ume is a simple schematic representation, I venture even to say a little too schematic. Each object is designated by a number, and the corresponding name is to be sought in the special tables of regions, canals and oases. This makes the use of the chart troublesome and comparison with other charts inconvenient. All the large and small canals, of whatever degree of importance and visibility, are treated in a uniform manner and are represented by lines of equal intensity; and the same with the oases, with the exception of the largest one of all, called the Lake of the Sun. It is not easy to recognize promptly on the chart many of the objects which are ordinarily seen at the first glance and which are familiar to areographers. Such objects as Indus, Oxus, Ganges, Cyclops, Trivium and Elisium must be sought in an inextricable maze of lines. We have here not a simple index, but one which in use requires itself an index.

I will close this incomplete description of the work on Mars at Flagstaff with the expression of a hope and a wish, namely, that so important a publication should not be limited to a single opposition. The exact and complete knowledge of Martian phenomena demands that the planet should be examined under all possible inclinations of its axis and during all seasons of its year. This requires observations continued at least through *seven* consecutive oppositions. I say, 'at least,' for if the terrestrial seasons are far from following the annual period with mathematical precision, the phenomena of Mars seem still more divergent; and the existence of other periods, longer and more complex, ought to be included among the possibilities. Nevertheless, I think that if we could have before us seven volumes similar to the one under review, and corresponding to a complete cycle of seven oppositions, many facts would be revealed of which we are at present ignorant, and many others of which we have at present only dubious indications; especially would this be the case if the seven volumes were the work of the same observers. I therefore hope and wish, as do many others, that Mr. Percival Lowell may be in a position to continue the work so happily begun; that he will soon publish the results of the observations during the opposition of 1896–97, and that the same means which he has employed for the study of the southern hemisphere of Mars may be applied to the still more important observation of the phenomena of the northern hemisphere.*

G. SCHIAPARELLI.

MILAN, March 1, 1899.

ON THE DEVELOPMENT BY SELECTION OF SUPERNUMERARY MAMMÆ IN SHEEP.†

IN the year 1890 Dr. Bell found that 50 % of the lambs born upon his farm in Nova Scotia were twins, and he made an examination of the mothers in order to ascertain whether the twin-bearing ewes differed in any noticeable degree from those which produced single lambs.

Thirty-three per cent. of the twin-bearing ewes were found to possess supernumerary mammæ in a more or less rudimentary condition, whereas among the ewes having single lambs only 22% possesssed the peculiarity; 43 % of the ewes having supernumerary mammæ bore twin lambs, whereas only 30% of the normally-nippled ewes had twins.

Although the absolute numbers were far too small to yield reliable percentages, they afforded some ground for the idea that the extra-nippled ewes were more fertile than the others; and Dr. Bell thought it would be interesting to ascertain (1) whether by

* Translated from the author's MS. in French by E. B. F.

† Abstract of a paper read before the National Academy of Sciences at Washington, D. C., April 19, 1899, by Alexander Graham Bell.

selective breeding the supernumerary mammæ could be developed from their rudimentary condition into real functional nipples yielding milk, and (2) whether in this case the fertility of the ewes would be increased.

In the autumn of 1890 his shepherd, Mr. John McKillop, made an examination of the mammæ of 890 sheep belonging to farmers in the island of Cape Breton, Nova Scotia. In 811 cases, or 91 %, the sheep were normally nippled, having only two nipples each. In 79 cases, or 9%, supernumerary mammæ were present in a more or less developed condition. Some of these sheep had three nipples, others four, a few five, and one ewe had six nipples. In 52 cases, or 6%, the extra nipples were so rudimentary as to resemble pimples upon the milk bag. In 27 cases, or 3%, the extra-nipples, though much inferior in size to the ordinary-nipples, seemed to be sufficiently developed to be functional; and most of these sheep were purchased by Dr. Bell and added to his flock.

Dr. Bell presented statistics showing the results of ten years selective breeding for supernumerary mammæ. The following tables show the number and percentage of lambs born each year having 2, 3, 4, 5 or 6 nipples, and the accompanying chart exhibits the percentages in graphical form:

Table I.

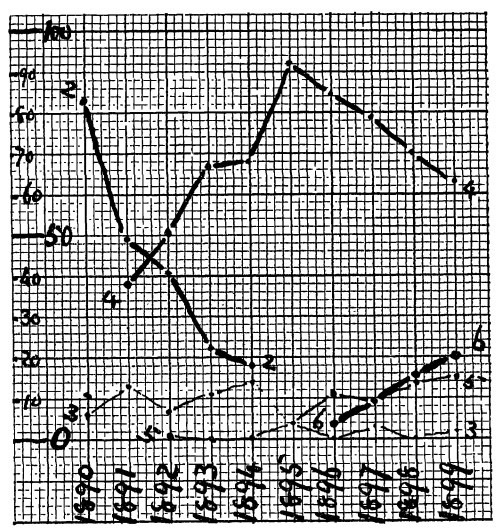
Number of Lambs born each year from 1890 to 1899.

