detection. An important chapter deals with the chemistry of coffee, which should be of great interest to investigators.

Having to deal with so many nations through such a stretch of time, Cheney has presented in two appendices an interesting ethnological discussion, showing the effect of the introduction of coffee on the political and social life of the metropolitan centers of Egypt, Arabia, Asia Minor, Europe and America. In the derivation of the term "coffee," Cheney presents a new theory, based on philological and botanical research backward through several oriental languages, and resulting, as is said, "in the correction of an error which has existed since the tenth century."

This book deserves wide attention, for it is a new kind of presentation of an important economic plant. A well-known coffee firm has made the following statement: "For exhaustive scientific research, for wealth of bibliographical reference to a species of plant life that has become a great economic factor, it is likely to be accepted as an authoritative and standard work."

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SPECIAL ARTICLES

CONIFERS AND THE COAL QUESTION

FOR over a century and a half a controversy has raged in regard to the origin of that all-important mineral, coal. On the one hand it has been maintained that its raw materials are the result of transport by water and that consequently coal is essentially of the nature of an aqueous organic sediment. On the other hand, the opinion has been held that coal is in the main the result of vegetable accumulations similar to those in actual circum-polar peat-bogs, consisting of the subaerial deposits, representing successive generations of fallen peat plants. The first view of the origin of coal is usually called the allochthonous or transport theory. The second is known as the autochthonous or *in situ* hypothesis. European geologists have in the main in recent years held to the latter view and their American colleagues have for the most part followed them in this opinion. It is important to emphasize however that the earlier and even the current views in regard to the origin of coal are for the most part arrived at in complete ignorance of its organization. Except in very recent years figures revealing the organization of coal are conspicuously absent in geological works, even in those which particularly deal with coal. It is apparently not without significance that the French, who above all others gave early attention to the actual organization of coal, are supporters of the transport or aquatic hypothesis of the origin of coal. Although new methods and improved old methods now give us real insight into the organization of coal, there is as yet unfortunately in general little observable rational improvement in geological theories regarding the formation of coal deposits.

The Tertiary coals as being nearest to our times and consequently representing conditions most easily compared with those of to-day, suggest themselves as most likely to resolve finally existing controversies. In this connection the lignitic remains in a large number of Tertiary coals have been examined in the writer's laboratories with results which are apparently highly significant. It has long been the custom in central Europe to compare the Tertiary coals with such formations as occur to-day for example in the Dismal Swamp. The characteristic Conifer of such swamps is *Taxodium distichum* and the abundant remains of wood in German coal deposits were referred to this or a similar species under the generic name Taxodioxylon. A notable difficulty in this connection is the fact that the conspicuous "knees" or pneutamophores of Taxodium have never been found even in the often excellent preserved remains of supposed Taxodium stumps, in the central European brown coals.

Over two decades ago the present writer pointed out that a reliable diagnostic feature of our two living species of Sequoia is their reaction to wounds. In *S. washingtoniana* (the Big Tree) and *S. sempervirens* (the Redwood) resin canals are formed in the wood of the wound cap. This feature distinguishes Sequoia from all other genera possessing the Cupressinoxylon type of wood and holds also for the Laramie (upper) Cretaceous (the most remote epoch in which true Sequoias have been found). It now turns out that in many cases the supposed Taxodiums of the German Tertiary coals are in reality Sequoias. Both our living species of the genus are mountain trees and in no case are they ever found in swamps. As a result of this addition to our knowledge of the most important ligneous remains of the central European coal deposits, a change of view is necessary in regard to the conditions under which they have been accumulated. It is now admitted even by some of our German colleagues that there must have been inundations (Ueberschwemmungen) by means of which the remains of Sequoias, at that time abundant throughout the northern hemisphere, were washed into the coal bogs. Unfortunately this concession does not go far enough, for an examination of Tertiary coals, in the writer's laboratories, covering North America, Europe and Asia, shows not only the presence of Sequoias, but at the same time a general organization typical of the organic sediments found in the

depths of modern lakes, lagoons and tranquil estuaries. Tertiary coals in general, in the Northern Hemisphere, are consequently to be regarded as the result of water transport and aqueous sedimentation. Even so uncompromising an advocate of the autochthonous hypothesis as the late Professor H. Potonie, agreed that accumulations in lakes and ponds were to be regarded as allochthonous.

