under the personal supervision of Timúr’s grandson, Ibrahim, while the other was the production of his direst enemy. Few indeed, if any, original annals of this class are written otherwise than to order, under patronage, or to serve a purpose to which truth is secondary. Among less reputed biographies or materials for bio­graphy may be mentioned a second Zafarnáma, by Mauláná Nizámu 'd-Dín Shanab Gházáni (Nizám Shámí), stated to be “the earliest known history of Timúr, and the only one written in his lifetime ” ; and vol. i. of the Matla'u’s-Sa'dain—a choice Persian MS. work of 1495—introduced to Orientalists in Europe by Ham­mer, Jahrbücher, Dorn, and (notably) Quatremère. There are also the Memoirs (Malfúzát) and Institutes (Tuzukát), of which an important section is styled Designs and Enterprises ( Tadbírát wa Kangáshahá). Upon the genuineness of these doubt has been thrown. The circumstance of their alleged discovery and presenta­tion to Shah Jahan in 1637 was of itself open to suspicion. Alhazen, quoted by Purchas in his quaint notice of Timúr, and referred to by Sir John Malcolm, can hardly be accepted as a seri­ous authority. His assumed memoir was printed for English readers in 1597 by William Ponsonby under the title of a Historie of the Great Emperor Tamerlan, drawn from the ancient monuments by Messire Jean du Bee, Abbot of Mortimer ; and another version of the same book is to be found in the Histoire du Grand Tamerlan, by De Sainctyon, published at Amsterdam in 1678. But, although the existence of this Alhazen of Jean de Bec has been believed by many, the more trustworthy critics consider the history and histo­rian to be equally fictitious.

Reference may be made to two more sources of information. (1) Supposed likenesses of Timúr are to be found in books and in the splendid collection of Oriental manuscripts and drawings in the British Museum. One contained in the Shah Jahan Náma—a gorgeous specimen of illuminated Persian manuscript and exquisite caligraphy—represents a most ordinary, middle-aged Oriental, with narrow black whisker fringing the cheek and meeting the tip of the chin in a scanty, pointed beard ; a thin moustache sweeps in a semicircle from above the upper lip ; the eyebrow over the almond-shaped eye is marked but not bushy. But it were vain to seek for an expression of genius in the countenance. Another portrait is included in a set of sketches by native artists, some of which, taken probably from life, show great care and cleverness. Timúr is here displayed as a stoutish, long-bodied man, below the middle-height, in age and feature not unlike the first portrait, but with thicker and more straggling hair, and dis- tincter, though not more agreeable character in the facial expres­sion, yet not a sign of power, genius, or any elements of grandeur or celebrity. The uncomfortable figure in the Bodleian Library does not give much help. Sir John Malcolm has been at some pains to invest his portrait of Timúr with individuality. But an analysis of his results leaves the reader in more perplexity than satisfaction at the kind of information imparted, and he reverts insensibly to the sources from which his instructor has himself been instructed. (2) As regards plays, in Marlowe’s Tamburlaine Timúr is described as tall of stature, straightly fashioned, large of limb, haring joints strongly knit, long and sinewy arms, a breadth of shoulders to “bear old Atlas’s burden,” pale of complexion, and with “amber hair wrapp’d in curls.” The outline of this de­scription might be from Sharifu 'd-Dín, while the colours are the poet’s own. A Latin memoir of Tamerlane by Perondinus, printed in 1600, entitled Magni Tamerlanis Scytharum Imperatoris Vita, describes Timúr as tall and bearded, broad-chested and broad- shouldered, well-built but lame, of a fierce countenance, and with receding eyes, which express cruelty and strike terror into the lookers-on. But Jean du Bec’s account of Timúr’s appearance is quite different. Now Tamburlaine was written in 1586. The first English translation of Jean du Bec is dated in 1595, the Life by Perendinus in 1600, and Petis de la Croix did not introduce Sharifu 'd-Dín or 'Alí Yazdí to European readers till 1722. The dramatist must have heard of Timúr in other quarters, equally reliable it may be with those available in the present stage of Oriental research. At the beginning of the 18th century Timúr was represented in Rowe’s Tamerlane as a model of valour and virtue. The plot, however, has little to do with history, and is improbable and void of interest. By Matthew Gregory Lewis again “Timour” is depicted as the conventional tyrant of a gorgeous melodrama, slaying, burning, slaughtering, and commit­ting every possible atrocity until checked by violent death and a poetical climax.

