Now, the books that are best fitted for this end are not those which are most commonly found in school libraries intended for the use of deaf children. We may be guided in our choice by the age of the child. We should place in the hands of the child such books as are of absorbing interest to hearing children of his age. If we wish the child to learn language, quantity of reading is more important than quality. For little children, such stories as "Jack the Giant-Killer," "The Three Bears," "Cinderella," and all the host of fairy-stories that so fascinated us when we were children, will be the best. For boys of twelve and thirteen I am afraid that the so-called "blood and thunder" novels would teach more language than "Stanley's Travels in Central Africa," or the best text-books of history. It is not necessary, however, to place in the hands of deaf children books of doubtful character, in order to give them reading of absorbing interest, while the press of this country continues to furnish such fascinating, entertaining, and at the same time elevating and improving literature for the young as has been prepared for them by such writers as Louisa Alcott, Elijah Kellogg, Margaret Sangster, and the scores of other authors of juvenile books of our time. A plentiful supply of interesting tales should be provided, sufficiently short to be read through at a single sitting, and of a character that could be illustrated by pictures and natural pantomime. Of course, suitable selection must be made of subjects; but I cannot too strongly impress upon you my conviction, that, *for language-teaching, mere quantity of reading is more important than quality.* For advanced pupils, the society novels and plays that are usually banished from the libraries of our institutions are what are wanted, especially those society novels that are written in conversational style, and abound in questions and answers. Ordinary books of history and travel are too often written in what may be called "book language," and not in the language of the people. But in novels and plays will be found the language of conversation, and these also are the books that will stimulate the pupil to read.

As your pupils become familiar with the printed page, they will take in words by the eye with greater and greater rapidity, until ultimately a speed of reading will be obtained of from three hundred to four hundred words a minute. Think what this means if the child reads for only an hour a day during the whole period of his school course! Think, too, of what value the habit of persistent reading will be to your pupils in adult life!

I believe, that, in the acquisition of language by the deaf, reading will perform the function that hearing does for the ordinary child. I do not think that any more important habit can be formed by the pupil than the habit of reading; for, after all, the utmost that you can do for his education in his school life is to introduce him to the wider literature of the world.

EXPLORATIONS OF CAPT. BINGER.

MORE than two years have passed since a marine officer set sail from Bordeaux (Feb. 20, 1887), destined to become renowned as a great explorer. After having for some time conscientiously studied the customs and the language of the people living about the Senegal, Capt. Binger returned to France, harboring the plan which he is about to execute

His numerous studies and careful researches culminated in the following plan: to fill the large blank space which on our charts is situated in the bend of the Niger; and to connect the investigations and surveys made on the right bank of the river by French officers, and previously by the French explorer René Caillé, with those of Barth and with the surveys of the lower course of the Niger.

His first objective point was to be the city of Kong, the situation of which is approximately given on all our maps. According to one authority, it was said to be a great market-place, a place of meeting for caravans, and a centre of trade; while, according to other authorities, its existence was a matter of doubt, as this name of "Kong" ("mountain") was said to denote merely the watershed between the Atlantic Ocean and the Gulf of Guinea. The plan once conceived, Capt. Binger, on account of his indomitable energy and his perfect health, was the right man to carry it through, in the face of serious dangers. It required a march into unknown regions. He was to be the first white man seen by the natives of that region; and his knowledge of the native tongue, spoken on the banks of the Senegal and the upper Niger, was of no use to him when once he had entered the unknown territory, as the language in the region to be traversed differs from that spoken throughout the French possessions.

On the 15th of May, Capt. Binger passed the post at Kayes on his way to Bammako, whence he was to start. From this point, in the beginning of June, he addressed a letter to the *almamy* ("chief") Samory, — the same who, by the treaty of March 23, 1887, had placed his states under French protection, — informing him of his intention to march into his country. The *almamy* pleaded that the war with King Tiébe, his powerful neighbor to the east, and the unfortunate condition of his country, would not permit him to receive the traveller, and refused to receive him. After a short time, however, he changed his mind; and, hoping to turn the chances of war in his favor, he wrote to Col. Gallieni, governor of Senegambia, asking him to send a re-enforcement of thirty soldiers from the colony. This request decided Capt. Binger to march on. He only wanted a pretext for doing so, and hoped he would be able to study the position of King Samory, and report to the commander of the French Sudan.

