

middle of the day that they cannot be got out, but are quite loose in the cool of the evening.

The Chairman observed, there was no doubt the expansive action of the heat would always produce its full effect, either by compressing the iron of the rails, or producing some motion or distortion in their position.

Mr. Norris said, that cases had occurred of the road becoming hog-backed, rising with the sleepers out of the ballast, from the want of sufficient allowance for expansion; also in curves, the rails and sleepers had been pushed bodily outwards in the ballast by the effect of expansion. The extreme change of length in this country, from 80° or 90° variations of temperature, amounted to a yard per mile, and this yard length must be disposed of somewhere in each mile, either by sliding or tension, or else by bending upwards or laterally, if there was not less resistance to compression of the iron.

Mr. C. Cowper remarked, that the extreme change of temperature of 90° would cause a total strain on the iron of 6 tons per square inch, at 1 ton for 15°, which amounted to the very severe total force of 40 or 50 tons on the whole sectional area of the rail of 7 or 8 square inches, to overcome any supposed resistance.

Mr. May thought the change of temperature in the rails would be considerably less than that of the air, because they were partly buried in the ground, and must therefore follow the temperature of the surface of the earth, which fluctuated much less than that of the air.

Mr. Duclos remarked, that the expansion or contraction of the rails would only take place from the mean temperature to the maximum or minimum: and as the mean temperature of the air in this country was about 50°, and the maximum 90°, making a change in the air of 40°, the actual change in the rails from the mean temperature was probably less than 30°, causing a strain of not more than 2 tons per inch expansion or contraction.

The Chairman observed, it was an important subject for consideration, whether the allowance for expansion could be entirely dispensed with; and the new chair appeared an important step in that direction, and might lead to doing away with longitudinal bearings.

Mr. Norris said that his attention had been first directed to the subject of this chair about two years since, by the circumstance of a very extensive alteration having been in contemplation from the ordinary rail and cross sleepers to a bridge rail on longitudinal timbers, the alteration being proposed entirely on the ground of obtaining a superior coupling of the joints with the longitudinal bearing than the ordinary rail and chair. But he objected to the bridge rail and longitudinal timbers as more expensive; and the idea then occurred to him of running the melted metal into the chairs to fill them up solid, and make a rigid coupling of the joint; and this led him to casting the joint-chairs solid upon the rails in their places, as the complete way of carrying out the object.

Preliminary Account and Results of the Expedition of Dr. Richard Lepsius to Egypt, Ethiopia, and the Peninsula of Sinai.*

The fertile and extensive province of Dongola, on the northern frontier, which we traversed on the 4th of June, after our departure

from Barkal, afforded us but few remarkable ancient remains; we may, however, mention among these the Island of Argo, with its monuments, from the 13th Manethonic Dynasty. They became still more numerous in the northern borders of Dongola, from which a nearly continuous cataract country extends as far as Wadi Halfa. Near Tombos we found traces of the Egyptian dominion under the Pharaohs of the 17th and 18th Dynasties, rock-tablets with the shields of the two first Thuthmosis and of the third Amenophis. Farther on, at Se-ebi, there were the remains of temples of the first Setkos of the 19th Dynasty. The great Temple of Soleb, built by Amenophis 3rd and 4th, detained us five days. The ruins of the Temple of Sedeinga, and those upon the island of Sai, belonged to the 18th and 19th Dynasties. Opposite this island stood the remarkable Temple of Amara, which was built by the Kings of Meroe and Naga, and is still an important proof of the extent of their dominion.

Semneh was the next point, we reached. The Nile is here compressed within a breadth of only about 1150 feet, between high rocky shores. On both sides there are ruins of old Temples of the 18th Dynasty. But these were not the earliest buildings which were erected here. We found a considerable number of inscriptions from the 12th and 13th Manethonic Dynasties, especially on the large foundations of the Temple of Kummeh, situated lower down, opposite Semneh on the eastern bank, as well as on the scattered rocks on both banks in the neighbourhood of that Temple. Many of them were intended to indicate the highest risings of the Nile during a series of years, especially in the reigns of the Kings Amenemhe 3rd and Sebekhotep 1st, and by comparing them, we obtained the remarkable result, that about 4000 years ago the Nile used to rise at that point on an average twenty-two feet higher than it does at present. This, therefore, which we saw before us was the most ancient Nilometer, and the earliest statements of the heights, and their greatest number, were recorded during the reign of the same King, the Moeris of the Greeks, with whom we had already become acquainted in the Faium, as the great hydraulic architect. The strong fortifications on both banks of that narrow part of the river convinced us at once that, during the early times of the 12th Dynasty, this remarkable point served as the boundary of the Egyptian dominion, against the Ethiopian nations who dwelt more to the south.

At Wadi Halfa, on the 30th of July, we again left the cataract country, remained from the 2nd to the 11th Aug. in Abu Simbel, examined until the end of the month the ruins of Ibrim, Aniba, Derr, Amada, Sebaa, Dakkeh, Kuban, Gerf-Hussen, Sabagura, Dendur, Kalabschah, Debot, and spent the whole of the following month in examining the monuments of the island of Philæ, and the islands of Bigeh, Konosso, Sehel, and Elephantine, surrounding it, and of the stone quarries between Phike and Assuan. October was spent visiting Ombos, the two Silsilis, Edfu, the desert Temple of Redesieh, El-Kab, Esneh, Tod, and Erment.

On the 2nd of November we again arrived on Theban ground, and first visited the rock-tombs of Qurnah, on the west side, where we remained nearly four months, till the 20th of February, 1845, when we encamped for three more months at Karnak. The number of monuments of all kinds both above and below ground at Thebes, is so great that they may be truly called inexhaustible even for a combined power like ours, and for the limited portion of time which we were able to devote to their investigation. But the age of the monuments at Thebes, is almost exclusively limited to the New Monarchy; and the most ancient we discovered, such as one might generally expect to find, are not earlier than the 11th Manethonic Dynasty, the last but one of the old Monarchy; for this simple reason, because it was in this Dynasty that Thebes

* Extracted from "Letters from Egypt, Ethiopia, and the Peninsula of Sinai," by Dr. Richard Lepsius.—Continued from page 152