Years of Birth	Total Lambs	Number of Mammæ				
		2	3	4	5	6
1890	71	59	4	8	—	—
1891	78	38	10	30	—	—
1892	71	29	5	36	1	—
1893	67	15	7	45	—	—
1894	22	4	3	15	—	—
1895	26	—	1	24	1	—
1896	27	—	—	23	3	1
1897	34	—	1	27	3	3
1898	37	—	—	26	5	6
1899	41	—	1	26	6	8

Table II.

Percentage of Lambs born each year from 1890 to 1899.

Year of Birth	Total Lambs	Number of Mammæ				
		2	3	4	5	6
1890	100 %	83 %	6%	11%	——	——
1891	100 "	49 "	13 "	38 "	——	——
1892	100 "	41 "	7 "	51 "	1%	——
1893	100 "	22 "	11 "	67 "	——	——
1894	100 "	18 "	14 "	68 "	——	——
1895	100 "	——	4 "	92 "	4%	——
1896	100 "	——	——	85 "	11 "	4%
1897	100 "	——	3 "	79 "	9 "	9 "
1898	100 "	——	——	70 "	14 "	16 "
1899	100 "	——	2 "	63 "	15 "	20 "



Graphical Chart showing the percentage of lambs born each year from 1890 to 1899 having 2, 3, 4, 5 or 6 nipples (See Table II.).

In the autumn of 1893 the flock was cut down very severely, and only those ewes were retained which had supernumerary mammæ in a functional condition. This accounts for the small number of lambs born in 1894. Since that time no ewe lambs have been retained excepting those having extra nipples large enough to yield milk.

No normally-nippled lambs (2-nippled) have been born in the flock since 1894. Three-nippled lambs are gradually disap-

pearing. Four-nippled lambs increased from 11% in 1890 to 92% in 1895, since which time the percentage has gradually fallen, the four-nippled lambs being replaced by five and six-nippled lambs. The first six-nippled lamb was born in 1896, and the percentage has increased from 4% in 1896 to 20% in 1899.

Dr. Bell claimed that his statistics showed that he had produced by selection a breed of sheep possessing supernumerary mammæ as a normal condition.

Figures are given on Plate V. showing the normal milk-bag of a ewe, extra nipples occurring as sports and the extra nipples obtained by selective breeding.

LATEST VOLCANIC ERUPTIONS OF THE PACIFIC COAST.

THE date of the last volcanic eruption on the Pacific coast of the United States, exclusive of Alaska, has long been a matter of doubt, and will probably remain so for many years to come. Speaking geologically, much of the material in the great volcanic field of the Northwest, including a large part of Oregon and Washington, with portions of California, Idaho and Wyoming, is of comparatively recent eruption. The outbursts may have begun in the Eocene, were most violent and extensive during the Miocene and Pliocene, and, diminishing in vigor, extended, perhaps, up to the borders of the historical period. In Alaska, however, there have been eruptions from Bogoslov, St. Augustin and other volcanoes as late as 1883 and even later, and there can be no question concerning the reliability of the testimony. G. F. Becker gives a list (U. S. G. S., 18th Ann. Rept., Part III., p. 14) of over forty volcanoes in Alaska which have been reported active within historical times.

The evidence, so far as the Pacific States are concerned, is given chiefly by Professor J. D. Whitney (The United States, 1889, p. 114), Major C. E. Dutton (SCIENCE, Vol. VI., p. 46), Professor George Davidson (SCIENCE, Vol. VI., p. 262), and Dr. H. A. Harkness, (Proc. of the Cal. Acad. of Sci., Vol. V., p. 408). Although there are no new facts at hand definitely fixing the date of the last eruption in that region, there has recently come to my attention some information having a bearing upon other evidence.

Last summer Mr. Frederick V. Coville, Botanist of the Department of Agriculture, while studying the flora of Mt. St. Helens, in Washington, found some interesting fragments of charcoal, which he transmitted to the Director of the U. S. Geological Survey, with the following letter:

"I collected two pieces of coniferous charcoal at the point where the trail from Lake Merrill to Mt. St. Helens crosses the Kalama River. Each came from a short charred piece of tree trunk about two feet long and a foot in diameter. My attention was first called to them by Colonel J. J. Hawkins, of Portland. The pieces of charcoal were caught with other fresh drift material brought down the Calama from Mt. St Helen's in last spring's flood. They were charred all the way to the center as evenly and thoroughly as the fragments sent you.

"The character of the charcoal, which need not be described in detail here, is such as at first to suggest that it was made in a very carefully prepared kiln. There are, however, no charcoal pits in the region, and the charcoal from forest fires has a very different character. It is evident from the peculiarities of the flora of Mt. St. Helens, and from its limited erosion, that it is a mountain of very recent volcanic origin. Among other phenomena presented by it was one which, although it did not come under my own observation, is well substantiated by people of the region, and furnishes an explanation of the peculiar sections of charred logs found at the crossing of the Kalama. The phenomena described is the occurrence of molds of tree trunks at various points in the lava flows about the base of Mt. St. Helens. In some places these molds occur in large numbers and lie in the beds in either a horizontal or a vertical position. They are sometimes thirty feet in length, and bear the impress of the bark of the tree in the minutest details. Though I was unable to visit the places where these tree molds occur, I talked with at least half a dozen men who had seen these casts, but none of