distributed in accordance with the distribution of water-bearing strata.

Artesian wells are now not infrequent; and the conditions requisite for their construction, and why they fail in London and elsewhere, and whether one could or could not be sunk in any special locality, should be illustrated. Again, calcareous and other mineral springs abound in certain places, and call for interpretation. They depend upon the fact that water holding an excess of carbonic acid in solution, derived from the decomposition of organic matter, will dissolve carbonate of lime, and which, whenever it evaporates, leaves an incrustaiion. (1) Stalactites and tufa will illustrate the fact, and "fur" in a kettle will furnish extra matter for illustration, while the practical application to the uses of hard and soft water might here find a place.

The teacher will thus see how any one subject constantly *suggests* another akin to it. He should thus bring in collateral matters, often of great practical importance; while the pupil's mind expands proportionately as he begins to see how phenomena perpetually interact and are linked together, though often at first sight quite incongruous

With regard to rivers, after the pupils have learnt by heart the names, and very likely, though unwisely, the lengths of the chief rivers of the world, they learn the meaning of such terms as river basin, channel, delta, &c., ; but little is told in Physical Geography of the work of rivers in excavating their own channels, and their powers of erosion above and below ground, of their powers of irrigation, of the varying phenomena of their flow, &c., all of which can be practically illustrated by some local brook. As an instance of a remarkable but not uncommon phenomenon, take the Churn of Gloucestershire. It arises in seven springs issuing between the limestone Oolite and the Lias clay. This shews the necessity of having a porous water-bearing bed based by an impervious clay bed to retain the water. It then flows with a volume of 11 cubic feet per minute. At one mile it has 73 cub. ft., at 2 mi., 105 cub. ft., at 5½ mi., 320 cub. ft. Hence, as long as it runs over clay, it gathers waters as it flows, and adds then to its general supply. It now leaves the Lias clay, and passes over the limestone, when a considerable portion sinks into the rocks below, so that at 6½ mi. it was only 290 cub. ft., at 9 mi. 45 cub. ft., at 14½ mi. from its source 10 cub. ft., or less than when it started, and only re-acquires a volume of 110 cub. ft. at Crickdale, 22 mi. from its source, where it joins the Thames.

The effect of water flowing underground is seen both in the deep wells of the Chalk, where the water penetrating by cracks accumulates in "pockets," as below Trafalgar Square.

In Limestone countries, as Derbyshire, even subterranean rivers abound: the origin of these, with their formation of caverns, must be explained, and their final use as dens for hyænas, bears, lions, and other animals, as well as prehistoric man, may form extra matter of discussion by the teacher *ad libitum*.

With regard to the phenomena of land, the configuration of the country around any particular place must be carefully noted, and a physical map constructed; but more than this is required. It is not enough to observe only that there are rolling downs of chalk in Sussex, limestone hills in Derbyshire, slate mountains in Wales and Cumberland, basaltic pillars and volcanic pitchstones in islands on west coast of Scotland, &c. The pecular nature of these rocks may be the respective and immediate causes of the different features of the country respectively; but what is the origin of the chalk, of the limestone, of the slate? Althout we may be dealing with the features of the land, even far in the interior of a continent, yet we must go to the sea for an interpretation for most of them. The sandstones and conglomerates of our rocks, and the fine slates of Wales, are now having their modern successors being formed on our beaches and on the sea-bottom. Denudation is always at work, destroying on the one hand, constructing on the other; while, for an interpretation of chalk and milestone, we find modern chalk is being deposited as a calcareous ooze at the bottom of the Atlantic; while existing coral reefs furnish the interpretation of the limestones near Scarborough, in Derbyshire, and near Plymouth, &c.

In alluding to chalk, we see how lifes comes into play in producing phenomena for the Physiographist to consider. He also differs from the Physical Geographer in not being content with the bare distribution of animals and plants upon the globe, but ascertains as far as possible the causes of their distribution. In this department, the botany and zoology of a district will furnish many facts of interest or observation; the return of the migratory birds will furnish matter for instruction; the native insects and mammalia, their habits, &c., are an endless source of observation, if only the teacher will set about instructing his pupils how to observe, and profit by their observations.[*]

It will, I think, be tunnecessary to proceed further. My object has been to throw out hints as to the value of the subject in respect to its vast comprehensiveness; and when once the mind is turned to this subject, it will be seen what a mine of educational wealth is utterly neglected, as a rule, for the want of teachers to turn it to account. Yet I am convinced Physiography, or the practical study of the natural phenomena in the neighbourhood of a school, is a subject of paramount importance. First, by the accumulation of observed facts; secondly, the study of their interpretation by the physical and vital agencies at work; then, by widening the application of the forces, the pupils will gradually learn how every phenomenon is linked to some other, that again to others, till the vast interaction of all the physical phenomena of the world will then appear before him. What can be the result of this, but a means of strengthening the mind to take large views of things generally. He will see tnat, just as *interaction* is a wide principle in nature, so also, in his future intercourse with his fellow men, interaction is a common bond of society. Mutual assistance is the key-note to the well-being of that society, just as mutual goodwill and charity is the silver cord which alone can save it from crumbling to pieces.

In conclusion, I will give an illustration of the close interaction of physical phenomena, and of the adaptation of various classes of facts to each other. I will begin with a horse's hoof, and will end with the sun.

Imagine a horse drawing a cart. It draws it by planting its foot firmly on the ground, exerting its muscles, which supply the mechanical force. Whence came that physical force? From the chemical affinities of the fool it ate. To derive benefit from the food, its digestive organs must correspond on the one hand to

(1) A simple experiment, of breating through a tube into a test-tube or small wine-glass of lime-water, will illustrate it. The water instantly becomes milky; if, however, the operator continues to breathe into it, the water again becomes clear.

[*] White's *Natural History of Selbourne* and Rev. L. Jenyns' *Observations in Natural History* (Van Voorst) will be found excellent guides for this purpose.