Let us in conclusion examine the nature of the waters which now impregnate the great mass of lower palæozoic strata in Canada. According to Mr. Hunt in them "only about one-half the chlorine is combined with the sodium (common salt), the remainder exists as chlorides of calcium and magnesium, the former predominating, while the sulphates are present only in small amounts."

Comparing the composition of these waters, which may be regarded as representing that of the ancient palæozoic sea, with our modern ocean, we find, as we have already theoretically inferred, that the chloride of calcium (lime) has been replaced by common salt (chloride of sodium), a process involving the presence of carbonate of soda and the formation of carbonate of lime.

Let us now finally return to our question, Was the sea always salt? If what we have deduced be correct, we may answer that the first ocean was one highly charged with various salts, chiefly chlorides of calcium and magnesia; that, with the continued action of atmospheric waters bringing down carbonate of soda to the sea, a chemical process has been constantly carried on, by which the chlorides of calcium and magnesia have been gradually but continuously diminished, and the quantity of chloride of sodium, or common salt, proportionately increased, and consequently that the saltiness of the sea is greater now than in its ancient state, and has been constantly increasing from the remotest times unto our own.

ON THE GEOLOGY OF THE STONESFIELD SLATE AND ITS ASSOCIATE FORMATIONS.

BY WILLIAM S. HORTON, OF LIVERPOOL.

THERE are, perhaps, few spots richer in the "time-hallowed memories of the past" than the old town of Woodstock, near Oxford. In its immediate neighbourhood once stood a royal palace, where, as the readers of Scott will doubtless remember, many of the scenes in one of his novels are laid. The site of this ancient fabric is now occupied by the more stately pile of Blenheim, the princely residence of the Duke of Marlborough. In the park there is a spring still termed, in allusion to the legend more or less familiar to all students of Eng-

lish history, Rosamond's well. At the distance of a few miles only, memorials of our Celtic ancestors exist in the form of tumuli, embowered among the venerable oaks of Wychwood Forest. It is not, however, our present intention to linger amid the many historical associations of Woodstock, deeply fraught with interest as they are, but proceeding at once to our object, we invite our readers to accompany us in a geological ramble to the village of Stonesfield, situated in its vicinity, at a distance of between three and four miles. By far the most agreeable portion of our road traverses the picturesque slopes and luxuriantly wooded glades of Blenheim Park: leaving these behind, we soon arrive within sight of our destination. As we approach the village we perceive it to occupy the sides and summit of a somewhat elevated ridge of land, and our attention will not fail to be arrested by the numerous precipitous piles or mounds of gray stones surrounding it in every direction, and from long exposure to the weather simulating at a distance much of the bleak and rugged aspect of natural cliffs and storm-beaten crags, but, as we discover in due time, they are in reality the gradually accumulated refuse of the slate pits we design to visit in the course of our excursion. Before ascending the hill into the village, the tourist, especially if at all interested in antiquarian pursuits, may profitably devote a short time to the examination of a Roman villa, although but few traces of it exist beyond a portion of its tessellated pavement, for the protection of which a rude hovel has been erected. This relic of that distant era when Britain was a province of the Roman empire, and this sequestered vale of Oxfordshire, the summer retreat of some wealthy citizen of the "Eternal City," is naturally suggestive of the reflection that the object of our visit to Stonesfield is in order to examine the records of an antiquity so remote, that even the far-receding vista of Roman annals affords no parallel by which a comparison may be instituted—an antiquity so vast that the very existence of the human race furnishes no chronology adequate to express the distance of a period so deeply enshrined in the dim eternity of the past. Let us, then, invoke the aid of geological science, which alone can roll back the strong barriers that have so long walled up the sepulchre of that ancient time, and reveal to its disciples the various mysterious forms and phases of life that prevailed during an age of which the historian takes no cognizance, and whose only archives are engraved on those "tables of stone," some of whose quaint inscriptions and marvellous heiroglyphs, as embodied in the Lower Oolitic rocks of Stonesfield, it is our present task to examine, and as far as practicable to decipher.

