full activity. Although of such great length, these Himalayan glaciers could never have reached the enormous thickness which the earlier alpine glaciers attained.

Two periods of glacial extension are clearly defined, separated by a milder interval of climate. During the earlier glacial period the Indus valley was filled with those extensive lacustrine and fluviatile deposits, mixed with large angular *débris*, such as we see at Scardo, which may be coeval with the extreme extension of the alpine erratics, so far as the miocene hills south of Turin.

The second period followed after a long interval of denudation of the same beds, and would correspond with the last extension of the great moraines of Ivrea, Maggiore, Como, etc., followed by a final retreat to nearly present smaller dimensions. Nowhere on the south of the Himalaya do we find valleys presenting any features similar to those of the southern Alps, particularly on the Italian lakes, which are, I believe, the result, in the first place, of marine denudation, succeeded by that of depression, and finally powerful ice-action.

This attempt to bring before you some of the great changes in the geography of Europe and Asia must now be brought to an end. I am only sorry it is not in more able hands than mine to treat it in the manner it deserves, and in better and more eloquent language; but it is a talent given to but few men (sometimes to a Lyell or a Darwin) to explain clearly and in an interesting form the great and gradual changes the surface of the earth has passed through. The study of those changes must create in our minds humble admiration of the great Creator's sublime work, and it is in such a spirit that I now submit for your consideration the subject of this address.

FRENCH GEOGRAPHICAL EXPLORATIONS.[1]

Since the last re-union of our societies, we have seen the complete success of the French expedition to observe the transit of Venus. This phenomenon, important for astronomy, which requires a unity of measurement of the celestial spaces, should also be of interest to geography, for the unity sought is the correct distance of the sun from the earth. We already know the distance of the moon from the earth, about ninety-six thousand leagues, of which I can easily form an idea, as it is the distance I have traversed by land and sea since 1854, the time that I commenced my isthmus travels. "The French expedition sent to foreign parts to observe the transit of Venus has obtained a great and well-earned success, of which they are justly entitled to be proud." So says one of the most eminent French *savants*, Mr. Dumas, who has largely contributed to that success.

It now remains, and it is not the least difficult part of the task, to compare the results obtained, in order to submit to a delicate analysis the infinitesimal differences, which correspond to errors of hundreds of kilometres, in the distance sought. *Savants* have, it is true, more than a century to make use of the observations of 1882; for the phenomenon will not take place again till the year 2004.

At the extreme east of Europe we find in process of execution a work whereby modern science shall again assert her superiority by a success which the ancients gave up. Through the initiative of Gen. Türr, the Isthmus of Corinth is at this moment being cut, which will shorten by about two hundred and fifty kilometres, on an average, the voyage between the eastern and western parts of the north of the Mediterranean. In the course of the present year, the two plains at the side of the Gulf of Aegina and the Bay of Corinth will be cut away, and workmen will attack the solid mass of forty-seven metres, which it is desired to cut away to eight metres below the level of the sea. It is, *in minimo*, the cut of the Isthmus of Panama, the length of which is seventy-three kilometres instead of six kilometres; that is, double the distance between the garden of the Tuileries and the Arc de Triomphe in the Étoile at Paris.

Some distance north of Corinth, there is unfolding another episode of the struggle between these two rival powers, the earth and man. There the work has begun which will transform a marshy lake into fertile plains. In a few years, broad Lake Copaïs will suffer the fate of Lake Fucino, Lake Fessara, Lake de Harlem, and the marsh of Pinsk.

There is still a fourth isthmus to cut. The king of Siam has authorized a survey for a maritime canal on his territory, between the Indian Ocean and the seas of China and Cochin China. The object is to escape the dangerous Strait of Malacca, and gain six hundred leagues from Europe to the extreme east.

In Arabia, Mr. Charles Huber, who two years ago successfully accomplished a mission for the minister of public instruction, has resumed the journey he made so fortunately; but he wishes to proceed farther than at that time he was able. At present he is at Palmyra, copying rare inscriptions; and, this completed, he will set out for Hall, for the Nedjed, and perhaps farther if circumstances favor his energy and firm will. The Arabian peninsula is one of the fields of study where French science has a long standing and very honorable record. We can but hope that Mr. Huber may show himself worthy of his predecessors.

