

in Scandinavia thin away, and the distinctive paradoxidian and olenidian divisions disappear. A group of strata, traceable from the S.E. of Lake Ladoga for a distance of about 330 miles to near Baltischport on the Gulf of Finland, with a visible thickness of not more than 100 feet (but pierced to a depth of 600 feet more in artesian wells), consists of three subdivisions; (a) Blue clay composed of a lower set of iron-sandstones (300 feet) resting on granite and an upper blue clay (300 feet), formerly noted only for some obscure fossils (*Platysolenites*, Pander, probably fragments of cystideans) but now known to include the *Olenellus*-zone; (b) Ungulite grit (50 to 60 feet) containing *Obolus Apollinis* (*Ungula*, Eichw.), *Schmidtia celata*, etc.; (c) *Dictyonema*-shales (about 20 feet) with *Dictyograptus* (*Dictyonema*) *flabelliformis*.³⁰ The recent researches of Schmidt have clearly shown the relations between these soft and seemingly not very old deposits and the Cambrian system of the rest of Europe. The lower sandstone, blue clay and a fucoidal sandstone lying immediately above the latter form an unequivocally Lower Cambrian group, for they have yielded *Olenellus Mickwitzi*, *Scenella discinoides*, *Mickwitzia monilifera*, *Obolella*, *Discina*, *Volborthella* (doubtfully referred to the orthoceratites), *Platysolenites* and *Medusites*. Schmidt points out that a complete break occurs between the top of the fucoid sandstone and the base of the Ungulite sandstone, and that this hiatus represents the Paradoxidian and Olenidian groups, while the *Dictyonema*-shales form the characteristic uppermost zone of the system.³¹

In Central Europe, Cambrian rocks appear from under later accumulations in Belgium and the North of France, Spain, Bohemia, and the Thuringer Wald.³² The most important in France and Belgium is that of the Ardennes,³³ where the principal rocks are grit, sandstone, slates, and schistose quartzites or quartz-schists (quartzo-phyllades of Dumont), with bands of whet-slate, quartz-porphry, dia-

³⁰ F. Schmidt, Quart. Journ. Geol. Soc. xxxviii. 1882, p. 516.

³¹ Mem. Acad. Imp. Sci. St. Petersbourg, xxxvi. 1889, No. 2.

³² The student will find a useful compendium on the correlation of the Cambrian and Silurian rocks of western Europe by S. Törnquist in Geolog. Fören. Stockholm Förhandl. xi. 1889, p. 299.

³³ Dumont, "Memoires sur les Terrains Ardennais et Rhénaux," 1847-48. Dewalque, "Prodrome d'une Description Geol. de la Belgique," 1868. Moulon, "Geologie de la Belgique," 1880. Gosselet, "Esquisse Geol. du Nord de la France," etc., 1880, and his great Monograph, "L'Ardenne," Mem. Carte Geol. detaill. 4to, 1888.