Strangers who visit this village almost invariably have one or other of two queries proposed to them by its inhabitants, either "Do you want a few thousand slates?" or "Do you want any fossils?" The products thus alluded to form the principle support of the villagers, and are chiefly obtained from the slaty fissile bed occurring at the base of the Bath, or Great Oolite, that being nowhere developed on so extensive a scale as at Stonesfield, although present in some other

localities, Sevenhampton, near Cheltenham, and Colley Weston, Northamptonshire, is thence denominated Stonesfield Slate. This bed of slate, although not exceeding six feet in thickness, is of considerable local value for roofing-purposes; and, indeed, all over Oxfordshire more or less of Stonesfield Slate may be observed on the roofs of the houses, churches, and other buildings. It contains some pebbles of a rock very similar to itself, which, as Sir C. Lyell suggests, may have been portions of the same bed broken up and subsequently re-deposited, and when first raised is very compact, but after having been exposed to the action of frost, readily divides into thin laminae, and in that state is dressed with the hammer, and prepared for the market. Unlike its equivalent formation in Gloucestershire, the Slate is not exposed in open quarries, but worked by means of well-like shafts penetrating the overlying Oolitic strata, and varying in depth from thirty to sixty feet, according to the level of the surface-ground. Although the Stonesfield Slate will receive the largest share of our attention, yet these overlying beds, which are, in descending order, the Cornbrash, Forest Marble and Bath Oolite demand a brief notice that perhaps will not be deemed out of place. Below the Stonesfield Slate a ferruginous bed of Inferior Oolite may be observed at the base of the hill in the adjoining parish of Fawler. This, since the time of its discovery (February, 1859), has been largely quarried for iron-ore, and found to contain a considerable percentage of that metal. At a distance of about four miles from Stonesfield, in the same direction, near Charlbury, the Lower Lias was exposed some years since by a cutting of the Oxford, Worcester, and Wolverhampton railway, and yielded some beautiful specimens of *Ammonites planicostatus*, *Pleurotomaria Anglica*, and other Liassic fossils.

The Cornbrash presents itself in this district as a hard, coarse, flaggy limestone, with thin bands of brown marls and clay, and when in a state of decomposition furnishes a valuable soil for agricultural purposes. It may be studied to advantage in the neighbourhood of Witney, more especially at a quarry on the side of the Woodstock road, where fine specimens of *Pholadomya Murchisoni* (?) are abundant, associated with a species of *Nautilus* (*N. inflatus*?), *Ammonites discus*, *A. Herveyi*, and another species too imperfect for identification; also *Terebratula maxillata*, *Cardium dissimile*, *Gresslya peregrina*, and *Isocardia minima*. This pit has also furnished some interesting sea-urchins, *Nucleolites sinuatus*, *N. clunicularis*, and a few finely preserved examples of *Holcotypus depressus*; also a solitary specimen of *Glyphia rostrata*, a crustacean allied to the lobster. In addition to the above, from some shallow openings on Curbridge Common have been collected *Trigonia costata*, *T. impressa*, *Lima gibbosa*, *Astarte elegans*, *A. excavata*, *Modiola plicata*, *M. bipartita*, with *Terebratula obovata*, a shell that is very abundant in this locality, and highly characteristic of the Cornbrash, and very rarely a beautiful species of sea-urchin, *Acrosalpinx hemisphaeroides*. The Forest Marble derives its name from the adjacent forest of Wychwood,

where it is largely developed. Several sections are well exposed at the quarries near the Witney Cemetery, where its upper portion consists of a dark-coloured bed of clay containing *Rhynchonella concinna*, *Terebratula digona*, and *T. maxillata*, with spines of *Cidaris*, and joints of *Pentacrinites*. This clay is divided about the centre by a thin band of slaty sandstone, which, although not equal to the Stonesfield Slate for the purpose, is capable of being worked by the hammer into a rough kind of roofing-tile. This Forest Marble slate recalls vividly to the mind the condition of the ancient Oolitic sea by whose agency it was formed, the surfaces of many of its slabs being strongly ripple-marked, and covered with the valves of small *Ostrææ*, *Rhynchonellæ*, and comminuted fragments of other shells, with here and there a perfect specimen of *Pecten lens*, or *P. vagans*, and occasionally a small sea-urchin, *Diadema depressa*. In one solitary instance the writer was so fortunate as to obtain from one of these slabs a specimen of *Acrosalenia*, much compressed, but still retaining its long, smooth, pointed spines attached to their sockets, a condition in which *Echini* are very rarely met with in this or any other formation. These beds of clay and slate are succeeded by a thick stratum of coarse shelly limestone, containing portions of coniferous drift-wood, and but few organic remains of any kind, with the exception of *Lima cardiiformis* and imperfect *Terebratulæ*. At Stonesfield the Bath Oolite consists of a soft white limestone, succeeded by a stratum of hard compact fissile ragstone passing downward into the true Stonesfield Slate. The upper portion is very fossiliferous, and contains several forms of life which seldom occur in the lower division. These are chiefly some interesting corals *Thamnastræa Lyellii*, two species of *Isastræa*, and some others, associated with a flat species of sea-urchin, *Clypeus Mullerii*, and much more rarely a beautiful *Hemicidaris* as yet unnamed. This bed also contains a variety of shells, among which may be enumerated *Astarte elegans*, *Terebratula maxillata*, *Nerinea Endesii*, *N. melanoides*, *Lima cardiiformis*, and a species of *Chemnitzia*, *C. Hamptonensis*.

