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

them had seen charred wood or bark in the holes. Presumably charcoal was formed only where the lava flow so completely covered the trees as to shut out the air, and the pieces found had been eroded by the Kalama River from wholly submerged molds."

Mr. Coville's conclusion as to the formation of the charcoal is probably correct. Mr. F. H. Knowlton, who studied the structure of the charcoal, recognizes the wood as Douglas spruce (*Pseudotsuga mucronata*). Attention was called (*Nat. Geog. Mag.*, Vol. VIII., p. 226) several years ago to the tree molds or tree wells by Captain P. Elliott. Through Mr. J. H. West, of Woodland, Washington, Mr. F. A. Walpole, one of Mr. Coville's assistants, secured a piece of the basaltic lava from one of these tree molds three feet in diameter. The piece of lava shows the impressions of the bark in great detail. In the hope of obtaining some evidence concerning the age of the lava flow associated with the tree molds and charcoal I entered into correspondence with Mr. West, who reports charred logs at least forty yards up the slope from the high-water mark of Kalama River. One of the charred logs is twenty-eight inches in diameter, and some of them are partly woody, not having been completely converted into charcoal. Near the River at one point the charred logs are found under six feet of sand and gravel, on which are now growing fir trees having a diameter of three feet. Some of the charred logs, therefore, appear to be at least 100 years old, for a fir three feet in diameter would probably require at least that length of time to attain its present size. If this be true it is probable that some of the charred logs are not the result of the last eruption of St. Helens, but of an earlier one. There is historical evidence furnished by Fremont (Memoirs, p. 282) to the effect that Mt. St. Helens and also Mt. Baker were in eruption November 23, 1843. At that time a light fall of ashes occurred at the Dalles, Oregon, on the Columbia, fifty miles from Mt. St. Helens, which was then noted as being in a state of eruption. Rev. Mr. Brewer collected some of the ashes and gave them to General Fremont, who visited the Dalles a year later. Mt. Baker is thought to have been in eruption at the same time, and the natives report that the fish in the Skagit River were killed by its ashes. Mr. S. F. Emmons gives (*Jour. of the Am. Geog. Soc.*, Vol. IX., p. 53) the testimony of a former Hudson Bay trader who saw an eruption of Mt. St. Helens in the winter of 1841–2.

It is hoped that the question may be settled some time in the near future by a geological survey of both Mt. St. Helens and Mt. Baker. While it may not be possible to establish the date exactly, the geological records upon the mountain slope are likely to be such as to give the relative age with certainty. The case of the cinder cone, ten miles northeast of Lassen Peak, California, may be noted as an example of the results of investigation in the field. Professor Harkness was of the opinion that the eruption occurred in January, 1850. The freshness of the material was so striking that Major Dutton and I, who visited the region in 1885, were at first of the same opinion, but fuller investigation, an account of which is published in the U. S. Geological Survey Bulletin No. 79, shows conclusively that the explosive eruption from the cinder cone must have occurred long before the beginning of the present century.

J. S. Diller.

U. S. Geological Survey,
Washington, D. C., April 22, 1899.

THE PROSPECTIVE PLACE OF THE SOLAR AZIMUTH TABLES IN THE PROBLEM OF ACCELERATING OCEAN TRANSIT.

It is not generally recognized that science, employing the mathematician and the engineer alike in the problem of shortening the duration of ocean transit, has accomplished