

visible at some distance, and they are white or black, to be used according to circumstances; moreover, the signalmen are furnished both with binoculars and telescopes to enable them to read the signals from remote stations. At night either a bright colza light is made use of, or a spirit flame, into which is blown from time to time a mixture of powdered magnesium and resin. A short puff or a long puff constitutes short and long signals, which are displayed, as before, in accordance to the Morse code. Every battalion of infantry and regiment of cavalry in the British army has a proportion of its men trained as signallers, so that these can act at once on taking the field. Their duty is to communicate between outlying pickets and the fighting column, and to do duty where there is no telegraph. For let the field telegraph of an army be ever so well ordered, there is always plenty to do for the army signaller; and he will doubtless find in the heliostat a means of fulfilling these duties with increased efficiency.

H. BADEN PRITCHARD

FLOODING THE SAHARA

THE French scheme of turning part of the Algerian Sahara into an inland sea continues to attract considerable attention in France, and scarcely a week passes without some allusion being made to it in the Paris Academy. At a recent sitting M. de Lesseps read a letter from Capt. Roudaire in which the latter gave some details of the results of his sounding of the soil at various points, sands and marls being the beds most commonly met with. At one place, four metres below the surface, plenty of potable water was met with, which will be a great saving in carrying on the work.

At the same sitting MM. Ch. Martens and Ed. Desor presented several considerations against carrying out the plan, their opposition to it being shared by several other French men of science. They have themselves examined part of the ground which it is proposed to put under water, so that their opinions ought to have some weight. While giving every credit to M. Roudaire for the accuracy of the survey which he is carrying out, they, however, point out the difficulty of perfect accuracy, which in this case is all important, in the classic country of mirage, where the surface of the ground is constantly altered and deformed by reflection and refraction. Moreover, they point out that to the south of the projected sea is the Wed-Souf, where are ripened the dates known as Tunis dates, the culture of which is a very special one. The least error in surveying, it is shown, might lead to the destruction of this culture, by allowing the waters of the Mediterranean to penetrate the soil where the date-trees are grown, and thus destroy them. The authors do not attempt to touch the argument that even in historical times part of the Sahara now being surveyed was really a great lake; but they point out that there are proofs that in prehistoric times there must have existed an interior sea, at an epoch when the hydrographical conditions of Europe were very different from what they are now. In 1863, when exploring the region between the oases of Guemar and the south extremity of the Shott Mebrir, they found the gypsum beds of the plateaux ended in regular lines like sedimentary beds, and from the soil they collected the *débris* of shells, truly marine, such as *Buccinum giberrulum*, Lam., and *Balanus miser*, L. Above these shells, in the sand, they found *Cardium edule*, better preserved than they had ever seen it. Thus they found fossils characteristic of salt water, and of those which are a mixture of salt and sweet. The retirement of the waters from the Sahara the authors attribute to the elevation of the land, which is even yet below the level of the Mediterranean, and is to a great extent a network of salt lagoons.

It has been said that the creation of an interior sea, of 13,280 square kilometres, would change the pluviometric condition of the country, and even that of the whole of

Algeria. This MM. Martens and Desor regard as a great illusion. Although the laws of the general atmospherical movements are little known, yet it is admitted that the Atlantic is the great reservoir from which come the vapours which are resolved into rain over the European continent. They believe that this is also the case for Africa. The Mediterranean is really only a Gulf of the Atlantic, and they do not believe that an addition of 13,000 kilometres will add anything to its climatic influence. Long calculations have been made as to the quantity of water that would be evaporated by the new sea; but the authors point out that the predominating wind in the region is north, and that if it were rendered either too cold or too moist it would injuriously affect the date-culture carried on in the south. The surroundings of interior seas, like the Caspian and Aral, are steppes noted for their aridity; the shores of the Mediterranean suffer in the same way when, as last year, the rains of the north do not extend to the south. For these reasons MM. Martens and Desor think it would be a mistake to insist on the creation of the interior Saharan Sea.

In a subsequent sitting, however, it should be said, M. Favé endeavoured to show that their fears were groundless, especially with regard to the accuracy of the survey; he thinks that the work in connection with the Suez Canal showed that perfect confidence may be placed in the methods of surveying adopted.

THE LONGEST TUNNEL IN THE WORLD

SCHERNITZ, the principal mining city of Hungary, has celebrated the opening of the Joseph II. Mining Adit, the deepest gallery of efflux of that place, and the longest subterranean work of this kind in the world.

Its excavation was commenced in the year 1782, during the reign of the Emperor Joseph II., whose name it bears, and has been continued since that time, but with varied energy. The most rapid progress was made within the last five years, so that its completion on September 5th, 1878, was a kind of surprise, and was saluted by guns, which caused a great joy in the city, because it announced a new era for the mining operations of the whole district.

Works of such importance deserve to be installed with solemnity, and a festival was arranged for the purpose on October 20-22, 1878. Prof. Szabó, one of the guests from Budapest, delivered a report to the Royal Hungarian Society of Naturalists, as a representative of that body, and we shall not hesitate to communicate an extract of this.

As the mining operations were progressing in depth, there was at the same time a well regulated system of sinking shafts and driving tunnels employed. The Joseph II. Adit is the eleventh of that kind; it lies 200 metres deeper than the Francis Adit, which was until now the principal gallery of efflux for the mines of Schemnitz. This was excavated between the years 1494 and 1637 to a length of 1,968 metres; but a greater extension was given to it by continuing the works from 1747 till 1765. After this period the mines of Schemnitz proved to be so lucrative, that the idea of undertaking some greater work for securing the future prosperity of the mines was conceived, and so the plan was fixed of driving a tunnel at the deepest possible level, which could convey the waters to the valley of Gran, the lowest point indeed which could be obtained within a practicable distance.

They commenced boring the tunnel west from Schemnitz, near the village of Voznitz, on the left bank of the Gran. The height of it is three metres, the width 1.6 metres. About the lower third is destined to convey off the waters, while the upper two-thirds are separated from this by a platform, and adapted for transporting the ores.

According to the original plan it could have been finished in thirty years at the cost of 1,215,000 florins.