In the extreme east, Cochin China and Tonquin have been most recently explored by the French, and I should like to recount the discoveries of Dr. Néis and Lieut. Saptans at the sources of the Donnaï. The former is at present *en route* for the region which he has already visited. Ethnography and anthropology, which are his special objects of study, will no doubt acquire new information, full and exact, from Dr. Néis's present journey. The study of the ancient civilizations and of epigraphy engages the attention of Capt. Aymonier, who has just finished a fruitful exploration at Cambodia. The parcels recently sent to the museum of the Trocadero testify to the importance of the results gathered by Mr. Aymonier, who is one of the most distinguished, perhaps the most distinguished, representatives of Indo-Chinese

[1] Address by Ferdinand de Lesseps before the geographical congress at Douai. Translated from *Cosmos-les-mondes*, vi. 91, 121.

students. Tonquin is known to us only by its delta, which has been an object for fine work by French hydrographic engineers. Beyond, to the right and left of the Red River, surveyed first by Mr. Dupuis, and afterward by Mr. de Kergaradec, we know nothing, or almost nothing, with certainty. Last year, in the face of dangers to which his companion Mr. Courtin succumbed, Mr. Villeroy-d'Augis made an examination which has given us the first rough sketch of the course of the Black River. The mineral resources of Tonquin, on the coast at least, have been ascertained by Mr. Fuchs in a recent voyage; and this distinguished engineer seized the opportunity to gather the first materials of the geological constitution of that part of Anam, as well as the rest of Indo-China. The events which are taking place at Tonquin we cannot examine; but they will lead, doubtless, to a state of things which will render journeys practicable. Mr. Harmand, who was conspicuous at the beginning of his career for his important explorations, will doubtless lend his co-operation to the French explorers who are about to set out for these parts of Asia.

If we turn our eyes toward Africa, we see several Frenchmen engaged in the contest which will definitely free this continent to science in opening it to civilization. For all Algeria the time of exploration, properly so called, is past. The country surveyed by geodesians is open to military topographers, who will give us a representation of it as beautiful and as correct as the map of France. At the instigation of our colleague, Col. Perrier, chief of the geographical service of the army, the surveys are being followed up, and the publication of the work will soon begin, to be continued without interruption.

For the extreme south of Orange, geography had only a series of isolated guide-books, with a few descriptions carefully made, but limited. Wars have drawn to this territory a troop of surveyors, whose campaigns have resulted in a survey, based on a triangulation, of all the country between Mecheria, the terminus of the Orange railroad, and the great oasis of Figuig. I certainly do not err in asserting, that the officers who have accomplished this difficult and dangerous work, Capt. de Castries and Lieuts. Brosselad and Delcroix, deserve well of geography.

In France the events in Tunis have been watched with much interest. Geography will gather the first fruits from these events. Here, again, we were reduced to information confined to the surroundings of Tunis, and certain points of the regency, and very estimable itineraries, but whose loose threads circumscribe vast regions left blank on the charts or timorously sketched. Following our exploring column, skilful surveyors have continued to fill up these gaps. Their records have been completed, and arranged methodically by officers attached to the geographical service of the army. If I am correctly informed, this service now possesses the materials for a large map, on which Tunis will appear in a decidedly new light, with the arrangement of its valleys, the character and projection of its prominence, and the precise position of its centres of population.

