distance from the sea and a sufficient altitude are reached, another region of cloud is encountered, so that there are two cloudy zones, separated by a zone over which the sky is prevailingly clear. This contrast was well seen by the writer at the beginning of the cloudy season in December, on trips between Mollendo, on the coast, and Arequipa, 80 miles inland in a direct line, 7,550 feet above sea-level. The same three zones were passed through on a trip up the Oroya Railway, from Callao, at sea-level, to Oroya, 12,178 feet above the sea.

As to the cause of the coastal cloud, that would seem to be found in the prevalence of cool southerly and southwesterly winds—the spiral outflow on the eastern side of the South Pacific anticyclone—blowing along shore or obliquely on shore along the whole desert strip of the Pacific coast of South America. These northward blowing and hence warming winds flow from a cool ocean surface on to a warmer land. They, therefore, becoming warmed, are increasing their capacity for water vapor, and instead of being rain-bearing, as might be expected in the case of on-shore winds which are forced to ascend by the topographic conditions, they are hostile to the production of rain. It is true, to be sure, that the adiabatic cooling due to their enforced ascent over the low coastal hills is sufficient to produce cloudiness, but it does not seem sufficient, in most cases, to produce precipitation. North of Paita, where the cold ocean current and the southerly winds turn off to the westward, the barren strip comes to a sudden end, and the coastal cloud, so far as could be determined by the observations of only one voyage, comes to an end also.

That the range of hills along the coast plays an important part in the production of the coastal cloud was shown by the fact that where the immediate seacoast is low, as, *e. g.*, at and for a short distance north of Pisco, there the coastal cloud was absent.

R. DeC. Ward.

Colon, Colombia, January 12, 1898.

NEWCOMB'S PHILOSOPHY OF HYPER-SPACE.

There is in Professor Newcomb's beautiful address (Science, January 7, 1898) a marked naïveté. He says: "Certain fundamental axioms are derived from experience, not alone individual experience, perhaps, but the experience of the race." On the contrary, the hereditary geometry, the Euclidean, is underivable from real experience alone and cannot be even proved by experience. Its adequacy as a subjective form for experience has not yet been disproved, but might in future be disproved. It can never be proved.

The realities which with the aid of our subjective space form we understand under motion and position, may, with the coming of more accurate experience, refuse to fit in that form. Our mathematical reason may decide that they would be fitted better by a non-Euclidean space form. But we are, and shall be, helpless to get such a space form from any experience whatever.

Space is presupposed in all human notions of motion or position. We may drop out such specifications from our space form as render it specifically Euclidean, but we cannot replace them by non-Euclidean. Euclidean space is a creation of that part of mind which has worked and works yet unconsciously.

It is not the shape of the straight lines which makes the angle-sum of a rectilineal triangle a straight angle. With straight lines of precisely such shape, but in a non-Euclidean space, this sum may be greater or less. In non-Euclidean spaces, if one edge of a flat ruler is a straight line the other edge is a curve, if the ruler be everywhere equally broad. In any sense in which it can be properly said that we live in space, it is probable that we really live in such a space. What becomes of the dogma that fundamental axioms are derived from experience alone?

George Bruce Halsted.

Austin, Texas.

SCIENTIFIC LITERATURE.

Traité des variations du système musculaire de l'homme, et leur signification au point de vue de l'anthropologie zoologique. Par Le Dr. A.-F. Le Double, Professeur de l'anatomie a l'École de Médecine de Tours, avec une préface de M. E.-J. Marey. En deux volumes. Paris, Schleicher Frères. 1897.

During the last twenty years large numbers of scattered observations on muscular anoma-