could not slide over it, I grant that there would be truth in the objection. But if the crust be considered flexible, as practically it must be if of small thickness and liable to corrugation, then I do not see why the rotation of the fluid should have the effect of preventing the crust slipping over the nucleus, and adapting itself to such a position of equilibrium, as any irregularities of thickness resulting from corrugation might render necessary under the action of the centrifugal force and gravitation.

The final query put by Mr. Hill is this—"Will a change in latitudes give the best explanation of the phenomena?" To this I reply, that we have *four* chief classes of facts to account for :

1. The almost ubiquitous presence, either in present or past times, of volcanic action; apparently showing that wherever the earth's surface is pierced to a sufficient depth, a molten stratum is tapped.
2. The capacity for slipping towards certain lines which the crust possesses, as proved by the lateral compression of the strata along the flanks of mountain chains.
3. The amount of horizontal compression of the superficial strata being greater than the cooling of a solid earth can account for.
4. Changes of climate—notably the existence of a warm climate in former times near the North Pole.

These are the phenomena, and it appears to me that these four classes of facts point convergently towards the doctrine of a fluid substratum. It is quite true that the question which I put to physicists and now repeat was *whether a fluid substratum over a rigid nucleus would not be compatible with mechanical considerations, and whether under those circumstances changes in latitude would not result from unequal thickening of the crust?* And I suggested that the present distribution of the continents gives support to that idea. But I was not seeking *primarily* to account for changes of climate in that manner. That theory belongs to Dr. Evans; and he has ably defended it against Dr. Haughton's somewhat formidable objections in his recent address to the British Association at Dublin. The supposition alternative to Dr. Evans', by which Dr. Haughton would account for a former warm climate at the Pole through residual heat in the earth, has, I think, been disposed of by anticipation in Sir W. Thomson's paper on the Secular Cooling.

V.—ON THE OCCURRENCE OF *TEREBRATULA MORIERI* IN ENGLAND.

By JOHN FRANCIS WALKER, M.A., F.G.S., etc.

A VALUABLE paper by T. Davidson, Esq., F.R.S., appeared in the Proceedings of the Dorset Natural History and Antiquarian Field Club for 1877, "On the species of Brachiopoda that occur in the Inferior Oolite at Bradford Abbas and its vicinity." Since then, during a recent visit to this locality, I have added a few species to this list, including two which have not been discovered in England before. I propose to give a short account of these species, and also a table showing the relative distribution of the Brachiopoda in the Inferior Oolite and Fuller's Earth deposits at Cheltenham and France, compared with this district.

To the Reader of the GEOLOGICAL MAGAZINE.

*Please instruct your binder to substitute these four pages (553–556) for
the corresponding pages of the GEOL. MAG., December, 1878.*

The most important discovery is that of the well-marked species *Terebratula Morièri*, which has hitherto only been found in France. It was first described and figured by Mr. Davidson in the Annals of Natural History for 1852, vol. ix. (second series) p. 256, pl. xiv. fig. 3 and *a, b*,—the MS. name of *Terebratula Morièri* having been given to it by Deslongchamps after its discoverer M. Morièr. It was afterwards described and figured by E. Deslongchamps in 1857, "Catalogue descriptif des Brachiopodes du système Oolitique Inférieur du Calvados," p. 37, pl. iv. fig. 6, *a, b*; and in 1877, in the Paléontologie Française Terrain Jurassique, Brachiopodes, p. 244, pl. lxxv. figs. 1-8. It is a very rare species, having been found in France in only one locality, Ste. Honorine des Perthes (Calvados), in the white Oolite of Port-en-Bessin, which contains *Terebratula Phillipsii*, Morris, and *Rhynchonella plicatella*, Sow.; these species occur with it in England.

There appears to have been some doubt whether in France this species had been found in position, or in a loose block which might have fallen from the Great Oolite above. M. Deslongchamps regarded it as an Inferior Oolite fossil, but the finding of this species settles the question with regard to its age, as no Great Oolite occurs in the quarry from which I obtained this specimen.