The minister of public instruction, on his part, has organized an expedition for the scientific exploration of Tunis. Already, from an archeological standpoint, important discoveries have been made on this ground, where exist the relics of several great civilizations. The learned work of Mr. Charles Tissot, the correspondent of the institute, formerly ambassador to London, will be, as far as concerns the Roman epoch, a fine and substantial introduction to the investigations undertaken. Our protectorate will revive the Tunis of the past, while it creates a Tunis of the future. Here is the opportunity to mention the scheme in regard to the interior African sea, rendered practicable by the perseverance, disinterestedness, and knowledge of Commander Roudaire. Other surveys, executed during this campaign by the engineers whom Capt. Henry leads, fill up the gaps in the previous works, complete the information regarding the banks of the Senegal or its tributaries, and prepare the route towards Bammakoo for the next expedition. This time a larger party must be sent out than on preceding expeditions, and they ought to advance farther. After having, while the road was making, removed, without striking a blow, the chief of Moorgoola, who was hostile to us, and after taking by assault the village of Daba, where advance was opposed, the column finally arrived at Bammakoo, Feb. 1; and, on the 7th, Col. Borgnis-Desbordes laid the first stone of the fort. From this first journey, under the direction of Capt. Bonnier, the surveyors, who included some experienced officers (Capt. Vallière, for instance), have brought back very complete results, extending over the ground between Kita and Bammakoo, and in the surrounding countries, Fooladoogo, Gangara, and Bélédoogoo. They have also contributed largely to the geography of a country lately only touched by a few explorers.

I do not know that you will agree with me; but I see, in these three expeditions of Col. Borgnis-Desbordes, a very interesting moral side. Let us imagine a handful of men setting out from Calais, to reach, in a certain time, the neighborhood of Vienna or Budapest: let that be the distance. You know the difficulties that were encountered. After a long journey in barges on the Senegal, it was necessary, under a burning sky, to make weary marches across districts covered with high grass or with thorny plants, and across calcined plains. They must scale steep acclivities, pass through innumerable swamps, slimy and malarious. They must venture through narrow paths on the sides of cliffs into defiles, — veritable Thermopylae, where a few might stop an army. After the departure, fever attacked the column, and each day claimed its victim. Nevertheless their courage did not fail. At times they were compelled to fight, and to the ravages of fever was added the fire of an enemy who could not be disregarded. Sometimes they stopped; but then they were obliged to work without relaxation in building a fort, for the season was advancing. Three times in succession our soldiers, under such circumstances, have penetrated to the heart of the western Soodan, led by a man hardened by bravery. He was commissioned to push to

the Niger the line of stations which should establish our claims. He advanced straight to his object: the difficulties of detail discouraged him no more than the unforeseen disconcerted him, or than danger frightened him. Thus supported by officers worthy of their leader, and by soldiers full of devotion, he has accomplished his whole task. The little phalanx re-embarked on the Senegal, ragged, worn out, emaciated, and reduced more than a third; but they had nobly and simply performed a grand deed.

Before leaving the Senegal, I would not forget to mention the efforts of Dr. Bayol to contribute to the geographical knowledge of these countries. You may already see, on the map of Africa, very carefully prepared by Capt. Lannoix for the geographical service of the army, the line of travel which, in his preceding journey, Dr. Bayol followed between Timbo and Medina, in a country still unknown. At present he has just traversed more than three hundred and sixty kilometres in a country, also left blank, or nearly so, on the maps. Lieut. Quiquandon, his companion, gives us a survey of the line of march, which, retreating from the Niger, will join the line of march of the Austrian traveller, Lenz, on his return from Timbuctoo. This is an important paper for geography. Mr. Bayol has arranged so that, up to Ségala, the states through which he has passed have accepted the protectorate of France. Besides the treaties to this effect, he brings back collections which will contribute largely to the geological and zoölogical description of this zone of the African continent.

If, now, we turn farther south, as it were symmetrically with the Senegal and the Niger, we shall come to the Ogowé and the Kongo. Here, too, we find a man firmly resolved to secure for France a country worthy of her on the banks of the Kongo. Here Mr. de Brazza (for you all have recognized to whom I refer) is at work. As I speak to you now, he must be *en route* for the great river, the inhabitants of whose banks will, without doubt, gladly welcome back an explorer who was always full of justice and humanity toward them. It is said that difficulties exist between Mr. de Brazza and Mr. Stanley. The situation has, I think, been much exaggerated. Let us not forget that the origin of the enterprise to which Mr. Stanley devotes his energy is due to his Majesty the king of Belgium, and was formed for the purpose of sparing the travellers of all nations a part of the dangers of their enterprises. The generous founder of the International African association will certainly do all in his power to establish kindly relations between two of the most illustrious pioneers of civilization and of science. Besides, Mr. de Brazza would not falsify by his acts the words which he uttered at the last banquet of the Société de géographie, when he received from the hands of his fellow-explorers the French colors: "There, where I shall be commissioned," he said, "to carry the colors you present to me, they will be a sign of peace, of liberty, of science, and of commerce; they will be kind and compassionate with the weak and courteous, but firm with the strong." Let us, then, be patient. Let us not expect, that, under the present circumstances in equatorial Africa, evolution and progress can be very rapid. Let us also not forget that we owe all respect to the claims of our friends the Portuguese to certain regions bordering the Kongo.

