has the biquartz. Two strips of heavy-glass of exactly equal length and similar quality, such as those I hold in my hand, must be introduced in the respective paths of the two beams: and one at least of them must be surrounded by a magnetizing coil. The biquartz has wiped out the interference fringes; but on magnetizing one of the two pieces of heavy-glass, or on magnetizing the two in opposite senses, the interference bands can be made to reappear. It is in this way that Prof. Sohncke's experiment—hardly suitable for a lecture theatre—was performed. It is in this way that we establish upon an experimental basis the fact that light itself, and not merely the plane of its polarization, experiences an optical torsion when subjected to those forces which, whether crystalline, molecular, or magnetic, exert upon it an optical torque.

BABYLONIAN ASTRONOMY.[1]

II.

THE year—that is, the period bringing back the recurrence of the seasons—is not a primitive means of dividing time, but the result of many observations. The simplest way of marking time is by seasons, and the system is still employed by some savage nations in Africa. A season does not correspond to one year, and more than one may be in a year; seasons, however, generally correspond to the year period. As to the division of the year, it must have varied according to the climate and region, but the simplest is by ten, as ten is the most common dividing number, and such was the one originally adopted by the Semites and Egyptians. This year of ten months, or rather ten parts, has left traces among the Semites and in classical authors. The Babylonians assimilated their first ten kings to the ten parts of the year. At Rome, we are told that the year before Numa Pompilius was composed of ten months only.

A year of ten lunar months is impossible, for after two or three of such periods it would no longer correspond with the seasons. We find, therefore, that the ten parts of the year were composed of thirty-six days distributed in four periods or weeks of nine days. This last division was not, however, official: the days of each of the ten divisions of the year were merely numbered from one to thirty-six; it was at a later date that the days received names from the protecting gods attributed to them.

It is to be noticed that in Egypt the months had no special names; the year was divided, after the reform of the calendar, into three seasons of four months of thirty days, called first, second, and so on, of the season to which they belonged. Popular names were attributed to them afterwards, taken from the religious festivals, but they do not appear in the texts before the Ptolemaic period. The like took place among the Semites: the months were called first, second, third, and so on, but were not distributed into seasons. It was only after the Akkadian invasion that the other names, Nisan, Tyyar, &c., were adopted, and the eighth month never lost its numerical name. In the astronomical omen tablets the primitive nomenclature by numerical order was often preserved.

It is still uncertain at what time the old calendar of ten divisions of thirty-six days was reformed into one of twelve months of thirty days. The change was due to the desire to measure the time by the appearance of the moon. This reform may be due to the influence of the Akkadians, who made the conquest of Babylon about 7000 B.C. These people had a lunar calendar composed of thirteen months of twenty-eight days, giving, therefore, a year of 364 days. It was no doubt more accurate than the Semitic calendar, but the Akkadians adopted their subjects' calendar. The deficiency with the normal solar year of 365 days was made up by means of a supplementary month placed irregularly by the priests when they thought it necessary. That is why we find various intercalary months, and why, in some cases, as late even as Nebuchadnezzar the Great, they occur in three successive years. To make up the deficiency the Babylonians had also a supplementary day called the "heavy 21st," which could be inserted in any month before the normal 21st. We find the mention of such supplementary days in several consecutive months.

The Akkadians, before invading Babylonia, divided their month into four parts or weeks of seven days each. This division had, however, nothing to do at first with the planets, to which the days were assimilated only at a later date. The Akkadians looked on the planets as evil spirits disturbing by their irregular motion the harmony of heaven; and, as evil spirits were the chief objects of their worship, they naturally attributed to each day of the week the name of a planet. When the Akkadians adopted the Semitic month of thirty days, the week of seven days was naturally abandoned in common use, but it was retained for religious purposes with some modification, a new series of four weeks commencing with each month. The Semites rejected the Akkadian names of the days of the week, though they preserved the symbolism attached to them, as is shown by the seven tablets buried under the foundation-stone of Khorsabad.

Our names of the days of the week are derived from the Akkadian assimilation of these days to the planets. There is no doubt as to the order in which the planets were assimilated to the names of the days, if we compare them with the colours of the walls of Ekbatana built by a Medic tribe, which preserved the primitive religion of the Akkadians, and also with the tablets of Khorsabad. The following table will show the correspondence:—

Names of the days and planets.	Colours of the walls of Ekbatana.	Materials of the tablets of Khorsabad.
1 Sunday (the Sun)...	... Gold ...	Gold
2 Monday (the Moon)	... Silver ...	Silver
3 Tuesday (Mars) ...	... Orange ...	Copper
4 Wednesday (Mercury)	... Blue ...	Tin
5 Thursday (Jupiter)	... Red ...	Iron
6 Friday (Venus) ...	... Black ...	Basalt
7 Saturday (Saturn)...	... White ...	Limestone

Iron, corresponding to Thursday, or Jupiter, is represented by a red colour, no doubt on account of the rust, which is red. And we must not be surprised to see Venus represented symbolically by black, for Vesper or the Evening Star is really the *dusky*.

This proves that the week of seven days, which is found all over Asia and Europe, spread, not from Babylonia, but from the country whence came the Akkadians.

[1] Abstract of the second lecture delivered by Mr. G. Bértin at the British Museum. Continued from p. 237.

THE INSTITUTION OF MECHANICAL ENGINEERS.

THE summer meeting of this Institution was held in Paris last week under the presidency of Mr. Charles Cochrane.

The papers offered for reading and discussion were a description of the lifts in the Eiffel Tower, by Mr. A. Ansaloni, of Paris, supplemented by the results of working to date, communicated verbally by Mr. Gustave Eiffel, President of the Sociéte des Ingénieurs Civils; the rationalization of Regnault's experiments on steam, by Mr. J. Macfarlane Gray; on warp-weaving and knitting without weft, by Mr. Arthur Paget; on gas-engines, with description of the Simplex engine, by Mr. E. Delamare-Deboutteville; on the compounding of locomotives burning petroleum refuse in Russia, by Mr. T. Urquhart; and description of a machine for making paper bags, by Mr. Job Duerden.

In the discussion of the first paper, which, as its title shows, was mainly technical in character, the interesting meteorological circumstance of the Eiffel Tower acting as a thunder-cloud discharger was referred to; clouds laden with electricity having passed quietly over the region of the tower, which previously and afterwards flashed with lightning. It was also pointed out that the perpendicularity of the building is not affected by temperature variations, nor by any wind pressure hitherto recorded.

We have not received a copy of the paper by Mr. Gray, who reserves the right of reproducing it, but from the syllabus of papers published by the Institution of Mechanical Engineers, it may be stated that Mr. Gray proposes a new unit of heat, which he compares with the ordinary water-unit, and a new diagram of energy, which he calls the Theta-phi (θ ϕ) or temperature-entropy diagram, a graphic representation of the Carnot-Clausius fundamental principle, of which the area shows heat-units, the co-ordinates being the temperature, θ, and entropy, ϕ. He compares Regnault's experimental steam-pressures with the pressures calculated by means of his formulæ, showing closer agreement than is obtained by Regnault's most accurate formulæ.

In Mr. Paget's paper the three chief methods of making fabric or cloth or tissue from yarns or threads, viz. ordinary weaving, knitting, and what the author calls warp-weaving, are referred to. The paper describes the method by which shaped goods can be made by warp-weaving, and the machine by which this is effected. The machine, which is of a very ingenious character,