (now replaced by the new motorway), having excellent railway connections and good sites for works on flat ground, though occasionally it is beset by disastrous floods as in the snow-melting period of March, 1947. Mines were opened a short distance west of the town from 1908 to 1913 and farther east from 1916 onwards; the railway works had been established in 1852 and other industries appeared, including brassworks and a rope-works. A variety of industries has been attracted from elsewhere, including an electric motor works from Bradford in 1907, a glassworks from St. Helens in 1921, a lubricating equipment firm from Hull in 1941 (closed early in 1961) and clothing from Leeds in 1949: and there are many more industries, including woollen manufacture, nylon spinning, cement and the making of combine harvesters. Doncaster has achieved, without state intervention, what so many mining and other towns have wanted; but largely because it has a combination of advantages including excellent communications by road, rail and canal, flat land, coal and labour, including the female workers normally available in any mining district though not necessarily able everywhere to act as sirens to prospective employers.

The three Standard Regions forming the north have shown an increase of population of + 12% from 1911 to 1951, compared

with + 27% for the Midlands and South, but only + 6% for Scotland and the same for Wales. From 1951–61 the increases were 2% in the North, 16% Midlands and South, 1·6% Wales and Scotland. And from 1939 the rate of unemployment in the North, Wales and Scotland has been double that for the rest of the country and conspicuously heavy in a number of areas: in 1939 it was 11% compared with 5%. About two-fifths of the employed population is in the North, Wales and Scotland, but since the 1939–45 war these areas have received approximately three-fifths of the new factory space by value and area. Much of this has been in the Development Areas, which have received about one-third of the new factory building in value and space: clearly some attempt has been made to redress the balance.

Considerations such as these involve some questioning of the 'coffin-shaped area': even so, the areas of greatest recent expansion appear to be Greater London, the West Midlands and the 'North' Midlands, that is the rather oddly named Standard Region including Leicester, Derby and Nottingham. The old industrial areas of Yorkshire and Lancashire (including the two conurbations based on Manchester and Merseyside) have reached a condition of virtual stability without however suffering the great problems of the North-east or of West Cumberland—this last now revivified by new industries and also by the development of atomic power. The troubles of Wales lie primarily in the unfortunate history of its coal-fields: other changes, such as the heavy decline of its quarrying, affect a far smaller number of people, but are locally of great significance.

SCOTTISH INDUSTRY

Scotland's industry is concentrated to a remarkable degree on the heavy metal trades, located in a restricted area. During the nineteenth century there was a marked expansion based on local coal and iron ore, predominantly between Stirling and Ayr, and especially on Clydeside: the centre of gravity of industrial and commercial life was moved from east to west. Half the industrial population in 1931 was in the four major cities—Glasgow 30%, Edinburgh 8%, Dundee 8%, Aberdeen 4%. Excluding these,

with Perth and the north of Ayrshire (5%), there was no concentration of more than 15,000 industrial workers, though there were approximately this number in the Tweed valley and its tributaries, with 3,000 each in Galashiels and in Hawick. Apart from these places, only Inverness and Dumfries showed any pronounced growth. The aluminium works at Foyers near Fort William and at Kinlochleven are well known and so too is the bauxite refinery at Burntisland, Fifeshire. The flax, hemp and jute industry is located almost entirely in Fife and Angus in a compact area extending from Dunfermline by Perth and Blairgowrie to Brechin and Montrose, with two-thirds of all the workers in Dundee. Over half the cotton operatives are in the thread works of Paisley and district, though there are a number of small mills elsewhere. But it is the metal and machinery industries which show the most remarkable concentration : apart from a very few works, all are within a small area some twenty-odd miles long from Paisley to Shotts and about five miles across. This is a vestigial siting, due originally to local ores: Clydeside in the nineteen-thirties fared badly and part of it was therefore scheduled as a special area.

Geographical factors are responsible for the marked concentration of Scottish industry. As noted on p. 155, two-thirds of the country is rough hill pasture, and the inaccessibility of much of the country by rail, even in places by road, makes industrial development difficult. Only in the Central Lowland and in a few other small areas is there transport adequate in quantity and quality to satisfy the demands of modern industry. It is generally thought that direct road connections between Edinburgh and Dundee by new bridges over the Forth and Tay will be helpful at least to Dundee and perhaps also to Fifeshire. The Highlands and Islands have become a Development Area, but their problems are both wide in scope and different in character from those of other Development Areas : they have recently been treated in a comprehensive survey directed by Dr. Fraser Darling. Mention will be made here only of the aluminium works, located in places not unlike the isolated industrial settlements in the west of Norway. Kinlochleven stands at the head of an extremely narrow fiord with high mountains above it : the British Aluminium Company and the residents have tried to make the town (*c.* 1,750

people) attractive but the difficulties are considerable, for there is little sunshine due to cloudiness, excessive rainfall and a smoke pall. Fort William (2,700) has been so spoiled by haphazard building that it has been called an 'eyesore', which is nevertheless visited by thousands of tourists. The ore ships come direct to the company's wharves at Kinlochleven and Fort William and the finished sheets and ingots are taken away by road. Opinions will differ on the wisdom of multiplying such centres, of which the best European examples are to be found in Norway, many of them in places entirely served by boat. Similarly, there may be differences of opinion on the Harris tweed industry, which enables a man to earn money working on a semi-automatic loom, placed generally in a small ill-ventilated shed, instead of in premises duly inspected. The success of tweed-making may mean the neglect of the crofts.

THE LOCATION OF PARTICULAR INDUSTRIES

Any industry depends on four factors: raw materials, industrial plant, the skill to work it, and markets. Rarely are these all found in the same place. Much of the present distribution of British industry is based on the regional specialization that developed during the nineteenth century: these included the cotton textile area of Lancashire, with engineering and coal-mining, and the woollen textile district of Yorkshire, also associated with engineering and coal-mining. Each has a background of domestic industry based on the use of the stream waters of the Pennines, used both for driving machinery and also in some of the processes of the textile industries. The cotton industry managed to attract its raw material from sources in many parts of the world, aided by careful research, and became for several decades the major cotton-processing area of the world. On Tees-side, active development began in the middle of the nineteenth century, with the use of Cleveland ores and Durham coking coals: ore is also imported for the steel works of Middlesbrough and district. More recently, the chemical industry of Billingham has used the local deposits of anhydrite (calcium sulphate) drawn from a large deposit some 700 ft. below the plant, and salt, obtained by brine-

pumping from the extensive rock-salt beds some 1,000 ft. below the surface.

Each of these areas had a number of characteristics favouring the industries for which it became famous: none had every possible advantage. The cotton area had no cotton, but plenty of soft water for washing, bleaching and dyeing, coal for steam power, a tradition of skill among the operatives, a well-organized commercial centre in Manchester and the services of the importers at Liverpool. And the allied engineering industry was designed at first to supply the needs of the mills, though its work has gone far beyond that in more recent years, with the result that when the decline of cotton became marked in the nineteen-twenties, engineering was an even more useful source of employment than before. As many of the older mines of Lancashire have been worked out, coal has been 'imported' from Yorkshire: the electrification of the line from Sheffield through Penistone was made financially possible by the heavy coal traffic. Good communications, including the Manchester Ship Canal, have helped the area, though the effect of this canal was rather different from the expectation of its promoters, whose main argument, heavily emphasized by statistics, was that it would bring in cotton cheaply, and thereby prevent the merchants of Liverpool from battening on the commercial fat of Manchester. In fact its main effect has been to add a wide range of newer port industries in Manchester.

Yorkshire's story is perhaps simpler, though not less interesting. The domestic phase of the woollen industry favoured the hillside site, but when the eighteenth-century canals were built and the rivers made into 'navigations', there was a downward movement to mills at the waterside. To this day, west Yorkshire has preserved the appearance of a congeries of industrial villages and towns, linked quite recently (especially during the inter-war period) by houses along the main roads, but having large areas of open country within easy reach. There is no tight line of demarcation between wool and cotton, for mixed cloths need both, with the result that some Yorkshire towns still have cotton mills, though this is declining, and there are some woollen mills in Lancashire—also declining. Steadily the main centre of mining has moved eastward through Yorkshire, with the result that in

many western parts of the woollen belt one may see the last remains of long-forgotten mines. No one town dominates the trade, but Bradford has traditionally been the main market for raw wool and Leeds is the main centre of the clothing trade and of a wide variety of other industries including engineering. The woollen trade has never had to face the catastrophe felt by cotton in the nineteen-twenties, but it reached its maximum employment a century ago and the subsequent growth of industry has been in ancillary trades and notably in engineering.

Tees-side no longer depends on local ore supplies, as the last working mine of Cleveland was closed early in 1964, when the field had existed for over a century: this has caused an employment problem in the mining villages. Over four-fifths of the ores are imported and the rest is acquired from Furness and the English Midlands: the area owes much to its port facilities. The north-east's steel area, which includes Teesmouth, Skinningrove near Saltburn, West Hartlepool and Consett, Co. Durham, produced one-quarter of the country's pig iron and one-fifth of its steel: the I.C.I. plant at Billingham, with 15,000 employees, has grown to its vast size since 1917. Due to this remarkable industrial growth, there were, in 1961, 362,000 people, an increase of +10% in 1951–61, in the interlocking towns of Middlesbrough (157,000), Eston (37,000), Thornaby-on-Tees (23,000) and Redcar (32,000) on the Yorkshire side of the river with Stockton (81,000) and Billingham (32,000) on the Durham side. Although sometimes regarded as belonging to the north-east, Teesmouth has been conspicuously more prosperous than Tyneside. Indeed, it may seem ironic that the iron and chemical industries, though developed so early on Tyneside, are now of relatively minor significance compared with those of the newer Tees-side towns.

Ports have obvious advantages as actual or potential industrial centres. Industries such as oil refining, the making of soap, margarine, cattle cake, flour milling and many more are likely to be located in ports as they depend on imported raw materials. But Liverpool never became a cotton town, and a major centre of tobacco manufacture is inland, at Nottingham, as well as at two ports, Bristol and Glasgow. Similarly, chocolate manufacture is located at York and Birmingham as well as at Bristol: in these

cases a large part of the cost of manufacture lies in the processing, that is in labour costs, rather than in the cost of the raw materials. A commonly quoted instance of the removal of an industry to the waterfront is the building of steel furnaces at Cardiff and Port Talbot in South Wales, with the vast new plant at Margam as a notable example. These sites, like Tees-side, have coal available in the hinterland and good facilities for the import of ore. Nevertheless, the plant at Consett, Co. Durham, far inland, survives and an old-established ironworks exists at Stoke-on-Trent; the vast modern plant at Ebbw Vale was built on its present site rather than in the English Midlands, partly in response to social factors. But no such considerations prevented the removal of the Wigan plant to Irlam, beside the Manchester Ship Canal, in 1929: here imported ore meets Yorkshire coal.

Certain industries are very closely tied to their sources of raw materials. Brick-making is now concentrated largely in the Oxford Clay belt, from Old Fletton near Peterborough south-westward, with some very large works around Bletchley and Bedford, though there are many other suitable clays, including those of the Coal Measures, used for example in the Stoke-on-Trent area and notably at Accrington. Glacial and alluvial clays are used in some cases but although there are over 1,250 brickworks in Great Britain, the largest are those of the 'Great Clay Vale' around Peterborough, Bletchley and Bedford: the clay contains about 5% of carbonaceous material, which results in a low fuel consumption. Tiles are made at a number of brickworks but much of the country's need is supplied by tileries using the Etruria marls of the Upper Coal Measures in the Stoke area and the Black Country: unfortunately some of these tileries create an acute smoke problem as vast quantities of black smoke are discharged into the atmosphere a few feet above ground level.

The cement-making industry has a clearly defined location fixed by chalk and limestone, prominently seen beside the Thames estuary. The pottery industry uses a variety of raw materials, but its initial location was fixed by the existence of suitable clays, such as those of the Stoke-on-Trent area and of the Swadlincote district in Derbyshire, to which Cornish kaolin is brought by water to Stoke and by rail and road to Swadlincote. An agricultural industry dependent on local raw materials is sugar refining

from beet, owing to the heavy costs of carriage. When the Irish government stimulated its self-sufficiency programme they set up sugar beet plants in four provincial towns, Carlow, Mallow (Co. Cork), Thurles (Co. Tipperary) and Tuam (Co. Galway), in eaeh case with the hope, realized to a considerable extent, of encouraging the growth of beet in the vicinity. Scotland has one beet factory at Cupar, Fifeshire; England has seventeen, of which two are in the West Midlands at Kidderminster and Alcott, Shropshire. The remaining fifteen are all in the eastern arable belt of the country from Poppleton (York) to Felstead in Essex, in market towns and villages. The crop is grown primarily in the area covered by these factories with a heavy concentration in the rich Fenland area.

Planners concerned with the provision of work naturally look favourably on the light industries to solve their problems. In all these the ultimate cost of the product is drawn largely from labour rather than the raw material: a site naturally attractive to such an industry is the London area on account of the ease of marketing. More and more such industries have settled in places with good road communications, conspicuously on the main trunk roads from London. Major initial processes, such as iron and steel making, aluminium refining, flour milling, sugar making, chemical manufacture, are normally concentrated in a few favoured localities under modern conditions, but the later processes can be carried on in a wide range of places. As Wilfred Smith pointed out, the weight of material per operative diminishes with the progression from steelworks to rolling mills, and from rolling mills to engineering shops. Equally the cost of labour increases with each process: one consequence has been the widespread dispersion of engineering over the country. It is perhaps ironic that one of the most successful modern industries to be established in South Wales is the making of zip fasteners, so plentifully used that many hundreds of people are employed to make them. Flour milling was at one time widespread, but has become concentrated on large mills, mostly at ports, though bread-making is a local industry in England and Wales.

Market towns at one time had a number of local industries and crafts, including milling, brewing, tailoring, dressmaking, and some which still survive, such as watch repairing and car mainten-

ance. Some of these have diminished : for example, the local tailoring trade has been partly removed by the high cost of labour, and partly by the increasing success of ready-made clothing which was originally concentrated on cheap clothes but gradually adapted its production to a wider market and, one may add, to a greater variety of figures. Part of the clothing industry's success has been due to an intelligent study of the size, shape and tastes of people who were to wear the clothes : the marked success both of the clothing factories on the trading estates and some of the older concerns is an interesting phenomenon. Equally the attraction of synthetic fibres such as nylon and terylene has been felt by a vast number of consumers. One could multiply examples, but standardization is clearly a tendency of the times. In passing one may perhaps regret that in the towns each set of shops in a main street looks much the same as any other, having the same company shops and the same goods in the privately owned shops.