I would not neglect to invoke your sympathies for the calm courage with which, in western Africa, on the route of the great lakes, Mr. Bloyet accomplished the mission placed upon him by the French committee of the International association. The travellers of several nations could tell us what protection they have received, what support, what counsels, they have obtained, from Mr. Bloyet. It is his courage which assists in the noble task of making the French name loved and respected by the natives of these hostilely inclined countries. Still nearer the lakes are our Catholic missionaries, some of whom have already given to geography useful data of the countries in which they are engaged. The same is being done, also, by French evangelical missionaries farther south, in the region of the Lessooto. One of them, Mr. Kurger, is busily at work, perfecting a map of the country. We hear little from Mr. Victor Giraud, who is proceeding in the direction of the great Lake Banguelo, south of which Livingstone died. Our best wishes accompany the young explorer, whose character, knowledge, and equipment warrant us in expecting much of him.

Before leaving Africa, I wish to mention one who has already proved himself a distinguished traveller. I refer to Mr. Georges Rexoil. He is engaged at the south in the large peninsula of the Comalis, which he has explored at the north with so great success. If he succeeds in penetrating into this unknown and formidable region, he will certainly garner a new scientific harvest not less rich than the preceding.

Allow me to approach America, and briefly speak to you of the cutting of the American isthmus between Colon and Panama. Two years have been spent in preparing the field of battle. The entire line is occupied by our workmen and machines. The director, Mr. Dingler, engineer-in-chief, who has just set to work our corps, has returned to Paris to report both his plans and his preparations to inaugurate the canal in 1888. In the course of this year, till July of the year following, he will each month remove from the cut a million cubic metres of *débris*, and from that date two million cubic metres a month, making twenty-four million a year. The enterprise will be finished during the following four years. I intend to visit this magnificent work early in 1884, and I hope that delegates from our geographical societies will accompany me. I must not leave Central America without respectfully referring to the successful perseverance with which one of the most devoted missionaries sent out by the minister of public instruction, Mr. Désiré Charnay, has explored the ruins of Yucatan. His researches and discoveries, together with his inferences, certainly throw unexpected light on the former obscurity of the American civilizations.

The feeling of sadness which we all experienced, on learning the terrible ending of the expedition of Dr. Crevaux, is still with us. Since then, only vague rumors have reached Europe in regard to this

tragedy in the heart of South America. Mr. Thouar, a young French traveller, is now facing dangers of every description, in his attempt to discover the remains of our unfortunate countrymen. Gathering information, and supported by good will on all sides, he is making slow but regular advance. We can only hope that he will attain his object; while we do not ignore the dangers to which he so generously exposes himself in trying to penetrate, accompanied only by an interpreter, a country inhabited by Indians who overthrew the mission of Dr. Crevaux. Our warmest hopes for success go with him in his noble undertaking.

At the extreme south of America, at Tierra del Fuego, a French mission, established a year ago, has been commissioned, in accordance with the international programme, to make meteorological and magnetic observations. We look forward to the next return of the guard-ships, whose work, accomplished under the direction of Mr. Martial, commander of the Romanche, will form a valuable contribution to the physical geography of these parts.

Finally, after a successful expedition to the northern latitudes, in the polar seas, which, since the voyage of the Recherche, have scarcely seen the French flag, one of our countrymen, Mr. Charles Rabot, is at present continuing in Russian Lapland the investigations which he began in Sweden. The region which he includes still offers a vast field for geographical and geological study.

