

from the seacoast; and in the Mississippi valley — then a great bay, as in the Cretaceous period — it extends northward over 500 miles, covering on the *east* a broad portion of the state of Tennessee, and reaching into Illinois, and on the *west*, an eastern portion of Missouri and Arkansas. From Texas it extends southward into Mexico.

The formation exposed to view from New Jersey through Virginia consists of sand-beds of different colors, including greensand or glauconitic beds, often shell-bearing, and is referred to the Lignitic Eocene. In South Carolina the exposure reaches nearly to the coast, and is more varied in its constitution. Along the inner margin occurs a stratum of *Buhrstone*, about 200 feet thick, a cellular siliceous rock, from which the shells have been dissolved away by siliceous waters; and over this, to the eastward, occur calcareous beds with some greensand, the *Santee beds* of Tuomey, and the related *Ashley and Cooper beds*, or beds along the basins of the Ashley and Cooper rivers. On the Gulf border the belt averages 65 miles in width.

1. The *Midway*, the lowest member of the Eocene, was named thus after a landing on Alabama River, Wilcox County, Ala., by Smith and Johnson in 1887. It was regarded by them as a subdivision of the *Lignitic*; it is made by Harris to include the *Black Bluff* and *Matthews' Landing beds*, and given coördinate rank with the *Lignitic*; the *Clayton* or *Monterey beds* of Langdon.

It is distinguished from the *Lignitic* by (1) its fossil contents and (2) the off-shore character of its deposits. In the region of Red River and the Mississippi Embayment, marine fossils are often wanting, and the beds are more or less lignitic; open sea deposits are found in southeast central Texas, central Arkansas, eastern Alabama and Georgia. No outcrops of this group have been recorded to the northeast of the last mentioned state. Total thickness, about 250'.

2. The term *Lignitic* was used by E. W. Hilgard (1860) for the Lower Eocene of Mississippi, consisting partly of freshwater lignitic beds and partly of estuarine fossiliferous deposits. The name *Lignitic formation* had been still earlier used by Conrad; and *Eo-lignitic* was proposed by Heilprin in 1884; *Lignitic* is used by Smith and Johnson (1887), to designate all Eocene deposits lying beneath the *Buhrstone*. The name has recently been restricted by Harris to the beds lying between the *Buhrstone* and the *Matthews Landing* clays, and is so employed here. The formation includes shallow-water depositions. Lignitic clay beds alternate with sands; the latter are often cross-bedded; huge boulders or septaria-like concretions are locally very abundant. Animal remains are scarce or wanting in the deposits west of the Mississippi; but in Alabama and to the northeast, in Maryland and Virginia, they are abundant in certain layers. Where most typically developed (in Alabama) the various subdivisions have received the following names and estimates of thickness from Smith and Johnson: (1) *Nanafalia*, 200'; (2) *Bell's Landing*, 140'; (3) *Wood's Bluff*, 80'-85'; (4) *Hatchetigbee*, 175'; total, 600'.

The *Pamunkey formation* (Darton), *i.e.* the Eocene deposits of Maryland and Virginia, are referable to the Bell's Landing horizon.

3. The *Lower Claiborne* was so designated by Harris to distinguish it from the Claiborne proper. It is represented in South Carolina, Georgia, and Alabama by the *Buhrstone* of Tuomey and Lyell; in Mississippi by the *Siliceous* and *Calcareous Claiborne* of Hilgard; in Louisiana by the *Lower Claiborne* of Harris; in Texas by the *Timber Belt beds* and the *Lafayette beds* in part, of Penrose; in California by part of the *Tejon group* of Gabb and Whitney. Near the axis of the Mississippi Embayment this group is without marine fossils; elsewhere, especially in its upper portion, it is often highly fossiliferous. In Ala-