THE PLANNER AND INDUSTRIAL LOCATION

The very fact that industry has shown considerable mobility in the past should encourage the planner to believe that he can influence its location in the future. But there must necessarily be limitations to this power, for legitimate enterprise must be recogmized as desirable and the elimination of existing works is by no means a simple operation. The much publicized case of Oxford comes to mind : Dr. Thomas Sharp suggested the removal of the pressed steel works and part of the Nuffield plant from Oxford on planning grounds, but is there any reasonable expectation that this will happen ? Once large capital sums are sunk in an enterprise removal may cost the state more than the exchequer may be prepared to pay. There are many who regret that Reading should have acquired its biscuit and other works, or Maidstone its toffee and other food industries, not to mention the paper mills on rivers in the vicinity, yet once the industries are established firmly, the case for their removal is difficult to make, especially where large numbers of people are employed.

Prohibition of new industries has already been successful in the national parks. In the Peak District, for example, the opening

of new limestone quarries has been prevented on the ground that enough have been developed already for present needs, and that the amenities of this area need not be spoiled further (see p. 164). On the other hand, no set of rules can be laid down for all upland areas: in Snowdonia the erection of new aluminium works and of hydroelectric stations has been prohibited, but in the Scottish Highlands there are a number of new reservoirs and power stations, of which some have destroyed—or at any rate changed—the attraction of the scenery. A Scottish geographer defended the Pitlochry power scheme on the ground that even if it altered the scenery it had become a great attraction for tourists! It pays! Wisely perhaps the old quarrying places such as Llanberis, Bethesda and Ffestiniog are excluded from the Snowdonia national park: these places have an obvious need for new industries. But one is bound to question the wisdom of such developments as Dolgarrog in the Conway valley, where an aluminium works with local power has been transformed into a rolling mill drawing its workers from the valley and from the coast towns. One could hardly maintain that all industry should be kept out of North Wales: indeed, some of the new factories at Llandudno Junction provide much-needed employment, are pleasing to the eye, are located conveniently near excellent train services and in no way interfere with the tourist attractions of this coast.

Major problems arise in such areas as Birmingham, where work is so plentiful that there is heavy immigration, including Pakistanis, West Indians and Irish, an acute housing shortage and extremely high prices for lodgings of any description: the Corporation is buying old houses for conversion into flats. So long as such conditions remain, population increase is certain and it is futile to say that the town should not be allowed to grow. One possible solution may be to build a new town, transferring to it some of the badly housed industries such as jewellery and gun-making to which M. J. Wise has drawn attention, and a number of others, but the problem admits of no easy solution. Indeed, the expansion of existing industries may well cause problems in such venerated towns as Oxford and Cambridge and make it impossible to prevent their growth. If any artificial measures are taken, such as the prohibition of house building, the inevitable result will be creation of near-famine conditions of accommodation in which houses are

sold at prices far in excess of their value and rents are inflated to give endless discomfort and even distress.

Considerable success had attended the policy of establishing trading estates in the Development Areas, conspicuously in South Wales, in the North-east and on Merseyside. Allied developments are the planned estates of new housing schemes such as Speke in Liverpool and Wythenshawe in Manchester. But there is no reason why a trading estate should be established in every town, especially as in some places solidly built premises are available at comparatively little cost: in the north-east Lancashire area, for example, a number of new industries have been established in old cotton mills. Throughout the cotton area of Lancashire, factories built for weaving and spinning are now occupied by a wide variety of industries. In all these cases new industries, however induced to come, have prevented an even greater decline of population: many towns in the industrial Pennines, both in Lancashire and Yorkshire, lost as much as 10% of their population from 1931 to 1951, and 5–10% in 1951–61. The inner Pennine towns have an unattractive climate, with large areas of inadequate and obsolete housing. And in South Wales the losses were much greater (see pp. 140–2). While it is unreasonable to allow any place to lose all its employment the decline is not necessarily serious as it is due partly to the reduction of the size of households. Then too in Lancashire many women have thankfully ceased working in the cotton mills as the men's wages are now adequate to maintain the households.

A steadily increasing proportion of the population now travel some distance to their work. When the Victorian industrialist built houses under the very shadow of his works he was regarded as a benefactor, for a health-giving walk of a couple of miles was not desired at each end of a twelve-hour day. Etruria, Stoke-on-Trent, was one of the first 'model villages', with cottages having gardens, the works, the big house overlooking the works, and a church: now Wedgwood's pottery is at Barlaston, surrounded by fields, with smokeless firing, and the workers coming by bus, bicycle, or trains to a special halt. Many of them work in surroundings healthier than their homes. The modern idea of 'zoning' involves a journey to work but the need is to prevent it from becoming too long, too expensive and in other ways frustrating. The industrial dispersion around London and other cities has reduced

the distance travelled by some, and another useful result has been that the rush-hour traffic is not a one-way movement. This is quite clearly seen in the 1951 Census Workplaces volume, which gives the number going outside their own town or rural district to work and the number coming in. From Stockport C.B., nearly 23,000 travel out, almost 12,000 of them to Manchester, but 15,600 come in, including over 6,000 from Manchester. In Altrincham, Cheshire, some 7,900 people travel from the borough, over 5,000 of them to Manchester, Salford and Stretford; but 6,800 enter Altrincham daily to work, 2,100 of them from the neighbouring borough of Sale and even 1,200 from Manchester. Altrincham has some 10,000 factory workers of whom 85% are in light engineering, and 1,500 workers in the distributive trades. No figures are available for 1961, but the position is little changed.

Planners of twenty years ago who hoped for the complete re-planning of Britain were more optimistic than some of their successors. Nevertheless the forthcoming changes must be tremendous as slum clearance schemes go forward, one hopes with increasing momentum, and as many of the poorer late nineteenth-century houses and, in a future not too distant, some of those built in this century are replaced. The distribution of population has changed radically since 1920 and will change even more sharply by 1990. And with this, the distribution of much of the country's industry must also change. The planning is far more likely to be successful if it is done with some sense of geographical factors, and with some historical perspective: the present distribution of industry has been worked out by trial and error, by the skilful adaptation of supply to actual or potential demand, by the development of suitable means of communication and the maintenance of supporting market facilities. There are no general laws of industrial location, rather a series of opportunities and disabilities to which adjustment has to be made.

THE PROBLEMS OF INDUSTRIAL AREAS

The greatest danger of an industrial area lies in its existence at all, for the massing of hundreds of thousands of people in any area is an experiment fraught with problems. Of these the greatest

is the possible removal of its sustenance through the exhaustion of its main resource, such as coal, iron, or both, or the decline in demands for its main products, such as linen or cotton textiles, ships or even possibly motor-cars. Few industrial areas depend on one resource only, but many parts of the South Wales coal-field never had even an iron foundry though this industry was partly responsible for the initial exploitation of the coal-field. Similarly the enormous success of the cotton industry in Lancashire during the nineteenth century, and until the nineteen-twenties, resulted in the growth of many towns and villages which depended solely on cotton and to this day have no other industry of consequence. On the other hand, both the Manchester and the West Yorkshire conurbations, and particularly the former, have shared conspicuously in the growth of the engineering industries. Even so the initial industrial problem remains the fear that an area's minerals may be exhausted, or its manufactures no longer required: not every industrial area has managed to attract a constant succession of new industries as successfully as Birmingham and the Black Country.

Industrial devastation is the second major problem. This is found equally in prosperous and in decayed industrial areas; until recently one-eighth of the Black Country was derelict land, but happily much of it is now used for housing. Mining areas have similarly devastated areas, but one fortunate circumstance is that modern bulldozing machinery can flatten out some such areas—but by no means all—more efficiently than any previously used method. In the iron ore mining of the Jurassic belt, complete restoration of agricultural land can now be reconciled with highly efficient ore extraction. More serious is the problem of subsidence, common to all mining areas, and occasionally spectacular in its effects, as in the Lancashire coal-field around Wigan and in the salt-mining areas of Cheshire. These areas are discussed in the following pages; and reference is also made to the Stoke-on-Trent area, a museum of land use problems.

Some planners have naïvely suggested that each town should have a proportion of workers bearing a very close relation to the national average: one work, on Cheshire, suggested extensive changes in each administrative area to achieve this end. There are various objections to this view. Firstly, the proportion of workers in manufacturing industry, service trades and professions has

changed and will change; secondly, each industrial area has particular resources with which it makes its main contribution to the nation's trade. But although there seems to the author no reason why industry need be established everywhere in order to conform to a national average, it is equally clear that an industrial area with several hundred thousand people, such as the South Wales coalfield, cannot be allowed merely to rot. The answer to this problem apparently lies in the trading estates, and in other forms of inducement to industrialists to settle in the Development Areas. As shown on p. 148, the first trading estates were established by private enterprise at Trafford Park in 1896 and Slough in 1920; their successors were founded from 1936 onwards.

EXTRACTIVE INDUSTRIES

Extractive industries have for generations, indeed for centuries, brought to areas temporary prosperity followed by ultimate decay. Quarries, lead, zinc, tin or copper mines, all may perish through changing conditions of trade or through the exhaustion of the raw material: relics of such enterprises are familiar to those acquainted with the upland areas of Britain. But other resources of upland areas may be needed: for example, limestone quarries are now prosperous owing to the demands of the chemical and cement industries and there are flourishing limestone quarries in the two Pennine national parks, near Ingleborough, Yorkshire, and in the Peak District of Derbyshire. In both areas it is possible so to control the working of an essential raw material that harm to the landscape is minimized: the scar made by a large limestone quarry is not of necessity unaesthetic, but a large number of small quarries could destroy the natural harmony of the scene. In Snowdonia the three slate quarrying areas at Llanberis, Bethesda and Ffestiniog have seared the mountain sides disastrously, but the ugliness of the scene is offset to some extent by its great interest: in employment there has been a decline from 16,000 in 1898 to less than 4,000 in the 1960's.

Coal-mining, of all extractive industries, raises most social problems: of these the greatest is the inevitable impermanence of the mines and probably of the places built for miners. Most

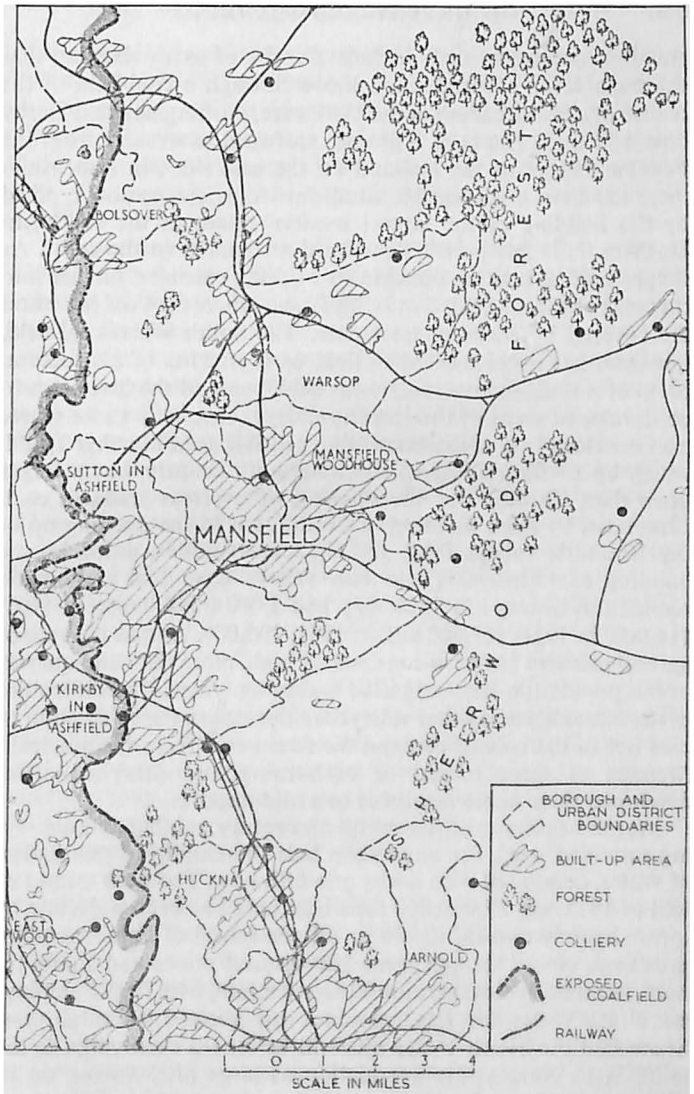

FIG. 7. *Coal-field expansion in the East Midlands*

Many of the largest collieries are east of the 'exposed' coalfield throughout the lowland from Nottingham to Leeds, but under modern travelling conditions, settlements of the type described in D. H. Lawrence's *Sons and Lovers* need not inevitably arise. The amenities of Sherwood Forest are still preserved.

standard geography texts include a series of maps showing that the main areas of production move through a coal-field in the course of a few decades: in the Yorkshire, Nottingham and Derby coal-field there has been a general eastward movement from the Pennine valleys to the lowland on the east side; in Lancashire there has been a perceptible southward movement, now typified by the building of the largest modern mines in the south; in Durham there has been an eastward movement to the coast. As deeper mining became possible so working extended further into the concealed coal-field, that is, into areas where the Coal Measures are covered by rocks of later date. The South Wales coal-field, however, has no concealed section, as it consists of a structural basin of a synclinal nature. In this field, some of the first areas to be developed were in the eastern valleys, especially those where iron ore close to coal made smelting possible as at Merthyr Tydfil, which up to the middle of the nineteenth century was a larger town than Cardiff. But the opening of overseas trade in coal, stimulated by dock building in Cardiff, led to the opening up of the Rhondda valleys from the eighteen-seventies, aided by the building of railways. These two valleys have had a dramatic population history: in 1861 they had 3,000 inhabitants, in 1901, 114,000, in 1921, 163,000 and in 1961, 100,000. And as the rate of natural increase has been consistently high, more than one-quarter of the population has emigrated within ten years. The difficulties of the Rhondda and other valleys are due not to the exhaustion of coal but to the lack of demand for steam coal from the nineteen-twenties as ships turned to oil-burning and other countries developed their home resources to avoid imports.

