

Conformable transition rocks cover the primary, and sometimes alternate with them; they are also associated with the lowest beds of the coal formation, so that no well marked division can be traced between them: but there is one character, independent of all artificial arrangements, which serves to distinguish transition rocks from the upper secondary strata, in countries where the regular coal formation is found. All rocks under the coal formation, belong either to the transition or primary class; and all the strata above the coal formation belong either to the secondary or the tertiary class. The geological position of the regular coal formation thus serves as a simple and intelligible key to the geology of all countries, wherever it occurs. But where the coal strata are absent, the difficulty of determining the class to which certain rock formations belong, is often very great. Of this we have a striking instance in the perplexed attempts of foreign geologists to classify the vast calcareous formations of the Jura, and the outer range of the Alps; and the perplexity is further increased, by the mistakes which are made in referring to the English mountain limestone, by confounding it with the *calcaire alpin*, or alpine limestone. The alpine limestone, according to some geologists, is a transition limestone; but according to other geologists it is analogous to the magnesian limestone under the new red sandstone, and also comprises the lias limestones and the oolites. Indeed, I am convinced that in the vicinity of the Alps, rocks analogous to the chalk formation have not unfrequently been classed with transition limestones. These mistakes have arisen from a desire to make observations agree with preconceived theories, and with the artificial arrangements which Werner had invented. Thus it was taken for granted, that the granitic mountains of the Alps being primary, the calcareous mountains must be primary also; and when organic remains were first discovered in them, the geologists in France were greatly surprised, and seemed unwilling to admit the fact: at length, by a painful and reluctant effort, they removed all these mountains from the primary to the transition class. A more Herculean labor remains to be performed,—that of removing many of these mountains still higher, to the upper secondary class. In the vicinity of Moutiers, in the Tarentaise, where M. Brochant first observed some organic remains supposed to belong to transition rocks, I discovered the *Patella* and other fossils, peculiar to the upper secondary strata.

In parts of France at a distance from the Alps and the Jura, the mineral character of the secondary strata might alone serve to identify them with the English lias, oolites, and chalk; but in the range of the Jura and the outer ranges of the Alps, the calcareous formations are of such immense magnitude, and the beds are often so highly indurated and crystalline, that it is only from their relative position and imbedded fossils, that we can trace their analogy to the English strata, or to the secondary strata in the north of France.