This division of the Bath Oolite may also be studied at Witney, where it has yielded some interesting fish remains identical with those of the Stonesfield Slate. At Minster Lovel, and other places situated on the Cheltenham road, many cuttings have been made in this formation, chiefly for the purpose of procuring road-stone, for which it is, however, but ill adapted. A quarry situated by the road side, near the Minster turnpike, has furnished some instructive specimens, chiefly the palatal teeth of fishes, with fragments of bone and scales; these are found in an insulated condition, and are confined to a thin stratum of brown friable marl, forming the summit of the section.

The second division of the Bath Oolite, both in lithological composition and organic remains, is so nearly allied to the underlying slate that we shall prefer studying them in connection with each other, and regard them both as belonging to one and the same period, rather than treat of them as two separate and distinct formations. A com-

plete list of the fossils of these beds has not yet been formed, probably because there is no complete collection of them in existence. Perhaps the Oxford Geological Museum contains the finest series, chiefly collected by the late Dr. Buckland, who paid frequent visits to this village, and with whose memory the formation under review, rendered classic by his labours and fame, will ever be associated.

Let us now proceed to glance at these products of the slate-pits, and it will be seen that they comprise a marvellous variety of organic remains; for, besides plants, insects, reptiles, and mammalia, indicative of dry land, the crustacea, shells, and predaceous shark-like fishes of the Oolitic ocean are likewise represented in the catalogue.

We begin with plants, and notice one marine form, a branching furoid, or sea-weed, *Halymenites ramulosus*. Among the ferns that once flourished on that ancient shore, whose dark impressions are presented in beautiful relief on the light grey of the slate, we find the delicate fronds of *Sphenopteris* (*S. cysteoides*) and *Hymenophyllites* (*H. macrophylla*), together with the broad-leaved tribe *Taniopteris*, one species of which (*T. vittata*) is identical with the form found in the carbonaceous shale of the Lower Oolite on the Yorkshire coast, in the vicinity of Scarborough. The beautiful Cycadaceæ, of which the *Zamia* of New Holland gives an existing example, are represented by such forms as *Palæozamia* (*P. pectinata*, *P. tazina*), *Zamites* (*Z. lanceolatus*), and *Pterophyllum* (*P. comptum*, *P. minus*). The three last-named species occur likewise in the Scarborough oolite. There is also a singular reed-like leaf, as yet undescribed, about twelve inches in length by one in breadth, destitute of a mid-rib, and with nervures parallel with its edges. The small extreme branches of coniferous plants are among the frequent fossils of the slate. One kind possesses affinities with the yew (*Taxites*), but most of them are more allied to the cypress, and have received the name of *Thuytes* (*Thuytes cupressiformis*), with three other species. Of the fruits of these coniferæ there are several varieties, one kind in shape and size not unlike the berry of the yew, some of its more perfect examples still retaining their outer integument, or husk.

Examples of another species are termed by the quarrymen "plum-stones," to which, in truth, they possess a resemblance. There is also a fine Zamioid fruit, with the scales attached to the axis (*Bucklandia squamosa*), and others that appear referable to large pine-like trees; these at present receive the merely provisional title of *Carpolithes*. Besides these ferns and coniferous plants, there is likewise a small one, whose delicate yet distinct impressions are apparently very much akin to those of the moss family. Neither the roots nor stems of any of these plants have been found at Stonesfield; from this circumstance, and that of their occurring as detached leaves and twigs, we may reasonably infer that the place of their interment was not the spot on which they grew, but that they were drifted from some shore probably lying at no great distance.