At the beginning of the twentieth century, mining and quarrying provided work for more than half the employed population of Wales, compared with under one-fifth now. The peak output of coal in 1913 was 57,000,000 tons but there has been a decline by approximately two-thirds since: all the mines of Pembrokeshire have been closed though some 200 disused mines and shafts remain. In South Wales there are 90 active mines, with 70,000 employees; North Wales now has five mines with about 5,500 employees. About half the South Wales pits will be closed eventually, as the policy is to concentrate production at large pits, having up to 3,000 workers; so far, it is estimated that 3,000 million tons

have been mined, and that the reserves, not more than 4,000 feet deep, consist of 8,200 million tons. In the eastern half of the field, the upper parts of the Monmouthshire and (east) Glamorgan valleys are likely to lose their collieries owing to the exhaustion of the more accessible coal, but most of the pits in the central parts of these valleys have reserves sufficient for mining in the next fifty to a hundred years.

The population history of the Rhondda and other areas in South Wales, not untypical of mining communities, raises great problems of an economic and social character. Shops, cinemas, schools, churches and other services are provided to meet the needs of a community far larger than that existing a couple of decades later: the community loses many of its most vigorous members and may even suffer from a labour shortage as the tendency to emigrate becomes widely prevalent among the younger people. It is generally recognized that even with the introduction of new industry to offset the diminished employment in mining a further decline of population must be expected. Not only so, but many of the houses are of poor quality, ripe for demolition. And similar problems exist in West Durham, where the population rose from 34,000 in 1801 to a peak of 341,000 in 1921 and is now declining. About one-quarter of the workers are now in mining compared with two-thirds in 1929, and the number of miners has declined by some 20,000 from the 57,000 employed in 1950. The decrease in employment would be even greater but for the maintenance of metal industries, notably at Consett, the introduction of various new industries (see p. 150) and the habit of travelling long distances to work acquired by the population. Housing conditions are even worse than those of South Wales and in some of the old mining villages,

> 'New buildings of any kind are hardly to be seen: the few shops are small and often shabby: there is no evidence of industry beyond the rusting remains of old pit-head gear, a few derelict buildings and the tumbled and grass-grown spoil-heaps of former mines . . . the older people live in property that has been condemned and will probably never be replaced. Few younger people or children are to be seen in these declining villages.'

Although many mining villages beside large modern collieries present a comparatively favourable picture, there are some who say that no mining village should ever be built at all. In the south of County Durham, two of the country's new towns are planned to replace several decaying villages: in Peterlee the proposed population is 30,000 and in Aycliffe 20,000. Each will have a variety of industries in addition to mining, partly in order that work may be available for the womenfolk. Under modern transport conditions of quick bus services, and with such amenities as pithead baths, it is no longer necessary for the miner to live on the threshold of the mine. Two other new towns, Cwmbran in Monmouthshire and Glenrothes in Fifeshire, of which the former is expected to have an ultimate population of 55,000, are also intended to be industrial as well as mining centres.

Subsidence is a peril of all mining areas: in the planning of new towns, special precautions are generally taken. The most spectacular effects are seen in such areas as the Lancashire coalfield, where many houses are shored up or tied together by steel bars, and large areas are filled with water, as for example the 'flashes' to the south of Wigan, where a main railway line runs for some miles on an embankment between flashes because the coal beneath it has not been mined. Similarly in the Stoke-on-Trent area, many buildings are on an insecure foundation: at Etruria, for example, the original Wedgwood works has sunk several feet below the level of the canal beside it, which has been built up at various times, and Etruria parish church has been preserved from extinction only by careful work. Cracked walls, broken windows, sagging floors and disappearing roads are all recorded and a recent newspaper headline read 'Water in the church but the baths run dry': through subsidence water entered a church from below during a service and in the swimming baths at Longton all the water disappeared through cracks. Similar problems at Northwich, Cheshire, due to salt mining and brine pumping, are discussed on pp. 146–7.

The association of coal-mining and industry is no new thing. In South Wales, the only industry was iron and steel making, which suffered through the exhaustion of the ore so that the coastal location, at Cardiff and Port Talbot, became more economic: even so, part of the industry was retained in Ebbw Vale,

though none at Merthyr Tydfil. In Lancashire, a traditional association was men in the mines and women in the mills, but both industries have declined in employment capacity. But here, as in Yorkshire, miners have been able to seek other work as new industries have been introduced, or travel, as in the case of Wigan miners, to new collieries which, though employing as many as 2,000 or 3,000 men, have practically no houses in the vicinity, only a bus park near the pithead baths. In 1951, Wigan had 15,500 workers who left the borough to work, compared with 10,700 who entered it from other areas. Some northern towns, such as Chesterfield, Mansfield and Barnsley, have for generations had an association of mining and other industries, in these cases textile and metallurgical in character; and the same is true of Coventry, even though mining now employs only a small percentage of its workers. As all these towns have been comparatively successful, except in periods of severe depression, one could argue that they provide historical evidence of the wisdom of establishing towns such as Aycliffe or Cwmbran rather than mining villages.

Heavy unemployment in the mining areas during the inter-war period led to the creation of the Depressed Areas, later the Development Areas, and to the building of some remarkable trading estates: these were not the first of their kind (see p. 148), rather were they expressions of a policy of industrial diversification in areas having too many eggs in too few baskets, even, in the case of some coal-fields, one basket only. The major pre-war Development Areas were Central Scotland, Northumberland and Durham, West Cumberland and South Wales: after the war, four others were added, Central Lancashire (almost the whole area between the two conurbations) in 1946, Wrexham and its environs in 1946, Merseyside in 1949 (not including Ellesmere Port) and North-east Lancashire in 1953 (Burnley, Nelson, Colne and a few neighbouring places). All these areas except Merseyside have suffered through the decline of coal-mining, of textiles in Lancashire and of ship-building and shipping trades in Scotland and Merseyside. The inclusion of the Wrexham area is due primarily to the limited remaining life of the coal-mines in the district. Some warning voices proclaim that new industries, such as the making of buttons or radio valves, do not belong to these areas, and that manufacturers

should have more freedom of choice. The *Economist* in 1948 spoke of

> 'the purely economic issue whether the forced revival of areas which have lost part or the whole of their economic *raison d'être* may not in the end prove more costly than the development of regions which have positive economic attractions.'

The type of industrial development on the trading estates and single sponsored factories is discussed on pp. 149–152: here one may merely remark that in South Wales, for example, the original aim was to provide work so that the numbers employed in mining and in other industries will be approximately equal.

IRON ORE

The extraction of iron ore in Britain goes back to Roman times, if not earlier: until the middle of the nineteenth century the ore workings were in the Carboniferous beds, conveniently near to coal and also, in certain areas, notably the Black Country, timber for charcoal. In the Birmingham area, for example, iron smallwares were made during the sixteenth century, and although some of the ironworks decayed before the end of the seventeenth century for lack of charcoal, the smiths remained active, and made their wares with iron brought not only from the neighbouring Black Country, but also from South Wales and even Sweden. Not all the iron areas were as successful: in South Wales many failed, for example in the Llynfi valley and at Merthyr Tydfil. Under modern conditions a coastal location is favoured, and the main centres are at Swansea, long dependent on a wide variety of imported ores, at Cardiff where ore is discharged straight from the ship to the works and conspicuously in the vast plant at Margam, Port Talbot. These enterprises have much the same locational features as Tees-side—coal in the neighbourhood and a port for ore. In Tees-side the modern stimulus to steel production came from the existence of local ores but, as noted on p. 130, all the Cleveland iron ore mines have now been closed. Nevertheless, the steel industry of the north-east produces one quarter of the

United Kingdom's pig iron and one-fifth of its steel, primarily on imported ores. In the former mining centres, such as Skelton, Brotton, Guisborough and Loftus, the problems of diminished employment are eased by the introduction of new factories.

Exploitation of the iron ore of the Jurassic belt from Oxfordshire to Yorkshire is now of great and increasing importance. The most spectacular steel-making plants are at Scunthorpe and Corby. Scunthorpe, Lincolnshire, having 67,000 inhabitants in 1961 compared with 34,000 in 1931, is in a phase of active growth; the Workplaces volume of the 1951 Census showed that it had 24,113 resident occupied workers of whom 1,061 went outside the borough for employment, but 7,014 came inwards, including 500 from Grimsby, 390 from Brigg and even 250 from Goole. Similarly Corby, so far virtually a steel town only, with a resident population of 17,000 (1951), had 7,660 occupied people of whom 948 went elsewhere for jobs; half the 600 women went to Kettering. But 3,778 workers came in, of whom 1,116 were men from Kettering borough and 1,439 from Kettering R.D. Both places, therefore, are drawing labour from neighbouring towns and rural areas: the advantages for the location of steel at Corby, in a vast ironstone field, on a main railway line, were appreciated by Messrs. Stewart and Lloyd, who built the large steelworks and rolling mill here in 1934. Under present conditions, such places seem likely to have a prosperous future but dangers beset the 'company town' with one main industry. By 1961 the population of Corby had risen to 36,000 and it will eventually rise to 55,000.

Most of the ore is acquired by opencast workings and after the beds of ore were removed the overburden, including the topsoil, was restored: by this method of working no harm was done to considerable areas of country. But in 1895 an ironstone company at Corby introduced a 'steam navvy' for excavating iron ore; when a belt conveyor was added for removing the overburden the first areas of 'hill-and-dale' were made. Some 3,400 acres of 'hill-and-dale', of which only 900 acres has been planted with trees, now exists, largely in Northamptonshire. The Mineral Workings Act of 1951 provided that all the land should be restored to agriculture except where the cost was excessive or tree-planting more suited to the soil. Various chemical experiments have so far been

remarkably successful in making new soils on levelled 'hill-and-dale', and another hopeful feature is that the new machines can replace the topsoil in the right position. So far over 20,000 acres has been used for excavation and reserves are thought to exist beneath another 116,000 acres; and the principle has been established that surface restoration should be regarded as part of the process of extracting ironstone and not as a separate operation.

POTTERY TOWNS

have especially severe problems of land use. Apart from the dangers of mining subsidence, in Stoke-on-Trent there has been widespread devastation of land by past working both for coal-mining, for iron foundries, for marl extraction and other industrial uses such as brickworks. Inevitably the pottery trades need considerable areas for their own breakages and waste though a few potteries are now using old marlholes for this purpose. It is ironic that coal tipheaps mount steadily higher though there are deep marlholes abandoned close by, but haulage costs prevent the apparently sensible solution of tipping into holes instead of making mountains. It has been estimated that there are some 4,000 acres of derelict land in the Potteries area : and the problem is equally severe, on a smaller scale, in the Swadlincote district, between Burton-on-Trent and Ashby, where the main industries are earthenware manufacture and coal-mining. In both cases, considerable areas are useless for housing owing to the dangers of subsidence, with the result that most of the new houses are on the fringes, for example in Newcastle-under-Lyme or in the valleys leading eastwards into the Pennines from Stoke.

SALT SUBSIDENCE

The extraction of underground salt has caused grave problems in parts of central Cheshire, where the main salt towns are Northwich, Middlewich and Winsford. Rock salt mining was practised from 1750 to 1870 and the abandoned mines caved in so that funnel-shaped holes were made. All these were

engulfed by the later, much more serious, subsidence due to the pumping of 'bastard brine', that is the pumping from disused mine workings: large flashes were formed by the collapse of these old mines and the entry of vast quantities of surface water into the new hollows on the ground. Meanwhile, other flashes, such as Winsford Bottom, had been made through the sudden collapse of the strata overlying the areas where the salt was saturated to provide 'natural brine': this has been practised from 1790 to the present and is still likely to affect the towns named and various areas outside them. In some cases small sinkholes appear, 20 ft. across and a few feet deep: unfortunately this has happened in central Northwich, where all the houses and shops are built within a steel framework capable of being restored to equilibrium after sinking. In 1911, the Salt Union established its plant at Weston Point, Runcorn, deliberately choosing a site not liable to subsidence: the main industry in Northwich is now chemicals. No building is possible immediately to the north of the town, and the flashes are now used for the disposal of lime-waste from the chemical works. Large areas close to the town centre are useless as building sites and the suburbs are housing estates in the neighbouring countryside. The modern method of brine-pumping, practised since 1935, is to send water down boreholes at high pressure so that salt is dissolved in chambers of limited size: so far there is no evidence that subsidence is caused by this method.

DERELICT LAND

Every industrial district has some derelict land, but nowhere is it more conspicuous than in the Black Country, where until recently it covered at least one-eighth of the total area. A journey from Wolverhampton to Birmingham by any route gives an excellent picture of its variety, but already much of it is being levelled by modern machinery of monstrous power, and transformed into sites for housing estates, factories or parks. Devastation is due to the long and distinguished industrial history, for the land has been spoiled by the extraction of coal and iron, and the abandonment of various industries in an area which has run through a wide range of enterprises. In the narrow middle and

upper sections of the South Wales mining valleys some old pit-heads have been levelled and turned into factory sites or used for parks and recreation grounds. Even so, the main trading estates of South Wales are all on the fringes of the coal-field (see p. 150). Tyneside has a number of areas of derelict land, especially on the sites of old chemical works and coal-mines. At Jarrow, for example, the Bede trading estate was made on land formerly used by a chemical works, and within five years, eighteen factories with 1,600 employees were built. But such schemes may be expensive: at Ince-in-Makerfield, near Wigan, the only large area available was the old steel works of the Wigan Coal and Iron Company; the cost of preparing the site was estimated to be at least £1,000,000 including the clearance of subterranean brick flues and a variety of cavities. Even so, attention is naturally given to derelict land as possible sites for building and recreational facilities, if only because the claims of housing on agricultural land are already so heavy. And in the Black Country local authorities have used several thousand acres of derelict land for housing. On a smaller scale, there are in all industrial areas numerous instances of the use of derelict areas for open spaces as well as for building.

TRADING ESTATES

In the previous pages, mention has been made of various industrial problems and especially of the spoliation of land through various forms of extractive mining. The worst areas of dereliction may exist in the most prosperous industrial districts, as for example in the West Midlands conurbation; equally they may exist in a coal-field where pits have been closed, either because their coal is worked out or—not uncommonly these days—because a number of small pits have been combined into a new large modern colliery. The human problem of the industrial area is quite another matter: after the Depressed (Development) Areas were named in 1934, trading estate companies were founded in these areas, provided with services attractive both to existing industrialists and to those beginning new concerns.

