

Editorial & Publishing Offices :

MACMILLAN & Co., LTD.
ST. MARTIN'S STREET
LONDON, W.C.2



Telegraphic Address :
PHUSIS, LESQUARE, LONDON

Telephone Number :
WHITEHALL 8831

Vol. 144

SATURDAY, SEPTEMBER 2, 1939

No. 3644

A PALÆOBOTANICAL RETROSPECT

IT is one of the privileges of the study of science to-day that it gives to the student a perspective and a sense of proportion that has a wonderfully steadying effect in these anxious days, and thanks to the happy decision of Sir Albert Seward to leave technicalities aside in his presidential address to the British Association, which is printed in the Supplement to this issue of *NATURE*, his listeners and his readers have had their thoughts tuned to a sense of distance and of time which permits a saner contemplation of the present temporary European turmoil.

No subject could be more appropriate for contemplation by a Scottish audience, or indeed by any British audience, at this holiday season, than a retrospective survey of one of the most popular holiday retreats, the Western Isles of Scotland; but the simple language in which problems of the widest import and of the most intriguing nature are expounded, makes the address at the same time a fascinating example of the scientific method in operation—as Sir Albert expresses it “of how a student asks questions of Nature and does his best to interpret the answers”. For a few magic minutes it must have been a great joy to his listeners to yield themselves completely to the direction of so competent and persuasive a guide, and with him to take an excursion “into a world that knew not man”, for the Western Isles are contemplated when they were part of a great continent, the Thulean continent or province, at a time some sixty million years ago, and human beings have not appeared upon the scene until all but one fiftieth of this period has transpired.

If thus vast tracts of time are passed in review and at the same time problems raised which

demand a mental grasp of distances that cover a large part of the northern hemisphere, the picture is built up by a creative imagination working with the most scrupulous regard for detail, and probably no feature of the address would more impress the newcomer to such problems than the suggestive use that is made of careful, detailed observations upon fossil plant material, the debris perhaps of a forest floor, preserved through the ages by the processes of sedimentation or the fortuitous action of volcanic agencies. The detailed sculpturing of a pollen grain needs microscopic examination with careful optical control, but through it may be built up a ‘spectrum’ of pollen dispersion in peat or coal which is as revealing to the botanist as is the spectrum of a star to the astronomer. Careful methods of clearing may render details visible in a fossil cuticle which permit the recognition of a microscopic leaf parasite and thus some suggestion as to the moisture of the climate in which this leaf-born cuticle had flourished. The student of the living plant must admit that if he had studied details of form and venation of leaves with the thoroughness of his palæobotanical colleague, very often his claims as to the affinities of living plants would be more securely founded.

Sir Albert's reconstruction of the Thulean forest is based in part upon the earlier collections from the plant-containing beds of the islands of the Inner Hebrides, and particularly the layers near the base of the basaltic lavas on Ardtum Head, near the south-western corner of Mull, but it is based mainly upon recent and as yet unpublished data obtained by Sir Albert himself, in association with Mr. W. N. Edwards, keeper of geology in the British Museum, and Dr. J. B. Simpson of the

Geological Survey; they are, then, the result of a felicitous partnership of botanists and geologists and illumine the field of study of both sciences.

The conifers of this corner of the globe in these far-off days were certainly more varied and diverse than the Forestry Commission would venture to utilize in trying once more to reclothe their rocky flanks and mist-swept valleys with forest. *Sequoia sempervirens* they might plant, and also *Abies*, but *Cryptomeria* and *Cephalotaxus* are surprising genera to find in a Hebridean flora; they are confined to-day to the Far East, as is also that other remarkable gymnosperm, *Ginkgo biloba*, the maidenhair tree, a doubtful native now of any country but still much valued in cultivation in China and Japan.

Indeed one striking result of this survey is the remarkable preponderance in the probable generic sources of fossil pollen, and in the debris of woody gymnosperms and angiosperms, of generic names which now are associated with the flora of the Far East. Many a keen gardener in Sir Albert's audience—and in a Scottish audience there would be many—must have been intrigued to realize that, in introducing to the garden such plants as *Cercidiphyllum* for its beautiful autumnal foliage, or such a flowering shrub as an *Abelia*, he was re-introducing to a Hebridean environment a genus which flourished in the Thulean forest sixty million years ago; the wheel has come full circle.

It is evident that the former existence of this vast continent, reaching into the Arctic Circle and linking North America through Greenland with Europe and even the Far East, has considerable significance in relation to problems of plant distribution of the present day—a point that is made clear by Sir Albert's suggestive discussion of selected genera of flowering plants. This naturally leads to a reference to hypotheses of drifting continents, discussed by Prof. W. W. Watts at the Norwich meeting of the Association. Sir Albert recognizes that geophysical methods of precision have as yet failed to furnish evidence of any sliding of the earth's crust, but he points out that "geologists and palæontologists contribute facts that are incontrovertible however much they seem to be in opposition to the views of students whose primary interest is in geophysical problems".

On such vexed questions of evolution as the origin of the flower and the angiosperm carpel, this Hebridean flora of sixty million years ago is silent. So comparatively recent a time is this in

terms of evolutionary processes, that the forest has already taken on the general aspects of a modern sub-tropical forest with seed plants dominant.

Sir Albert discussed in this connexion the fascinating problems raised by Prof. T. M. Harris's observations upon forest beds at Scoresby Sound in Eastern Greenland, which suggest that a luxuriant and uniform vegetation once occupied an area stretching from central Germany to southern Sweden and a thousand miles farther north, beyond latitude 70° N. In those days arctic voyagers, had there been any, might have felled tall trees for their masts within the Arctic Circle, and the fossil records from both arctic and antarctic regions are a constant reminder that the problems of climate of past time raise questions of far-reaching implication.

In fact the address showed how the palæobotanical approach stimulates interest, gives significance to the minutest detail and adds depth and width to our contemplation of everyday phenomena. Inevitably, therefore, the thought arises, as it emerged at the end of the address, why is this enrichment of everyday experience usually denied to us during school years. But a plea for the introduction of geology to a curriculum which is already so overloaded that even biology still often demands a place in vain is scarcely likely to receive more than a sympathetic hearing.

Perhaps the solution is along the lines followed now in an increasing number of schools, where up to the School Certificate stage the formal divisions of science are no longer recognized and general science is studied; when the material for exercises in scientific method can thus be selected in accordance with their claim upon experience, the soil will certainly win its way into the class-room and thus, for certain schools, where perhaps some member of the staff has made contact with geology in his years at the university, the rocks and their story and that of the agencies at work moulding the earth on which we live will be permitted to weave their own spells upon the unspoilt imaginations of the coming generation, which may thus become alive to the possibilities of interest which the subject holds. It will then perhaps add still more, for a coming generation, to the foundation of a serenity of outlook and saneness of poise, conspicuous in this year's president, which if more widely spread among us, would to-day have its definite value in preserving the community from the onslaught of the 'war of nerves' now so loudly proclaimed as in full spate.