Such, my dear colleagues, are the chief means by which the advance of French geography, in its most active and most persistent form is disclosed. I might still speak to you at length, but we must not deserve the reproach of weaving for ourselves crowns; and, in the noble titles I have just recalled to you, we should see rather the obligations they place upon us than the satisfaction which they bring to our proper national pride.

LETTERS TO THE EDITOR.

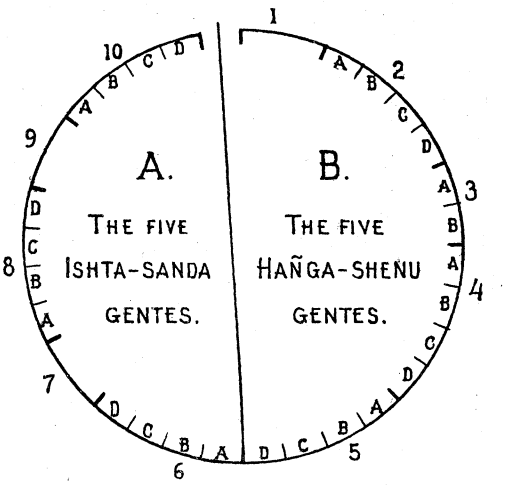
Marriage laws of the Omahas and cognate tribes.

THE Dakotas or Sioux still have mother-right in some of their tribes, and I cannot say how far the following statements apply to them; but the Omahas, Ponkas, Kansas, Osages, and others have father-right, and are governed by the principles here given, with one exception, — the Kansas have recently disregarded their laws, and have begun to marry in the gens.

The Omaha tribe is divided into ten gentes or clans, each gens having its special place in the tribal circle. In the figure the numerals denote the gentes, and the letters the sub-gentes.

Suppose that I belong to 1, the Elk gens, which is also my father's gens: I cannot marry any female of that gens. If my mother belongs to 2, a buffalo gens, I cannot marry any woman of that gens.

Suppose that my father's mother belonged to 3 a, my mother's mother to 4 a, my father's father's mother to 5 a, my mother's father's mother to 6 a, my father's mother's mother to 7, and my mother's mother's mother to 8 a: I cannot marry any women of 3 a, 4 a, 5 a, 6 a, 7, or 8 a, if I know of their relationship to me; but I can marry any women of the other sub-gentes, 3 b, 3 c, 3 d, 4 b, 4 c, 4 d, 5 b, 5 c, 5 d, 6 b, 6 c, 6 d, 8 b, 8 c, or 8 d, as they are not my full kindred.



I can also marry any women of 9 or 10, if they are not forbidden to me for other reasons; that is, if they are not my affinities, such as the wives (*real* or *possible*) of those whom I call my fathers, mother's brothers, grandfathers, sons, sister's sons, or grandsons.

Principles considered. — 1. Marriage in the father's gens forbidden. 2. Marriage in the mother's gens forbidden. 3. The regulation of the sub-gens. 4. Potential or possible marriages must always be kept in mind, and kinship terms are based upon them.

J. OWEN DORSEY.

Washington, D.C.

Francis Galton's proposed 'Family registers.'

Mr. Francis Galton is now planning to push his inquiries into the laws of heredity upon a more extensive and systematic scale than ever before. The success of his early work, 'Hereditary genius,' led him to observations in a wider field, which extended over several years, and were collected in his very valuable book, 'Inquiries into the human faculty,' which appeared last spring. His new proposal involves the collection of a large number of family biological histories, to extend over three or four generations, and to be obtained by circulating an exhaustive schedule of printed questions. The writer has just received a copy of the latter, together with a prospectus of the general plan, which Mr. Galton will call 'Family registers.' The revised schedules will shortly be ready for distribution. In the mean time an abstract of the prospectus and schedule may be given.

Mr. Galton foresees the difficulties which he will encounter; and, appreciating that the obtaining of accurate family histories of health and disease among laymen is almost out of the question, his prospectus appeals principally to the medical profession. Among doctors, all inherited disease is a disease, and not necessarily an hereditary disgrace, as most of the laity are apt to regard it. In this class, also, the scientific interest attached to inherited imperfections of physique or mind often overbears every other feeling. At all events, although the *anonymous* will be strictly maintained, Mr. Galton seems to expect that few non-professional persons will be ready even