The idea of the trading estate was not in itself new, for the oldest in Britain, and still the largest, is Trafford Park, Manches-

ter, laid out from 1896 when the Ship Canal was recently completed. The second was at Slough, Buckinghamshire, begun in 1920, when industrialists were beginning the colonization of Outer London actively: like other estates of later establishment, Slough used a War Department site close to a main railway line. As trading estates have been established for private profit, the government-sponsored enterprises have an economic precedent; but they were located in areas not generally regarded as attractive to new industry.

Inherent in the conception of a trading estate is the separation of home and workplace. The Trafford Park estate was provided from the beginning with railway lines, still used for goods traffic, and tramways now abandoned in favour of bus services. At Slough in 1922 one siting attraction was the Great West Road and another the main line of the Great Western Railway, which had a special estate station closed only in 1956. When the other estates were founded, from 1936 onwards, motor-buses and lorries were the main means of transport, though some estates also used railways. The mobility of workers had greatly increased. A roadside location is naturally favoured under present conditions: indeed, W. Ashworth comments on arterial roads

> 'it became normal for a large proportion of the frontage of these roads to be occupied within a few years by factories. The principal commercial firm constructing trading estates in the London area located every one of its estates beside an arterial road.' (*The Genesis of British Town Planning*. 1954, p. 211.)

Estates were founded in 1936 both in South Wales and in Tyneside, in Clydeside (at Hillington) in 1937 and in West Cumberland in 1939; in addition, help was given by the government to smaller groups of factories or even to a single factory in the Development Areas. As a general result of this policy, many places have industries never previously known in the area: on the five main Welsh estates and the other factories, there were 58,000 employees in 1953, but about 63,000 in 1963, divisible into groups as follows: paints and chemicals 3%; electrical engineering 31%; vehicles and other mechanical engineering 26%; textiles and dress 20%;

others 19%. In the north-east, mechanical and electrical engineering are both strongly represented among the new enterprises but there are also clothing factories and even cotton spinning at the Hartlepools estate. Study of the lists of firms in these areas shows that many long-famed names are represented and that a number of widely known products, such as Dunlopillo or new synthetic fibres, are manufactured here, In many cases an expanding firm has welcomed the chance of settling on a new trading estate: equally a number of new enterprises have been attracted by the facilities provided.

The North Eastern Trading Estates Company was formed in May, 1936, and in 1960 became part of the Industrial Estates Management Corporation for England, for which the headquarters is at Team Valley, Gateshead. Team Valley was a site of 700 acres, of flat, poor agricultural land of no charm or interest: but the Great North Road, the main railway line from London to Edinburgh, the nearness of the Tyne ports were all locational advantages that, combined with the availability of labour—especially of women and girls—made the site economically promising. A master plan for the estate was laid down by Sir William Holford with good roads, factories of simple but attractive design, flower beds and trees, and sports facilities for works teams. By 1963, there were over 100 firms with some 15,000 employees, of which 37% are in light engineering, 15% in clothing and textiles, and 9% in electrical equipment. Thirteen other trading estates with 31,000 workers have also been established, with eight group sites for more than one factory and fifteen single-site factories: in all, these enterprises with Team Valley have some 69,000 employees. Three-quarters of all the workers are concerned with light engineering, electricity, or clothing and textiles. The need for new industries is by no means satiated and publicity on behalf of the north-east is wide-spread: the attractions of the Hartlepools, which has had a trading estate since 1946, are constantly brought before readers of *The Times* Personal Column. But the real need is for the entire reorganization of the north-east as a social, economic and administrative region.

Wales has five major trading estates and a large number of new factories on single sites or in small groups. In 1963 there were some 63,000 workers with estates at Treforest (12,010), Hirwaun

(4,060), Bridgend (5,410), Swansea (5,030) and Wrexham (3,400); the remainder, more than half of the total, were in factories dispersed through the mining valleys. Twenty factories have been sold outright to their proprietors and sixteen more are being purchased or are held on premium leases: the figures of the total employment in these factories are not included in the 63,000 noted above. The first trading estate was established at Treforest in 1936 on a stretch of level land in the Taff valley, and the three others of South Wales, at Swansea, Bridgend and Hirwaun, are former war sites. All are on level land: Bridgend is on the lowland south of the coal-field, Hirwaun at the head of the Taff valley and Swansea on the edge of the town. Within the valleys, level land is limited, and in some places old tipheaps have been levelled to provide sites, as at Porth where zip fasteners, cardboard toys, showcards, kitchen cabinets and window frames are made. At Treorchy in the Rhondda valley there is a clothing works with over 1,500 employees, and electronic engineering, and Merthyr Tydfil has factories providing washing machines, perambulators, electric lamps and television sets, steel pressings and sheet metal, buttons, toys, and fancy goods, cakes and confectionery.

At Wrexham the trading estate was established on an old war site to provide employment to replace mining as the coal is gradually exhausted. In all the site covered four square miles, but almost three-quarters of it was returned to agricultural use. Some 678 acres remained of which 280 acres were allocated to Celanese, which employs 1,200 people here, three-quarters of them men and boys. Over 280 acres there are factories for pharmaceutical products, surgical textiles, prints and varnishes, tables and electrical goods: there are also warehouses for wholesale dealers and for the Ministry of Agriculture. Some 39 acres are used for housing, and 42 acres for roads and rail sidings, the latter to be removed shortly. For future development there is a further 73 acres, of which over half has been cleared of its wartime erections. The effect here is to forestall the decay of a mining area.

In other areas, comparable, if not necessarily identical, developments have been seen. West Cumberland received a number of new factories shortly before the 1939–45 war, but its present significance lies partly in the development of atomic power. Central

Lancashire has some small trading estates, for example at Wigan and St. Helens, but there is also plenty of work available in places outside the Development Area though within travelling range, such as the new collieries to the south, the steel plant at Irlam, the engineering and chemical works at Warrington and the motor-works at Leyland. In the north-east Lancashire development area a number of new industries have been attracted, partly by the ease of acquiring premises. Many towns have continued their long-established policy of attracting industry, as for example at Liverpool in the Aintree and Speke estates, or at Manchester, where the new Wythenshawe estate has land allocated and increasingly used for industry.

CHAPTER VII

NATIONAL PARKS

> 'Large tracts of uncultivated mountain and moor land in Scotland, formerly depastured by sheep and cattle, have of late years been stocked with deer, and attempts have been made to deprive Her Majesty's subjects of the rights which they have heretofore enjoyed of walking upon these and other tracts of uncultivated mountain and moor for purposes of recreation and scientific or artistic study.' (Lord James Bryce, 1884, in the preamble to the Access to Mountains (Scotland) Bill.)

LORD JAMES BRYCE'S bill was not passed but his hopes were met two generations later. Britain is fortunate in the range and variety of its landscapes : if one were to look for the fullest contrast from the Scottish Highlands, it could be found in Romney Marsh. Its flat green fields, the drains beside them, the pebble ridges on which sheep graze sparsely, the villages clustered round noble churches, the canals built as part of a defensive scheme against Napoleon, the lines of trees marking every skyline, and above all the great bowl of the sky, which exists everywhere but seems more apparent in flat districts, all these features will give pleasure to some but will seem merely dull to others. To some the flat, richly cultivated fields of the English fenlands are a source of delight ; to others they seem dull. And the author remembers with pleasure a distant view of the river Shannon, seen from a country road in Co. Roscommon beyond fields with wooded hedgerows—but few would think it anything but 'ordinary' except perhaps on a sunny afternoon. Even the appreciation of scenery is an acquired taste. The eye for beauty does not normally exist among young children ; it is not as instinctive as, for example, the love of exercise.

Mountains are loved by many people but by no means all, as

to some they represent danger and even a narrowing of the range of view. To the psalmist they were the eternal hills, the place of light and refreshment above valleys dangerous alike in heat and in shadow: a man's enjoyment of mountains may be at once aesthetic and athletic. Many who live in areas of great beauty long for the vivid life of large cities, partly because they have ceased to care for the familiar and partly because they are in vital need of social stimulus. Most of the climbers of mountains are townspeople; organizations such as the Youth Hostels Association, the Scout and Guide movements, have brought thousands to mountains, and bodies such as the National Trust have worked for years to open ways through the mountains of Britain. The governmental imprimatur was set on such activities by the National Parks Act of 1949, which unfortunately does not apply to Scotland.

For some, scenery means little unless the human interest is present also. A Scotsman in the Highlands may deplore the ruined crofts on the hillside, seeing in them the withdrawal—probably to congested towns—of proudly independent people. Many who know the west of Ireland think that the white farmhouses on the hillsides add much to the attractions of a land lovely to the eye, and Ruskin even looked favourably on a railway line as a feature of a landscape. In a well-cultivated agricultural countryside the attraction lies in the field-pattern built up during centuries, the houses, lanes and trees made by past generations. In East Anglia the villages and their churches, the market towns, the windbreaks round the farms, the deep-red brick farmhouses all belong to the English tradition. Even in Norwich, significant as its industries were and are, the visitor feels that he has gone back into an earlier, more truly agricultural England—and for those whose background is industrial such an experience is rewarding. In Great Britain, many countrysides, with their villages and towns, have a personality of grace and charm which should be retained by wise planning: of such landscapes it would be fortunate if one could say, with a certain optimistic hymn-writer, 'The changes that are sure to come I do not fear to see'.

For over sixty years the National Trust (1895) has done excellent work by the preservation of countrysides, both in mountainous and lowland country, of historic monuments such

as castles, of villages and even of individual houses. It has opened woods and mountain peaks for walkers and has acquired powers for the protection of areas against exploitation. With only a small income, it has had to maintain its work on a sound financial basis, and the need for such work remains. But the National Parks Act is designed to deal with areas of considerable extent, normally some hundreds of square miles, chiefly in mountains, but also including coasts such as those of Pembrokeshire and Cornwall, or possibly inland watercourses such as the Norfolk Broads. And variety is an essential characteristic of British scenery : the Norfolk Broads are made the more attractive by their surroundings of rich farmland with old villages ; Snowdonia has its valleys with waters travelling rapidly to the sea as well as its lakes, and its mountains like those of the Lake District may afford views of surrounding lowlands and of the sea. Contrast is of the essence of fine scenery. In many mountain areas, too, the green sward of improved valley pastures contrasts attractively with the darker colours of the moorland, whether heather, bilberry or grasses, and on the highest continuous area of land in Britain over 4,000 ft., the Cairngorms, massive slabs of granite with a sparse arctic-alpine vegetation remind the traveller of the variety possessed by our mountains.

THE ECONOMIC VALUE OF MOUNTAINS

Some writers on the countryside appear to take the view that the economic aspect does not matter : but mountains have certain resources of national value. If the extent of poor quality mountain and moorland is taken as an approximate indication of the country's mountain area, the question becomes the right use of 9% of England, 34% of Wales and 68% of Scotland. The possible uses of this area, in all some 25,811 sq. miles (18,753 sq. miles in Scotland), include recreation, agriculture, forestry, military training, mining and quarrying, water supply, hydroelectric construction, and game shooting or trapping. Two or more of these uses may be competitive, such as agriculture and forestry or game preservation for the enjoyment of the few against recreational use by many. And assessment of the general interest of the local

community, or of the nation as a whole, may suggest different policies in comparable areas: for example, the National Parks Commission does not favour the construction of additional power stations in Snowdonia, though in the Scottish Highlands hydro-electric schemes are being constructed and expanded year by year (see pp. 168–9). There can be no universal directive: each case must be considered on its merits.

RECREATION

This use is essential to a nation having four-fifths of its population in towns, most of them in large towns. The need for such a national park as the Peak District is all the greater because it has the Yorkshire coal-field to the east, the Nottingham and Derby industrial areas to the south and the Manchester conurbation to the west. The young men from Sheffield who in 1932 organized a mass trespass over Kinderscout, some of whom were imprisoned, are now regarded kindly by most people and with admiration by some: they are even mentioned in government pamphlets. All this mountain is now open, and the Pennine Way begins its course over its summit. It is not unreasonable that the inhabitants of mountain areas should profit from catering for visitors; the need is for control of garish tourist developments.

AGRICULTURE

Farming may be competitive with reservoir construction, with hydroelectric schemes or with afforestation. In the case of Thirlmere (p. 163), Manchester's need for water meant the removal of sheep farms and the spread of forests: in Ennerdale (p. 163) flocks of sheep gave way to trees. In the Scottish Highlands (pp. 168–9), water for power stations has submerged some good farmland. If a forestry plantation covers a hillside above the level reached by farming, then it may remove the summer feed on which the farmer depends for pasturing his sheep (see p. 157). But sheep farming has its critics: sheep do not tread out bracken,

which may invade hill-pastures and cause their decay: and in some areas gorse and brambles also colonize open ground easily. And sheep graze selectively with the result that mountain pastures cannot retain their value indefinitely: L. D. Stamp has said that 'the main problem area' is 'the great mass of moorland and rough grazing covering . . . a third of the whole country'. Of this only one-third is suitable for forests, but some of the rest could be improved as hill-grazing.

FORESTRY

Advocates of afforestation sometimes assume an apostolic air and point out the known national need of timber, the degeneration of many upland pastures from an improved to a rough state, and the possibility of providing employment on a scale greater than that given by farming. A recent Scottish estimate is that one forester is required for each 100 acres, compared with one worker for each 2–3 square miles of sheepwalk: in the National Forest Parks, such as Glen Trool in the Southern Uplands, or the Argyll and Queen Elizabeth forests in the Highlands, there are new settlements for the workers. And a further possibility is saw milling, especially if electricity is available (see also pp. 168). It may be wise to restore vegetation on hillsides liable to be eroded by rainwash or storm gullies once the protective tree cover, a natural binder of the soil, is removed. Forests such as Rothiemurchas, on the north side of the Cairngorms, apparently never cleared and extending to an altitude of 2,000 ft. on glacial sands and gravels, have at once great beauty and great value; on the other hand, the sheep runs of the Lake District and many other mountain areas have a clear economic value also.

