cesco di Giorgio Martini of Siena (1439-1506), whom Vasari wrongly states to have been the principal architect of the palace. Federigo adorned his palace with fine series of paintings by Piero della Francesca, Melozzo da Forli, Paolo Uccello, and Raphael’s father, Giovanni Santi; and, in addition to the crowd of able Italian artists whom he invited to his court, Flemish painters, such as Justus of Ghent, visited and worked in this hospitable city.@@1 The rich wood-work in the palace, decorated with *tarsia,* or wood mosaic, was executed by Gondolo Tedesco; the rooms were filled with magnificent furniture, costly gold and silver plate, and works of art of all kinds. Literature was no less encouraged under the patronage of Federigo : it was at his court that Piero della Francesca wrote his celebrated work on the science of perspective, Francesco di Giorgio his *Trattato d'Architettura* (published by Saluzzo, Turin, 1841), and Giovanni Santi his poetical account of the chief artists of his time, among whom, probably from jealousy, he has omitted to mention either Justus of Ghent or Francesco di Giorgio, the latter a man of extraordi­narily versatile talents, who was much employed by the duke to design fortifications and military engines, to paint wall decorations, and to carve sculptured ornaments.@@2 Though stripped of its art treasures and dismantled of its decorations, the ducal palace still exists in a good state of preservation : it is a very picturesque, massive building of irregular plan, suited to its uneven site, and stands up very nobly on the hill, dominating all the rest of the city.@@3 The refined magnificence of Guidubaldo’s court is elo­quently described by Baldassare Castiglione (*q.v.*) in his *Cortegiano.* When Henry VII. of England conferred the order of the Garter on Guidubaldo, Count Castiglione was sent to England with a letter of thanks and with the small picture, now in the Louvre, of St George and the Dragon, painted by Raphael@@4 in 1504, as a present to the English king. This painting was among Charles I.’s collection which was sold by order of the Commonwealth in 1649.

Throughout the whole of the 16th century the state of Urbino was one of the chief centres for the production of majolica (see Pottery, vol. xix. p. 625 *sqf,* especially the towns of Gubbio and Castel Durante. Most of the finest pieces of Urbino ware were made specially for the dukes, who covered their sideboards with the rich storied *piatti di pompa,* of which fine specimens have recently sold for from £2000 to £3000.@@5 Among the distinguished names which have been associated with Urbino are those of the Ferrarese painter and friend of Raphael, Timoteo della Vite, who spent most of his life there, and Bramante, the greatest architect of his age.@@6 The Milanese sculptor, Ambrogino, who worked so much for Federigo, married a lady of Urbino, and was the progenitor of the Baroccio family, among whom were many able mathematicians and painters. Federigo Baroccio, Ambrogino’s grandson, was a very popular painter, some of whose works still exist in the cathedral and elsewhere in Urbino. This city was also the birthplace of Pope Clement XI.. of several cardinals

of the Albano family, and of Bernardino Baldi, Fabretti, and other able scholars.

The modern city of Urbino, with a population of 5087 in 1880, is the seat of an archbishop, and still possesses a small university, but is not a thriving place. The cathedral, a building of no special interest, stands in the great piazza opposite the ducal palace, which is now used for municipal purposes and contains the city archives. In the sacristy there is a very beautiful miniature-like painting of the Scourging of Christ, by Piero della Francesca. One of the finest paintings by this artist is a large altar-piece of the Madonna enthroned between angels and saints, now in the Brera at Milan ; it contains a very noble kneeling figure of Federigo in full armour, showing his strange profile disfigured by a bullet, which carried away part of the bridge of his nose. It was origin­ally a votive retable given by the duke to the monastic church of San Bernardino, about a mile outside the walls of Urbino, where Federigo and Guidubaldo were buried. The modest house where Raphael was born and spent his boyhood is still preserved. It is now the property of a society of artists, and so is safe from destruc­tion. Its rooms form a sort of museum of engravings and other records of Raphael’s works, together with a picture of the Madonna by his father, Giovanni Santi, formerly thought to be by Raphael himself. The Institute of the Fine Arts in the Marches contains a small but interesting collection of pictures, including works by Giovanni Santi, Justus of Ghent, Timoteo della Vite, and other 15th-century artists. The picture of the Holy Communion by Justus is specially valuable from its containing fine portraits of the Montefeltro family and members of the ducal court. On the walls of the chapel of the guild or confraternity of San Giovanni are some valuable early frescos, painted by Lorenzo da San Severino and his brother, of the Florentine school, about 1416. An in­teresting collection of Roman inscriptions, arranged by the palaeo­grapher Fabretti, is still preserved on the upper walls of a court in the ducal palace. In the church of S. Spirito are two paintings by Luca Signorelli, the Crucifixion and the Day of Pentecost, origin­ally intended for a processional banner. The theatre, decorated by Girolamo Genga, is one of the earliest in Italy ; in it was per­formed the first Italian comedy, the *Calandria* of Cardinal Bibbiena, the friend of Leo X. and Raphael. The magnificent library formed by the Montefeltro and Della Rovere dukes has been removed to Rome.

