of hardness of the rocks in question should be exactly counter-balanced by the time taken by the retreat of the sea, the existence of which it would be very difficult to prove. I merely bring it forward for what it may be worth, as an explanation which, if it may not be the true one in the present case, yet may, I doubt not, be applicable to others.

5. *Summary.*—The conclusions I have endeavoured to shadow forth in this paper may be briefly summarized as follows:

1. That with the exception of a central double range of *mountains of elevation*, Western Brittany consists of two great northern and southern *plains of marine denudation*.

2. That the last time these plains were exposed to the action of the sea, was in Upper (?) Miocene times.

3. That the rivers of Finistère are identical with those which flowed from the central dry-land into the Miocene sea.

4. That the valleys at the bottoms of which these rivers run are the result of their erosive action, aided by other subaërial agents.

5. That the uniformity of depth and breadth at present displayed by these valleys is due to the degree of hardness of the rocks in this district, being in an order of succession directly inverse as the time during which they were submerged beneath the middle Tertiary sea, and exactly proportionate to that during which they have been exposed to present subaërial influences.¹

V.—NOTES ON THE NORTHAMPTON OOLITES.

By SAMUEL SHARP, F.S.A., F.G.S., etc.

ATTENTION having been drawn of late to the "Northampton Sand" by the able papers of Mr. George Maw and Mr. Judd, and by the discussions which arose upon them, and to the Oolitic beds of Northamptonshire generally, by the too concentrated article (so rich in information) by Professor Morris, in the *GEOLOGICAL MAGAZINE* for March, and by a letter from the Rev. P. B. Brodie elicited thereby in the May number, I venture to offer the following provisional statement as to the Oolitic strata in the neighbourhood of Northampton, and the order in which they occur, purposing at some future time to write more fully upon them, to enumerate the palæontological contents of each bed, and to endeavour to correlate the Northampton series with those occurring in the more northerly parts of the county and around Stamford.

The thickness of the beds respectively varies greatly. I have stated the maximum thickness of each in feet:

Great Oolite.	1. White Limestone	-	-	-	-	-	-	25 feet.
	2. Blue and Grey Clay	-	-	-	-	-	-	15 "
	3. White Sand	-	-	-	-	-	-	12 "
	4. A Series of very variable beds—more or less ferruginous	-	-	-	-	-	-	30 "
Inferior Oolite.	[Place of the Stonesfield Slate, which is absent.]							
	5. Coarse Shelly Calcareous Oolite, with numerous Fossils	-	-	-	-	-	-	4 "
	6. Sandy Slate, with Fossils	-	-	-	-	-	-	3 "
	7. Ironstone Beds	-	-	-	-	-	from 1 foot to	25 "
Upper Lias.								

¹ Read at the British Association Meeting at Exeter, in Section C., on Saturday, the 21st August, 1869.

Upon the foregoing beds I will remark briefly :

1. The White Limestone is disposed in beds from a few inches to about three feet in thickness, much fissured, and contains characteristic Great Oolite fossils. It is traversed by an earthy zone of from 9 to 18 inches thickness, made up of thin laminæ, and containing flattened bivalves, which are well preserved. This limestone passes down into—

2. Blue and Grey Clay. This clay is used in many places for brick-making. At Kingsthorpe, at the base of the limestone, is a zone containing *Rhynchonella concinna* and *Modiola imbricata* in abundance, and these are found also in the underlying clay to the depth of a few inches. In the same section a zone of *Ostrea Sowerbyi* occurs in the limestone; in some other localities these same forms occur in the clay beneath. This clay passes down by an easy transition into—

3. White clayey sand, with occasional ferruginous stains. In some places this sand has become so indurated as to be used as a building stone, and has proved very durable. Few fossils occur in this sand, but at its base there occurs a plant-bed, composed of thin alternating layers of sand and vegetable matter of a thickness of from 6 to 12 inches, overlying a band containing root perforations running down to a depth, in some instances, of two feet. Conformable to these sands is—

4. A series of very variable beds, composed sometimes of ferruginous sandstone, in thin layers which overlie calcareous beds containing shelly zones and plants, false bedding being frequent. Sometimes the whole section presents a series of beds of compact ferruginous sandstone, with no fossils—an excellent building-stone; in one instance the entire section consists of white sand and sandstone. Near the bottom of the beds there occurs in some localities a zone of coral, composed chiefly of *Thamnastræa*.

Immediately beneath these beds I have placed, as above, the Stonesfield slates, not in accordance with any conclusion arrived at by myself, but upon information derived from certain geologists whose opinions are worthy of all respect, and whose aid, together with that received from time to time from other geological friends, I will take a future opportunity of more particularly acknowledging.

5. A coarse shelly Calcareous Oolite. I will here content myself with saying that this bed is in texture much like some of the Stamford limestones, and, like them, it contains Inferior Oolite fossils—*Lima grandis*, etc. Associated with this bed is—

6. An Arenaceous Slate-bed, worked anciently for roofing slates, and which, because of its position with reference to beds above and below it, I have for some years held to be equivalent to the Collyweston slates, and with the latter to belong to the Inferior Oolite series. What little merit may be due for such identification, I think I may claim. Immediately under, and conformable with, this slate-bed are the interesting—

7. Ironstone-beds. These are so variable in thickness that, though at Kingsthorpe they are represented by a bed one foot thick, at

Duston, within a distance of a mile and a half, they present a section of 25 feet. They here consist of a dark red brown rock, having a cellular texture (the walls of rich iron ore enclosing ochreous cores), and are disposed in some seven or eight beds, from three to five feet in thickness, divided by joints and fissures, and traversed by shelly and coral zones, and a plant-bed. Near the top is a zone crowded with *Astarte elegans*, associated with which occur patches of *Astarte minima*; this zone is persistent over a considerable area, and is useful in determining at other points the general sequence and position of certain beds. The fossils are generally characteristic Inferior Oolite forms; but with them is found *Pholadomya ambigua* (?) and from near the bottom of the series have been obtained, from widely-separated localities, two well-defined examples of *Ammonites bifrons*. This leads me to conjecture that, in the lowest portion of the Ironstone-beds of the Northampton Sand, we have a passage-bed from the Upper Lias to the Inferior Oolite, representing, perhaps, the Cephalopoda-bed of the Cotswold Hills and the sands below. The Palæontological evidence, I think, proves conclusively that the Northamptonshire ironstone (all below the coarse shelly limestone No. 5, and the slate-bed No. 6, and including these beds, down to the Upper Lias Clay) is Inferior Oolite.

A study of these Northamptonshire beds reveals the interesting phenomena of repeated alternations, during their deposit, of marine and estuarine conditions. I think it probable that a careful examination of the several strata over a large area might determine the character and direction of each estuary. Indeed, from the relative localities of the thickening and thinning of the ironstone-beds, I have an impression that the estuary which they represent had a direction north-east to south-west.

DALLINGTON HALL, NORTHAMPTON,
AUG. 19, 1869.

NOTICES OF MEMOIRS.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, EXETER,
AUGUST, 19TH, 1869.

SECTION C.—GEOLOGY.

Address by PROFESSOR ROBERT HARKNESS, F.R.S., F.G.S. (of Queen's College, Cork), President of Section C.

IT has of late become the custom to open the several Sections of the British Association with an introductory address. This custom had, I believe, its origin in this Section when the Association met at Aberdeen; and upon that occasion Sir Charles Lyell made the important discovery of the late M. Boucher de Perthes, of the occurrence of flint weapons with the bones of extinct mammalia in the gravels of the Valley of the Somme, the subject of his opening address. In some instances new matter of importance in connection with geology has furnished materials for the opening address; but