MILITARY AREAS

It is to heathlands that the Services naturally turn for suitable training grounds: already this problem has come before the National Parks Commission, for example in places on the Cornish coast. A comment on Dartmoor is given on p. 167. To some a far

more serious problem is the slow progress made in clearing up wartime dumps and in the rehabilitation of derelict airfields.

MINING AND QUARRYING

Though these activities have scarred mountain areas from Roman times onwards, mineral extraction is now a localized problem. The major upland coal-field, South Wales, is perhaps beyond redemption in a few generations, but in other areas, such as the Lake District, the effects of past quarrying and mining have been softened by the weathering of detritus and the growth of vegetation. At Honister Pass, in the Lake District, a slate quarry still operates; and there is some highly successful limestone quarrying in the Pennines, notably near Buxton and in the Dove valley of the Peak District, and between Ingleton and Hawes on the west side of the Dales national park. It was from local quarries that the fine building materials of mountain areas were hewn. The Hobhouse report advised that new mineral workings, or extensions of existing ones, should be allowed 'in cases of proved national necessity'. Many applications for new quarries have been refused.

WATER SUPPLY

The use of mountains as gathering grounds for water supply is inevitable: for example, all the Millstone Grit moors of the Pennines are now used for gravitational water supply, meeting the needs of some eighteen million people. In the Millstone Grit series, the shales and hard impervious gritstones give an abundant surface run-off, and the spring waters are made purer by the filtration through coarser-grained and more porous grits: further, the thick peat deposits act as a sponge storing water, and making the yield reasonably regular. But many claim that reservoirs with their dams, their bare mud patches in times of drought and their plantations of coniferous trees, are an ugly element in the landscape. Similar objections are raised to the works associated with hydroelectric schemes. At the same time, it is apparent that water

supplies for large towns, especially in the north of England, can only be found by using the same waters that made the textile industries successful here (see p. 129), and that it is not surprising that Manchester should need extra supplies from the Lake District, or that Liverpool's major source should be Lake Vyrnwy, on the east side of the Berwyn range. The whole problem is well seen around Thirlmere, where farmsteads have been replaced by coniferous woods, mountain streams directed into concrete troughs and the population of Wythburn parish, as a notice in its parish church reminds wayfarers, reduced to sixteen persons.

HYDROELECTRIC SCHEMES

In the major mountain areas of Europe, the Alps and the Scandinavian peninsula, water power has been the basis of a profitable measure of industrialization. An area of constant emigration, the Scottish Highlands is generally regarded as in need of economic rehabilitation: the first big power stations were built to supply electricity to aluminium works, but so far the industrial developments have been limited. The North of Scotland Hydroelectric Board, founded in 1943, has the aim of financing the uneconomic cost of distribution in the Highlands by the sale of electricity in the Lowlands (see also pp. 168–9).

GAME

Of the more sporting mountain uses, grouse breeding in the Pennines is not competitive with sheep-grazing, and local walkers regret only that the grouse season is heralded by a rash of barbed wire and efforts to close tracks. But deer and sheep are almost mutually exclusive: some 17% of Scotland is in deer forest and only some 62,000 sheep are kept within this large area. Not all the deer forest could be profitably used for sheep—two-thirds of it is over 1,000 ft. high—but some of it could be given to pastoral agriculture. The main increase in the area of deer forest was noted from 1850 to 1912: between 1912 and 1938 fourteen deer forests, covering *c.* 238 sq. miles, were restored to pastoral and other

uses, including forestry, and there has been a further decline since then. They still, however, cover two-fifths of the entire area of Aberdeenshire and almost half Ross and Cromarty. The shooting season is short, chiefly in September and early October. Under present conditions it is unlikely that the area under deer forests will increase.

NATIONAL PARKS

The Hobhouse report of 1947, the fourth of a series which advocated national parks, laid down the major principles of their use and development. These were, first, that the characteristic landscape beauty should be strictly preserved; second, that access and facilities for 'public open-air enjoyment' should be amply provided; third, that wild life and places of architectural and historic interest should be protected; and fourth, that established farming must be effectively maintained. The three main qualities of a national park are its great natural beauty, its high value for open-air recreation and its substantial continuous extent. Areas such as the Mendip Hills, the Malverns, the Pentlands, and many more, are hardly of sufficient extent to rank as national parks, though they are not less in need of protection against undesirable changes by shrewd local application of planning legislation: areas such as the Peak District, surrounded on three sides by industrial areas, rich in limestone quarried for chemical and other works, and within the outer suburban zone of great cities, need national protection. The parks are variously administered. The Peak District has a joint board of four counties, with its own planning officers, but in the Lake District, though there is a joint board, planning is administered by the offices in Lancashire, Cumberland and Westmorland. No joint board has been established for the Yorkshire Dales, Exmoor, Snowdonia and the Brecon Beacons, all of which lie in two or more counties, so that these four parks are administered by separate committees of the county councils, whose activities are co-ordinated by Joint Advisory committees without executive powers. All these bodies include government nominees chosen for their general interest in the National Parks. Their real problem is to find time for

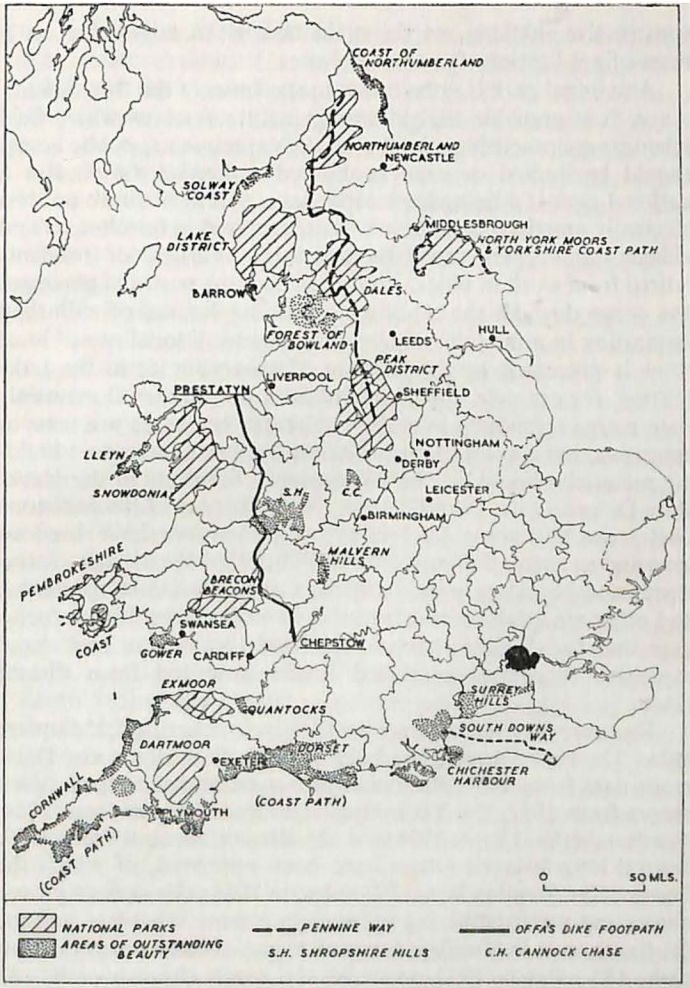

FIG. 8. *National parks and areas of outstanding beauty*

The ten national parks are shown with the coast paths, the Pennine Way, and the Offa's Dyke route. The areas of outstanding beauty are discussed on p. 168.

constructive thinking, as the main task is to adjudicate on a mass of applications for new land uses.

A national park is not a museum specimen of the British landscape. It is arguable that in certain nature reserves where field scientists are practising a long series of experiments, public access should be limited or even prohibited at certain times. But a national park is a living landscape, having its agriculture not less efficiently practised because guests are received in farmhouses and village shopkeepers profit by supplying tourists, or residents retired from work in cities. The most obvious past disfigurement has come through the addition of staring houses of suburban inspiration in mountain valleys where the traditional use of local stone is prevented by the expense of quarrying it: in the Lake District, for example, the houses of dark purple-grey Borrowdale slate merge splendidly into the landscape, but these are now so expensive that a compromise solution has been necessary: building materials should not be incongruous. Similarly in the Yorkshire Dales and the Peak District, the sandstones of the Millstone Grit series and some Carboniferous Limestones have been so long and so successfully used for building that the villages, farmsteads and boundary walls harmonize into the landscape: brick and other materials appear intrusive in such places. It is unfortunate that fine building stones, quarried locally, are now more expensive than mass-produced bricks imported from distant places.

There are now ten national parks (Fig. 8) covering 5,254 square miles. The Peak District, the Lake District, Snowdonia and Dartmoor date from 1951, the Pembroke coast and the North York moors from 1952, the Yorkshire Dales and Exmoor from 1954, Northumberland from 1956 and the Brecon Beacons from 1957. Several long-distance routes have been approved, of which the first was the Pennine Way, 250 miles, in 1951: this crosses grouse moors and water gathering grounds in places. What has become the South-west Peninsula coast path began with the north Cornish path, 135 miles in 1952, to which the south Cornish path, 133 miles, was added in 1954: there was an extension into south Devon, 93 miles, in 1959, and Somerset with north Devon, 82 miles, in 1961. A further extension in Dorset (1963) added another 72 miles to the 443 miles already approved: eventually there will

be a continuous coastal footpath from Minehead to Studland. The Pembrokeshire coast path of 167 miles was approved in 1953 and the Offa's Dyke route, 168 miles, in 1955. There are also proposals for opening walking routes in north Yorkshire and on the crest of the South Downs. Many difficulties have arisen in defining these routes, such as the inevitable conciliation of landlords in the case of Offa's Dyke, and the severe erosion at places on the south-west coast. Parts of the routes are well known already: others, even in Cornwall, are as yet visited by few people.

Some of the country's greatest problems of planning are found in coastal areas: North Wales, for example, has a number of ugly caravan communities and holiday camps, and groups of shacks, cheap bungalows and huts disfigure many fine stretches of coast elsewhere, notably in the south of England. Peacehaven, on a fine site on the South Downs, is generally regarded as the classic example of hideous opportunism that failed because the expected residents never came in sufficient numbers: much the same type of partial growth is seen near Dungeness, where cheap inter-war bungalows are scattered beside concreted roads. In these and other cases a town failed to grow and a travesty of a town remains. Many little-known coasts are equal in beauty to those so greatly spoiled: the example of the ruined sections of the south coast is at least a warning of what could happen elsewhere. In South Wales, the Gower coast has some splendid cliff scenery, chiefly of intricately folded limestones, and the coast between the Ogmore and the Ely rivers has an interesting mixture of cliffs and deep valleys. Other examples could be given: a word must be said for the protection of areas of sand dune and salt marsh, attractive especially to lovers of bird life and students of vegetation.

The *Lake District* national park covers an area of 866 sq. miles. Nowhere else in England is there such a variety of scenery within so small an area: from the centre of the mountains, rivers radiate outwards through valleys deepened by glaciers and made spectacular by lakes. Sheep-farming in the valleys and on the mountain pastures gives to the area a human interest greater than that of many parts of the Scottish Highlands, but some famous flocks, for example in the forested Ennerdale and Duddon valleys,

no longer exist as plantations cover the hillsides. Wordsworth said of forestry plantations that 'their sombre uniformity, the hard edges where they meet the natural hillsides, and their general air of regimentation, are always out of harmony with the landscape of this country'. In the Lake District, much can be seen from the valleys, even by those who travel on the coach tours or use the railway steamers on Windermere, or the launches on Ullswater or Derwentwater. There is reasonable access to the inner areas for all types of travellers, and the paths to the mountain tops are well trampled by the boots of countless walkers. The glare of tourism has entered little into the heart of the Lake District but in the major centres, Ambleside, Grasmere and Keswick, it is obvious.

The *Peak District* is so close to expanding towns that it might easily be ruined. Two main types of scenery are represented: first the shale and grit country of the Edale moor country and secondly the limestone country farther south, drained by the Derwent and its tributary the Wye, and, to the south of Buxton, the Dove and the Manifold. In the first of these the upland is the main attraction ; in the second the valleys. Both in the valleys and on the hillsides there are splendidly built stone houses and fine stone walls, gritstones in Hathersage or Edale and limestone in Winster, Monyash and Tissington. Alien building materials are discordant though less expensive than those of local origin. In the Edale valley, four-fifths of the occupied population is employed in industrial enterprises, chiefly in cement works and limestone quarrying: the essential problem is to maintain the rural scene with a localized industry. As there is enough accessible limestone to last for several generations there is no need to open fresh quarries. The main problem on the mountains has been access to grouse moors, but Kinderscout, the finest stretch of rough walking country in the Peak District, has now been opened: its attraction lies in the vastness of its peat-covered plateau surface, nowhere higher than 2,088 ft., cut by deep gullies on all sides. It is ironic that the name 'peak' should be attached to an area of 542 square miles whose main feature is a large plateau.

The *Yorkshire Dales* park, some 680 square miles, lies in the Central Pennines between the Aire valley and the Stainmoor gap. Only the upper and on the whole more scenically striking parts

of the dales are included: the boundary runs from a point north of Skipton east across Wharfedale to cover the whole of upper Wharfedale but no part of Nidderdale, and then crosses moorlands to the Aire west of Leyburn and the Swale west of Richmond. The park boundary passes south of the main road from Barnard Castle to Brough, includes Sedbergh, swings south to exclude Ingleton, Settle and Skipton. Much of the scenery is far more attractive than that of the southern Pennines, and includes some fine peaks, notably Whernside, Ingleborough and Penyghent, the famous 'three peaks' loved by walkers in the Ingleton area, and Great Whernside—all *c.* 2,300–2,400 ft. high. Its scenery is varied too, for there are expanses of limestone country, including limestone pavements on the lower flanks of Ingleborough, a varied range of Yoredales, limestones, shales and sandstones weathered into terraces, and Millstone grit caps on several of the peaks, notably on Ingleborough itself. The varied component rocks of the Carboniferous series can be well seen in this area: the limestones have in places not the dramatic bareness of the pavements (karsts), but a covering of sweet green turf, forming good sheep country, and the sandstones and shales are partially masked, like the limestones, with soils of glacial or fluvioglacial origin, forming good cattle country. In general the upper parts of the valleys have sheep farms, the lower dairy farms; and the stone houses and walls have the Pennine solidarity of form. Many of the villages are completely unspoiled; others, such as Ingleton, just outside the park area, have been agonizingly commercialized. Quarrying is not now a serious menace to the appearance of the area and mineral exploitation in the future seems improbable.

