

that river would have had to force their way;—subsequently, of a portion of the Euphrates finding a partial course to the eastward, through the less obstructed channels of the Tigris, and of the consequently easier and more rapid victory of the sands over the sluggish, and at times almost stagnant waters of the former river;—then of the formation of marshes which would have been alternately flooded and left dry, as the waters of the Euphrates rose and fell;—till at length the union of the two rivers being perfected, by which completion of the process the united streams would roll together to the ocean, the separate course of the now tributary river, the Euphrates, would gradually become obliterated, and all traces of its existence at length be lost.

When the chorography of the countries in question shall have been investigated with reference to the change above alluded to, we shall be enabled to understand more fully and more satisfactorily the statements respecting them of the geographers and historians of antiquity: under any other point of view it is an interminable and hopeless task to attempt to reconcile their conflicting, and in many cases apparently totally contradictory, assertions.

London, June 1, 1835.

CHARLES T. BEKE.

VII. *On the Silurian System of Rocks.* By RODERICK IMPEY MURCHISON, F.R.S., Vice-President of the Geological and Royal Geographical Societies, &c. &c.*

GEOLOGISTS having long felt that the older sedimentary deposits required a systematic examination, I have devoted the last five years to the study of this class of rocks, hoping thereby to fill up certain pages which were wanting in the chronology of the science†. A table published last year was the first attempt to convey to the geological student a correct view of the thickness, variety of strata, and fossil organic contents of a vast system, which, though arranged by nature in the most lucid order of succession, had not previously been pointed out. These rocks, rising from beneath the old red sandstone in Herefordshire, Shropshire, Radnorshire, Brecknockshire, Monmouthshire, and Caermarthen-shire, and each distinguished by separate and *peculiar organic remains*, were respectively named after those localities where each of them could be best studied, and their places in the series most clearly established. I have no change to an-

* Communicated by the Author.

† See Lond. and Edinb. Phil. Mag. 1832 to 1835, in the Proceedings of the Geological Society.

nounce in the order detailed in that table (see Lond. and Edinb. Phil. Mag., vol. iv. p. 370), but I wish to simplify it by the abandonment of double names, as applied to any one formation, and by the adoption of the names of those places only where the respective rocky masses lie in juxtaposition.

The names finally adopted, and which will be incorporated in a work now in preparation on this subject, are,

1. *Ludlow rocks*, divided into upper and lower Ludlow rocks, with a central zone of limestone: in this formation no change of name is proposed.

2. *Wenlock limestone* and shale (*equivalent, Dudley*).

3. *Caradoc sandstones*. This name, supplying the place of the Horderley and May Hill rocks, has been derived from the striking and well-known ridge of Caer Caradoc, on the eastern flanks of which, and lying between it and the Wenlock Edge, are exhibited those peculiar strata which are the equivalents of the shelly sandstones of Tortworth.

4. *Llandeilo flags* (preferred to "Builth and Llandeilo"). When this table is reprinted, there will naturally be found many additions to the organic remains, some identifications of British with foreign species, and numerous corrections.

Notwithstanding the adoption of these names, there was still required a comprehensive term by which the whole group could be designated, and at once distinguished from the *old red sandstone* above, and the *slaty rocks* below. Without such a collective name for the group, I found it impracticable to proceed with the work which I had engaged to complete, it being essential to the clear exposition of the subject, no longer to speak of these deposits as "transition rocks" or "fossiliferous grauwacké." The term 'transition' might indeed, have been retained, if for no other reason than to impress upon foreign geologists, (the Germans particularly,) how vast a difference exists between the geological horizon of the mountain or *carboniferous* limestone and that of the limestones of Ludlow and Wenlock, which are not only separated by many thousand feet of strata from the limestone of the carboniferous system, but, further, contain an entirely distinct class of organic remains. It was, however, utterly hopeless to use the word 'transition' in any definite sense as applied to these lower deposits, seeing the extent to which it had been abused. By some it was confined to those older rocks in which the earliest traces of organic remains were supposed to be observed, whilst others had more recently so expanded the meaning as to comprehend in it the whole of the carboniferous series! Thus at a period when, from the rapid advances of the science, it had become indispen-

