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Air Survey and Empire Development.

THE growing call for the application of scientific knowledge in the development of the resources of the British Empire has found one response in the increased attention which is being paid to the survey of the Dominions and Colonies. In July last a conference of Empire surveyors was held in London. This was the first conference of its kind, and marked a great forward step in the mapping of the Empire. On that occasion the Secretary of State for the Dominions and Colonies emphasised the importance of maps in facilitating the development of new countries. A great deal has been done in late years, but only about 20 per cent of the Empire has been actually surveyed by modern methods on even comparatively large scales.

In a recent lecture to the Dominions section of the Royal Society of Arts, Col. H. L. Crosthwait dwelt on the value of air photography in this connexion. Ground surveys are slow and laborious. In many of the larger areas of the Empire, even if the steady flow of funds is available, years must elapse before the accurate maps made by topographical surveyors are available. Forest lands, which are numerous in many parts of the Empire, are difficult to survey and mean slow progress. Rugged and inaccessible areas present other serious problems. Most of these difficulties disappear when aerial survey is employed. A recent example was the speed with which certain forested deltaic lands in Burma were mapped by air, the whole occupying a few days instead of as many months. Air survey is being used effectively and comparatively cheaply in many parts of the Empire, and at home the Ordnance Survey has shown its value in the revision of maps. The prevalence of air survey in the future may even effect a change in the style of maps. The photographic map on which certain features are strengthened may replace the plan in town surveys. It would have its value in maps where the indication of the details of surface relief was not an essential.

The production of accurate large-scale maps is the aim of every survey department, but the work is necessarily slow even after the observations have been taken. The maps will be available in the course of time, but meanwhile the development of the Empire proceeds, and air photography can be of great assistance in reconnaissance and preliminary or local surveys for various purposes.

Col. Crosthwait spoke of various aspects of the work that have an immediate value in the development of new lands. He showed how a photographic survey of possible routes of a new railway through unmapped country might be of great service to the engineer who had to decide which route should

be surveyed in detail. The faulty alinement of a railway has more than once been a source of serious expense to a colony, and its avoidance by ground surveys of several possible routes is not only a costly matter but also always entails the possibility of the best route being overlooked if a feasible one be found. For such a purpose no detailed work is required until the engineers have chosen the most useful route, which then of course has to be surveyed in detail. Air photography has also been used with success, particularly in the United States, in coastal surveys for the exploration of obstructions to navigation in deltaic waters and on rocky coasts. Aeroplanes have been employed by the government of Canada in surveying the distribution and movements of ice in Hudson Strait in connexion with the opening of the new trade route via Hudson Bay to Churchill, which is to be a wheat port for the west of Canada.

Air survey can also be used in the investigation of water-power development, and water storage for irrigation purposes. The feasibility of a power scheme based on the storage of water which necessitates the submergence of large areas of land can be ascertained by stereoscopic photographs. They provide the preliminary reconnaissance at a low cost and in a short time. The photographs taken for the preliminary investigations can then be used for the final plans merely by the addition of ground control. The location surveys required for electric power cables and pipe lines can rapidly be made from the air.

Air photography can also supply much useful information with regard to mineral resources. It cannot be used for detached geological survey, but it can give geological indications by means of land forms which will afford useful suggestions to the surveyor and point to localities where close investigation might be profitable. Air photographs of vegetation serve as a useful guide in a survey of soils and the possibilities of cultivation of various crops, and in forest survey they serve to indicate areas of value for commercial purposes. As a result of recent work in Northern Rhodesia, during which air surveys were extensively used, Mr. R. Bourne, of the Imperial Forestry Institute at Oxford, emphasised all these among other uses to which air photographs can be put.

The aeroplane has also been found useful in combating insect pests. Successful operations in the cotton fields of the United States prompted the Canadian authorities to try the experiment of scattering insecticides from an aeroplane over spruce forests in Nova Scotia. The first year's experiments were very promising.

There is, in fact, a wide scope for the use of aeroplanes in all parts of the Empire quite apart

from the transport facilities they provide. They afford another example of the value of scientific application in the development of the resources of new lands, and can be employed for many useful purposes at comparatively small cost.

#### Evolution and Fundamentalism.

THE illegitimate use of the minor discussions of scientific workers to cast doubt upon the whole question of evolution is well known and can be guarded against only by extreme caution in our words. This is illustrated in an article in the Catholic review, *America* (Nov. 10, 1928), entitled "Neanderthal—a Slippery Ancestor." The writer pits against each other the views of Hrdlička and Elliot Smith (with quotations from *NATURE*) regarding the significance of Neanderthal man in human evolution, and because a divergence of opinion exists, he suggests that science should be looked on askance. "Draw up to the curb of common-sense and Revelation," he says, . . . "because very often 'scientists' are but a 'We-Too' gathering, all, despite their protestations of independent thinking, following some leader in beating the tomtom of Evolution." But, of course, on the fundamental question of evolution or non-evolution amongst all living things, including man, the two distinguished scientific workers named are in agreement.

While such articles show that the fire of dissent is still alight, a recent *Daily Science News Bulletin*, issued by Science Service of Washington, points to a distinct smouldering at the present time. In universities and other centres of higher education in Tennessee and elsewhere, anti-evolution legislation is "more honoured in the breach than in the observance," but in the lower schools, particularly in smaller places, no amount of theoretical freedom of teaching can prevent local school boards from rejecting candidates for positions when they do not approve of their theological views. Biologists have come to accept these two conditions as actualities of their profession.

Since the Scopes trial at Dayton, Tennessee, in 1925, no serious effort has been made to get a test case of the anti-evolution statutes in Tennessee or Mississippi, the only two States which have passed such laws up to now. Perhaps this is partly due to the indefiniteness of the law itself, for in its decision on the appeal of the Dayton case, the Tennessee Supreme Court rendered three distinct opinions, all of which left the interpretation of the law in a state of confusion. In spite of this enforced truce, it would be unwise, however, to imagine that the smoking flax of anti-evolutionism is anywhere near the quenching stage.

By an overwhelming majority Arkansas has adopted an anti-evolution law, so that it is now