In addition to works quoted above, see Dennistoun, *Memoirs of the Dukes of Urbino,* London, 1851 ; Card. di San Clemente, *Memorie concernenti la Città di Urbino,* Rome, 1724 ; and Sismondi, *Histoire des Républiques Italiennes,* Paris, 1807-8. An interesting view of Urbino, in the first half of the 16th century, occurs among the pen drawings in the MSS. *Arte del Vasajo,* by the potter Piccolpasso, now in the South Kensington Museum. (J. H. Μ.)

UREA is known chiefly as a component of urine. Re­ferring to the article Nutrition (vol. xvii. pp. 682-685) for its physiological relations, we consider it here only as a chemical substance. Urea, CO(NH2)2, was discovered by H. M. Rouelle in 1773; Fourcroy and Vauquelin in 1799 published the first exact investigation on it. In 1828 Wöhler showed that it can be obtained by the union in aqueous solutions of cyanic acid with ammonia, and thus for the first time effected what was then considered an impossibility, namely, the artificial preparation of an organic compound from mineral matter. For the extrac­tion of urea from urine the latter is concentrated by evaporation (more or less, according to its original strength), and then, after cooling, mixed with a large excess of pure @@7 nitric acid of 1∙4 specific gravity. On standing in the cold most of the urea separates out as a crystalline nitrate, CO . N2H4. HNO3, which is collected over glass wool and washed with nitric acid. To convert it into urea, it is treated with water and carbonate of baryta, which acts upon the HNO3 as if it were present as such, the urea be­ing liberated. The mixed solution of urea and the nitrate is evaporated to a small volume and allowed to stand, when the bulk of the barytic nitrate crystallizes out. The rest is removed by evaporating the mother liquor to dry­ness over a water-bath and extracting the urea with strong alcohol. To obtain fine crystals, the filtered alcoholic solu­tion is evaporated to dryness, the residual urea dissolved in a very little hot water, and the solution allowed to cool

@@@1 The works of art from the palace of Urbino were scattered in the 17th century. Two paintings of the Sciences, part of a series executed for Federigo, are now in the National Gallery, London, where they are doubtfully attributed to Melozzo da Forli. Another by Justus of Ghent is in the royal collection at Windsor.

@@@2 The very high esteem felt for Francesco’s personal character and genius by the duke is shown in a letter which Federigo wrote to the commune of Siena ; see Ricci, *Storia d' Architettura,* vol. ii. p. 538. His life is given by Vasari, part i.

@@@3 See Arnold, *Der herzogliche Palast von Urbino,* Leipsic, 1857; and Baldi, *Descrizione del Palazzo Ducale di Urbino,* Rome, 1724.

@@@4 For Raphael’s birth in Urbino, and his subsequent connexion with that town, see Raphael.

@@@5 The Bargello at Florence and the South Kensington Museum possess the finest collections of Urbino ware.

@@@6 Much information about Urbino and its crowd of artists is given by Pungileoni, *Elogio Storico di Giov. Santi,* Urbino, 1822.

@@@7 This word points chiefly to the absence of nitrous acid, which, if present, decomposes its equivalent of urea into nitrogen, water, and carbonic acid, thus :—

CO(NH2)2 + 2HO. NO = CO(OH)2 + 2N2 + 2H2O. Urea Nitrous Carbonic Nitrogen

Water