

ment of a blastoderm in the more rapid division of the germinal cells at the animal pole of the egg; so that the coarser yelk-cells become included by the blastoderm, by epibole, just as in the typical meroblastic ovum. The segregation of the protoplasmic and deutoplasmic matter, therefore, occurs after the first cleavage in these types; in fact, manifests itself after the first and second cleavages in *Clepsine* and *Rana*. It is important to note, however, that in the vicinity where the polar cells have been extruded, the embryonic or germinal differentiation first begins to show itself, and that this is not improbably due to the lingering influence of the original polar displacement of the egg-nucleus at the time of maturation and impregnation. While the germinal vesicle, or rather what represents it, actually returns to the centre of the deutoplasm-laden ovum in these forms, may it not be that a path of germinal matter has remained over in the track of its original outward passage, through which it could return to undergo the first cleavage, shortly after which its segments were again repelled towards the germinal pole?

The mode of evolution of the yelk is of great interest, and doubtless occurred through the working of natural selection. It is evidently adaptive in character; and the necessity for its presence as an appendage of the egg grew out of the exigencies of the struggle for existence. The lower, hollow vegetative cell of a meroblastic egg, such as shown in fig. 4, is, to all intents and purposes, comparable to a fat cell, or to an endosperm cell of a seed containing stored reserve material, which may be, for the most part, in an absolutely non-contractile or static condition, like the oval globoids of the egg of *Lepidosteus*. JOHN A. RYDER.

BALTIMORE SURFACE-GEOLGY.

THE 'Geology of the surface-features of the Baltimore area,'¹ by P. R. Uhler, bears evident marks of the author's unfamiliarity with his subject. No proof is offered in support of a number of assertions concerning the age and the physical changes of the Baltimore strata. After mentioning several rocks, which are referred, apparently without any evidence, to the Laurentian and archæan epochs respectively, we are told, that, "during the *Jurassic* period, these archæan upfolds seem to have attained their maximum development." Not a particle of evidence is offered in support of this assertion, which, we think, would need very strong proof indeed; and we are surprised at the facility with which the author handles 'wide-spreading, while comparatively local changes,' for metamorphic purposes. We also fail to see how the abundance of hornblendic and pyroxene rocks is a "restricted element in the structure of the Baltimore rocks, which serves to give them character, and to

separate them broadly from members of the series found in other parts of eastern North America." We were not before aware that a prevalence of such rocks was confined to the vicinity of Baltimore.

Leaving the azoic rocks, the author reaches what he calls the *Jurassic* period, and says that only the upper member of this great age of reptiles, the 'Wealden,' remains within the Baltimore area. The English Wealden is considered by European geologists as the equivalent of the marine Neocomian of the continent, the lowest member of the cretaceous. Moreover, the Wealden is a fresh and brackish water formation, considered to be the local deposit at the mouth of a large river; and, as shown by Mr. Judd,¹ the actual marine representative of the continental Neocomian occurs at the south end of Filey Bay, in Yorkshire. Sir A. C. Ramsay, although describing the Purbeck and Wealden as a special local fresh-water formation, does not hesitate to consider the Wealden as the equivalent of the Neocomian. The preceding facts will show that it is difficult to see why Mr. Uhler uses the term 'Wealden' in connection with the *Jurassic* period, or why, if the Baltimore strata are the equivalents of the local fresh-water cretaceous deposit of England, he speaks of them as of *Jurassic* age.

Mr. Uhler, also says that in the upper *Jurassic* the flora has made a step in advance, gymnosperms taking the place of the old calamites and their relatives. But this step in advance was made already in the triassic keuper, where cycadites and gymnosperms make their appearance. The Wealden flora belongs to that degree of development of the vegetable kingdom which begins with the Rhetic, and ends with the lower cretaceous. This flora does not completely change till we reach the lower Quadersandstein, or upper greensand, where dicotyledons make their appearance; so that, judging on the evidence of flora alone, we should have to place the Gault or lower greensand also in the *Jurassic*.²

At the close of this Wealden (?) period, Mr. Uhler makes the climate colder, and brings great masses of ice to tear things to pieces, but gives no evidence in support even of this assertion.

RAINFALL OF UBERABA, PROVINCE OF MINAS GERAES, BRAZIL.

THE following observations on the rainfall of the city of Uberaba, by Friar Germano, are interesting as being, so far as known, the first that have ever been made in the great interior Paraná basin; those hitherto published being either for the coast-towns and the maritime range of mountains, or, if actually within the interior basins, too near the margin to represent accurately the rainfall of the interior.

Uberaba is situated about 300 miles from the coast, in latitude 19° 44' 30" S., on the elevated grassy plains between the Paraná and its great tributary the Rio Grande. Its position as regards the maritime range and the Paraná-Paraguay basin—the South-American homologue of the Mississippi valley—may be compared with that of Cincinnati, or, better, some of the Ohio towns on or near the divide between the Great Lakes and the Ohio River. It is at an elevation of 750 metres above the level of the sea, according to the determination of Friar Germano.

The material is not at hand for an accurate comparison of its rainfall with that of other points where observations have been recorded. It is, however, not

¹ Quart. Journ. geol. soc. Lond., xxiv. 218.

² Heer, Monde primitif de la Suisse, pp. 59, 269.

¹ Johns Hopkins univ. circ., February, 1883.