In the war mentioned above, Capt. Binger had tried to act as mediator. He settled upon the 30th of September as the date of his departure, but Samory interfered. First, his son, Karamoko, warned Capt. Binger that the roads leading to Kong and Tegrera were not safe, that it would be preferable to wait, and adduced many other reasons to induce him to give up his plans.

When Capt. Binger insisted upon his departure, Samory declared that he would not let him depart until he had taken Sikasso and several other cities in the neighborhood of Kong. This answer did not satisfy Capt. Binger; and therefore he demanded a final answer from Samory as to whether or not he would give him permission to traverse his country; but again no definite answer, and pretexts without end were the only result. Tired of these performances, Capt. Binger decided to move on as soon as practicable, and run the risk of Samory's hostility; but his energy and his firmness had been effective. He soon after received a confidential visit from the king and his son, begging him not to forget them, and to bring them some cartridges on his return.

The return to Benokubugula was effected by way of Saniena and Komina. Here, again, Capt. Binger found traces of the ravages of war. Komina, which some years before consisted of seventeen villages, — a much-frequented centre of almost four thousand inhabitants, — was nothing but a ruin. A few lemon-trees bore fruit as an emblem of former prosperity. "Since the *almamy* has come here," said a native to the captain, "the land is lost; the soil was good; one mule cost *ba wuoro* ('fifteen francs'); now we can barely find enough to eat."

On the 7th of October, Capt. Binger re-entered Benokubugula, tired out, but still in good spirits. With the exception of the information gained as to the position of the *almamy*, his journey had been void of results.

After resting for several days, Capt. Binger resumed his march on the 16th of October, but not without having to overcome the same obstacles he had met with at Wolosebugu and Sikasso, — that of being unnecessarily detained. Near Tengrera, threatened by the inhabitants with the loss of his head if he proceeded farther, he was deserted by his escort, and at Furu — the boundary of the lands of Samory — he had to pay heavily for the permission to cross. At last he entered the dominions of Tiébe, accompanied by a guide and two men from Niele, captives of Pegue, chief of this part of Follona.

The captain first crossed Pomporo, where he was not disturbed, although he had not been officially received by the dignitaries of the village. At Dionmantene several men joined his small caravan.

After he had arrived within five miles of Niele, he was taken sick with bilious-fever, and during this time was well treated by Pegue, who daily sent him eggs, chicken, and honey.

During his rapid convalescence he tried his best to persuade Pegue to admit him to his capital, but in vain. Pegue refused, as he was influenced by his *kenielala* ("magicians"), who associated

