

Wonders of Glass-making in All Ages

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in consideration of all that our subject embraces. The fear which obliges us to this avowal will surprise no one when we say that one of the most learned men of our period, M. Peligot, treating the question of Glass under its different chemical and practical forms, says to his readers: "I am under no illusion as to the imperfections of my work,* but I hope that allowance will be made for the difficulties found in collecting the scattered documents on glass working, a manufacture which lives in tradition, which avoids publicity, and on which, if I except the articles in encyclopaedias and chemical treatises, no complete work has been attempted for more than a century and a half." If, through an excess of modesty, M. Peligot claims the reader's indulgence for himself, who has certainly less need of it than any one else, how can we, at the commencement of this book, forbear to solicit a greater and more necessary indulgence 2 * *Da Dowse lepom sur VArt de la Verrerie.*

LIST OF ILLUSTRATIONS. PAGE. Thkban Glass-makers 24, 25 Bead Of A Royal Necklace 26 Inscription In Hieroglyphics 26 Roman Glass 29, 35, 39 Strasbourg Vase 38 Glass Furnace" Pots 16 Blowing Of Sheet Glass 85 Egyptian Mirrors 90 Mirror Of Marie De Medici 99 Italian Mirror With A Frame Of Carted Wood 103 Ivory Box Containing A Mirror 107,109 Mirror Of Henry III 113 Manufacture Of Bottles 129 Mould For Claret Bottles 131 Venetian Bottle' 133 Jug (Glass-works of Clichy) 135, 137 German Wiederkommen 143 Venetian Glass 148,149, 152, 155 -glasses (Crystal Works of Clichy) 153 French Glass Of The 16th Century 157 Venetian Glass Sprinkled With Gold 160 Bohemian Glass Engraved Flagon 169 Portland Vase 1W Venetian Frosted Glass 183 Spun Glass 187 Manufacture Of Thermometers 196,198,199 PAGE. Egyptian Breastplate 203 Venetian Vase 223 Specimen Of Filigree Canes 227 Solar Spectrum 262 Recomposition Of Light 264 Furnace For Optical Glasses 266 Manufacture Of Crown Glass 269 Basin And Ball 2'2 Simple Microscope 277 Compound Microscope 279 Progress Of Luminous Rats 280 Micrometer 282 Camera Lucida 287 Magic Lantern 289 Solar Microscope 291 Photo-electric Microscope 293 Astronomical Telescope 295, 297 Gregorian Telescope 300 Opera Glass SO? Binocular Glass 307 Light-house Lantern 311 THE WONDERS OF GLASS-MAKING. CHAPTER I. INTRODUCTION. Few questions have been more discussed than that of the origin of glass. Are we indebted for it to Phoenicia, Phrygia, Thebes, or Sidon? Or, going back into ages long before the foundation of these kingdoms, must its invention, as many writers maintain, be fixed at a period when men, having discovered fire and submitted to its action natural bodies, either separately or together, observed, among other phenomena, the vitrification of certain masses? To admit this last opinion is to recognize as the inventor Tubal-Cain,* son of Lamech and Zillah, who, according to tradition, was the eighth man after Adam, and who is mentioned in Genesis iv. 22 as "an instructor of every artificer in brass and iron." This acknowledged antiquity was certainly suffi * Born in the year of the world 130 (3810 B.C.), which would carry the discovery of glass back 5739 years.

anciently venerable to content the most scrupulous .when M. Riemann, a German savant, maintained that the translation from the Hebrew was defective, and that it should be read that Tubal-Cain had only taught the engraving on copper and on iron. This reading, which only represents the son of Lame ch and Allah as an artist embellishing iron and bronze worked by others before his time, would oblige us to go back still further in order to find the first smelter of metals, and in the attempt to obtain such a problematic result, we should not have left to us more than a hundred years to the commencement of the world. We, therefore, request the permission of our readers to quit these suppositions, and to come as quickly as possible to facts attested by actual remains, for after all this antediluvian erudition, we remain in utter ignorance as to the date of the discovery of glass. Before, however, coming to the remains themselves, we must give our readers the account given by Pliny * of the accidental manner in which glass was discovered. "It is said," narrates the classic writer, "that some Phoenician merchants, having landed on * Tacitus gives the same account as Pliny, but in a simpler manner, for leaving unexplained the process of melting employed, and entirely suppressing the mention of the cooking vessels, he merely states that some sand found at the mouth of the Blues, a river which flows into the sea of Judaeo, when mixed with nitre and melted by fire, produced glass.

