

and on the same plane would give its real dimensions in thousandths of an inch, while the tenths of the inch scale would represent a real dimension of as many ten-thousandths. It is often desirable to make such measurements from careful tracings of the outlines of objects, rather than from the visual images,—this plan being especially advantageous when the exact dimensions of many similar objects have to be compared, as in the case of blood-corpuscles, precise measurements of which are not unfrequently required in judicial inquiries. It was by the use of this method that the late Mr Gulliver made his admirable series of measurements of the average and extreme dimensions of the blood-corpuscles of different animals. And more recently Mr Dallinger has shown,—by first

making a very fine camera lucida tracing of *Bacterium termo* under an amplification of 2000 diameters, and measuring the breadth of its body in the mode above indicated (which gave it as $\frac{1}{10000}$ th of an inch), and then by magnifying his tracing from five to ten diameters, and comparing, by means of the screw-micrometer, the breadth of the flagellum with that of the body (which last proved to be just ten times as great),—that, although the theoretical limit of resolving power for closely approximated lines is $\frac{1}{10000}$ th of an inch, a semitransparent filament whose breadth is not greater than $\frac{1}{10000}$ th of an inch may be clearly discerned, and even measured with a close approximation to accuracy (*Jour. of Royal Microsc. Society*, vol. I., 1879, p. 169). (W. B. C.)

MIDAS, king of Phrygia, is one of those half-legendary heroes in whom religious legends have gathered round a real person. The name Midas the king, ΜΙΔΑΣ ΦΑΝΑΚΤΕΙ, occurs on a very ancient tomb in the valley of the Sangarius, the legendary seat of the Phrygian kingdom (*Iliad* iii. 189). The Phrygian monarchy was destroyed by the Cimmerians about 670 B.C., and the last king Midas committed suicide by drinking bull's blood. The name Midas became in Greek tradition the representative of this ancient dynasty, but all that is told of him is religious myth. He is a figure in the cycle of Cybele legends, the son of the goddess and her first priest. He is also closely connected with the cultus of Dionysus, like the two heroic personages Marsyas and Silenus. The Midas legend was known on Mount Bermius in Macedonia, and must at one time have existed in Greece; two cities Midea, in Argolis and in Bœotia, recall the Phrygian city Μιδάειον.

See Herod. viii. 138; Xen., *Anab.*, i. 2, 13; Paus. I. 45, &c.

MIDDELBURG, in Holland, the ancient capital of the province of Zeeland, situated in the middle of the island of Walcheren, is mentioned as early as 1153, and receives the title "town" in a charter granted it in 1227. It has all the characteristics of an old and worn-out place. The population (25,000 in 1739) had sunk to 12,000 or 13,000 by the beginning of the 19th century, and has only begun recently to increase again, being 15,939 in 1882. The dwelling-houses, which in 1739 were about 3800, are now but 3000, and of these about 600 are unoccupied. The vast warehouses and imposing mansions once belonging to wealthy families, which have either died out or left the place, call up the memory of that prosperity which Middelburg enjoyed before its extensive trade, with the East and West Indies, with England and Flanders, was ruined by the war with England and the French occupation. By the opening of the railway (1872) and of the ship canal (1873) to Flushing Middelburg was lifted out of its isolation, and, with the assistance of the chamber of commerce, manufacturing industries (iron, machinery, furniture, oil, cigars, &c.) were established; but the prosperity anticipated for Flushing, and consequently for Middelburg, remains unrealized. One of the chief sights of Middelburg is the splendid town-house, for the most part erected in 1512-13, with its front gable adorned with twenty-five statues of counts and countesses of Holland and Zeeland; it contains the archives, and a most valuable antiquarian and historical collection. The abbey, begun in 1150, has frequently been the residence of royal visitors (Maximilian, Philip the Fair, Charles V., and so on down to Napoleon I., and William I., II., and III.); part of it is now an hotel, and part of it is occupied by the provincial authorities. The great hall of the building, in which the states of Zeeland assemble, is adorned with beautiful tapestries by Jan de Maecht, representing the heroic feats of the men of Zeeland in the contest with Spain. What was formerly the nave of the abbey church is now the New Church, and the ancient choir constitutes the Choir Church. The former contains a fine pulpit resting on an eagle, the monument of William, king

of the Romans (d. 1256), and the tombs of Jan and Cornelis Evertsen, two naval heroes who fell in the war against England in 1666; the latter has the monuments of the learned Hadrian Junius and of Jan Pieterszoon. The provincial court, the corn exchange, the Hof St Joris and the Hof St Sebastian (formerly buildings belonging to the guilds of archers, and now places of amusement) deserve mention. The great museum of Zeeland antiquities, collected by the Zeeland Society of Arts and Sciences (founded at Flushing in 1769 and transferred to Middelburg in 1801), shows that the town is the intellectual centre of the province.