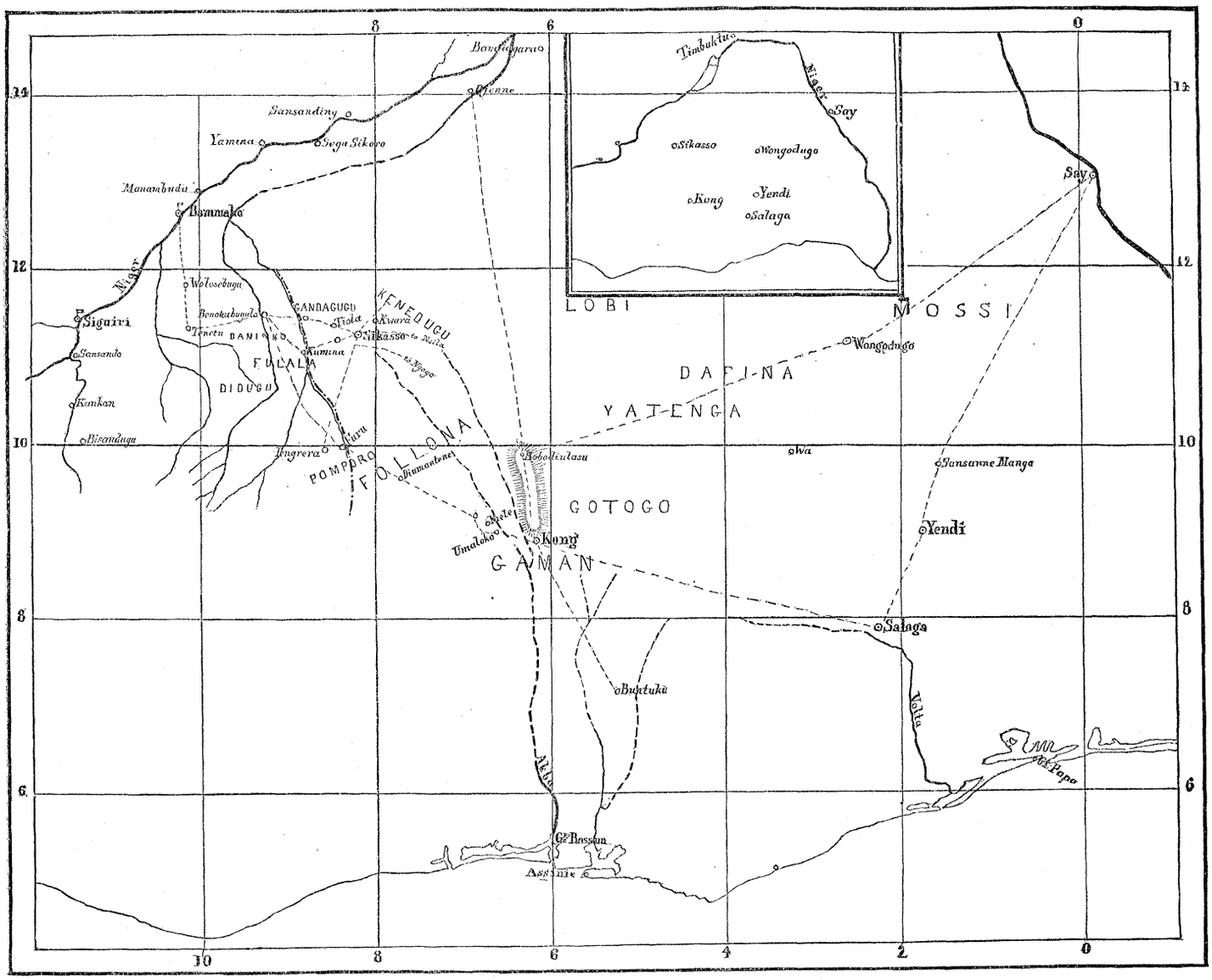
the death of Tidiani, shortly after the departure of Lieut. Caron from Bandiagara, with the death of the chief of Furu two days after the passage of the caravan. He was therefore obliged to depart without having seen either Pegue or his capital; at least, he had received all assurances of Pegue's friendship for the French, and his promise to permit the passage of any Frenchman, provided he came alone, and not on horseback. There was no use mentioning a treaty, and the situation was not favorable.

If Samory was successful, he would reduce Niele to ashes. Tiébe, in his turn, would do the same. An alliance between Tiébe and Pegue was out of the question, because the former was detested for his cruelty, and the latter would not accept the proffered conditions. On the 3d of February, Capt. Binger left the village, and, passing Niele, started for Umaloko, in the country of Kong. He was accompanied by one of Pegue's servants, who was to lead him safely into the first villages of the country of Kong.

On the 20th of February he arrived at Kong, having traversed two great rivers from 40 to 80 metres broad, which, coming from Sikasso, flow towards the south, and unite shortly before reaching Kong. They form, without doubt, either the Aleka (Abka or Akbo) or the Volta.

Kong, situated in west longitude 6° 9′ 43″, and north latitude 8° 54′ 15″, is a city of ten thousand inhabitants, and lies in a large plain at an altitude of from six hundred to seven hundred metres. It is divided into seven large parts and several suburbs, and contains one grand mosque and several of less importance. It is under the government of the family of Wattara. The *fama* is called Wamoko-Ule-Wattara; the chief magistrate, Diawara-Wattara; the religious chief of the population, a Musselman, is the *almamy*, Sitafa-Sakhanoko. The chief products of industry are woven goods and indigo dyes. At Marrabatu, one of the suburbs, there are more than forty dyeing-establishments.

