group, of Safford (1864), the *Appomattox* of McGee (1888), — all of one formation, and now named by agreement the *Lafayette;* made by Hilgard, and in this work, a formation of the Glacial period. Marine deposits of this period are well developed along the Caloosahatchie River, south Florida. To the north, considerable areas are supposed to have been occupied by lakes having but slight elevations, and subject to occasional intrusions of the sea with its salt-water fauna; hence the Peace Creek bone beds in Manatee County, and Alachua clays, in Alachua County, are found apparently interstratified with marine Pliocene deposits (Dall, *U. S. G. S. Bulletin*, No. 84). The Mammals include a considerable number of Eocene, Quaternary, and Pliocene species, and the beds are supposed to be Quaternary in accumulation.

Dall reports that the Miocene group of Gay Head, Martha's Vineyard, is overlaid by beds affording Pliocene fossils (1894).

Miocene and Pliocene of the Pacific Coast. — Along Carrizo Creek, east of the coastal range of mountains in southern California, there is a bank or terrace, sometimes composed of fossil shells in its upper part, that has been referred to the Miocene Tertiary by Conrad and to the Pliocene by Gabb. The sandstones and shales of the Santa Suzanna, Santa Monica, and Santa Inez ranges are mainly referable to the Miocene; the conglomerates and sandstones about the base of the San Gabriel range can only be classed as Neocene. Resting on the granitic axis of Santa Lucia Mountains are highly metamorphosed Neocene (Miocene?) sandstones; stratigraphically above are thick deposits of bituminous shales, which toward the southeast are overlaid by soft, sometimes calcareous, sandstone, having a thickness of over 1000′, and referable to the Miocene series on paleontological evidence. Sandstones and bituminous slates of this age have been described from the Sierra de Salina, Gavilian, Santa Cruz, and Mount Diablo ranges. In the region of Mount Diablo Turner finds the Miocene series made up of coarse gray sandstone containing the large *Ostrea titan*, and conglomerates with pebbles of rhyolyte, quartz, and metamorphic rock. The Pliocene beds contain marine fossils, silicified wood, hornblende-andesyte tufa, and pebbles. North of the Golden Gate several fossiliferous Miocene deposits have been recorded, but their characters and limits are unknown. Along the foothills of the Sierra Nevada, especially in the vicinity of Ocoya Creek, there are Miocene beds of fine sand, coarse sand, conglomerates, fragments of pumicestone, ferruginous fossiliferous gravel, and clay nodules, in all 160′ thick. Farther to the north, the *Ione* formation of Lindgren, best developed in Amador and Calaveras counties, is composed of (1) 100′ of clay rock, (2) 100′ of sandstone, (3) 860′ or more of white clay and sand beds containing coal seams.

In Oregon, Miocene sandstones and shales occur at Astoria, and others, presumably of the same age, at Port Orford, Cape Blanco, and near Yaquina Bay. They are perhaps a continuation of the bituminous shales and sandstones of California. From 1 to 3 miles east of Eugene City, Dall has noted a Miocene sandstone 37′ thick. Condon states that the backbone of the Coast Range consists of argillaceous Miocene shale similar to that at Astoria; stratigraphically above are the fossiliferous *Solen beds* of Condon, also of Miocene age; on the flanks of the highlands there are lacustrine deposits containing some Equus bed (Quaternary) fossils.

In Washington, the Astoria clay-shales are reported from near Bruceport, and at various points on Shoalwater Bay. Other outcrops of the same formation are known from Vancouver Islands and Alaska.

The Pliocene *Merced group* of Lawson (*Bull. Geol. Univ. Cal.*, i., 142, 1893), on the coast of the San Francisco peninsula, south of the Golden Gate, is described as having a thickness of 5834′. A cliff consisting of the beds, 720′ high, extends from Lake Merced, near San Francisco, to Mussel Rock, about 8 miles south of Point Lobos. The basal bed contains some carbonized wood and leaves. Some of the fossils were described by J. G. Cooper in 1888, and a list of others, determined by Dall, is given in Lawson's paper. Delta material in the great valley of California at San Benito also is referred by him to the Pliocene.

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