The principal facts in the history of Middelburg are the sieges by the Flemings in 1288, 1296, and 1303 (the last resulting in the capture of the town by Guy of Dampierre); the recovery of the town from the Spaniards in 1574, after an investment of nearly two years; the frequent disturbances among the townsfolk in the 17th and 18th centuries; the surrender to the English in 1809; and the arrival and departure of the French in 1809 and 1814.

MIDDLEBOROUGH, a town of the United States, in Plymouth county, Massachusetts, 34 miles south of Boston. It has a handsome town-hall and a public library, manufactures woollen goods, straw goods, shovels, shoes, carriages, &c., and in 1880 had 5237 inhabitants.

MIDDLESBROUGH, situated near the mouth of the Tees, on its south bank, in the North Riding of Yorkshire, has now become the principal seat of the English iron trade. It is a municipal and parliamentary borough, locally governed by a mayor and corporation, and returns a member to parliament. The earlier history of the place is meagre. Where Middlesbrough now stands (Graves's *History of Cleveland*) there were at one time a small chapel and priory founded by Robert de Brus of Skelton Castle. These were dedicated to St Hilda, and with some lands were given by De Brus to the abbey of St Hilda at Whitby in 1130. The priory fell into ruins at the time of the Reformation, and no trace now remains beyond some stones built into the wall of a brewery. The mayor's chair also is made from a fragment. In 1801 there were upon the site of Middlesbrough only four farm-houses. In 1829 a company styling itself the Middlesbrough Owners bought 500 acres of land, and commenced building the town. In 1830 the Stockton and Darlington Railway was extended from Stockton to Middlesbrough; four years later the town was lighted with gas; and after six years more a public market was established. The census of 1831 showed the population to be 154; that of 1841 showed 5709. In 1842 the opening of the docks gave additional importance to the town. First containing an area of 9 acres, they were extended in 1872 to 12 acres, with 1700 feet of quays. Vessels of 3000 tons burden can be accommodated. From the year 1851, when J. Vaughan discovered the presence of ironstone in the Eston Hills, the town advanced with rapid strides. When the jubilee of the town was held in 1881 (a year late) the population had risen to 55,934, the area to 2731 acres, and the rateable value to £140,000, the population of the parliamentary borough (area 4715 acres) being 72,145. In the district there are upwards of

130 blast furnaces, besides large iron and steel works; and the Thomas-Gilchrist process of making steel promises for Middlesbrough importance in the future as a steel entrepôt. The make of pig-iron in 1880 was 1,991,032 tons. There are also shipbuilding, potteries, chemical works, and a salt trade. Middlesbrough is well laid out, nearly all the streets lying at right angles to one another. Many of the churches and the exchange are handsome buildings, while the station of the North Eastern Railway is probably the finest in the north of England. A splendid park of 72 acres, the gift of the late H. F. W. Bolckow, adds greatly to the amenity of the town.

MIDDLESEX, an inland county in the south-east of England, lying between 51° 25' and 51° 40' N. lat., and between 0° and 0° 36' W. long. On the south it is divided from Surrey and Kent by the Thames, on the east from Essex by the Lea, on the west from Buckinghamshire by the Colne, and on the north from Hertfordshire by a partly artificial and very irregular line. Although with the exception of Rutland it is the smallest county in England, its population is exceeded by that of Lancashire only. Its total area is 181,317 acres, of which 2592 acres are common or waste lands. The longest straight line that can be drawn in the county is one of nearly 28 miles from the north-eastern extremity near Waltham Abbey to the south-western at Staines. From north to south in the broadest part the distance is about 15 miles.

Surface and Geology.—The greater portion of the county is flat, although there are sufficient undulations to allow of a proper drainage of the land. A range of hills runs along the Hertfordshire border by Barnet, Elstree, Stanmore, and Pinner, averaging 400 feet in height; another range occupies the ground just north of London by Hornsey, Highgate, and Hampstead; Harrow occupies an isolated eminence between the two ranges.

