in order to vindicate their claims to hereditary lands. Hence several of these documents are called 'titulos,' or family titles.

Many of these native writings were lost; so that, of them all, only four are certainly known to be in existence. They are named in the note,[1] and it will be seen, that, while they are now all accessible in print, two have appeared only within a year, and two are merely Spanish translations without the original text. The 'Popol vuh,' or 'national book,' of the Quiches, is already well known to scholars. About one-half of it is concerned with the religious myths of the Quiches, the remainder with their historic traditions. The precise date of its composition is uncertain, but it may be assigned to the last half of the sixteenth century. The 'Titulo de Totonicapan' is officially dated in 1554; the title of the Princess Nehaib is somewhat later, and refers to lands south-west of the Quiche territory, in the province of Soconusco; while the 'Annals of the Cakchiquels' were written by a native who was already a married man when the Spanish troops first entered his country. The Cakchiquels, it may be observed, were of the same lineage and language as the Quiches, and adjoined them on the east.

These four publications, therefore, offer to students who would investigate the pre-Columbian history of Central America a large amount of authentic aboriginal material. We may say that it has never yet been utilized; for the Abbé Brasseur, in his 'Histoire du Mexique,' was utterly uncritical, and spun a romance from these writings, all of which he had consulted; while Mr. H. H. Bancroft had never seen three out of the four when he prepared his 'Native tribes of the Pacific coast,' and his 'History of Central America.' A comparison shows that all the native writers drew from some common stock of national legend; all deny that the regions they occupied were their original homes; all refer to some distant land in the west or north-west, beyond the sea, as the residence of their ancestors. An echo of ancient Nahuatl tradition floats through these earliest reminiscences. We hear of the wondrous city of Tulan, the mysterious land of Zuiva, and of battles with the Nonoalcos. But the many problems presented by these writings cannot even be mentioned here. As a whole, they offer the most complete body of American mythology and legend extant.

[1] *Popol vuh; le livre sacré des Quichés.* The original text, with a French translation by the Abbé Brasseur de Bourbourg. (Paris, 1861.)

Titulo de la casa de Ixcuin-Nehaib. Edited by Don Juan Gavarrete. (Guatemala, 1873.)

Titulo de los Señores de Totonicapan. The Spanish text, with a French translation by M. le Comte de Charencey. (Alençon, 1885.)

The annals of the Cakchiquels. The original text, with an English translation by Dr. D. G. Brinton. (Philadelphia, 1885.)

GEOGRAPHICAL NOTES.

Heights of mountains in Lapland. — Recent explorations of Swedish Lapland by Bucht Svenonius and Rabot have revealed the existence in the department of Norrbotten of a mass of mountains, of which several summits rise considerably over 6,000 feet. Their ravines enclose numerous glaciers. The highest is called by the Lapps Kebnakaisa, is situated in latitude 68°, a degree and a half eastward from the meridian of Stockholm, and between the Luleo and Torneo lakes, and by trigonometrical measurement appears to be 6,940 feet in height. The two next highest are Kaskasatjokko, 6,800 feet, and Sarjetkt-jokko, 6,760 feet, approximately.

Northern Norway and Finland. — The observations of Charles Rabot in the mountainous area of Store Baergefjeld, in Nordland, arctic Norway, represented on the best charts as occupied by an immense continuous glacier field, show that it has been wholly misunderstood. There is no primary glacier, but merely seven secondary glaciers, isolated in ravines, and hardly passing beyond the stage of *névé*. Their total area does not exceed six square kilometres, about one-fiftieth of the area formerly supposed to be ice-covered. The field is not a plateau, but to the north a mountain mass, whose culminating points reach nearly 6,000 feet, and which averages 3,600 feet; and to the south a densely wooded tableland, cut with myriads of deep and regular cañon-like valleys. Fir-trees three feet in diameter a yard above the ground were not rare. After completing his work on the field, Rabot made explorations in the Kola peninsula of Russian Finland, determining the existence of three distinct chains of mountains between the Polar and White seas, which reach a height of more than 3,000 feet. The country has hitherto been charted as a sort of plain, broken merely by lakes and low hills. The area between the ranges is level, and trees of good size and form reach latitude 68° 50′; beyond they extend some distance, but do not exceed twelve or fifteen feet in height. Collections were made of geology, terrestrial and fluviatile mollusks and fishes.

