Reassessment of the Evidence for Primary Fusinite and Degradofusinite Based on Studies of Coal Balls from the New Castle Coal Bed (Alabama, U.S.A.), the Union Coal Bed, (Lancashire, England) and the Calhoun Coal Bed (Illinois, U.S.A.)

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The origin of fusinite has been studied using polished coal balls (permineralized peat) from the New Castle coal bed (Alabama, U.S.A.), the Union coal bed, (Lancashire, England), and the Calhoun coal bed (Illinois, U.S.A.). Previous claims that sclerenchyma from Lyginopteris is preserved as fusinite though the surrounding tissues are preserved as vitrinite are shown to be unconvincing due to the false assumption that brown tissues in coal ball thin sections always represent vitrinite whereas black ones always represent inertinite. Reflectance measurements of black cortical sclerenchyma bands alternating with brown parenchyma show that both are preserved as fusinite (figure 1). Other Lyginopteris specimens in which both sclerenchyma and parenchyma were brown had vitrinitic reflectivity in both tissues. Similar results were obtained with a Myeloxyylon specimen in which black sclerenchyma was completely surrounded by brown parenchyma. Previously, it was assumed that the brown parenchyma was vitrinite surrounding fusinitic sclerenchyma. This was the strongest evidence in favor of primary fusinite in vascular plants. Other evidence for primary fusinite from vascular plants is inadequate.

Abundant fungi with vitrinitic reflectivity were found in coal balls whereas none with fusinitic reflectivity were found (figure 2). Although genuine fungal sclerotinite does exist, the occurrence of fungal sclerotinite proves only that fungi can be fusinitized, not that fungal sclerotinite is primary fusinite.

Both coprolites and decayed lycopod periderm have vitrinitic reflectivity in coal balls (figure 3). These tissues should have had fusinitic reflectivity if decay results in fusinitization thus throwing doubt on the existence of degradofusinite.

Charcoal and decayed tissues show features which may allow them to be positively identified in some cases. In charcoal, the secondary cell walls of adjacent cells together with the middle lamellae are fused into a single homogeneous unit. In decayed tissues, the middle lamellae is preferentially decayed which can result in the separation of adjacent cells. The middle lamellae can be preserved in vitrinite in bituminous coal so coalification alone does not result in the destruction of the middle lamellae. Some prominent illustrations of degradofusinite show fusion of the cell walls of adjacent cells indicate that they are really pyrofusinite. This indicates that presently accepted criteria for recognizing degradofusinite are inadequate even if degradofusinite does exist.

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