To return to Capt. Binger, he was received with a good deal of distrust by the people, who saw in him a spy of Samory's. But as the marabouts, the leading class, decided in his favor, his safety was assured.



CAPT. BINGER'S JOURNEYS IN THE NIGER REGION.

From the latest news, dated at Kong, March 10, and received at Bammako June 21, it was seen that Capt. Binger was to leave Kong about the middle of March, and to turn northward to Bobodiulasu, where he was to arrive on the 6th or 7th of April. Thence his route lay to Wongodugu. From Wongodugu he intended to make his way to the Niger at Say, then to return to Kong by way of Sansanne-Mango, Yendi, Salaga, and Ngottogo. From Kong, finally, he wanted to reach the coast, passing through the capital of Buntuku, the position of which was not accurately determined by the English Capt. Lonsdale, who visited it in 1883.

It is now ten months since we have had news of the enterprising traveller. From the time of his departure at Bammako, up to

the time of his arrival at Kong, — a period of six months and a half, — he must have traversed from seven hundred to a thousand miles. Judging from this fact, it would take him at least a year to complete his proposed tour from the city of Kong, and his return to the same. We must not be surprised at not having heard from him : that may be due to a lack of opportunity for sending messages.

Having given this description of the journey of Capt. Binger, we can but wish that it may terminate as well as it has begun.

GUSTAVE EIFFEL.

BEFORE proceeding to speak of the Eiffel Tower in detail, *Engineering*, in its issue of May 3, in which is a noteworthy survey of the opening Paris Exhibition, takes occasion to say a few words about Gustave Eiffel and his works. Born at Dijon in 1832, he passed brilliantly through the Ecole Centrale, and commenced the active pursuit of his profession in 1855. One of his first works was the completion of the foundations of the great railway-bridge of Bordeaux by means of compressed air,— a system then but little known in France. After this work, M. Eiffel constructed a large bridge over the Nive at Bayonne, and two others at Capdenac and at Florac.

In 1867 he was intrusted by M. Krantz, the commissioner-general of the Paris Exhibition of that year, with the task of checking experimentally the calculations made for the large buildings. In 1868 he constructed, under the direction of M. de Nordling, engineer of the Orleans Company, the viaducts with iron piers, upon the line between Commentry and Gannat. It was in these viaducts that he first employed the system consistently followed by him afterwards, of wrought-iron braced structures, instead of cast-iron columns or masonry piers. A little later he introduced, with great success, a system of launching bridges from their site of erection on the ground across the piers previously built to receive them. His first attempt in this direction was in 1869, with the Sioule viaducts, followed by another at Vianna, in Portugal, where iron girders more than 1,800 feet in length were launched into position. Then came the viaduct of Tardes, near Montluçon, which was launched at a height of 328 feet above the ground, over piers 340 feet apart.

M. Eiffel was the first among French engineers to employ the system of erecting bridges of great span without scaffolding, by building out the structure piece by piece. His first work of this class was at Cubzac, near Bordeaux, where he crossed a river with a bridge 236 feet span without any staging. At Tan-an, in Cochin China, he erected in a similar way a bridge of 262 feet span. Of arched bridges built in the same manner, the most important, until it was surpassed by the viaduct of Garabit, was the great bridge over the Douro, at Oporto, the central span of which is 534 feet, and the rise of arch 138 feet, the height of rails above the water-level being no less than 200 feet. But he surpassed himself in the Garabit viaduct, where an arch 541 feet span crosses the torrent of the Truyère 400 feet above it. Among the other great engineering works carried out by M. Eiffel must be mentioned the Pesth railway-station ; the Szegedin bridge ; the principal façade of the Paris Exhibition of 1878 ; and the dome of the Observatory at Nice, 75 feet in diameter, and weighing more than 100 tons, which floats within a circular trough, so that the effort required to move it is almost inappreciable. Scarcely less remarkable as an engineering work, and as a triumph of the founder's art, is the gigantic statue of Liberty, modelled by Bartholdi, and presented by France to the United States, where it now stands lighting the entrance to the harbor of New York.