Connecting the Volga and the Don. — The project of connecting the Volga and the Don dates back to 1568, when Selim, the son of Solyman the Magnificent, besieging Astrakhan, attempted to join the two rivers in order to transport material of war. His work was brought to an end by the power of Ivan the Terrible, czar of Moscow. In 1700, aided by John Perry, an English engineer,

the work was attempted by Peter the Great, but at the end of a year, after his defeat at Narva, Peter abandoned the project, which has since that time been periodically discussed. In October last M. Léon Dru, a French engineer, having surveyed a line, was convinced that the project was practicable, and experimental borings have already commenced.

A ruined city found in Asia Minor. — In the province of Adana, Asia Minor, not far from Tarsus, at a few hours' travel from the sea, among the mountains, has recently been discovered a ruined town hitherto entirely unknown. The ruins lie near the route from Sélef-Ké to Karaman by Mohara. Sarcophagi almost intact, and resembling those of Lycia, exist there, and would seem worthy of study.

Monuments of Babylonian times. — It is stated that an archeological expedition, under Professor Niemann of the Academy of fine arts, is fitting out in Vienna for the exploration of those parts of Taurus and Anti-Taurus where last year were found remains of monuments dating from Babylonian times.

Siberian interest in geographical exploration. —An exploration, to cover a period of five years, is being organized by Yadrintseff, under the auspices of the Russian geographical society. Its purpose is the investigation of the ethnology and social economy of Siberia. The party will consist of young men, who will be distributed over different parts of that immense region for purposes of study. Residents of Siberia have already manifested a laudable interest in such investigations; and beside museums at Irkutsk, Omsk, Yeniseisk, and Tomsk, M. Martianoff, at Menusinsk, in the Yenisei government, has already gathered a collection of more than six thousand archeological and ethnological specimens.

The trans-Siberian railway. — The trans-Siberian railway has already finished its first section of 135 kilometres between Ekaterinburg and Kamishoff, and its early completion to Tiumen is confidently expected. The canal between the Obi and the Yenisei is already so advanced that navigation will probably be inaugurated on it by the spring of 1887, if not even earlier. Sibiriakoff has established a line of steamers on the Angara, which unites Lake Baikal to the Yenisei, and which has been thought too turbulent for navigation.

The old bed of the Oxus. — Daniloff, in examining the Oxus, has found what he reports to be the point of its ancient bifurcation into the Amu Daria and the Uzboi. In opposition to the opinion of M. Lessar, chronicled in these pages, but confirming that of Kalitine, Daniloff believes that the latter is right in his mapping of an ancient river-bed in the desert, called the Uzboi or Unguz. This will soon be levelled throughout its extent, and the conflict of opinion be settled by the more exact methods of a careful survey.

ASTRONOMICAL NOTES.

Equatorial currents in solar and planetary atmospheres — Of the bodies of the solar system, the sun, Jupiter, and the earth are the only ones that have thus far distinctly shown any decided difference of rotation-period, either for different parts of their visible cloud-surfaces, or for a gaseous atmosphere and the solid or cloud-surface above which it sweeps. Of these, Jupiter offers by far the greatest variety of detail, but it has never been adequately observed until the sudden appearance of the 'great red spot' in 1878 attracted universal attention to the planet. The result has been, that not only has this red spot, which is still visible, been shown to have a definite and nearly constant rotation-period, not varying many seconds from $9^h\ 55^m\ 37^s$, but certain white spots upon equatorial belts are found to be permanent features for several years in succession, and to have a rotation-period (about $9^h\ 50^m\ 10^s$) decidedly shorter than that of the red spot, but equally constant; so that their conjunction-times, as they sweep by each other, can be predicted pretty accurately. Detailed micrometric work upon these spots and belts, like that described in Professor Hough's annual reports, is especially valuable, and there is plenty of work still to be done upon the other details of the planet's cloud-surface. As to the sun, it is well known that the spots give a rotation-period of about 25 days for the solar equator, slowing up to about 27.5 days at latitudes of 45°, beyond which there are not sufficient data for fixing any period. But we think hardly sufficient attention has been paid to the fact that Professor Young's observations (*Amer. journ. sc.*, 3d ser., xii. 321) upon the displacement of lines in the spectra from the east and west limbs of the sun gave for the equatorial velocity of the chromosphere $1.42 \pm .035$ miles per second, while the equatorial sunspot-period gives only 1.25 miles for the photosphere. It is a pretty strong indication that the solar atmosphere sweeps forward over the photosphere; and its bearing upon the probable behavior of the corona and meteoric matter falling into the sun would seem to call for a redetermination of this line-displacement with the more powerful dispersion now available in Rowland's gratings. As to the earth, we know that the general drift of the lower atmospheric currents is eastward, rotating faster than the globe itself; but of the circulation high up above the clouds we knew absolutely nothing until the red