sable to define the boundaries of groups naturally distinct from each other, dissimilar things were still confounded under one common name! and hence every geologist with whom I am acquainted had been for some time agreed upon the expediency of obliterating the term. The name 'transition' is, in truth, not applicable to any one class of stratified deposits in preference to another. Thus, for example, within the area of a map now preparing for publication and embracing parts of ten counties only, I shall be able to show *transitions* into every formation, beginning with the inferior oolite and terminating in descending order with the Llandeilo flags, many thousand feet below the old red sandstone; whilst the latter overlies other fossiliferous masses, the relative ages of which yet remain to be worked out! In various memoirs read before the Geological Society I have described these rocks as "fossiliferous grauwacké," but this term is in reality a misnomer, as the group contains few if any strata of the true grauwacké of German mineralogists. But whilst this system contains no such beds, it is underlain and sometimes in discordant stratification, by a vast series of slaty rocks, in which much genuine grauwacké is exhibited. It was therefore manifest that if used at all in geological nomenclature, the term 'grauwacké' must be rejected as inapplicable to the first great system below the old red sandstone, and restricted to rocks which were *now* proved to be of much higher antiquity. My friend Professor Sedgwick will doubtless soon dispel the obscurity which hangs over these grauwacké rocks, with which his labours in Wales and Cumberland have so well enabled him successfully to grapple.

To return, however, to the system under review, I was urged by leading geologists both at home and abroad to propound an entirely new name for it. In consonance, therefore, with those views which have rendered the names used by English geologists so current throughout the world, I venture to suggest, that as the great mass of rocks in question, trending from south-west to north-east, traverses the kingdom of our ancestors the Silures, the term "Silurian system" should be adopted as expressive of the deposits which lie between the old red sandstone and the slaty rocks of Wales, including, as above detailed, the Ludlow, Wenlock, Caradoc, and Llandeilo formations. One of the largest of these formations, to which, indeed, the Llandeilo flags are frequently subordinate, has been named after the bold and picturesque ridge of *Caer Caradoc* in Shropshire.

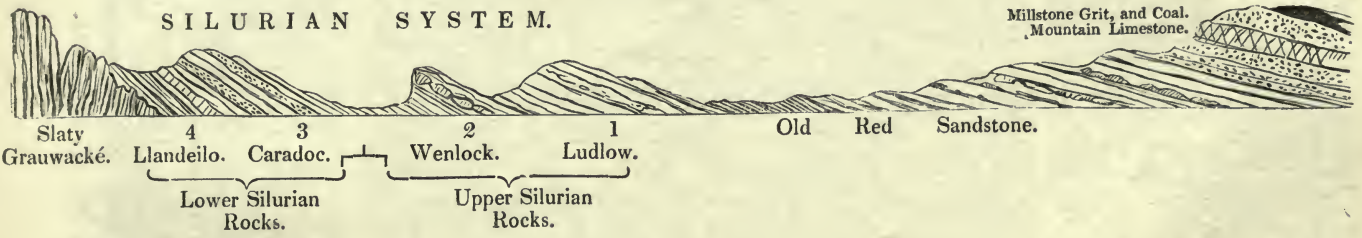
I further propose that the system be subdivided into "Upper" and "Lower Silurian rocks," the former em-

bracing the deposits of "Ludlow" and "Wenlock," the latter those of "Caradoc" and "Llandeilo." By this arrangement the observer will not be embarrassed when he finds that certain typical strata have disappeared. Thus, for instance, when the zones of limestone thin out, by which the formations of Ludlow and Wenlock are subdivided, it is no longer practicable to mark lines of separation between them. Under such circumstances the united mass will simply be described as "*Upper Silurian rocks*," whilst, wherever similar causes prevent the separation of the "Caradoc sandstones" from the "Llandeilo flags," the two will be termed "*Lower Silurian rocks*."

A wood-cut is annexed, explanatory of the manner in which these deposits are connected with the old red sandstone above them, with each other, and with the slaty grauwacké rocks beneath them. Although the lower Silurian rocks are frequently unconformable to the schistose grauwacké, as represented in the wood-cut, there are situations in which a passage from the one to the other may be detected.

Having alluded to a work which is in preparation upon the geology of the country of the Silures, and of several of the surrounding counties, I may take this opportunity of acquainting those friends who have fostered the undertaking, that the author is unceasingly occupied in promoting its completion. Geologists are not, I am sure, among those who feel surprise at the delay; for they well know that so large an area of country, and one so little previously examined, could not have been adequately described without several years of hard labour. In the mean time I may state that a map is now constructing, being a precise reduction of the Ordnance Maps, extending over the greater part of ten counties, all of which have been geologically coloured in the field; together with about twenty plates of engravings of fossils, many of which are of new species, and a vast number of coloured sections, vignettes, &c., all of which will, I trust, be completed so as to enable me to lay the work before the public in a few months.

P.S. Authorities differ in opinion concerning the exact geographical boundaries of the kingdom of the Silures. Cluverius and Camden state that it embraced the greater part of South Wales, including also Monmouthshire and Herefordshire. Hume speaks of the Silures as a nation inhabiting the banks of the *Severn*, whilst others think that their chief river was the *Wye*. The Roman historians afford no correct account of the geography of this region, but they assure us that the Silures were, of all the nations of South Britain,



SILURIAN SYSTEM.

Millstone Grit, and Coal.
Mountain Limestone.

