there is among them a decided predominance of undivided and entire-edged leaves, with smooth (not wrinkled) and glossy surface.

6. The intermixture of abundant remains of Ferns with those of Dicotyledonous plants is a characteristic of this leaf-bed. In the plant-bearing deposits of the palæozoic and secondary periods, the Ferns are generally found unaccompanied by any trace of ordinary (*angiospermous*) Dicotyledons; in those of Tertiary age, this latter class prevails, and Ferns are for the most part rare or wanting. The intermixture of both classes is perfectly analogous to the existing state of things in Madeira. The profusion of Ferns in the undergrowth of the forests of that island is well known to all who have travelled there, and we should certainly expect their remains to be preserved in any fossiliferous freshwater deposit that might be formed in such a country.

7. The leaf-bed of S. Jorge has undoubtedly preserved to us but a very small fraction of the vegetation which at the time clothed the island; and a variety of causes, difficult to estimate, may have influenced the proportions in which different kinds of plants were preserved; therefore it would hardly be safe to draw any conclusions from the very small proportion of *Monocotyledons*, whether in this collection or in that described by Professor Heer. This is, however, a fact deserving of notice. It is not merely that the proportion of distinct forms belonging to that class is extremely small, but that their remains are extremely scarce. Now, Grasses and *Cyperaceæ* would seem very likely plants to be preserved in any freshwater deposit, as they so often grow near water, and their leaves, from the quantity of siliceous matter they contain, seem well fitted to resist decomposition. That the leaves of these plants may, in fact, be preserved in a fossil state, is shown by the discovery of several fossil kinds in the Molasse of Switzerland. (See Gaudin and De la Harpe.) It is, perhaps, worth notice, that the proportion of *Cyperaceæ* in the existing Flora of Madeira appears to be remarkably small. This cannot, however, be said of the Grasses.

8. On the whole, I am disposed to conclude that the vegetation of Madeira, at the time when the S. Jorge leaf-bed was formed, was, though not absolutely identical with that now existing, yet not very different from it. But such conclusions must be received with great caution, considering the small extent of the deposit, and how imperfectly it is yet known.

2. On a SECTION of a part of the FIFESHIRE COAST. By the Rev. THOMAS BROWN.

(Communicated by Sir R. I. Murchison, V.P.G.S.)

[Abridged.]

THIS section of the Carboniferous strata, as exposed on the northern shore of the Firth of Forth, from Anstruther to Burntisland,

represents the strata, at about high-water mark, arranged as occupying the space due to their real thickness only.

The Carboniferous rocks in this section present three great natural groups:—1, the Lower Carboniferous; 2, the Mountain-limestone; and 3, the Upper Carboniferous, or the workable coal-measures.

From Anstruther, on the east, to beyond Pittenweem the sequence of strata is clear, exhibiting a magnificent series of the Lower Carboniferous rocks (approximately 3800 feet thick), consisting of freshwater or estuarine shales and sandstones, with a few bands of limestone, one of which latter is of marine origin. The comparative abundance of *Sphenopteris affinis* characterizes the upper portion of this inferior group; and of *Cyclopteris*, its lower portion. The Burdiehouse limestone belongs to the upper portion; and, like the other calcareous bands, gets thinner eastwardly. The Granton beds, on the contrary, appear to belong to the lower portion.

The lowest portion of this Lower Carboniferous series has *Cyclopteris*, *Stigmaria*, *Carpolithes*, and *Cypridæ*. The marine band—an argillaceous limestone, in the middle of the series—has *Encrinites*, *Fenestella*, *Nucula tumida*, *N. attenuata*, and *Productus semireticulatus*. The upper half of the series contains *Sphenopteris affinis*, *Cypridæ* in abundance, and *Palæoniscus*.

The strata have a westward inclination, with a gradually increasing angle of dip, which is still greater towards St. Monance, as the section traverses the “Mountain-limestone” series. This consists of sandstones and shales, with five or six beds of limestone—all of marine origin, and may be altogether about 400 feet thick. The lowest of these bands of limestone (at Ardross) contains *Nucula tumida*, *N. attenuata*, *Schizodus sulcatus*, *Goniatites*, *Natica*, *Serpulites*, *Holoptychius Hibberti*, *Eurypterus* (?), *Gamponyx*, *Dithyrocaris*. The next band (E of the section) and its accompanying “bone-bed” contain *Productus semireticulatus*, *Aviculopecten*, *Spirifera duplicostata*, *Cochliodus*, *Ctenacanthus*, *Pterichthys* (?), and *Eurypterus*.

The fossils of the four limestone-bands (D, C, B, A) in the upper part of the “Mountain-limestone” are *Zaphrentis*, *Orthis filaria*, *Productus punctatus*, *P. semireticulatus*, *Aviculopecten*, *Modiola*, *Loxonema rugifera*, *Orthoceras*, and *Nautilus subsulcatus*.

This “Mountain-limestone” series passes under the Coal-basin (Upper Carboniferous) of St. Monance*, reappearing with a reversed dip. Between St. Monance and Elie the strata are associated with much trap-rock, and are singularly contorted: and an important fault runs parallel with the coast, causing much confusion. At Elie the beds have a westerly dip, and pass under the great central coal-basin of Fife†. This consists of upper carboniferous rocks, estimated by Mr. Laudale at 1700 feet in thickness.