The *North York Moors*, an area of Oolitic and Liassic limestones, consist of fine open heath country, some 1,200–1,400 ft. high, penetrated by deep, well-wooded valleys: to the west, the Hambleton hills rise as a sharp ridge above the Vale of York. The main economic resource is the phosphoric iron ore discovered—or more probably rediscovered—in 1849 in the northern part of the area commonly called the Cleveland hills. This was one of the factors leading to the growth of Middlesbrough as an iron and steel centre, but the mining is now extinct. Once past the mining area, which has some dreary industrial villages, there is no

break in the moorland landscape with grass farming on the hill-slopes and in the valleys. The limit of the area (553 sq. miles) designated as a national park follows the hill edge from Claughton, north of Scarborough, past the lowland towns of Pickering, Helmsley, Thirsk, Stokesley and Guisborough, to Staithes: all the coast, some of it having steep cliffs and striking bays, is included except for Whitby and its immediate environs.

Snowdonia is a national park on a grand scale, comparable to the Lake District. The slate-quarrying areas of Bethesda, Llanberis, Nantlle and Blaenau Festiniog, disfigured beyond early redemption, are excluded: less obvious but equally serious blots are the smaller quarries which scar the mountainsides and choke ravines. The area has all the ingredients of great scenery—high mountains made craggy by a mountain glaciation, lakes, woods and swift-running streams flowing through deep but widening valleys to the sea. The park covers 845 square miles from Snowdon to Cader Idris; some of it is well known to tourists, but some is less familiar if hardly less attractive. The Ardudwy sand-dune coast between Harlech and Barmouth is included within the park and will therefore be protected against the type of development seen along the North Wales coast.

Exmoor (265 sq. miles), designated a national park in 1954, has nearly thirty miles of wooded cliffed coast between Minehead and Ilfracombe, broken only at Porlock and Lynmouth. Swift-running streams drain the northern uplands, of which the highest is Dunkery Beacon (1,707 ft.): the phenomenally heavy rainfall in the Lyn valley on 15 August, 1952, up to 9 in. within twenty-four hours on the north and north-east slopes of Exmoor, and the partial destruction of Lynmouth drew attention to the dangers of siting a village in so vulnerable a situation (see also p. 53). South of Dunkery and the main Exmoor ridges, tributaries of the Exe drain southwards through wooded valleys having sheep farms: thinly populated and essentially agricultural, this southern part of Exmoor is remote from the main currents of English life. On the north side the dangers of unharmonious development are considerable, but so far, apart from some modern building at Porlock, the problem is not acute.

Dartmoor (365 sq. miles), a granite upland with its highest 'tors' at just over 2,000 ft., was regarded by the writers of the

Hobhouse report as gaining 'by contrast with its surroundings an appearance of height, wildness and extent even greater than the evidence of . . . contour lines suggest'. The fertile, warm countryside around it, with wooded valleys, pleasant irregular villages, and hardy-looking farmsteads near the limit of settlement, gives place to a moorland as spacious as any in England. The 'tors', weathered into fantastic shapes, crown summits of no great altitude: all the tin-working has ceased and the main problem now is the use of the moor for military purposes. It is perhaps inevitable that on certain days visitors approaching Yes Tor from Okehampton should be welcomed by a sign inviting them to enter the national park, only to be turned back a hundred yards farther on by red flags giving warning of firing on the slopes leading to Yes Tor.

The *Northumberland National Park* (398 sq. miles) extends from the north side of the Tyne valley close to Haltwhistle to the Border, including the Cheviot range: it is bounded on the west side by the Kielder national forest park. Like the *Brecon Beacons Park* (515 sq. miles), it is remote and known to comparatively few visitors. This Welsh park has some fine fishing streams, and a number of historic monuments as attractions. In it are reservoirs for Cardiff, Newport and Swansea.

Each of the national parks has its own individuality: each its own problems. If the Blaenau upland of South Wales had been designated a national park a century ago, would the commissioners have protested against the development of iron and coal mining? The Hobhouse report mentions Hull's possible reservoir in Farndale as a 'threat' to the North York moors: and Manchester's use of Thirlmere and Haweswater in the Lake District is deplored by many people. The need for more water led Manchester to ask for Ullswater as a reservoir, but vigorous and sustained protests followed. The National Parks Commission has already protested against the addition of further power stations in Snowdonia (besides those at Dolgarrog and Maentwrog) and similar developments in the Lake District would no doubt raise vigorous protests. And strong objections have been made to the construction of overhead power cables in Lake District valleys, such as Borrowdale, Patterdale and Langdale, with the result that the main cables are laid underground, at greater expense it is true, and the surface works are discreetly located.

AREAS OF OUTSTANDING BEAUTY

This term is applied to areas in need of careful preservation and development. Some are of small extent, such as the 40 square miles of the Malvern Hills, and others, such as west and south Dorset, 400 square miles, are as large as some of the national parks. The first area to be designated was the Gower peninsula (73 square miles) in 1956. Having a fine coast, some interesting valleys and sandstone ridges, with some archaeological remains of significance, it resembles Pembrokeshire but is far more accessible to the people of industrial South Wales. In 1957 the Quantock hills (38 sq. miles) and the Lleyn peninsula (60 sq. miles) were added, with the Surrey hills (160 sq. miles), the Northumberland coast (50 sq. miles) and Cannock Chase (26 sq. miles) in 1958. In 1959 the small Malvern Hills area was designated, with three much larger areas, Dorset, the Shropshire hills (300 sq. miles) and Cornwall (360 sq. miles). The Dorset area is not dramatic scenically, but has been described as a 'pleasantly varied landscape with many attractive villages, downland and heath, and a fine coastline from Lyme Regis to Poole Harbour.' The areas in Cornwall, a county whose chief glory lies in its coast, include much of the Land's End peninsula, the whole of the Lizard peninsula and Bodmin Moor. Stretches of fine coastal scenery in south (128 sq. miles) and north Devon (66 sq. miles) were added in 1960. In 1962 east Hampshire (151 sq. miles) and in 1963 east Devon and 73 sq. miles of the Isle of Wight were designated. In 1964 three more areas were added: Bowland Forest, 310 sq. miles, mainly moorland, Chichester Harbour, 29 sq. miles, chiefly reclaimed or natural salt marsh beside good sailing waters, and 41 sq. miles on the attractive Solway coast.

ELECTRICITY IN THE SCOTTISH HIGHLANDS

It is estimated that Scottish water powered stations already save some 2,000,000 tons of coal a year, supply all the needs of the Highlands out of the 3,250 million units a year and leave a surplus for export to Central Scotland of 1,000 million units a

year. Eventually, it has been estimated, Highland lochs and rivers could produce over 6,000 million units of electricity a year, one-seventh of the amount now consumed in Britain. Further, these schemes make possible a limited industrial development: the oldest in the Highlands was at Foyers, beside Loch Ness, built in 1896 for aluminium smelting: a better-known station at Kinlochleven, 1907–9, at the head of a loch with deep water for shipping, is now surrounded by an aluminium-producing town. In the nineteen-twenties, a power company drove a fifteen-mile tunnel through Ben Nevis from Loch Treig to generate electricity for an aluminium works near Ben Nevis: the waters of Treig are now supplemented by those of Loch Laggan. Under the Grampian schemes, two great power stations supply towns in east Scotland and Deeside, including Montrose, Stonehaven and Ballater: the Rannoch scheme uses water from Loch Ericht and the Tummel scheme water from Loch Rannoch. At Clunie, where the rivers Tummel and Garry join, a new dam with a power station has doubled the size of Loch Tummel: after passing through the Clunie turbines the water goes to a new lake behind the Pitlochry dam and power station. To the north, in Ross-shire, a power station at Loch Luichart supplies power to Nairn, Dingwall and Dornoch; and there are several more.

Two features are notable here: first, power is supplied to the population of the mountains and the bordering lowlands to the east and, second, there has been a limited industrial development similar to that seen in remote places beside Norwegian fiords. Kinlochleven is not unlike Hoeyanger, an aluminium-producing town on a fiord tributary to the Sogne in Norway. Whether the creation of these isolated industrial centres is desirable must remain a matter of opinion but at least it helps to check the outward emigration from such areas. A less controversial matter is the supply of electricity to farms and to sawmills in an area that is partly a forest reserve. One could perhaps argue that the Highlands is so large an area, with so great a reserve of natural beauty, that if it is necessary to submerge part of a fine valley, as at Pitlochry, to implement a scheme, the sacrifice should be made in the national interest. The landscape in the Pitlochry area is largely man-made, with fine woods and fields, and the new lake is at least an expression of twentieth-century technology.

CONCLUSION

The national parks of England and Wales are not comparable with those in America where an attempt has been made to preserve a 'natural' landscape; the aim is rather to preserve an 'unspoilt' landscape. Some park boundaries are drawn just beyond towns, notably Buxton, Kendal, Scarborough and Minehead, yet some 260,000 people live within their bounds. Towns such as Keswick, Windermere and Ambleside, or Bakewell, villages and farmsteads with their fields and woods, form part of a landscape which is man-made rather than natural: neither agricultural nor forestry operations are directly controlled by the various local bodies or the National Parks Commission. True, much afforestation has been prevented, notably the covering of a large stretch of the North York moors by conifers. Some people want to offer compensation to farmers anxious to plough and enclose open land, as permitted under the Town and Country Planning Act of 1962; but provided that the improvement does not involve the loss of access by the public, new fields may be an aesthetic addition to the landscape.

Much more difficult, however, is the problem of works of national or local value that may be unaesthetic. The television mast on Dartmoor may be a blot on the landscape, but a boon to the people of the south-west. Manchester needs more water, not only for its own people but for those of many other towns, yet permission to use Ullswater has been refused. The use of water for power generation may become increasingly necessary, and some electricity pylons run across mountains, though in Borrowdale the lines were laid underground after a vigorous campaign in the press and elsewhere. It is surely in the national and especially the local interest that Milford Haven should become an oil port. Even so, the amenities of the parks must be preserved for visitors who, with varied interests, will become steadily more numerous year by year: one essential need is to find out who these visitors are, and why they come—to walk, to ride, to swim, as leisured motorists or as hardy rock climbers, as campers or caravanners.

CHAPTER VIII

THE CHANGING SCENE

PLANNERS are haunted men, having the perpetual fear that they may miss opportunities, partly through failure to recognize them as they arise. The rapid increase of town populations in Britain during the nineteenth century was a challenge to the ingenuity of legislators and administrators: to some extent they were aware of this challenge, though their main concern was to alleviate distress and discomfort by providing good sanitary arrangements and by making certain minimum standards of street width or house accommodation. Wide disparities of living conditions were accepted as normal and natural characteristics of society and the erection of artisan homes in long drab streets went on steadily. The enterprising man sank his capital profitably in houses, from which he drew rents not regarded as unreasonable. Some such houses today are so great a liability on their owners that they abandon them, and disappear. No doubt population growth was so rapid in places that speed of house construction outweighed all other considerations. The first efforts in slum clearance by local authorities were timid—but they showed the shape of things to come. Under the Artisan Dwellings Act of 1875 insanitary houses could be removed and replaced by others and various authorities repaired or demolished old houses and built flats as replacements. But the early municipal efforts now seem inadequate and many of the private ventures of philanthropic trusts are open to similar criticism.

It would be easy to dwell on the missed chances of the nineteenth century: in fact, there was a constant stream of government reports on such matters as the state of towns, and especially the health of the inhabitants, and on factors of industrial growth. Twentieth-century planners, confronted with the task of removing square miles of nineteenth-century artisan houses, have

naturally thought hard things of their builders; but the devastating impact of an increase of town populations from ten millions in 1851 to more than three times that number in 1961 could not be foreseen. The first impetus to slum clearance came from the need for new roads, railways, stations, warehouses, factories and other non-residential uses: Birmingham's two stations, Snow Hill (1852) and New Street (1854), were built partly on the sites of houses already old and insanitary. In other large cities, including London, Leeds, Liverpool and Manchester, central areas began to decline in population from the 1841–51 decade, owing to the need for land for many purposes. On pp. 105–15 some comment has been made on the changing land use of towns apparent at all times in varying degrees, but difficult to forecast. Some modern planners have tried to plan for sixty years, only to restrict themselves later to 'the foreseeable future' of some twenty years; the needs and desires of a town may change. In the nineteenth century many towns looked for a sewerage system or a gas works as a status symbol: now many of them want a university.

Historical perspective is necessary both to the geographer and the planner. On p. 85, reference was made to the types of town then recognizable in 1851, the ordinary market centres, the county towns, London supreme at all times, and the growing industrial centres. More recently Christaller in Germany showed a series of 'orders' of towns, based on their provision of services for their own inhabitants and the people of the countryside around them. In Britain, R. E. Dickinson, F. H. W. Green and A. E. Smailes have developed schemes of town classification based on similar ideas, in which the major regional centres stand out as a dominant group in the provinces. Such places are all industrial as well as market and commercial centres, but their strength lies not only in their very size and wealth but also in their provision of facilities for higher education, their newspapers, theatres, concerts, hospitals, and many other services that add comfort and distinction to the process of living. Some planners regard all such major cities with loathing, using for them words like 'Megalopolis', yet they are already the homes of too large a proportion of our people for such an attitude to be realistic. The 'million-city', as an American writer has called it, is a feature of the present age and the main need is to meet some of its undeniable problems.

Study of large cities shows that they all have some well-marked 'central business district', to use another American phrase. This will include the main shops, warehouses, banks, offices, entertainment facilities, retail and wholesale markets, and probably the railway stations and bus stations. It was the steady growth of this area that gave the first real impetus to nineteenth-century slum clearance, but entirely on economic grounds. The growth of suburbs from the mid-nineteenth century, that is during the railway age, has shown that as a town grows beyond a certain size, what planners now call subcentres will emerge naturally, but many of them are old village centres whose simple shops have been multiplied in number and in size. Planners designing subcentres are only meeting a need long since demonstrated in our towns. All goes well so long as allowance is made for unexpected human behaviour: a city street may become more prosperous or it may decline; in some northern cities, the arrival of a famous general store brought greatly increased custom to the shops in the area around it, and so enlarged the shopping centre, though there are also instances of city streets where the retail trade is obviously declining. During a planning enquiry in Manchester, some witnesses, arguing on doctrinaire grounds, said that a certain area could not be recognized as a subcentre as it was too near the city centre. In fact it was a prosperous shopping area because it had a strong departmental store, using the slogan 'It's worth a bus ride to So-and-So's'. Around this store, many other shops prospered, but only a short distance away prosperity was less apparent. But when this store was destroyed by fire, the owners did not rebuild on the same site, but found premises in the city centre. And from that time the surrounding shops began to decline.

