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-