to provide in time the pre-adaptive forms which may take advantage of some new situation in the changing environment? A still more important contribution that field zoology can make to evolutionary theory is to throw more light on the part played by organic selection. The gene combinations which are best suited to the *habits* of the animal may tend to survive in preference to those which do not give such full scope to the animal's pattern of behaviour. This idea, put forward independently by Baldwin and Lloyd Morgan at the turn of the century, may, indeed, be a factor of importance.

There has now appeared over the horizon something which many do not like to look at, namely, telepathy. Prof. Hardy believes that no one who examines the evidence with an unbiased mind can reject it; particularly the evidence from many experiments (made by several independent workers) which have passed the statistical tests regarded as decisive in normal scientific technique. Such a discovery should make us keep our minds open to the possibility that there may be so much more in living things and their evolution than our science has hitherto led us to expect.

THE PLANNING OF LAND USE

THE development of geographical thought over the past half-century has been marked by the emergence of a logical pattern of cause and effect and by the demonstration of the influence of environmental factors on human life. Prof. L. Dudley Stamp points out in his presidential address to Section E (Geography), that the stage has now been reached when geographical methods of survey and analysis, and further, of synthesis, can be and should be applied and used so as to assist in the solution of the great social problems of the world to-day. In particular, in the field of land-use planning, there is considerable justification for the assertion that geography is the science of which land planning is the art.

Every country has two ultimate assets—its land and its people. The planning of land use is no more and no less than planning for the full development and use of natural resources, notably of food-producing land. It must be viewed against a world background of expanding population but fixed land area, where there are no longer vast tracts of virgin land available for easy conquest, even though the tropical lands are eventually brought into full production. Good land is becoming rapidly scarcer, and modern land planning involves a balance between competing demands. Land is needed for at least six basic needs of man: for the siting of industrial works, for homes, for food and associated raw materials, for recreation, for communications, for security or defence. The problem of securing a just balance between these competing demands is acute in a country such as Britain with only a little more than an acre per head—less than half an acre of food-producing farmland. Although a multiple use of many types of land is possible and a concept of 'optimum use' for any given tract may be developed, the old conflict between different interests may even be intensified under the comprehensive national land-use planning to which Britain is committed. The long-term advantage to the country of conserving the best food-producing land may conflict sharply with short-term economic advantages.

The most serious aspect of land planning to-day is that much is being done by those concerned with the day-to-day work of town and country planning without an adequate understanding of the scientific background, while far too often the essential facts remain unknown. A good example is afforded by the present chaotic state of 'rural planning'. Stated simply, increased technical efficiency in agriculture permits the maintenance of a high level of production with a smaller labour force. Even when agricultural production is increased, heavy rural depopulation is still in evidence. With a changing age-composition of the population, the stage is soon reached when the village communities dependent primarily on the land are too small to justify the continuance of a school or the maintenance of those services regarded as essential to a modern standard of life. For example, whereas an average rural parish on good farmland such as may be generally found in the English Midlands had 80 children between five and nine to support the village school in 1871, the number to-day is not likely to exceed 34. Instead, therefore, of restricting housing in the village to workers connected with the land, an active policy of encouraging others to go and live therein appears the only hope of maintaining corporate rural life.

A gulf exists between the natural scientist and the professional town and country planner. Sometimes it is a failure of the latter to use and apply existing knowledge; often it is the failure of the man of science to carry out those particular studies which are most needed. The geologist has not yet provided a drift map; the geologist shows little interest in the lithological characters which determine whether a given deposit—for example, of gravel—is or is not of economic importance. There is no soil map of Britain, and the trend of pedological research often renders modern work of less practical value than the pioneer studies of Hall and Russell. A comprehensive survey of water resources, so long urged by Capt. W. H. Mclean before the British Association, is still an outstanding need. The value of given tracts of land for such purposes as intensive horticulture frequently depends on microclimatology; yet there are few exact surveys to help the planner. Vegetation cover is accepted as an index of the sum total of environmental factors; yet ecologists have made little effort to produce a primary vegetation survey. Until some of these gaps are filled, the work of land-use planning must rest on a scientifically unsatisfactory basis.

In an old-settled country such as Britain, existing land use reflects the results of many centuries of trial and error—often the results of the interaction of geographical, historical and economic factors. The mapping and interpretation of the existing land-use pattern are fundamental contributions of the geographer to planning. Treated historically, the evolution of the pattern shows trends in development or change, and land planning is simply the encouragement of such trends or positive action to change them.