Whilst examining the well-known quarry at Bradford Abbas, on the farm of Prof. Buckman, I picked up this specimen from the horizon of *Rhynchonella parvula*, E. Desl., but did not recognize it until I commenced to clean it; it corresponds in all respects with the figured specimens, showing the deep sinus in both valves and the peculiar concentric projecting imbricated ridges which well distinguish this species. It belongs to a small group, of which it is the earliest representative, followed, in the Fuller's Earth rock, by *Terebratula reticulata* and the closely-allied or identical species *Terebratula hybrida*, and in the Great Oolite by *Terebratula coarctata*. The specimen is about the size of figure 7 in pl. 65, Pal. Franç. Brachiopodes Jurassique. It is well preserved, both valves being perfect. I also obtained from the quarries at Half Way House a specimen of *Rhynchonella subdecorata*, and one or two specimens of *Rhyn. ringens* unusually large for English specimens. Also three specimens of a *Waldheimia* which appears to be *Waldheimia subbucculenta*, Chap. et Dew., and probably the same as the species figured, but not named, by Mr. Davidson in his paper on the Dorset Brachiopoda, pl. iii. figs. 14-15. *Waldheimia subbucculenta* is stated to occur in France in the lower part of the Fuller's Earth, but probably what in England would be called the upper part of the Inferior Oolite. It is a species which is closely allied to *W. Waltoni*, Dav., and somewhat resembles *W. indentata* and *W. perforata* of the Lias; *W. humeralis* of the Kimmeridge; and *pseudojurensis* of the Neocomian. It is a long, narrow, flat shell, tapering towards the beak and front margin, foramen small, beak ridges well defined, and a dark line on the smaller valve indicates the presence of a septum, showing that the loop was long. It will be figured with the other species in the appendix to Mr. Davidson's supplement to his great work on Jurassic Brachiopoda.

LIST OF BRACHIOPODA—continued.	SOMERSET AND DORSET.		CHELTEN- HAM.		FRANCE.	
	I.O.	F.E.	I.O.	F.E.	I.O.	F.E.
<i>Terebratula provincialis</i> , E. Desl. ....	.....	.....	.....	.....	c	.....
<i>curvifrons</i> , Oppel .....	.....	.....	c	.....	r	.....
<i>Morièri</i> , Dav.	r	.....	.....	.....	s	.....
<i>curviconcha</i> , Oppel .....	.....	.....	.....	.....	r	.....
<i>fylgia</i> , Oppel .....	.....	.....	.....	.....	c	.....
* <i>Wurttenbergica</i> , Oppel (Germany) .....	.....	.....	.....	.....	.....	.....
* <i>omalogastyr</i> , Hehl Ziet. (Germany) .....	.....	.....	.....	.....	.....	.....
<i>Waldheimia emarginata</i> , Sow.	r	.....	.....	.....	c	c
<i>Waltoni</i> , Dav.	s	.....	?	.....	c	.....
<i>subbucculenta</i> , Chap. et Dew.	r	.....	.....	.....	c	c
<i>ornithocephala</i> , Sow. ....	.....	c	.....	.....	.....	c
<i>Cadomensis</i> , E. Desl. ....	.....	s	r	.....	c	.....
<i>Hughesii</i> , Walker .....	.....	.....	r	.....	.....	.....
<i>carinata</i> , Lamarck	c	.....	r	.....	c	.....
var. <i>Mandelslohi</i> , Oppel = <i>W. carinata</i>—	.....	.....	.....	.....	.....	.....
<i>alveata</i> , Quedstedt	s	.....	c	.....	c	c
* var. <i>Blakei</i> , Walker (Yorkshire) .....	.....	.....	.....	.....	.....	.....
<i>Meriana</i> , Oppel	c	.....	c	.....	c	.....
<i>Leckenbyi</i> , Walker .....	.....	.....	r	.....	.....	.....
<i>cardium</i> , var. <i>Leckhamptonensis</i> , Walker	r	.....	r	.....	.....	.....
<i>Anglica</i> , Oppel	c	.....	.....	.....	.....	.....
<i>bullata</i> , Sow. ....	.....	c	.....	.....	.....	?
<i>Megerlia Munieri</i> , E. Desl. ....	.....	.....	.....	.....	.....	r
<i>Terebratella bivalvata</i> , E. Desl. ....	.....	.....	.....	.....	.....	c
<i>sulcifrons</i> , Benecke .....	.....	.....	.....	.....	.....	c
<i>Rhynchonella frontalis</i> , E. Desl. ....	.....	.....	.....	.....	r	.....
<i>Wrightii</i> , Dav. ....	.....	.....	r	.....	c	.....
<i>plicatella</i> , Sow.	c	.....	.....	.....	c	.....
<i>subtetrahedra</i> , Dav.	c	.....	c	.....	c	.....
<i>subdecorata</i> , Dav.	r	.....	s	.....	?	.....
<i>quadruplicata</i> , Zieten .....	.....	.....	c	.....	c	.....
<i>Lycetti</i> , Dav. ....	.....	.....	c	.....	.....	.....
<i>cynoccephala</i> , Richard	r	.....	c	.....	r	.....
<i>ringens</i> , Herault	c	.....	.....	.....	c	.....
<i>subringens</i> , Dav.	r	.....	.....	.....	.....	.....
<i>Oolitica</i> , Dav. ....	.....	.....	c	.....	.....	.....
<i>Forbesii</i> , Dav.	c	.....	.....	.....	.....	.....
<i>subobsoleta</i> , Dav. ....	.....	.....	c	.....	.....	.....
<i>angulata</i> , Sow. ....	.....	.....	c	.....	c	.....
<i>subangulata</i> , Dav.	s	.....	c	.....	.....	.....
<i>Smithii</i> , Walker .....	.....	c	.....	.....	.....	?
<i>Tatei</i> , Dav. ....	.....	.....	s	.....	.....	.....
<i>parvula</i> , E. Desl.	s	.....	.....	.....	c	.....
<i>Stephani</i> , Dav.	r	.....	.....	.....	.....	.....
<i>spinosa</i> , Sow.	c	r	c	.....	c	.....
* <i>Crossii</i> , Walker (Lincolnsh. & Yorksh.) .....	.....	.....	.....	.....	.....	.....
<i>sentiosa</i> , v. Buch.	r	.....	.....	.....	c	.....
* <i>acuticosta</i> , Hehl Zieten (Germany) .....	.....	.....	.....	.....	.....	.....
* <i>Stiufensis</i> , Oppel (Germany) .....	.....	.....	.....	.....	.....	.....

