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-GEOLOGY.

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 archaean epochs respectively, we are told, that, "during the *Jurassic* period, these archaean 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.

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

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.

very different from that of Rio de Janeiro (one of the nearest coast-towns where observations have been made) and that of Sabará (some 250 miles to the eastward, near the western margin of the mountainous area of eastern Brazil), and is somewhat greater than that of São Paulo (situated 35 miles from the sea, behind the first ridge of the maritime range).

	1880.		1881		1882.	
	Millim.	Inches.	Millim.	Inches.	Millim.	Inches.
January .	360	14.2	285	11.2	280	11
February .	333	13.1	226	8.9	405	15.9
March . .	109	4.3	138	5.4	180	7.1
April . .	181	7.1	27	1.1	120	4.7
May . . .	19	0.7	15	0.6	60	2.4
June. . .	2	0.1	3	0.1	70	2.8
July . . .	11	0.4	4	0.2	26	1
August . .	2	0.1	6	0.2	80	3.1
September,	70	2.8	12	0.5	97	3.8
October .	190	7.5	102	4	120	4.7
November.	274	10.8	142	5.6	100	3.9
December .	219	8.6	290	11.4	125	4.9
Total . .	1m.770	69.7	1m.250	49.2	1m.663	65.2

NOTE. — In reducing to inches, hundredths have been disregarded.

ORVILLE A. DERBY.

LETTERS TO THE EDITOR.

[*Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*]

Pairing of the first-born.

IN SCIENCE of March 16, p. 167, Charles S. Minot estimates the chance of the first-born male pairing with the first-born female, where there are ten birds of each sex to pair, as one to one hundred. It is easy to see that the first-born male must pair with one of the ten females: he is, therefore, as likely to pair with the first-born female as with any other one; and hence the chance that the first-born male will pair with the first-born female is as one to ten, instead of as one to one hundred. J. E. HENDRICKS.

Des Moines, March 27, 1883.

Thermal belts of North Carolina.

The abstract of Prof. J. W. Chickering's paper on the above topic (SCIENCE, p. 147) has suggested to me the propriety of putting on record the results of observations made by me many years ago, on the 'frostless zones' of the flanks of the mountain spurs adjacent to the valleys in the Blue Ridge. My observations were made at Flat Rock, near Hendersonville, Henderson County, N.C., — a well-watered, fertile, mountain-plateau-like valley, which is about 2,200 feet above the sea-level.

My own observations, and the information elicited from residents, seem to indicate the following facts, which, if verified in other places, may have a bearing on the physical causes which give origin to the 'frostless zones'; viz., the zones in question are *not* exempt from frost during the whole of the cold season: in fact, during the winter, the ground in these belts is frequently frozen to a considerable depth; but during the spring months they are conspicuously and uniformly frostless. They *coincide* with the nocturnal and morning 'fog-belts' of the spring months. The uniform presence of these white, circumscribed belts of fog on the flanks of the mountain spurs, during the early morning hours, imparts a striking feature to the scenery of these valleys. When illuminated by the bright morning sun, they appear like girdles of cotton-wool of moderate width, encircling the peaks at the height of 200 or 300 feet above the adjacent valleys; and their cumulus-like whiteness, contrasted with the verdure above and below them, is no less striking than it is beautiful.

The latter circumstance seems to furnish an explanation of the physical cause of the so-called 'thermal belt;' for the constant fogs at night and in the morning not only prevent refrigeration by obstructing terrestrial radiation, but, during the condensation of vapor in the process of fog-formation, there must be developed an enormous amount of heat just at this zone. Why this condensation of aqueous vapor should be so persistently restricted to a belt of only a few hundred feet in vertical thickness, is a question much more difficult to answer.

The observations of intelligent residents of the mountain valleys, in the southern divisions of the Appalachian chain will doubtless verify or disprove the general *coincidence* of the 'frostless zone' with the 'fog-belt;' and this is the point which some of the readers of SCIENCE may be able to settle.

JOHN LECONTE.

Berkeley, Cal., March 27, 1883.

Flight of the flying-fish.

A note in SCIENCE of March 23, concerning the flight of the flying-fish, leads me to offer the results of my own observations. During a passage through the Indian Ocean in 1880, I had so numerous and excellent opportunities for observing the movements of flying-fish in all kinds of weather, that I determined to discover, if possible, whether or not the wings were of material aid in flight, beyond a mere buoyant action. In many cases the fish would continue its flight for a surprisingly long period, sometimes in the face of the wind. Again, the direction of flight would be changed in such a way as to render it improbable that the wind was the cause. When an object is passing over a rapidly changing surface, it is very easy to imagine it to rise or fall in unison with the latter; but so frequently did I notice a fish clear advancing waves, that I finally was forced to believe them to have the power of controlling their flight. I frequently called upon other passengers to confirm my own observations, with which their testimony was in general harmony. I may say, therefore, that I finally reached the same conclusions as those presented by Mr. Kneeland. D. P. PENHALLOW.

Mountainville, N.Y., March 29, 1883.

THE NATURAL HISTORY OF OHIO.

Report of the geological survey of Ohio. Vol. iv. Zoölogy and botany. Part i. Zoölogy. Published by authority of the legislature of Ohio. Columbus, *State*, 1882. 8 + 1020 p. 8°.

THIS long-looked-for volume has appeared, and, notwithstanding its size, includes only the vertebrates of the state. Dr. Newberry, the head of the survey, holds out some hope of a future volume on the invertebrates and on the botany of the state; but the difficulty experienced in securing further appropriations for the publication of the fossil remains leaves their appearance rather doubtful.

The part devoted to the mammals (a hun-