Leaving the vegetable kingdom and ascending to that of the animal, we find in these beds but few zoophytes, these organisms being chiefly confined to the upper division of the Bath Oolite already mentioned. The Annelida are represented by a small serpulæ, and the crustacea by a small lobster (*Glyptia rostrata*), and a small species of crab (*Eryon*) not yet named. Faint but unmistakable relics appear of that department of animal life usually regarded as the most frail and perishing, namely the class of insects; nevertheless, the remains of primeval beetles and dragon-flies are preserved in the fossil state. The most frequent specimens of this kind are the elytra, or wing-cases of beetles allied to the Buprestidæ, or Prionidæ, races which abound in warm, but are not excluded from temperate, climates. The Oxford Museum contains the wing of a neuropterous insect allied to the dragon-fly, most elaborately described by Dr. Buckland, and likewise the hind-leg of a species of Curculio, exhibiting the peculiar adaptation for leaping.

Having noticed the insects, the Mollusca, or shell-fish, now claim our attention, and we remark their number to be comparatively limited. The Brachiopoda are represented by two species of Rhynchonella (*R. concinna* and *R. obsoleta*). Among the Monomyarian bivalves may be enumerated three species of Gervillia (*G. acuta*, *G. subcylindrica*, and *G. ovata*), three of Lima (*L. impressa*, *L. duplicata*, and *L. proboscidea*), two of Inoceramus (*I. obliquus* and *I. amygdaloides*), two of Pinna (*P. ampla* and *P. cuneata*), three of Pecten (*P. lens*, *P. annulatus*, and *P. vagans*), one of Perna (*P. rugosa*), and several species of Ostrea, the best defined of which are *O. acuminata* and *O. Sowerbii*. The Dimyarian bivalves also comprise several genera distributed as follows:—Two species of Modiola (*M. plicata* and *M. implicata*), two of Pholadomya (*P. acuticosta* and *P. Murchisonii*?), two of Trigonina (*T. Moretonii* and *T. impressa*), the latter being highly characteristic of this formation, and occurring in great abundance, its opened valves completely covering the surfaces of many of the slates; one of Mytilus (*M. sublaevis*), one of Cardium (*C. acutangulum*), also a species of Unicardium and *Mya calceiformis* (?). The Gasteropodous univalves include *Alaria trijida*, *Patella rugosa*, *P. Romeri* (?), two species of Natica, one of Actæonina, one of Turbo, and a small Nerita, which often retains very distinct traces of the black and yellow bands of colour that adorned its shell. The Cephalopoda are represented by but few species, and individually they exhibit an equal paucity of numbers; we may, however, enumerate *Belemnites fusiformis* and *B. Bessinus*, associated with *Nautilus Baberi* and *Ammonites gracilis*, with the cast of another Ammonite, too imperfect for identification.

Still ascending in the scale of animated beings, the fossil fishes of Stonesfield come under our consideration. The greater number of these have been described by Agassiz, and constitute a large and extremely interesting group, although rarely more than fragmentary, and chiefly represented by the teeth, scales, and "spears," as the workmen term the ichthyodolulites, with a true rendering of the

Greek name. These parts are so characteristic, and preserved in such a degree of perfection, as in most cases to admit of correct reference to the families and genera. The species are all extinct, and belong to the Placoid and Ganoid divisions of the four great orders of fishes established by Agassiz. Of these there are but few living examples, as the fishes that inhabit the seas of the existing period belong, with a limited number of exceptions, to the other two orders, Ctenoid and Cycloid, which were not introduced until the Cretaceous epoch, an era when the more ancient Placoids and Ganoids had already begun to decline. The Placoid fishes of the Stonesfield Slate are referable to three families, namely, the Cestraciontidæ, Hybodontidæ, and Edaphontidæ. The Cestraciontidæ are represented by species of the genera *Acrodus*, *Asteracanthus*, *Strophodus*, *Ceratodus*, *Leptacanthus*, *Nemacanthus*, and *Pristacanthus*. The teeth of this family form their chief characteristic, and under the name of Palates have attracted much attention from palæontologists. These palatal teeth are flat and oblong, or quadrangular in shape, and often beautifully enamelled. Beneath the enamel, the surface of which is frequently worn away, the body of each tooth is composed of a strong mass of bone. In some species not less than sixty of these teeth were embedded in each jaw, forming a kind of tessellated pavement, which constituted a most efficient apparatus for crushing the shells of crustacea and mollusca, probably the principal food of these fishes. The *Cestracion Phillipi*, a shark that inhabits the Australian seas, presents the only known analogy to the extinct *Acrodi* and *Strophodi* of Stonesfield. The palatal teeth most frequently to be met with in the slate are those of *Acrodus leiodus*, and sometimes measure one and a half inches in length by three-quarters in breadth. These, from their resemblance in form and colour to contracted leeches, they are regarded as such by the workmen, who are seldom without an analogy for any fossil they may offer for sale to the stranger geologists who visit their pits. Indeed, so far is the wisdom of philosophy transcended by that of these unlettered sages, that in cases where the mere scientific observer can only perceive the most ordinary fragments of stone or slate, these village savans can frequently succeed in demonstrating most clearly to their *own* satisfaction the presence of strange creatures that, like man, must have been most fearfully and wonderfully made, if they had ever been possessed of existence. Unfortunately, however, for the theories of these gifted men, all such specimens are invariably declined with thanks by those visitors possessed of the slightest knowledge of palæontology. Many amusing instances of these attempts at restoration might be related; we merely allude to them in order to convince those who are comparatively young geologists, that a certain degree of caution is requisite in their purchases of specimens from the quarrymen.

