public hall, and the free library. Some traffic is carried on by the Medway, which has been made navigable for barges. Tunbridge ware, chiefly sold at Tunbridge Wells, is largely manufactured. There are gunpowder mills on the banks of the Medway; and wool-stapling, brewing, and tanning are carried on. The population of the urban sanitary district (area 1200 acres) in 1871 was 8209 and in 1881 it was 9317.

Tunbridge owed its early importance to the castle built by Richard, earl of Clare, in the reign of Henry I. The castle was besieged by William Rufus, was taken by John in the wars with the barons, and again by Prince Edward, son of Henry III. Subsequently it became the property of the Staffords, and on the attainder of the duke of Buckingham in the reign of Henry VIII. was taken posses­sion of by the crown. It was dismantled during the Civil War. The remains now consist chiefly of a finely preserved gateway flanked by two round towers. Formerly it was defended by three moats, one of them formed by the Medway. The lords of the castle had the right of attending the archbishops of Canterbury on state occasions as chief butlers.

TUNBRIDGE WELLS, an inland watering-place of England, chiefly in Kent but partly in Sussex, is situated in the midst of charming and picturesque scenery, on the South-Eastern Railway and at the terminus of a branch line of the London, Brighton, and South Coast Railway, 46 miles (by rail) south-east of London and *5* south of Tunbridge. It owes its popularity to its chalybeate spring and its romantic situation. The wells are situated near the Parade (or Pantiles), a walk associated with fashion since the time of their discovery. The houses and shops in the Parade somewhat resemble the Rows at Chester. It was paved with pantiles in the reign of Queen Anne. The town is built in a picturesquely irregular manner, and a large part of it consists of districts called “ parks,” occupied by villas and mansions. On Rusthall common, about a mile from the town, is the curiously shaped Toad Rock, and about a mile south-west the striking group called High Rocks. The principal public buildings are the pump-room, the town-hall, the corn exchange, the public hall, the mechanics’ institute, the friendly society’s hall, the dis­pensary and infirmary, and the provident dispensary. The Tunbridge Wells sanatorium is situated in grounds sixty acres in extent, and is capable of receiving 150 visiters. There is a large trade in Tunbridge ware, which is made chiefly at Tunbridge, and includes work tables, boxes, toys, &c., made of hard woods, such as beech, sycamore, holly, and cherry, and inlaid with mosaic. The town is governed by a local board of twenty-four members. The population of the urban sanitary district (area 3351 acres) in 1871 was 19,410 and in 1881 24,308.

The town owes its rise to the discovery of the medicinal springs by Dudley, Lord North, in 1606. Henrietta Maria, wife of Charles I., retired to drink the waters at Tunbridge after the birth of her eldest son Charles. Soon after the Restoration it was visited by Charles II. and Catherine of Braganza. It was a favourite residence of Anne previous to her accession, and from that time became one of the special resorts of London fashion. It reached the height of its comparative popularity in the latter half of the 18th century, and is specially associated with Colley Cibber, Samuel Johnson, Cumberland the dramatist, Garrick, Richardson, Reynolds, Beau Nash, Miss Chudleigh, and Mrs Thrale. The Tunbridge of that period is sketched with much graphic humour in Thackeray’s *Vir­ginians.* Though it still attracts an increasing number of visiters, its importance in reference to London society has considerably declined.

T’UNG-CHOW, a sub-prefectural city in Chih-li, the metropolitan province of China, is situated on the banks of the Peiho in 39° 54' N. lat. and 116° 41' E. long., about 12 miles south-east of Peking. Like most Chinese cities, T’ung-Chow has appeared in history under various names. By the founder of the Han dynasty (206 B.c.) it was called Lu-Hien ; with the rise of the T’ang dynasty (618 a.d.) its name was changed to Heuen-Chow ; and at the begin­ning of the 12th century, with the advent of the Kin dynasty to power, Heuen-Chow became T’ung-Chow. The city marks the highest point at which the Peiho is navi­gable, and here merchandise for the capital is transferred to a canal, by which it reaches Peking. The city, which is faced on its eastern side by the river, and on its other three sides is surrounded by populous suburbs, is upwards of 3 miles in circumference. The walls are about 45 feet in height and about 24 feet wide at the top. They are being allowed to fall into decay. Two main thoroughfares run through the city, one connecting the north and south gates, and the other the east and west gates. The place derives its importance from the fact that it is the port of Peking. Its population was estimated at about 50,000 in 1887.