Slaty
Grauwacké. 4 Llandeilo. 3 Caradoc. 2 Wenlock. 1 Ludlow.
Lower Silurian Rocks. Upper Silurian Rocks.

Old Red Sandstone.

the most powerful and warlike, impatient of slavery, and of great intrepidity. Such was their confidence in their gallant leader Caradoc (Caractacus), and so exasperated were they at the saying of the Emperor Claudius, "that the very name of Silures must be extirpated," that they carried on a stubborn war, not only under Caractacus, but long after his capture, defeating the legion under Manlius Valens, and wearying out the indefatigable Pro-Prætor Ostorius, who died when spent with the difficulties they opposed to him. Veranius, who commanded under Nero, attacked them in vain, and they were only finally subdued by Julius Frontinus in the time of Vespasian! British geologists, therefore, will not doubt that "Silúria" is a name entitled to be revived, when they are reminded that these struggles of their ancestors took place upon the very hills which it is proposed to illustrate under the term "Silurian system." Antiquaries are not agreed concerning the exact spot in which Caractacus made his last stand against the Romans. Camden has unquestionably erred in supposing it to have been on *Caer Caradoc*, an error into which he was doubtless led by the hill bearing the name of the great chief. The existence of a river at times deep and rapid is pointedly mentioned by Tacitus, and there is no such feature at the base of *Caer Caradoc*. The site of this battle is now most generally supposed to be *Coxwall Knoll**, near *Leintwardine*, about 10 miles west of *Ludlow*, and on the left bank of the *Teme*, to which stream the hill opposes a precipitous face. Having examined this locality with the eye of a soldier, and with the words of Tacitus in my recollection, I am disposed to doubt the accuracy of the conjecture, and I may, on some other occasion, point out the reason for this dissent, and suggest the position which the wily Caractacus may have occupied. This, however, is of no interest to the geological question, for even if *Coxwall Knoll* be the spot, it is in the very heart of the "Silurian system" of rocks. Although a profound antiquary and one to whose erudition I ought perhaps instantly to defer, is of opinion that the country of the Silures never extended so far to the north as *Caer Caradoc* and *Wenlock Edge*, I am still (until decisive counterbalancing evidence be produced,) disposed to think that the territory over which this warlike race exercised an influence must have been prolonged to the gorge of the *Severn*. It appears highly improbable that the north-eastern portion of a hilly system, which running from south-west to north-east has its natural termination in the parallel ridges of *Caer Caradoc* and *Wenlock Edge*, should not have been occupied or controlled

* See Ordnance Map.

by the same powerful people who possessed all the remainder of the chain, particularly as the Severn forms a well-defined natural boundary to the ridges in question. But after all, should antiquaries prevail in abstracting this hilly tract of South Salop in which the "Silurian system" of rocks is so well displayed, from the domains of old Caradoc, ample space is still left in Herefordshire, Radnorshire, Brecknockshire, and Monmouthshire, to sanction the use of the name proposed. In allusion to this term I have only further to add, that it is to be hoped that no naturalist will, from its sound, fall into the mistake of an early English writer who is ridiculed by Camden for having misapplied the line of Juvenal,

"Magna qui voce solebat
Vendere municipes fracta de merce Siluros,"

supposing that the British captives were exposed to sale at Rome, when the poet spoke of *fishes*, and not of men! My geological readers do not require to be told that there are no fossilized remains of the "*Silurus*," or bony Pike, in these deposits, since M. Agassiz will afford us very different names for the ichthyolites of the Ludlow rocks.

VIII. *Proceedings of Learned Societies.*

GEOLOGICAL SOCIETY.

PROCEEDINGS at the Annual General Meeting, 20th February 1835.

The various official Reports having been received, the President delivered the following Address:

GENTLEMEN,

In the Report which has just been read to you, it is stated in what manner the Council have adjudicated the proceeds of the Wollaston Fund for the present year. To carry into effect that award is the pleasing duty which I now have to perform. It is to me as well as to Mr. Mantell a subject of deep regret that he cannot attend to receive the prize in person. I shall deliver it, with your permission, to Mr. Lyell, who will officiate as his representative on this occasion.

Mr. Lyell,—In the name of the Geological Society I beg to commit to your care the proceeds for the present year of a fund bequeathed to us by one of the most eminent philosophers to whom this country has given birth, and by him directed to be applied to the furtherance of geological science. The Council are of opinion that they cannot upon the present occasion more conscientiously discharge the duty imposed upon them, than by awarding this prize to Mr. Mantell. Zealously engaged as he is in the practice of an arduous profession, we, his fellow labourers in this Society, have witnessed with great satisfaction for a series of years his unceasing endeavours to unravel the geological phenomena of the interesting district around him. By long experience Mr. Mantell has acquired