Recently, the writer has had the opportunity of studying brown coals of the Southern Hemisphere, in New Zealand and Australia. Here the evidence against the *in situ* or peat bog hypothesis of the origin of coal is equally decisive. The coals from a large number of New Zealand mines not only of Tertiary but also of late Cretaceous age shows organization such as is found to-day only in lacustrine or similar organic mucks. Further the woods of New Zealand coals belong to the Araucarians and Podocarps, Conifers, which are not found growing in bogs at the present time. It is not without significance too in this connection, that the official view of the Geological Survey of New Zealand, is that the coals of that country are of sedimentary or transport origin. In Australia the remarkable brown coal deposits near Morwell in the state of Victoria were examined under very favorable conditions, through the kindness of Sir Edgeworth David, of the Department of Geology, of Sydney University, and Sir John Monash, Chancellor of the University of Melbourne. These deposits are in places nearly eight hundred feet thick and in the open workings which are at present being operated are of a depth of nearly two hundred feet. In one of these are prodigious quantities of generally admirably preserved tree trunks, which in many instances have not undergone even the slightest compression. A microscopic examination of a number of these has shown that they are either Araucarian Conifers, or Proteaceae. The Araucarians are certainly not bog plants and the only reasonable explanation of their presence in coal deposits is their having been water-borne from some more or less distant site. The most characteristic Proteaceous wood present is that of the so-called silky-oak or Grevillea, which is a notable component of the well-known dry sandstone flora, so characteristic of Australia not only of to-day but as far back as the Eocene. The general organization of these coals is lacustrine like those of New Zealand and in places seams of actual oil-shale are present in the coal.

It appears advisable that more attention be given to the organization of coal, in connection with theories in regard to its origin. Certainly the prevailing views represent habit and prejudice rather than a rational consideration of the rapidly increasing body of new and significant facts. Not long since the writer was exhibiting the colored plates of his recent memoir on coal to two of his geological friends, one of whom remarked apropos of the brilliant hued illustrations, that coal did not look like that. He was advised by his fellow geologist to go and examine some coal sections. This advice may perhaps be of value in a wider circle.

It is clear from the structural study of Tertiary coals and their contained woods that these coals can not have been formed *in situ* as is generally assumed, since the woods are those of land and even desert trees. Further the general organization of brown coals closely resembles the aquatic accumulations of vegetable matter in the same regions at the present time and consequently can not be compared at all with peat.

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PACIFIC SCIENCE ASSOCIATION

THE outstanding feature of cooperative scientific work in the Pacific for the year 1926 is the organization of the "Pacific Science Association"—the culminating action of the remarkable Science Congress which met at Tokyo, from October 30 to November 11, 1926. The objects of the association are:

(a) To initiate and promote cooperation in the study of scientific problems relating to the Pacific region, more particularly those affecting the prosperity and well-being of Pacific peoples.

(b) To strengthen the bonds of peace among Pacific peoples by promoting a feeling of brotherhood among the scientists of all the Pacific countries.

The constitution of the association provides for administration through a "Pacific Science Council" composed of members appointed by the research councils or similar organizations, located at centers where investigations of Pacific problems are now in progress. The charter membership consists of representative institutions in Australia, Canada, China, France, Great Britain, Hawaii, Japan, the Netherlands, Netherlands East Indies, New Zealand, the Philippines and Russia. Provision is made for the admission to membership of other countries as they develop active interest in Pacific problems.

In its organization, the Pacific Science Association presents some unusual features. It has no permanent officers and no specified place of meeting. The plan is to meet once in three years in response to an invitation extended by a responsible institution in some Pacific country; and to leave to the institution under whose auspices a meeting is held the entire responsibility for organization, financing, program and personnel. Between sessions, the work of the