The inevitability of population movement must be recognized. Several factors are involved, dominantly the need for decent housing for a nation of townspeople. Some of the problems likely to emerge have been discussed on pp. 93–8, with reference especially to the claim of the townsman on rural land. It cannot be too strongly stressed that the real key to the situation is not the increase of population by 5·3% (England and Wales 1951–61), but the far greater increase (21·3%, 1951–61) in the number of households. Even a stationary or declining population will require more dwellings, so long as the size of households diminishes: it now

averages 3·1 persons. The clamant need for houses should not blind planners to the fact that schools, social facilities, shops and transport are essential to the well-being of a new community from its beginnings. Similarly, the reduction of long journeys to work is possible only if any large housing scheme also has its own industrial estates where some at least of the residents will find employment.

Not infrequently, the decrease of population in the countryside arouses alarm and despondency. But this is not inevitably a bad thing; the desertion of some remote farms may mean that their inhabitants can find a more satisfactory way of living somewhere else, and some marginal lands may prove to be more productively used for forestry plantations than as poor pastures. Further, the mechanization of agriculture has made possible a reduction in the number of farm labourers employed, with an improvement in the living conditions of those who remain. Not the least of these improvements is the provision of new houses in and near villages, many of which replace old 'tied cottages'. More and more, the rigid line of division between town and country, equated respectively with industry and agriculture, blurs. Sugar-beet mills, dairies, agricultural processing factories, iron-mines, quarries, coal-mines are likely to be established in rural districts: some industries have been placed in villages as a clean atmosphere is beneficial. Under modern conditions of travel, this may strengthen villages as social centres without seriously disfiguring the countryside and allow the countryman and his family to choose from a reasonable range of employment.

The boom area of yesterday may well be the depressed area of today or tomorrow. Only to a limited extent is industry firmly rooted to one place by its raw materials and any trade depending partly on an export market may face constant dangers. In Lancashire, for example, cotton now has only one-third of its former labour force and in parts of the South Wales coal-field heavy unemployment and outward migration has been caused not by the exhaustion of coal but by the lack of demand for it. Many industries remain static in employment though expanding in productive capacity through rationalization for long periods of time, while others show an apparently unlimited power of expansion. Perhaps the most fascinating feature of the economic history of Birming-

ham and district has been its resilience to constant changes in demand, for some of its numerous industries are contracting and others expanding. What changes will be brought about by increased resort to automation it is difficult to foresee, but it need not of necessity involve any substantial redistribution of the population. And possibly the same might be said of the use of atomic power, though one makes such a comment with reserve. The real need is to watch the potential depressed areas, which in some instances has been done already as in the Wrexham area, where new industries have been introduced well in advance of the anticipated exhaustion of the coalfield.

All regional study leads to a recognition of the rich variety of our country. Fundamental to such study is the wide range of physical features in lowland and upland alike. The preservation of recreational areas as national parks or 'areas of outstanding beauty' involves the control of their land use so that economic advantages do not mean scenic ruin. Site selection by altitude and nearness to open country for houses of various types is a long-established practice, well known to Mrs. Beeton almost a hundred years ago, and it still operates. On the coasts, much has been learned from the abundant and unsightly examples of 'development' during the inter-war period. Although certain rural areas have obvious attractions, other countrysides are equally interesting, and possess a charm that some people will appreciate. Study of local geography in the field inevitably leads to a more appreciative understanding of any landscape: those who, like the author, have led groups of students and teachers on excursions will realize that many can be thus interested in the countryside and its problems. The immense increase in the productivity of agriculture has improved the appearance of the countryside, not least by the addition of cropped fields in areas formerly used almost entirely for grass. But it is hard to see how the housing needs of our townspeople can be met without some sacrifice of agricultural land. However, if Best and Ward (pp. 66–8) are right in their assessment of the productivity of the suburban garden, then the loss of food, at least, is not a serious problem.

Of all the social and economic revolutions that have affected, or may shortly affect, Britain, none is greater than the increased mobility of our people due to changed means of locomotion. In

parts of Lancashire, for example, the houses were built around mines now abandoned and for workers in factories some of which are now closed. The modern large mines in the south of this coalfield draw their workers from older colliery areas such as Wigan, but farming continues to the very gates of the new collieries. Of all the problems of industrial change, none is clearer than the limited life of areas given to extractive mining, for coal, iron ore, or less obviously lead. Among the industries in Britain, the most dramatic example of decline is given by cotton textiles. Towns such as Wigan, whose prosperity was built on coal and cotton, are no longer able to provide sufficient work for their residents in spite of the growth of new industries: the 1951 Workplaces Census showed that for every three persons who left Wigan to work only two came in, and the position has changed little since then. To what extent should people expect their work to be near their homes? The closing of railways, the increased traffic density on the roads, the cost of commuting, even the physical strain on many people especially in hard weather, all seem to make the journey to work less and less desirable every year. Eventually the 1961 Census data will show how many people travel to such areas as central Manchester or central London, and from which places they are drawn. In 1951, the city of London had 336,000 people travelling in to work, of whom 226,000 were men—the armies of black-clothed, bowler-hatted, umbrella-carrying professional and business commuters who pour out of every tube station. But very different types commute from Wigan or travel from the old mining villages of Durham or the valleys of South Wales to the bright new trading estates, for this is a movement from an area where employment is static or declining, to one where industrial growth has outstripped the local labour supply.

Whatever epithet one applies to this age, it is clearly one of change, and it is a not unworthy aspiration of any planner or writer 'to serve the present age'. Sooner or later, every planner confronts a major problem of British life, its present administrative structure: within the necessarily short compass of this book, boundaries have been taken for granted. No one can understand the geography of Britain without some sense of history, and the deep penetration of county boundaries into modern problems is a matter of history. Cheshire has a population of 1,367,900, but of

these 467,700 live in towns of the Manchester conurbation and 407,800 in the Wirral section of the Merseyside conurbation. Inevitably, town administration has spread, conspicuously through the County Review orders of the nineteen-thirties.

Re-casting of administrative units is a main concern of the present time, due in part to the increasing range of services provided for ratepayers both in towns and rural areas. A century ago a town took pride in its sewerage system and gas supply: now such things are taken for granted and a town council takes pride in its recreational facilities, its provision for the afflicted in mind, body or estate, its range of specialist educational advisers. The services provided increase in complexity, and a population of some ratepaying strength is necessary to support specialist staffs. In general a population of 150,000 or more[1] seems to be adequate for such provisions and the tendency of the time is to make administrative units having such populations, for example by uniting Black Country towns into strong county boroughs or even by joining counties such as Cambridgeshire with the Isle of Ely and Huntingdonshire with the Soke of Peterborough. Even so Rutland, with 24,000 people in 150 square miles, has successfully managed to resist union with Leicestershire. The 1958 Local Government Commission is now disbanded and a new commission formed to decide whether some more radical rearrangement is needed than rearrangement of existing boundaries. But this involves wide questions of regionalism beyond the scope of this book: all one can do here is to comment that in a changing industrial society the replanning so constantly necessary has, and will always have, its geographical basis.

[1] Many comments by local government experts suggest that 250,000 is now the accepted figure. It appears to be rising.

NOTES AND REFERENCES

This list can only be partial, as the literature of planning interest is increasing rapidly each year, much of it in a wide range of journals, some of which are listed below and others on page 181. The following contractions are used here:

G.J. .. *Geographical Journal*
G.R. .. *Geographical Review*, New York
J.T.P.I. .. *Journal of the Town Planning Institute*
T.I.B.G. .. *Transactions of the Institute of British Geographers*
S.G.M. .. *Scottish Geographical Magazine*
T.P.R. .. *Town Planning Review*

CHAPTER I

Other volumes in the Hutchinson University Library series will prove helpful, notably S. W. Wooldridge and W. G. East, *The Spirit and Purpose of Geography*, 1951; F. W. Morgan, *Ports and Harbours*, 1952; J. H. G. Lebon, *An Introduction to Human Geography*, 1952; A. E. Smailes, *The Geography of Towns*, 1953; R. C. Estall and R. O. Buchanan, *Industrial Activity and Economic Geography*, 1961. Later editions and impressions of these books have been published. J. N. Jackson, *Surveys for Town and Country Planning*, 1963 in this series, is a refreshingly practical work by a geographer-planner. See also J. H. Appleton, *The Geography of Communications in Great Britain*, 1962. Vidal de la Blache's *Principes de Géographie Humaine*, 1922, was translated as *Principles of Human Geography*, London, 1926. Lebon's book has a useful bibliography: note also H. J. Fleure, 'Human Regions', *S.G.M.*, vol. 35, 1919, pp. 94–105. Those who wish to read a book on modern trends in geography will find eighteen essays, some of them controversial, published as R. J. Chorley and P. Haggett (eds.). *Frontiers in Geographical Teaching*, 1965.

CHAPTER II

Sir Cyril Fox's *Personality of Britain* was first published at the National Museum of Wales, Cardiff in 1932, fourth edition 1950:

it deals especially with the relation of archaeological finds to physical factors. A. G. Tansley's *The British Islands and their Vegetation*, 1939, summarizes the findings of ecological workers in admirably clear prose: general readers may prefer his *Britain's Green Mantle*, 1949.

A. G. Ogilvie (ed.), *Great Britain—Essays in Regional Geography*, 1928, has chapters on the major regions of Great Britain with a splendid summary article on climate by H. R. Mill. A recent work is J. B. Mitchell (ed.), *Great Britain: geographical essays*, 1962, with an essay on climate, vegetation and soils by A. A. Miller Two general works were issued in 1964 when the International Geographical Union Congress was held in London: *Field Studies in the British Isles*, ed. J. A. Steers; *The British Isles: a systematic geography*, ed. J. Wreford Watson and J. B. Sissons. A new series of regional geographies includes A. E. Smailes, *North England*, 1960; A. C. O'Dell and K. Walton, *The Highlands and Islands of Scotland*, 1962; G. H. Dury, *The East Midlands and the Peak*, 1963; T. W. Freeman, H. B. Rodgers, R. H. Kinvig, *Northwest England: Lancashire, Cheshire and the Isle of Man*, 1966; J. A. Steers, *The coastline of England and Wales*, 1946, is a standard work, and another work by the same author is *The Sea Coast*, 1957, in the New Naturalist Library. The special planning problems of coasts were treated by J. A. Steers in two articles in *G.J.*, 'Coastal Preservation and Planning', Vol. 104, 1944, pp. 7–27, and Vol. 107, 1946, pp. 57–60. The Lynmouth floods were studied and described by two workers in *Geography*, Vol. 38, 1953, pp. 1–17. Similar work on the East Coast floods was recorded in *Geography*, Vol. 38, 1953, pp. 132–89, and by J. A. Steers in *G.J.*, Vol. 119, 1953, pp. 280–98. The Scottish material is drawn from A. G. Ogilvie, 'Land Reclamation in Scotland', *S.G.M.*, Vol. 61, 1945, pp. 77–84, and from H. M. Cadell, 'Land Reclamation in the Forth Valley', *idem*, Vol. 45, 1929, pp. 7–22 and 81–100.

CHAPTER III

Standard maps are given in the Climatological Atlas of the British Isles, H.M.S.O., 1952. E. G. Bilham, *The Climate of the British Isles*, 1938, is a valued reference work summarizing and interpreting the statistical data: W. G. Kendrew, *Climatology*, 1949, is an explanatory text, and F. K. Hare, *The Restless Atmosphere*, 1964 in the Hutchinson University Library Series is a useful introduction. Climate and weather are related to many natural features and human vagaries in the entertaining work by G. Manley, *Climate and the British Scene*, 1952. All these have useful bibliographies. Dr. Garnett's excellent local work is in D. L. Linton (ed.), *Sheffield and its Region, a Scientific and Historical*

Survey, British Association, Sheffield, 1956, pp. 44–69. There is also interesting data in such books as H. R. C. Carr and G. A. Lister, *The Mountains of Snowdonia*, 1930. The information on the 1954 Pembrokeshire gales is taken from the Report of the Ministry of Housing and Local Government 1950–1 to 1954, Cmd. 9559, 1955; see also, on the Tweed basin floods, A. T. A. Learmonth, 'The Floods of 12th August, 1948, in South-east Scotland', *S.M.G.*, Vol. 66, 1950, pp. 147–53. T. J. Chandler, 'London's urban climate', *G.J.*, Vol. 128, 1962, pp. 279–302, is of special planning interest. This work has since been developed further. Two papers in which the varied incidence of rainfall is discussed are by E. C. Barrett, 'Local variations in rainfall trends in the Manchester region', *T.I.B.G.*, Vol. 35, 1964, pp. 55–71; and 'Regional variations of rainfall trends in Northern England, 1900–59', *T.I.B.G.*, Vol. 38, 1966, pp. 41–58.

CHAPTER IV

The work of the Land Utilisation Survey was summarized in L. D. Stamp, *The Land of Britain: its Use and Misuse*, 1947 and 1950, which has a full bibliography: unfortunately some of the county reports are out of print but many of the 1 : 63,360 maps are still available. There are numerous articles on agriculture in geographical and other journals: those mentioned in this chapter are R. H. Best and J. T. Ward, 'The Garden Controversy', Wye College (University of London), 'Studies in Rural Land Use', Report No. 2, 1956; June A. Sheppard, 'Horticultural Developments in East Yorkshire', *T.I.B.G.*, 19, 1953, pp. 73–80, and S. W. E. Vince, 'Reflections on the Structure and Distribution of Rural Population in England and Wales, 1921–31', *T.I.B.G.*, No. 18, 1952. pp. 53–76. On forests, see H. L. Edlin, *Trees, Woods and Man*, 1956, an admirable and attractive work: see also the Guides to National Forest Parks, H.M.S.O., Argyll, Forest of Dean, Snowdonia, Queen Elizabeth (Ben Lomond, etc.), Glen Trool (Galloway), the New Forest. *Country Planning*, edited by C. S. Orwin and written by members of the Agricultural Economics Institute at Oxford, was published in 1944 and is worthy of careful study. A Land Utilisation Survey memoir of special note is E. C. Willatts, *Middlesex and the London Region*, Part 97, London, 1937. The new land use survey is discussed in Alice Coleman, 'The second land use survey: progress and prospect', *G.J.*, Vol. 127, 1961, pp. 168–86. A useful background of work in land economics is apparent in M. Chisholm, *Rural settlement and Land Use*, 1962 (Hutchinson University Library). Four works of planning significance are G. P. Wibberley, *Agriculture and urban growth: a study of the competition for rural land*, 1959; R. H. Best and

J. T. Coppock, *The changing use of land in Britain*, 1962; R. H. Best, *Land for New Towns*, 1964; R. H. Best and R. M. Gasson, *The Changing Location of Intensive Crops*, London, 1966.

