This publication represents the proceedings of a symposium on "the Geology, Paleobotany, Geochemistry, and Microbiology of Peats". The symposium was held during the Annual Meeting of the Geological Society of America and associated societies which took place in Miami, 18-20 November, 1974, and was jointly sponsored by the Coal Geology Division of the Society and the Organic Geochemistry Division of the Geochemical Society. Fourteen papers were presented, and nine are included in this publication. Five authors elected to make other arrangements for publishing their work; but the abstracts of these five papers, as submitted for inclusion in Abstracts with Programs, volume 6, number 7, 1974, are included here for completeness.

Peats are of interest to scientists in a variety of disciplines: coal geology, organic geochemistry, soil science, plant ecology, the general ecology of food chains, agronomy, and environmental studies. Workers in many of these fields contributed to this symposium, but it is perhaps fair to say that the central unifying core is the consideration of peat as the precursor of coal. From a broad and general earth science point of view, peats and coals are of special interest because (a) such sediments contain higher concentrations of organic matter than any other common sedimentary deposits, and (b) in most peat beds and coal seams, the greater part of the organic matter and part of the mineral matter are autochthonous in the strictest sense, so that the many biological and chemical fossils that they contain are valid indicators of the organisms from which the organic matter was derived or of the environment of deposition. By contrast, although the reservoir and source rocks of petroleum do contain chemical fossils indicating their origin, reservoir rocks at least, cannot, of their nature, contain relevant fossils in the ordinary biological sense.

The study of modern sediments as an aid to the interpretation of ancient rocks is, of course, a well recognized procedure, and half the papers in this symposium describe studies of this kind. A significant theme of the symposium is the reverse of this approach, the reconstruction of features of ancient peat swamps from the study of mature coals (first four papers). Of special interest is the interaction between these two approaches that is evident in the papers presented here. Robinson and Melton, and Caruccio and Ferm, discuss back barrier coals, formed in saline conditions near a coast behind a beach barrier. Casagrande and Erchull, and Reuter and Beck, studied the modern Okefenokee Swamp, which could be accurately described as a back barrier peat swamp, inasmuch as it occurs in the lee of a sandy beach barrier (Trail Ridge). But the sea has receded a long way since the ridge was formed (ca. 100,000 yr BP), while the maximum age of the peat is about 6000 yr, and the water conditions in the swamp are fresh, not saline. No mature coal laid down in fresh water conditions behind a beach barrier that was already ancient at the time of deposition has yet been identified; even the possibility of this had not been appreciated before the Okefenokee was studied.
Three studies using quite different experimental approaches (Ting; Phillips, Kunz and Mickish; Niklas and Phillips) throw light on the plants that have given rise to peats in past eras. Phillips, Kunz and Mickish, from a study of coal balls, were able to reconstruct in considerable detail the succession of floras that inhabited a Carboniferous swamp. Gleason and his co-workers in their study of modern sediments show that in three climatically and vegetationally distinct areas a broad similarity in the succession of plant types represented in profiles can be seen. Their study of the nature and origin of tree islands in peat-forming environments shows, incidentally, that several different plant communities may simultaneously be contributing to the formation of a single stratum of peat (something that it would be difficult to establish from studies of mature coal seams).

Casagrande and Erchull conclude from their study of trace elements in Okefenokee peats that there is little need to postulate epigenetic acquisition to account for the distributions found in coals. They did not find any particular correlations in the peat profiles between trace element distributions and the succession of the plant communities that gave rise to the peats. On the other hand, Cameron and Wright, with some elements, did find evidence that at particular horizons the nature of the plant cover indeed determines distributions. These authors were studying raised bogs, formed in glacial kettles and now populated mainly by mosses rather than vascular plants. It can be argued that in view of the rarity of widespread glaciation in geological history such bogs are special phenomena, and also that they are unlikely to give rise to coals. Even so, one is left with a strong suspicion that the character of the biota can, in other environments, determine the relative amounts of the minor and trace elements, including micronutrients, that accumulate in a peat swamp.

The point is made in Calder's paper that although peats may be strictly autochthonous as judged by the recognizable plant tissues in them, chemically they may be partly allochthonous. Calder demonstrates that a Florida salt marsh receives an input of dissolved organic matter from landward areas. Both he, and Reuter and Beck, show that leaching of organic matter out of marshes and swamps also occurs. Sasson shows that the distributions of fatty acids in mangrove peats and in the organisms that gave rise to them are distinctively different. This may to some extent represent an allochthonous contribution to the peats, but is mostly due to differential consumption of some fatty acid structures by microorganisms, and may also be partly due to contributions from cellular substances of the microflora itself.

The microbiology of peats is arguably the most neglected area of peat studies. It is therefore gratifying that four papers in this symposium bear, in one way or another, on this topic. Fell's study was performed as a contribution to the ecology of the bays and estuaries bordering the Florida Everglades, and concerns the fungal and meiofaunal attack on mangrove leaves washed into bodies of water by tidal action. Yet it illustrates vividly the fate that mangrove organs left within the swamp domain are likely to experience.

It is accepted dogma in police practice that, since direct observation of a serious crime is rarely available, circumstantial evidence is important and can usually secure conviction. In the same sense, Swain's study of marsh
gases provides circumstantial evidence of the activity of certain taxa of microorganisms in peats. Exarchos and Given were also concerned with circumstantial evidence. They show by experiments with pure polymers that the potentiality for rapid microbial destruction of the polymers of plant cell walls does exist in peats, and therefore ask, why is this potentiality not fully realized?

*Botryococcus braunii* is a most peculiar organism. It is a green alga which, in its resting phase, has 70% of dry cell weight as hydrocarbons. It, or a closely related species, is the principal precursor of the Scottish algal coal known as torbanite and of the Australian coorongite. It is also the principal contributor to the coal maceral known as alginite. The observations of Niklas and Phillips to some extent document the way in which this organism makes its contribution to the history of organic sediments.

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