* See Mr. Laudale's description, Transact. Highland Soc. vol. xi.

† Including the coal-fields of Dysart, Wemyss, Leven, Largo, and Earlsferry. See Mr. Laudale's Memoir in the Transact. Highland Soc. vol. xi.

At Invertiel (Kirkaldy) the "Mountain-limestone" beds reappear from under the coal-measures with an easterly dip; and the section crosses the lower shales, sandstones, and limestone, with thick intercalated trap-rocks, all having the same general inclination, to Burntisland, where a lime-band crops out, which is equivalent to that of Burdiehouse, and on the same level with that near Pittenweem, above mentioned.

Details of the Section,—commencing on the West.

Mountain-limestone. Lower Carboniferous.	Shales and sandstone	Burntisland.	} Dip easterly.
	Limestone-band (K) and sandstone.		
	Trap-rock	Pettycur Harbour.	
	Limestone (H); trap-rock, with thin interstratified shales.		
	Trap-rock.		
	Covered ground; and sandstone and shale .	Kinghorn.	
	Thick conformable trap-rocks, with occasional shales and sandstones.		
	Bone-bed, shale, and limestone (E).		
	Conformable trap-rock.		
	Shale; limestone (D); sandstone and shale.		
Mountain-limestone.	Conformable trap.		} Dip westerly, at a low angle.
	Shale and sandstone; bed of trap; shale and sandstone; and limestone (C)	Seafeld Tower.	
	Shales and sandstones.		
	Limestone (B); shale and sandstone; sandstone; limestone (A); conformable trap .	Invertiel (Kirkaldy).	
	(Upper Carboniferous omitted.)		
	Limestone-band (A.)		
	Sandstone		
	Trap-rock	Elie Pier.	
	Inclined and arched strata of sandstone and shale, and the limestones B, C, D, and E, with interpolated masses of trap-rock.		
	Encrinites in B and C; shells in D; Encrinites, Corals, Shells, and Fish-teeth in E and its shales	Saucher Point, Ladies' Tower.	
Mount. limestone.	[At one spot the lower beds with <i>Sphenopteris</i> , <i>Megalichthys</i> , &c. are brought up by a fault.]		} Dip easterly.
	Shales and sandstones, with a thin limestone (F), in a succession of irregular anticlinal and synclinal folds, with interruptions of trap. Encrinites in the band F at Newark Castle; and <i>Holoptychius Hibberti</i> and <i>Dithyrocaris</i> , at Ardross Castle	Ardross and Newark Castles.	
	[In the axial fold, to the west of Newark Castle, a shale-band (G), with <i>Sphenopteris affinis</i> , <i>Cyprida</i> , and Fish-remains, is brought up. Lower Carboniferous.]		
	Trap-rock.		
	Sandstones and shales, with thin fossiliferous limestones E, D, C, B, and A		
	(Upper Carboniferous omitted.)		
	Shales and sandstones, with thin bands of limestones (A—F) containing Encrinites, Corals, Shells, &c.		

Lower Carboniferous.	} Dip westerly.	Shales and sandstones, with a shale-band (G) containing <i>Sphenopteris affinis</i> , and lower down a thin limestone (H) with <i>Sphenopteris</i> and <i>Cypridae</i> .
		Sandstones and shales.
		Shale and a limestone-band (K). <i>Sphenopteris affinis</i> abundant.
		Sandstones and shales Pittenweem Harbour.
		Shale with a calcareous band (L). Encrinites, Corals, and Shells.
		Shales and sandstones. <i>Sphenopteris</i> in some of the uppermost; <i>Cyclopteris</i> abundant in several of the shales.
		Shale and limestone-band. <i>Cyclopteris</i> and Fish-remains.
		Sandstone and shale.
		Shale with a limestone. <i>Cyclopteris</i> and <i>Carpolites</i> .
		Sandstones and shales, with a bed of trap-rock.
		Shale with a thin limestone, containing Fish-remains, <i>Cypridae</i> , and <i>Cyclopteris</i> .
		Sandstones, shales, and bedded trap-rock.
		Fish-remains in one of the shales.
		Sandstones and shales, with a seam of coarse coal, and two thin calcareous bands in the shales. Casts of <i>Stigmaria</i> abundant in the lower sandstone.
		(Covered ground.)
		Sandstone Anstruther West.
		Sandstone and shales.
		Shale.
		Sandstones and shale Anstruther Harbour.
		[Further eastward the same strata are repeated, with reversed dips.]

3. On the LOWER COAL-MEASURES, as developed in BRITISH AMERICA. By J. W. DAWSON, LL.D., F.G.S., Principal of McGill College, Montreal.

DEPOSITS indicating the existence of the coal-flora and its associated freshwater fauna at the beginning of the Carboniferous period have been recognized in various parts both of the Old and New Worlds, and have modified the views entertained of the subdivisions of the Carboniferous system. In Nova Scotia and New Brunswick such deposits are developed with a clearness and fullness of detail capable of throwing much light on the dawn of the terrestrial conditions of the coal-period, and on the relations of these lower beds to the true coal-measures. I propose in the present paper to offer a contribution towards this end, by collecting in one view the information existing on these rocks in British America, with the addition of facts collected in the past summer, and the results of a comparison of the specimens in my collection with those of the upper portions of the coal-measures.