Apart from modern European savants and historians, and the more strictly Oriental chroniclers who have written in Persian, Turkish, or Arabic, the following authorities may be cited—Laonicus Chalcondylas, Joannes Leunclavius, Joachimus Camerarius, Petrus Perondinus, Lazaro Soranzo, Simon Mairlus, Matthew Michiovius. A score or so of other names are given by Samuel Purchas. See also Clements Markham’s Clavijo, in the Hakluyt Society’s pub­lications ; White’s edition of Davy’s translation of the Institutes (1783) ; Stewart’s translation of the Malfúzát ; Malcolm’s History of Persia·, and Trans. Roy. Soc., 1885. (F. J. G.)

TIN (Lat. *stannum,* whence the chemical symbol “Sn”; atomic weight = 117⋅6, O = 16), being a component of bronze, was used as a metal thousands of years prior to the dawn of history. But it does not follow that pre­historic bronzes were made of metallic tin. When the un­alloyed metal was first introduced cannot be ascertained with certainty. All we know is that about the 1st century the Greek word *κασσίτϵρos* designated tin, and that tin was imported from Cornwall into Italy after, if not before, the invasion of Britain by Julius Cæsar. From Pliny’s writings it appears that the Romans in his time did not realize the distinction between tin and lead : the former was called *plumbum album* or *candidum* to distinguish it from *plum­bum nigrum* (lead proper). The word *stannum* definitely assumed its present meaning in the 4th century (H. Kopp).

Grains of metallic tin occur as a subordinate admixture in the gold ores of Siberia, Guiana, and Bolivia. Of tin mineral compounds (which are not numerous) tinstone, SnO2, is the most important ; besides it only tin pyrites, which, according to Rammelsberg, exists in two varieties, FeCu2SnS4 and ZnFeCu4Sn2S8, need be named here.

*Tinstone or Cassiterite.—*This native oxide of tin, SnO2, forms very hard quadratic crystals of specific gravity 6⋅8. The pure mineral is colourless, and it is very scarce ; most specimens are brown owing to the presence of ferric or manganic oxide. The faces of the crystals exhibit diamond lustre. There is also another native form, known as “ wood tin,” occurring in roundish masses with a fibrous radiating fracture. The ore is found in veins or layers within the older crystalline rocks and slates. Being much more highly proof against the action of water and carbonic acid than its matrix, the ore often presents itself in loose crystals as part of the sand of rivers (stream tin). The oldest known deposit of tinstone is that of Cornwall, where it occurs in granite and in the “ killas ” (a kind of metamorphic clayish slate), associated with wolframite, apatite, topaz, mica, tourmaline, arsenide of iron, and other minerals. Cornish tin ore is characteristically rich in arsenic. Minor European deposits occur in the Erzgebirge, in Brittany, and in Galicia (Spain). A very considerable deposit of pure ore (chiefly stream tin) exists in the island of Banca ; and in Malacca tinstone is found. Other relatively abundant deposits occur in Bolivia and Peru, and in Queensland and New South Wales (lately discovered).

*Metallurgy.—*In the extraction of tin from tinstone ore the first step is to pound the crude ore and wash away the lighter gangue with water (see Metallurgy, vol. xvi. p. 59). The washed ore is “roasted” to burn away the arsenic and sulphur and to convert the iron, originally present in the heavy and compact form of pyrites or arsenide, into light friable oxide, which is removed by a second washing process. If much oxide of copper is con­tained in the product, it is extracted with dilute sulphuric acid, and from the solution is recovered by precipitation with metallic iron (see Copper, vol. vi. p. 347). The puri­fied ore, known as “black tin,” goes to the smelting furnace. During the roasting process the ore must be constantly agitated to prevent caking, and to bring the arseniferous, &c., parts to the surface. To save manual labour, Oxland and Hocking have constructed a mechanical roaster. It consists of a slanting tube of boiler-iron, coated inside with fire-brick. The lower end opens into the fire-place ; the upper communicates with a set of chambers for the con­densation of the white arsenic produced. The washed ore, after being dried on the top of the chamber, is run thence by a funnel into the pipe, which is made to rotate about its axis from three to eight times per minute. Before the ore has travelled far down the arsenic and sulphur catch fire, and by the time it reaches the bottom it is fully roasted. It falls into a receptacle below the level of the