The Hybodontidæ are represented by various species of *Hybodus*, chiefly recognized by their striated teeth, which are sharp-edged and well adapted for cutting. Many varieties of these are found at

Stonesfield, the more perfect specimens in some instances retaining the serrated sockets by which they were inserted in the jaw. Fine specimens of the defensive fin-spines (*Ichthyodorulites*) of these *Hybodi* are sometimes found. These singular fossils were at one time regarded by naturalists as the jaws of fishes; they are now, however, ascertained to be the defensive weapons of sharks, the supposed teeth that in some species arm their concave sides, being the hooks or prickles to which the membrane of the fins was attached. Several living species of the great family of sharks have smooth horny spines connected with the dorsal fin, and similar small toothless spines occur in a fossil state in the chalk formation. Ten species of the genus *Ganodus* represent the *Edaphodontidæ*. The Ganoid fishes of Stonesfield belong to the four families *Pycnodontidæ*, *Lepidoidei*, *Sauroidei*, and *Cælacanthi*. The *Pycnodontidæ* are represented by the genera *Pycnodus*, *Gyrodus*, *Gyronechus*, and *Scaphodus*. The remains of this family most frequently found are the small round palatal teeth of *Pycnodus trigonus*, generally occurring in an insulated condition, but sometimes met with in small groups retaining the position they once occupied in the jaw. The family *Lepidoidei* has only two genera as its representatives in the formation under review, namely *Lepidotus* and *Pholidophorus*. These are distinguished by their enamelled scales, rhomboidal in form, and in some species smooth and glistening, but in others curiously plicated or folded. Small jaws are also sometimes obtained belonging to *Lepidotus tuberculatus* (?); these retain the teeth in a considerable degree of perfection. The *Sauroidei* are represented by the genera *Sauropsis*, *Caturus*, *Macrosemius*, and *Belonostomus*. The fishes of this voracious family combine both in the structure of their bones and some of their soft parts characters belonging to the class of reptiles. The *Sauroid* fishes are distinguished by their beautifully striated teeth, nearly conical, with conical cavities like the teeth of *Saurians*. In some species the base of the tooth is fluted like that of the *Ichthyosaurs*. The nearest analogues presented to these fishes in the existing creation are the *Lepidosteus*, or bony pike of North America, and the *Polypterus* of the South African coast. Of the *Cælacanthi* only a single species, *Otenolepis clychus*, is known at Stonesfield.

From the fishes of Stonesfield we ascend to its reptiles, the most famous of which is the *Megalosaurus Bucklandii*. The thigh-bones of this animal measured three feet, and the leg-bones, which were hollow, the same length; and the vertebræ were also of great size. Portions of its jaws, armed with long thin serrated teeth curved in the form of a pruning knife, are preserved in the Oxford Museum. From these remains, Dr. Buckland conjectured this enormous lizard to have been twice the length of a crocodile, or thirty or forty feet.

Associated with the *Megalosaurus* are found the remains of another saurian of considerably smaller dimensions (*Teleosaurus Cadomensis*), possessing affinities with the recent crocodiles. Those strange flying

reptiles the Pterodactyles are represented by one species (*P. Bucklandi*), chiefly known by its wing-bones, remarkable for their length, and which, like those of birds, were hollow in the middle, thus combining extreme lightness with strength. The family of turtles are known in these beds by one small species of *Chelonia*.