The shore, though of moderate extent, still affords an inexhaustible supply of sand.

the coast of Palestine, near the month of the river Blues, were preparing for their repast, and not finding any stones on which to place their pots, took some cakes of nitre from their cargo for that purpose. The nitre being thus submitted to the action of fire, with the sand on the shore, they together produced transparent streams of an unknown fluid, and such was the origin of glass." This opinion with some variation is repeated on the authority of Flavors Josephus, by Palsy, in his *Trait e def e aux et fontanels* (p. 156). "Some say that the children of Israel, having set fire to some forest, the fire was so fierce that it heated the nitre with the sand, so as to make them melt and run down the slopes of the hills; and that thenceforward they sought to produce artificially what had been effected by accident in making glass." The account, which is moreover given by Pliny on hearsay only, and which he is therefore unable to certify, has found, and still finds, a great number of disbelievers among chemists, who cannot understand, or who rather explicitly deny that at any period it was possible to liquefy in the open air substances which, in our day and with our improved processes, can only be fused by means of furnaces constructed expressly for the purpose, and which concentrate a heat of 1000° to 1500° centigrade Fahd. 1832° to 2732°. It is then impossible for us to decide either the . scientific question or the claim to prior invention among the productions (found in great numbers in our museums) that, while dating back to an extremely early epoch, bear no indication of the place or date of their manufacture, which alone could enable us to range them in chronological order.

We will therefore merely begin with those objects which, from the place of their discovery or from the inscriptions they bear, belong, according to our actual knowledge, to remote antiquity. Reference will first be made to the Theban glass makers represented in the paintings on the tombs of Ben i-Hassan, which are supposed to date about two thousand years before the Christian era. Certain writers even believe them to have been executed during the reign of I. (3500 B.C.). The accompanying illustration (Fig. 1) represents a Theban crouching at the foot of a furnace, and apparently taking from it the molten glass. The next (Fig. 2) shows two others seated on the ground, each holding a blow-pipe, very similar in all respects to those used at the present day. At the end of Fig" 1-Theban each of the tubes, which are turned towards a fire, is some glass which the men are beginning to-blow. And in the third illustration are two glass-makers, also with blow-pipes, blowing a vase, the mouth of which touches the ground.

Such an early date (3500 B.c.) cannot be admitted altogether without question, since it is uncertain whether the paintings were executed during the reign of I. or his successors. While stating authoritatively that glass-making was practised at Thebes, let us take another example which will be indisputable, for the necklace bead of Fig. 3.â€”Theban Glass-makers. which we give an illustration (Fig. 4) bears the name of the queen for whom it was made, and, consequently, the date of its fabrication. This glass bead was found at Thebes, by Captain Hervey of the Royal1 Marines; and a description of it has been given by Sir Gardner Wilkinson,* in which he states that this * 'The Manners and Customs of the Ancient Egyptians.' Vol. iii. p. 88. Ed. 1847.

"moulded" bead of very advanced art bears the hieroglyphic legend of the queen impressed upon it in sunken characters. Fig. 4.â€”Bead of a Fig. 5.â€”Inscription in Hieroglyphics. Royal Necklace. , This legend round the as has in the engraving been extended, so as to enable the reader to see the whole of it at once. For the translation of it we are indebted to M. Reverie, son of the celebrated Achilles Reverie, already well-known in the scientific world for his ability in deciphering hieroglyphics. We give his own words: "Only the first line of this legend is legible. It may be translated without difficulty as follows:â€”" 'The good goddess (*i.e.*, the queen) Ra-ma-ka, the loved of Thor, protectress of

Thebes.' Ra-ma-ka was the first name of the Queen the wife of III., who reigned in the eighteenth dynasty (1500 B.C., according to the chronology of Brunch)." Here then we see Thebes with this manufacture without any precise date, but exhibiting an advanced art 3367 years ago. Thebes, as we shall shortly see, was not the only town in Egypt which practised with success the manufacture of glass; for Pliny boasts of the glass-manufactures of Si don, and Herodotus and sing the praises of the marvellous productions of the Syrians.

The fame of these different manufactures in glass could not remain unknown to the Romans; accordingly, scarcely had Caesar Augustus subdued Egypt (26 B.c), than he ordered that glass should form part of the tribute to be imposed on the conquered. This tax, far from having been, as one might have thought, a cause of ruin for Egypt, became a source of wealth to all her glass manufactures; for Rome, always eager of novelty, having patronised these new productions, the result was that the Egyptians devoted themselves to a very large export trade, of which they preserved the monopoly until the reign of Tiberius (14 A.d.), at which period, according to Pliny, this industry began to be cultivated at Rome. The Romans, gifted with a quick intelligence, by employing the processes used in Egypt, taught them by Egyptian artists allured to Rome, or by pupils who had been sent to their new province, made such rapid progress that in a short time their productions rivalled the most beautiful specimens which the Egyptians had formerly brought them, both in shape, color, and the cutting of the glass.

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