The great series of locks which were to have formed a sort of giant staircase for the passage of ships across the Isthmus of Panama was elaborated as to design, and considerably advanced as to execution, when the great work collapsed. From the foregoing rapid sketch, it will be seen that few engineering constructors have carried out so many important and original works as M. Eiffel ; and the success which has uniformly attended him was a guaranty for the stability and beauty of his latest effort, the Column of the Republic, and his own monument.

Of course, the idea of a tower of gigantic height is not a new one. Not to mention the efforts of the early engineers which had the unexpected result of inventing foreign languages, there are three better authenticated and more recent proposals than the instance in which the sons of men said, "Go to, let us build us a tower whose top may reach unto heaven, and let us make us a name." The earliest was that of the splendid but eccentric genius Trevithick in 1833 ; then came the proposal of the well-known American engineers, Messrs. Clarke & Reeves, who offered to construct for the Philadelphia Exhibition, in 1876, a tower, 1,000 feet in height, of wrought iron, and about 150 feet in diameter at the base. Finally, in 1881, a M. Sebillot proposed to light Paris electrically by a 1,000-foot tower.

Excepting the American project, none of these schemes had any practical value, but the proposal of Trevithick is worth referring to here. He suggested, in a letter published in the *Morning Herald* of July 11, 1832, that the passing of the Reform Bill should be commemorated by a gigantic tower made of cast iron, 1,000 feet in height, 100 feet in diameter at the base, and 12 feet in diameter at the top. It was to be set upon a stone plinth 60 feet high, and was to have a capital 50 feet in diameter, supporting a colossal statue. The shape was to be that of a cone, and an internal cylinder 10 feet in diameter was to run from the ground to the top of the structure. Trevithick proposed that the tower should be composed of 1,500 symmetrical segments, with internal flanges around their edges for bolting them together. Each segment was to be pierced with a large circular opening for lessening the weight and reducing the wind-pressure. The total weight was to be about 6,000 tons, and each of the cast-iron panels was to weigh about 3 tons. The contract price offered for the castings was £7 per ton, the total estimate of expense was under £80,000, and Trevithick undertook the erection of the column in a period not to exceed six months. Passengers were to be raised to the top of the tower in the central cylinder, which was to be fitted with a piston providing accommodation on its upper surface for twenty-five persons ; and the piston was to be raised from the bottom to the top by compressed air forced into the cylinder, and controlled by suitable valves. Fortunately for the memory of Trevithick, this scheme remained upon paper.

The Eiffel Tower is the natural development of the class of work upon which its constructor has been occupied for so many years. It was the direct outcome of a series of investigations undertaken by M. Eiffel in 1885, with a view of ascertaining the extreme limits to which the metallic piers of viaducts could be pushed with safety, this special line of investigation having reference to a proposed bridge with piers 400 feet in height and 140 feet of base. The idea of the great tower followed, preliminary plans were prepared, and calculations made by two of M. Eiffel's principal engineers,—MM. Nouguier and Koechlin,—and by M. Sauvestre, architect. Naturally, the leading principle followed was that adopted by M. Eiffel in all his lofty structures ; namely, to give to the angles of the tower such a curve that it should be capable of resisting the transverse effects of wind-pressures, without necessitating the connection of the members forming these angles, by diagonal bracing. The Eiffel Tower, therefore, consists essentially of a pyramid composed of four great curved columns, independent of each other, and connected together only by belts of girders at the different stories, until the columns unite towards the top of the tower, where they are connected by ordinary bracing. Iron, and not steel, was used in the construction throughout.

MENTAL SCIENCE.

Psychic Cures.

OUR first record of the practitioners of the healing art describes them as invested with the priestly function, thus making the cure of physical ills a result of intellectual and religious influence. When reading the records of the past in the light of modern knowledge, we can trace almost at every point the very marked influence of mental states in the cure, sometimes described as miraculous, of disease. The repute of drugs altogether harmless, or of the physician who gave the drug, is often due to the successful action of the patient's own belief upon his susceptible system. And quite as truly are the wonderful cases of the infliction of ills by