In a quarry near the church at Misterton, near Crewkerne, I found a band of clay lying on the top of the Inferior Oolite stone, containing numerous specimens of a variety of *Waldheimia Meriana* associated with *T. decipiens*. It is probable that some of the

specimens found in this district, referred to *T. Eudesii*, Oppel, may belong to *Terebratula conglobata*, Desl.

I have thought it necessary, in drawing up the preceding table, to give the species found in the Fuller's Earth as well as those found in the Inferior Oolite, as these beds are closely connected, and the division may have been drawn differently in France and in England.

Remarks.—The specimens which occur at Dundry are identical with those in the Sherborne district; but the small shells *Thecidea*, *Zellania*, etc., have not yet been found in the latter locality, but will be sought for the next time Prof. Buckman's quarry is worked for road-metal. Several *Thecidea*, etc., and more *Rhynchonellæ* may occur in France, but as these have not yet been described in the *Paléontologie Française*, the list may be incomplete. *Terebratula maxillata* and *Rhynchonella concinna* have been stated to occur in the Fuller's Earth of Sapperton Tunnel near Cirencester, but a blue band of the Great Oolite was cut through in making the tunnel, and the fossils from it were mixed with those from the Fuller's Earth, being nearly the same colour. It will be observed that the species peculiar to the Oolitic Marl of Cheltenham district, as *Rhyn. Lycetti*, Dav., *Rhyn. subobsoleta*, Dav., *Waldheimia Leckenbyi*, Walker, *Terebratula fimbria*, Sow., *Terebratula submaxillata*, Dav., etc., are wanting both in the Dorset district and in France; and that several species, as *Rh. ringens*, Herault, *Rh. parvula*, E. Desl., *Rh. plicatella*, Sow., *Rh. senticosa*, v. Buch, *Waldheimia subbucculenta*, Chap. et Dew., *W. Waltoni*, Dav., *W. emarginata*, Sow., *Terebratula decipiens*, E. Desl., *T. Ferryi*, E. Desl., *T. Morièri*, Desl. and Dav., *T. Stephani*, Dav., *T. sphaeroidalis*, Sow., occur in France and Dorset and Somerset, and not at Cheltenham. Probably some Palæozoic barrier separated these two areas during the deposit of these zones, and the exact equivalents may not be able to be found on comparing the different horizons of the Inferior Oolite of these districts. The Oolite marl being absent in France and Dorset; the bed containing *Rh. ringens* has not been found at Cheltenham. It is also worthy of remark that the Brachiopoda of the other Oolitic strata, and the Lias of Somerset and Dorset contain several species which do not occur in other parts of England, but are common in France.

VI.—ON *MEYERIA WILLETTII*, A NEW MACROUROUS CRUSTACEAN FROM THE CHALK OF SUSSEX.¹

By HENRY WOODWARD, LL.D., F.R.S., F.G.S.,
of the British Museum.

THE genus *Meyeria* was established by Prof. M'Coy, in 1849, for the reception of certain Crustaceans from the Gault and Greensand, found at Speeton, Yorkshire, and at Atherfield, in the Isle of Wight. A new form has been most obligingly sent to me for examination by Henry Willett, Esq., F.G.S.; and this being in a more perfect state of preservation than any heretofore obtained,

¹ Originally published in Dixon and Jones' *Geology of Sussex*, 1878, p. 379.