Primarily the Cretaceous floras looked tropical, and it has been difficult to read anything else into them. If it can be done it will require long and elaborate quantitative study of the phytologic factors. It would however be early to say there are no cold scrub forests in the lower Cretaceous, and I give some attention to this subject in the current April number of the *American Journal of Botany*. Then at the other end of a long record stood juxtaposed the dank coastal fringes of coal plants; whence the long series of the Permian, Triassic and Jurassic, found their more obvious antecedents in warm climates and seemed to terminate in such. The ginkgos were long almost the only element suggesting interruption to the all-tropic landscape, with the fact that they must be a very great phylum, hidden. But with the cycads dominant and certainly tropical, there was no *open sesame* to a broader vista for the paleobotanist.

Now it was at this point that Nathorst and Wieland, using the words of the excellent University of Glasgow historian of botany, "began to learn something about the cycads." It was found that these had flowers with the possibility of all the sex variation seen in dicotyls, and stems with generalized structure. A great Cycadophyte leaf series was discerned resting under more than a suspicion of affinity to the forerunners of the angiosperms. And presently it was found that the cycadeoid types were in great numbers microphyllous, and that they crossed over into small fern-like leaves called *Tæniopteris*, etc. Next the paleobotanists seemed as if by common consent to see side by side with the ever lengthening cycadeoid record a great ginkgoid phylum. Within but a few fortunate years of investigation types of scrub, for such many of the cycadeoids surely are, and forest elements with the capacity to live in varied climates, could be pointed out with some degree of safety.

But as a bare half dozen invertebrates can not firmly set the age of the "Cannonball shales," limited series of animals and of plants of unfixed affinity, can make neither a summer nor a winter. And so the difficulties which beset the work on fossil plants must be met serially.

Meanwhile as paleobotanists we are peculiarly indebted to Dr. Knowlton for his splendid Philippic on tropic climates. It was well that it should appear in this time of rapid accumulation of new facts, at least as a warning against the grave danger of an overburden of inference in the guise of proven fact. Even that big and valuable word *diastrophism* might suffer. And the aggrading of the continents, with their reappearance, mountain bulwarked as regularly as Chladni figures, might fail of demonstration. The Knowlton defense has already functioned in bringing out the two accentuations of the value of the physical and paleozoologic factors herein noted. Yet, the lower-most Cretaceous floras of the mid-west are not truly tropic. We may doubt if there is a single North American dicotyledonous flora, unless it be that associated with the Vicksburg Oligocene, that by any possibility merits the term tropical in a strict sense. "Many of the floras indicate warmer or wetter conditions than now prevail in correspondent latitudes; but most are far from tropical."

All evidence must eventually be coordinated, and the paleobotanists will lay ears to the rocks. To use exactly the witticism of Voltaire, let our *conchiferous* brethren be reassured.

G. R. WIELAND

HAVE BIRDS AN ACUTE SENSE OF SOUND LOCATION?

THERE can be little doubt that the drum membrane picks up very minute energies in the form of sound vibrations. There can be no question that a certain amount of the energy impinging on the outer surface of the drum membrane passes through it into the air of a cavum tympani. It may also be conceded that energies entering the middle ear area are fairly well dampened out in so far as a reflection back toward the drum membrane is concerned. This is true for the mammals. The bird, however, has but a single middle ear

which is flanked on either side by a drum membrane. The energies transmitted to the air of the middle ear from the deep surface of one drum membrane may pass directly to the deep surface of the other membrane.

The ability to locate a sound may be partly due to its intensity. It may also be due to a differential registration of fundamental and overtones on the two sides. A pure tone may not be located. Overtones are less readily dampened out than fundamentals as Mach's experiments seem to indicate. The relation of the position of the sound source to the head-form and diffraction into the two external canals would therefore play an important rôle in relation to the differential registration of fundamental and overtones. This was I believe worked out in part by Fite of Princeton University.

It would seem that the evidence in birds points not only to a great acuteness in hearing but also to a definite ability in determining the direction of the sound source. This in spite of the fact that birds do not possess the functional auricle of the mammal. If it be true that the sense of location for sound is so well developed in owls, woodpeckers and possibly robins, then a special significance may be attached to a confluence of the middle ear cavities. It may be that a more definite analysis of the fundamental and its overtones is due to a greater efficiency of the two drum membranes applied to a single middle ear.

The writer will appreciate and acknowledge any direct observational data on this problem of the acuteness of hearing in birds and in particular the evidence for the definiteness with which a bird may locate a sound source.

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QUOTATIONS

SCIENTIFIC ORGANIZATION

Professor W. M. Wheeler, a learned and witty American biologist, has recently addressed a genial remonstrance to his scientific fellow-citizens on their devotion to resounding phrases. His remarks deserve a wider application, and are very pertinent to ourselves. The current watchword of the elect, he says, the "highbrow" toast of the moment, is "organization." Wayward, individual pursuit of knowledge is out of fashion. It is distasteful to the bureaucratic spirit of the age, it tends to overlapping of effort, and it exalts personal reputations, possibly and regrettably those of obscure unofficial people. The committee is the thing. The problem must be set, the parts allotted, the results received, edited, and issued by the authority of men sitting round a table. There must be sub-committees and super-committees, joint committees and special committees. How else shall we control genius, encourage mediocrity, and secure "team-work"? How better can science present a respectable front to governments or offer responsible hands for grants-in-aid? A detached individual is an unstable creature; he may die, neglect to report, get off the lines, or make discoveries of a very upsetting kind. A committee is safe; its existence secures continuity and is a guarantee against the precipitate production of uncomfortable truths. But the professor fears that the child product of organization is organizers, and that in elaborating our machinery we forget its purpose. Fortunately, however, mankind is wiser than any of its generations and has a knack of creeping out of the hard shells it continues to secrete. "Organization" is the fad of to-day, and will be as ephemeral as its predecessors. "Culture" was one of these. But "culture" died, and its corrupt body became decadence when, ceasing to be a mental attitude, it became an intonation and a set of opinions. Progress was another; but that has hardly recovered from the shock of the war, which gave us good reason to distrust some aspects of modern civilization. Now even popular preachers find it safe to mock at "progress." The truth is that a conception seldom becomes crystallized in a phrase until it has outgrown its most fertilizing activity. Ideas have their cycle of life; they are born of the great, named by the dull, and killed by common usage.—The London *Times*.