

the monk, that a few faint sparks of civilisation and refinement were yet preserved. The abbey of St. Gall possessed in the 7th century, a chart of elegant design, '*mappa subtili opere*,' as we learn from Radbert. (de casib. mon. scti. Galli. cap. 10). And Dicuil an Irish monk, in his treatise *de mensurâ orbis* speaks of the maps of the Irish and Anglo-Saxon monks of the 8th century, and of their relating to each other the adventures of their pilgrimages. These religious journeys were very prevalent at this time, and led to the production of numerous "cartes routières" or itineraries, which in some degree retarded the attainment of correct geographical notions.

The glories of the reign of Charlemagne, brilliant and evanescent as those of a meteor, were the product of the genius of one man alone, of him whose image stands before us, in its large proportions, through all time, as the wise legislator, the beneficent reformer, fronting the gloom and misery of the time

With Atlantean shoulders, fit to bear
The weight of mightiest monarchies.

Amid the thousand cares and solitudes of his reign, the great king was ever alive to the interests of science. He invited learned monks from Ireland and Britain. He solicited the assistance of Ravenna, the residence of the last Greek emperors, and the latest school of Græco-Roman geography. Thus aided, he produced a map of the world, of square form, engraved on three tablets of silver, having the cities of Rome and Constantinople specially designated, with walls, gates, and towers, as on coins. The existence of this magnificent work was of no long duration. In the war which Lothaire, grand-son of Charlemagne, had to sustain against his brothers, in 842, the first of the tablets, which was the largest was broken in pieces and distributed as booty among the soldiers. A very precious monument of the reign of the illustrious Alfred the Saxon yet remains, a map attached to the manuscript of the *periegesis* of Priscian in the British museum. It has been published by Strutt in his chronicles of England. The epigraphs are in small latin type: In central Asia, we have the legend '*hic abundant leones*'; in the island of Typrobane (Ceylon?), '*his in oris immensa fruges*', near the Nile we have '*hic dicitur esse mons semper ardens*'; and, at Cartago, *magna, fruges, regio ipsa, sicut Africa, omni favens, leonibus, leopardibus, elephantibus*; on the western shore of the Caspian Sea, we have Gog and Magog. This is the latest known monument of the Roman Geographical school. Darkness, thick and palpable, followed.

But the lamp of science has never been wholly extinguished. As that sacred vestal fire, watched by virgin priestesses in rotation, which was ever nourished and never permitted to expire, so the bright flame of philosophy and science passed for a time from the guardianship of the Frankish nations to the schools of Cordova and the Caliphs of Bagdad. The name of Haroun-al-Raschid is familiar to all as a household word: and even now, at the distance of eleven centuries, the gloriole that surrounds his

brow is still bright and unfading. He was, in truth, a king among men. Wise and learned himself, he possessed the art of infusing into his people his own fondness for intellectual pursuits. He invited learned men from all parts and rewarded them with royal munificence. He caused translations to be made of the leading works in Greek, Syriac and Latin, and circulated them by innumerable copies. Dying, his mantle fell on a worthy successor, the Caliph al Mamun, who, it is said, offered the Greek Emperor five tons of gold and a perpetual treaty of peace, if he would send him for a time the philosopher Leo. During his reign excellent schools and large libraries were established at Bagdad and Alexandria. Contemporary with these efforts was the establishment of the Ommiad dynasty at Cordova, in Spain, which speedily became the chief seat of learning in Europe. Students came thither from France and other Frankish states, to perfect themselves in mathematics and the exact sciences. Besides Cordova, fourteen other chief seats of learning were established in Spain by the Arabs. These orientals introduced the numerals now in use: they simplified the trigonometrical operations of the Greeks: they adopted sines instead of chords: and extended the application of Algebra. Both at Bagdad and Cordova astronomy was eagerly studied, at special schools and observatories. The Arab mind was of wonderful activity. The mariner's compass, which Marco Polo is commonly thought to have brought with him in returning from his travels in the East, in 1260, was certainly used by the Arabs of Spain, as Renauld has shown in his translation of Aboulfeda, a century before that date, and perhaps earlier: gunpowder also, according to Aschbach, was in common use among the Andalusian Arabs towards the end of the 13th century, long before the birth of the Freiburg monk, Berthold Schwarz, its supposed discoverer.

In glancing very briefly at the geography of the Arabs, I may be permitted to remark that the Arab maps exhibit almost universally a system based on climates, or zones parallel to the equator. Ibn Khottair A. D. 830 makes out seven, extending from the equator to Northern Georgia: there being an extra climatal space beyond the seventh. Four centuries later Abul Hassan Nourredin, known as Ibn Said of Grenada, makes out nine. In research the children of Islam were indefatigable. Muslim ben Ali, who had been a prisoner of war in the Greek Empire, profited by his captivity to obtain all the knowledge possessed by the Greeks. He returned to his country in 846. At about the same time (840), the Kalif Vatssek charged Sallam to explore the coasts and neighborhood of the sea of Tabaristan, or the Caspian. The South also was visited: the Soudan was explored, the Nile, and Habesh or Abyssinia. Still more important were their oriental discoveries. The conquest of Sindh was followed by the reconnaissance of the countries more to the East. The merchant Soliman, in 851, traversed the "seven seas" to visit China. In 876, Ibn Vahab visited the interior of that country. At this epoch an extraordinary