The remarkable catalogue of associated life exhibited by these rocks is rendered still more complete by the occurrence of three genera of Mammalia, namely, *Amphitherium*, *Phascolotherium*, and *Stereognathus*. Of these the only known remains are a few specimens of the lower jaws, with small cuspidated teeth, indicative of a small insectivorous quadruped, probably allied to the opossums, and other marsupial genera now confined to Australia and Tasmania. It is extremely interesting to observe that this resemblance to existing forms of Australian life is by no means limited to the mammalia of the Oolite. For instance, in the Australian sea exists the *Cestracion Phillipi*, or Port Jackson shark, the only known representative of the numerous species of *Acrodi* and *Strophodi*, the palatal teeth of which are so abundant in the Oolitic beds. There also living Terebratulæ are found associated with a species of *Trigonia*, the extinct forms of which are among the most common of the Stonesfield fossils. On the continent of Australia also flourish the *Araucariæ* and *Cycadaceæ*, coniferous plants, very nearly allied to the vegetable remains of the Stonesfield Slate.

If we review the fossil treasures of Stonesfield in the aggregate, we can to some extent reproduce that period of the earth's history in which the district under our notice was a lagoon with bordering marshes, intervening between a line of coast on the one hand, and the ancient Oolitic ocean on the other. Every circumstance connected with these finely laminated and ripple-marked sandstones indicates the nature of the process by which they were deposited to have been slow and gradual, doubtless demanding similar conditions to those which would prevail in a shallow sea-lake, penetrated at intervals by moderate swells, or gentle tides from the sea, but not exposed to storms or fluctuations caused by violent littoral action.

We may picture to ourselves the inhabitants of this lagoon, constituting a large population, beautiful branching star-corals analogous to those forming the reefs and islets on which the broad Pacific smiles, aristocratic Nautili and Ammonites associated with their humbler neighbours, the *Trigoniæ*, Terebratulæ and oysters that furnished a supply of food for the numerous sharks and other predaceous fishes infesting the wide open sea, and frequently visiting this quiet lake in quest of prey. On the ancient land lived that monstrous reptile the *Megalosaurus* and the crocodile-like *Teleosaurus*, with a few turtles; strange winged lizards, the Pterodactyles, hovered in the air, or snatched their prey from the calm waters below; and insects like dragon-flies flitted over the reedy marshes. From time to time fragments of bordering plants floated in the shallow pools, either swept down by inundations or driven by the wind;

leaves of ferns, branches, and fruits of coniferous trees like the yew and cypress.

Thus we see that in this lonely and, to the superficial eye, utterly unattractive village, we tread upon a spot once instinct with animal life in its most marvellous organic forms. It is a subterranean museum closely and securely packed, a treasury for palaeontologists, a storehouse containing numerous instances of the skill, power, and wonderful resources of creative Omnipotence, which could people a world with the strangest organisms, and yet permit them for so many ages to remain hidden and entombed, being well able to dispense with their testimony to its powers.

THE CARBONIFEROUS SYSTEM IN SCOTLAND CHARACTERIZED BY ITS BRACHIOPODA.

By THOMAS DAVIDSON, Esq., F.R.S., F.G.S., Hon. Member of the Geological Society of Glasgow, etc., etc.

(Continued from page 240.)

"This group in Northumberland is seen, westward of Alnwick at Garmitage-bank and Crawley Dean, and on the flanks of the porphyry of the Cheviot in Biddleston Burn, and in the Coquet below Linn Brig; it occupies a considerable area in the south part of Berwickshire, and is largely developed on the Tweed at Carham, Coldstream, Norham, etc.; it is seen underlying the mountain-limestone on the sea-coast from near Lammerton Shiel to Burnmouth; on the north side of Lammermuirs it is intercalated between the Old Red Sandstone, and the mountain-limestone from the Pees mouth to the Cove harbour."

Mr. Tate observes also that the Campsie and Fifeshire beds resemble those of Northumberland.

We will now conclude by offering a list of the Scottish localities, distance, and direction from certain towns, as well as of the nature of the sediments in which Carboniferous Brachiopoda and other marine fossils have been hitherto procured, with the hope that such may prove of use to collectors and geologists generally, and by thanking all those kind and zealous friends for the great interest and important assistance they have afforded me during the prosecution of this somewhat lengthened inquiry.