CHAPTER V

Aspects of town geography are treated in the book by A. E. Smailes noted under Chapter I, and in the venerable classic, P. Geddes, *Cities in Evolution*, 1915. W. Ashworth, *The Genesis of British Town Planning*, 1954, is an excellent treatment of its subject: R. E. Dickinson, *City and Region*, 1964, discusses a wide range of European and American material on urban geography. Out of the numerous local studies in journals, see E. W. Gilbert, 'The Growth of Brighton', *G.J.*, Vol. 114, 1949, pp. 30–52, and *Brighton: Old Ocean's Bauble*, 1954; J. P. Haughton, 'The Social Geography of Dublin', *G.R.*, Vol. 39, 1949, pp. 257–77; H. B. Rodgers, 'Altrincham—a Town of the Manchester Conurbation', *T.P.R.*, Vol. 23, 1952, pp. 190–202. There is an interesting group of papers in 'Lund Studies in Geography', Series B, Human Geography, No. 24, *Proceedings of the symposium in urban geography, Lund 1960* (published at Lund in 1962). The material on Manchester and Bowdon is taken from H. Taine, *Notes on England*, 1874, trans. H. Roe. There are numerous other local studies in all the journals so far named, and in a number of others, including the *East Midland Geographer*, Nottingham; *Economic Geography*, Worcester, Mass.; *Geography*, London; *Irish Geography*, Dublin.

Aspects of the relation of towns to one another and to the countryside have received wide attention. These include R. E. Dickinson, 'The Regional Functions and Zones of Influence of Leeds and Bradford', *Geography*, Vol. 15, 1930, pp. 548–57, and 'The Distribution and Functions of the Smaller Urban Settlements of East Anglia', *Geography*, Vol. 17, 1932, pp. 19–31; 'The Town Plans of East Anglia', *Geography*, Vol. 19, 1934, pp. 37–50. A. W. Ashby, 'The Effects of Urban Growth on the Countryside', *Sociological Review*, Vol. 31, 1939, pp. 345–69, is an entertaining and discriminating article. A socio-economic approach is seen in H. E. Bracey, *Social Provision in Rural Wiltshire*, 1952, and in 'Towns as Service Centres: an Index of Centrality with Special Reference to Somerset', *T.I.B.G.*, No. 19, 1953, pp. 95–105. See also H. E. Bracey, *English rural life*, 1959. Grading of towns is the theme of A. E. Smailes, 'The Urban Hierarchy in England and Wales', *Geography*, Vol. 29, 1944, pp. 41–51, and 'The Urban Mesh of England and Wales', *T.I.B.G.*, No. 11, 1946, pp. 85–101; 'The Analysis and Delimitation of Urban Fields', *Geography*, Vol. 32,

1947, pp. 151–61. Efforts to define the service areas of towns produced a series of papers by F. H. W. Green, including 'Motor-bus Centres in South-West England Considered in Relation to Population and Shopping Facilities', *T.I.B.G.*, No. 11, 1949, pp. 57–68; 'Urban Hinterlands in England and Wales: an Analysis of Bus Services', *G.J.*, Vol. 116, 1950, pp. 64–88; 'Bus Services in the British Isles', *G.R.*, Vol. 41, 1951, pp. 645–55. These techniques are developed further in Ian Carruthers, 'A classification of service centres in England and Wales', *G.J.*, Vol. 123, 1957, pp. 371–85. Mr. Carruthers also wrote interesting and important sections of the *Report on the Royal Commission on Local Government in Greater London*, Cmd. 1164, 1961: see pp. 295–305, 341–53. See also J. B. Fleming and F. H. W. Green, 'Some Relations Between Country and Town in Scotland', *S.G.M.*, Vol. 68, 1952, pp. 2–12.

On conurbations, a famous paper is C. B. Fawcett, 'The Distribution of the Urban Population in Great Britain', *G.J.*, Vol. 79, 1932, pp. 100–16; some may find help in T. W. Freeman, *The Conurbations of Great Britain*, 1966. Administrative aspects are considered in E. W. Gilbert, 'The Boundaries of Local Government Areas', *G.J.*, Vol. 111, 1948, pp. 172–206; see also E. W. Gilbert, 'Practical Regionalism in England and Wales', *G.J.*, Vol. 94, 1939, pp. 29–44. C. B. Fawcett, *Provinces of England*, originally published in 1919 was re-issued in 1960 with a new introduction by W. G. East and S. W. Wooldridge. An interesting series of articles analysing the 1951 Census figures appears in the *East Midland Geographer*, A. G. Powell, 'The 1951 Census: an Analysis of Population Changes' in: Derbyshire, No. 2, 1954, pp. 13–23; Leicestershire, No. 3, 1955, pp. 3–15; and Nottinghamshire, No. 4, 1955, pp. 29–42. *Conurbation; a Planning Survey of Birmingham and the Black Country by the West Midlands Group*, 1948, is a splendid survey. This city's modern housing is described in A. P. Sheppard Fidler, 'Post-war Housing in Birmingham', *T.P.R.*, Vol. 26, 1955–6, pp. 25–50; interesting historical information is given in Vol. II of C. Gill and A. Briggs, *History of Birmingham*, 1952. On Wolverhampton, see T. Brennan, *Midland City*, 1948. The literature on London is vast: the works mentioned in the text are S. E. Rasmussen, *London the Unique City*, 1937; W. A. Robson, *The Government and Misgovernment of London*, 1939. Two significant detailed studies of London in the Hutchinson University Library are J. Bird, *The Geography of the Port of London*, 1957, and P. G. Hall, *The Industries of London since 1861*, 1962. The same author, as Peter Hall, published *London 2000* in 1963—a most interesting though not unprovocative work. Many authors have contributed to three recent books on London: J. T. Coppock and H. C. Prince (eds.), *Greater London*, 1964; R. Clayton (ed.), *The Geography of Greater*

London, 1964; K. M. Clayton (ed.), *Guide to London Excursions*, 1964. This last-named work, published for the 20th International Geographical Congress, contains much interesting local information not only for London but for a large area around it, including Oxford. On the surroundings of London, see D. Thomas, 'London's Green Belt', *G.J.*, Vol, 129, 1963, pp. 14–24, and *The Green Belts* published by the Ministry of Housing and Local Government, 1962.

Regional surveys partly concerned with future growth but also including much current information have appeared as *The North East: a programme for regional development and growth*, Cmnd. 2206, 1963; *The South East Study 1961–1981*, Ministry of Housing and Local Government, 1964; *The West Midlands: a regional study*, Department of Economic Affairs, 1965; *The North West: a regional study*, Department of Economic Affairs, 1965. A variety of British and American views presented at a conference has resulted in D. Senior (ed.), *The Regional City*, 1966.

A town study in a class of its own for detailed scholarship is the monograph by M. R. G. Conzen, *Alnwick, Northumberland—a study in town-plan analysis*, published as *T.I.B.G.*, No. 27, 1960. A work concerned largely with the evolution and morphology of towns is H. Carter, *The Towns of Wales*, 1965.

CHAPTER VI

W. Smith, *Economic Geography of Great Britain*, 1949 and 1952, is a comprehensive work: industry is treated thoroughly in L. D. Stamp and S. H. Beaver, *The British Isles, a Geographic and Economic Survey*, 1933 and later editions. Developments of planning significance are treated in J. R. James and others, 'Land use and the changing power industry in England and Wales', *G.J.*, Vol. 127, 1962, pp. 286–309.

The pre-1939 distribution of the industrial population was discussed in the *G.J.*, Vol. 92. 1938, pp. 22–39, 499–526, and some generalizations drawn from these discussions were criticized in E. W. Gilbert and J. N. L. Baker, 'The Doctrine of an Axial Belt of Industry in England', *G.J.*, Vol. 103, 1944, pp. 49–72. A critical study is W. Smith, 'The location of industry', *T.I.B.G.*, No. 21, 1955, pp. 1–18. See also N. J. G. Pounds, *The Geography of Iron and Steel*, (Hutchinson University Library 1959).

Much useful information on industry appears in the Scientific Surveys published annually for the British Assocation meeting: these include: *Birmingham and its Regional Setting*, ed. M. J. Wise, 1950; *South-eastern Scotland*, ed. C. J. Robertson, 1951; *Belfast in its Regional*

Setting, ed. E. Jones, 1952; *Merseyside*, ed. W. Smith, 1953; *The Oxford Region*, ed. A. F. Martin and R. W. Steel, 1954; *Bristol and its Adjoining Counties*, ed. C. M. MacInnes and W. F. Whittard, 1955; *Sheffield and its Region*, ed. D. L. Linton, 1956; *The Glasgow Region*, ed. R. Miller and J. Tivy, 1958; *The Cardiff Region*, 1960; *Norwich and its Region*, 1961; *Manchester and its Region*, ed. C. F. Carter, 1962; *Nottingham and its Region*, ed. K. C. Edwards, 1966.

The particular problems of mining and mining communities have attracted a number of writers: many papers have appeared in geographical and other journals. See S. H. Beaver, 'The Iron Industry of Northamptonshire, Rutland and South Lincolnshire', *Geography*, Vol. 18, 1933, pp. 102–17; 'Minerals and Planning', *G.J.*, Vol. 104, 1944, pp. 166–98; 'Coke Manufacture in Great Britain: a Study in Industrial Geography', *T.I.B.G.*, Vol. 17, 1951, pp. 133–48; 'The Development of the Northamptonshire Iron Industry, 1851–1930', *London Essays in Geography*, ed. L. D. Stamp and S. W. Wooldridge, 1951, pp. 33–58; 'Land Reclamation after Surface Mineral Working', *J.T.P.I.*, Vol. 41, 1955, pp. 146–54. There are useful papers on coal mining and brick making in the *East Midland Geographer*, which also contains helpful material on a variety of other industries.

Problems arising from the increasing need for raw materials is the theme of S. W. Wooldridge and S. H. Beaver, 'The Working of Sand and Gravel in Britain: a Problem in Land Use', *G.J.*, Vol. 115, 1950, pp. 42–57. T. M. Thomas, 'Wales: Land of Mines and Quarries', *G.R.*, Vol. 46, 1956, pp. 59–81, is a crisp summary: see also T. M. Thomas, *Mineral wealth of Wales and its exploitation*, 1961. Problems of devastation are treated in three papers by K. Wallwork, 'Subsidence in the mid-Cheshire Industrial Area', *G.J.*, Vol. 122, 1956, pp. 40–53; K. Wallwork, 'Some problems of subsidence and land use in the mid-Cheshire industrial area', *G.J.*, Vol. 126, 1960, 191–9; 'Land use problems and the evolution of industrial landscapes,' *Geography*, Vol 45, 1960, pp. 263–75. The special problems of the Potteries are treated in H. A. Moisley, 'The Industrial and Urban Development of the North Staffordshire Conurbation', *T.I.B.G.*, Vol 17, 1951, pp. 151–65, and S. H. Beaver, 'The Potteries: a study in the evolution of a cultural lanscape', *T.I.B.G.*, Vol 34, 1964, pp. 1–31. An industrial area whose problems are at least as severe is treated in G. Manners (ed.), *South Wales in the Sixties*, 1964, and in G. Humphrys, 'The journey to work in industrial South Wales', *T.I.B.G.*, Vol 36, 1965, pp. 85–96. Human problems are the main theme of G. H. J. Daysh and J. S. Symonds, *West Durham*, 1953, and F. Fraser Darling, *West Highland Survey*, 1955. On coal mining, the annual *Guide to the Coalfields*, ed. E. G. Corbin, published by the *Colliery Guardian*, London, is recommended.

CHAPTER VII

The Hobhouse report gives a splendid account of national parks in various countries and deals thoroughly with the position in Great Britain: it was published by the Ministry of Town and Country Planning, Report of the National Parks Committee (England and Wales), 1947, H.M.S.O., Cmd. 7121. For a critical study see H. C. Darby, 'British National Parks', *Advancement of Science*, Vol. 20, 1963, pp. 307–18. Various authors have contributed to H. M. Abrahams (ed.), *Britain's National Parks*, 1959. Maps and other propaganda may be obtained from the National Parks Commission, 3 Chester Gate, N.W.1: the Commission's annual reports are published by H.M.S.O. and summarized in the Reports of the Ministry of Housing and Local Government (e.g. for period 1950–1 to 1954, Cmd. 9559, 1955; for 1955, Cmd. 9876, 1956; for 1956, Cmd. 193, 1957; for 1957, Cmd. 419, 1958; for 1958, Cmd. 737, 1959; for 1959, Cmd 1027, 1960; for 1960, Cmd. 1435, 1961; for 1961, Cmd. 1725, 1962). Separate reports are issued for the national parks of which the latest is *Sixteenth Report of the National Parks Commission for the year ended September 30 1965*, H.M.S.O.

The reports of the Local Government Commission for England contain much material of relevance to geographers and planners: see Report No. 1, *West Midlands Special Review area*, 1961; No. 2, *West Midlands General Review area*, 1961; No. 3, *East Midlands General Review area*, 1961; No. 4, *South Western General Review area*, 1963; No. 5, *Tyneside Special Review area*, 1963. No. 6, *North Eastern General Review area*, 1963; No. 7, *West Yorkshire Special Review area*, 1964; No. 8, *York and North Midlands General Review area*, 1964; No.9, *Lincolnshire and East Anglia General Review area*, 1965. The report of the separate commission on Greater London is mentioned on p. 182.

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