The vexed question of land classification calls for the evaluation of many factors. This is well seen in the determination of the ten types made by Prof. Dudley Stamp as director of the Land Utilization Survey. Although giving a crude and highly generalized picture, the Land Classification Map of Britain (now published by the Ordnance Survey for the Ministry of Town and Country Planning on the scale of 1 : 625,000) does serve to indicate the distribution

and small extent of the most productive lands of Great Britain, and points to the tracts which should be avoided in the siting of new towns if the productive capacity of the country is not to be impaired. The classification of land, when linked with the results of the Farm Survey (1941), suggests problems of the 'carrying capacity' of land in terms of primary producers, and so the population density to be expected with a given type of land and a given type of farming. Britain exhibits a curious super-imposition of an urban-industrial settlement pattern on an earlier rural-agricultural pattern. It may be suggested that many features of the latter are relatively permanent —the spacing of farm and village—whereas the former is changing and developing with new concepts of the standard of living and threatens to overwhelm the whole.

ECONOMICS : YESTERDAY AND TO-MORROW

SIR ALEXANDER GRAY'S presidential address to Section F (Economics) provides a survey of recent and current trends in economics. He points out that it would be possible to learn much about the continually changing view of the subject-matter of economics by reading in chronological order the definitions of economics given by its leading exponents. In Adam Smith, it was considered "as a branch of the science of a statesman or legislator". In the early part of the nineteenth century (as exemplified by Senior) there was a conscious effort to transform economics into a wholly independent scientific discipline, establishing laws or generalizations, while remaining perpetually and eternally neutral in a world of conflict. Broadly, the nineteenth century was in the main a period of specialization, when the economist tried to keep himself to himself, and to pursue the peculiar problems of his own specialism.

To-day the old frontiers have largely been obliterated; and perhaps in the next generation the economist's primary task may be to view his economics in relation to all the other so-called social sciences, and thereby to effect a new synthesis. The first and most complete disappearance of a frontier is that between economics and politics. To-day every economic problem has become a political problem; and most, if not all, political problems have their economic penumbra. So, also, it may be said that a structure of economic theory that is not based on a sound psychology is a house without foundation; and therefore your economist must be a psychologist—of a sort. Economics, in its modern form, sprang from the moral philosophy class-room of Adam Smith. Economics, in a familiar phrase, is the 'handmaid of ethics', and it is, indeed only in so far as we take some part in the ethical debate that our economics can acquire a meaning, an inspiration and a driving force.

The breakdown of the frontiers is accentuated by the fact that to-day the economic problems to be solved present themselves inextricably embedded in a whole mass of relationships which cut across purely economic considerations, and involve all phases of the manifold problem of men living together in society. It does not follow that we must cease to be economists; but more than ever, an economist, to be an economist, must be vastly more than an economist.

It follows, also, that in the near future there may be more urgent tasks for the economist than the elaboration of theory far above the heads of all but the experts. Never was there a time when so many experiments were being launched in the economic laboratory. Never was there a time of such far-reaching institutional change; and perhaps for the next ten years we may be constrained to revert, somewhat but not overmuch, to a point of view resembling that of the Institutionalists.

The economist of to-morrow will be living in a very different economic climate from that of nineteenth-century Victorianism, and the economico-politica-problem (of how to live together and keep things going) may be very different. There are three ways in which we may manage to live together in the complete Welfare State. The first is that of relying on a degree of compulsion vastly greater than we have yet had the courage or the honesty to admit may be necessary. If, disliking the idea of a world resting on compulsion, we ask for an alternative which will preserve our free society, the second possibility is to consider what can be done towards a solution of the age-long question of incentive. It remains true, however—and regrettably true—that the only effective incentives are of a material character, with an appeal to the individualistic and competitive instincts of mankind which we are supposed to be eradicating. If compulsion is rejected as immoral, if incentive is looked upon as a species of bribery, leading back to what some would regard as the jungle of individualism, there remains the third possibility of enrolling ourselves (for this purpose) among the followers of Lenin, and waiting in faith for the emergence of a better form of man, for the universal prevalence of a higher order of morality than that now to be found among us.

BRIDGING THE GAP BETWEEN SCIENCE AND INDUSTRY

THE theme of the presidential address by Sir Arthur Fleming to Section G (Engineering) is that industrial research and development form the bridge between scientific discovery and its practical application. Past technological achievements were obtained by the patient and persistent work of inventors and industrialists based on fundamental discoveries of scientific men. Such discoveries will always be the starting point; but to-day, as well as providing new ideas, science must also at every stage provide the means whereby their industrial application can be most completely achieved.

The function of industry is to make natural resources available for the use of man. Industry is dependent on engineering for power, machinery, transport and communications. It is never static, but its rate of progress depends on the acquisition and effective use of new knowledge. To-day new industrial knowledge is mainly derived from organised scientific research and is the result of team-work.

Facilities for pure research are expanding in university, Government and industrial laboratories and in research associations, but the cost is becoming increasingly heavy, especially in the field of nuclear physics, and this emphasizes the need for co-operation to avoid duplication of effort and waste of personnel. Further increased facilities for research are needed, but there must always be a balance between the cost of research in money and personnel and national