It was at T’ung-Chow that Sir Harry Parkes, Sir Henry Loch, and their escort were treacherously taken prisoners by the Chinese when they were sent forward by Lord Elgin to negotiate terms of peace after the troubles of 1860.

TUNGSTEN (Germ. *wolfram,* or, antiquated, *scheel),* one of the metallic elements of chemistry. The mineral tungsten (meaning in Swedish “ heavy stone ”) used to be taken for a tin ore until this was disproved by Cronsted. Scheele showed in 1781 that it is a compound of lime with a peculiar acid, the metallic nature of which was recog­nized in the same year by Bergmann. It occurs only as a component of a number of relatively rare minerals, the most important of which are wolfram or wolframite, (Fe, Mn)O.WO3, and scheelite (tungsten), CaOWO3 (see Mineralogy). The metal is prepared from the pure oxide WO3 by reduction with hydrogen in a platinum tube at a high temperature. It forms resplendent tin-white or grey plates, or a dull black powder similar to hydrogen-reduced iron. Sp. gr. = 19∙129, water of 4° C. = 1 (Roscoe). It is more difficult to fuse than even Manganese (*q.v.*). It is unalterable in ordinary air ; oxygen and even chlorine act upon it only at a high temperature. Hydrochloric and sulphuric acid do not attack it. Nitric acid attacks it slowly, aqua regia readily, with formation of the trioxide WO3. Impure tungsten is now being prepared industrially for the production of a peculiar kind of steel (see Iron, vol. xiii. p. 352).

*Chlorides.—*Tungsten forms four chlorides,—WC12, WC14, WC15, WCl6. The highest, WCl6, is obtained by heating the pure powdery metal in a current of absolutely pure chlorine. In the presence of moisture or air oxy-chlorides are produced. It sublimes off as a dark red liquid, freezing into crystals. These fuse at 275° C. and re-solidify at 270o ; the liquid boils at 346o∙7. The sp. gr. of the vapour is in accordance with the formula at 350° ; at higher tempera­tures it dissociates into WCl5 and free Cl2 (Roscoe). When the vapour of WC16 is passed over heated trioxide, the two bodies unite, WO3 with 2WC16 into 3WOC14, forming magnificent red needles, which fuse at 210°∙4 and boil at 227°∙5 C. (Wohler). Both compounds, WCl6 and WOC14, are decomposed by water, the oxy-chloride more readily, with formation of hydrochloric acid and trioxide. For other chlorides and oxy-chlorides, see the ordinary hand-books of chemistry.

*Oxides, WO2 and WO3, and Compounds of These with Each Other.* —The trioxide, popularly known as tungstic acid, is the more important. Impure trioxide is producible by treating scheelite (WO3CaO) with hot hydrochloric acid. Wolframite is not so readily decomposed ; but when fused with twice its weight of chloride of calcium it passes into lime salt, obtainable as an insoluble residue by lixiviation of the fuse with water. The oxide obtained forms a yel­low powder insoluble in water and in hydrochloric acid. To purify it, it is washed, dissolved in aqueous ammonia, and the filtered solution evaporated, when an acid tungstate of ammonia separates out in scales of great purity. These, when heated in air, leave behind them a pseudo-morphose of pure yellow oxide. Trioxide of tungsten combines with basic oxides into tungstates ; but the pro­portion in which it unites with a given base is subject to great variation : for instance, the quantity Na20 of soda unites into so many definite tungstates with 1, 1½, 2, 2⅓, 2⅖, 2½, 4 times WO3 and in each case more or less of water. To each of these soda salts corresponds theoretically a certain tungstic acid,—to the salt Na2OW206, for instance, the acid H2OW2O6 or H2W2O7. But few of these hydrates actually exist, and they are not individual acids in the sense in which the three phosphoric acids are, except per­haps that remarkable substance known as metatungstic acid,