The county lies entirely within the basin of the Thames, and the London Clay extends over a large portion of the surface. This formation stretches from the mouth of the estuary of the Thames to the neighbourhood of Marlborough. It attains its greatest breadth (little short of 30 miles) in the neighbourhood of London, and extends northward until it is lost beneath the drift of Suffolk and Norfolk. The following is a table of the various beds of rock which occur at the surface, with their greatest thickness (in feet) in the district:—

Alluvium (recent river deposits).....	15
<i>Post-Pliocene Tertiaries.</i>	
Post-glacial beds (brick-earth, gravel, &c.).....	50
Glacial drift (boulder clay, gravel, &c.).....	80
<i>Eocene Tertiaries.</i>	
Lower Bagshot sands.....	100
London Clay.....	420
Woolwich and Reading beds.....	90
<i>Cretaceous.</i>	
Chalk with flints.....	300

Chalk comes to the surface in so very few places that it is scarcely worth mention. It is seen near Harefield and on the north-west side of South Mimms. The depth from the surface to the chalk varies greatly in different parts of the county. This has been proved by the borings for wells; thus at Isleworth the depth is 400 feet and at Hampstead 378, while at Ruislip it is 76 feet and at Pinner only 60. The Reading beds (plastic clays) are brought to the surface at Windsor. They follow roughly the course of the river Colne from the north of Uxbridge along the flank of the hills north-eastward, but are sometimes cut back southward along small side valleys. An outlying mass is exposed at Pinner. The Bagshot sands, consisting of gravel and sand permeable to water, once stretched over the whole extent of the London Clay, but they are now to be found only on the high grounds at Hampstead, High-

gate, and Harrow. A corner of the main mass enters the south-west corner of the county near Littleton. Beds of brick-earth occur in the drift between West Drayton and Uxbridge.

Several deep borings in the London basin prove the existence beneath the chalk of beds which do not crop out in Middlesex. Three of these are in the county; and the most interesting is that at Meux's Brewery, Tottenham Court Road (about 1146 feet), which passes through the following formations:—gravel and clay, 21 feet; London Clay, 64 feet; Reading beds, 51 feet; Thanet sand, 21 feet; chalk, 655 feet; Upper Greensand, 28 feet; gault, 160 feet; Lower Greensand, 64 feet; Devonian, 80 feet.

Rivers and Canals.—The Thames is very tortuous in the 44 miles of its course from Staines to Blackwall, and makes a remarkable bend at the eastern limit of the county where it forms the so-called Isle of Dogs. The width at Staines is 200 feet, at Chiswick opposite Barnes 340 feet, at Hammersmith 525 feet, at Fulham 820 feet, at Westminster Bridge 1100 feet, but at London Bridge it is less than 800 feet; above the junction of the Lea at the Isle of Dogs the width is 1350 feet. The ordinary rise of the tide at London Bridge is 16 feet, and the tide-way ends at Teddington. The port of London begins below London Bridge, and the channel for from 2 to 3 miles is called the Pool.

The Colne from Hertfordshire enters Middlesex at the north-western corner of the county. It then runs south, joining the Thames at Staines, and in its course divides Middlesex from Buckinghamshire for 15 miles. After the river leaves Uxbridge it divides out into several small channels. The Lea from Hertfordshire enters Middlesex at the north-eastern corner of the county near Waltham Abbey. It runs south, dividing Middlesex from Essex for 15 miles, and falls into the Thames at Bow Creek. Several branches flow off from the river during its course. The Brent from Hertfordshire enters Middlesex near Finchley. It takes a circuitous direction southward through the middle of the county by Hendon, Kingsbury, Twyford, Greenford, and Hanwell to the town of Brentford, where it unites with the Thames. Where the river crosses the Edgware Road (about 3 miles south of the town of Edgware) it is expanded by artificial means into an extensive reservoir. The Cran (or Yedding Brook) rises in the district between Harrow and Pinner and flows under Cranford Bridge; it crosses Hounslow Heath, and bends round to Twickenham and Isleworth, where in a divided stream it falls into the Thames.

There were several other small streams in the neighbourhood of London which have left their mark in the names of places, but which are now merely sewers, such as the Wallbrook, the Westbourn, the Tyburn, the Fleet river, &c. The last-mentioned, which runs into the Thames near Blackfriars Bridge, was formerly navigable as far as Holborn Bridge; but, the Fleet Ditch, as it was then called, having become in the last century a dangerous nuisance, the lord mayor and citizens were empowered by Act of Parliament to arch it over. The work was commenced in 1734, and in 1737 Fleet market, occupying the site of the space from Holborn Bridge to Fleet Bridge, was opened to the public. The New River, an artificial water-course constructed by Sir Hugh Myddelton in the reign of James I. to supply London with water, runs through the county from north to south a little to the west of the river Lea. It derives its waters from the springs of Amwell and Chadwell, increased by a cut from the Lea, in the neighbourhood of Ware, and enters Middlesex from Hertfordshire about 2 miles north of Enfield. It passes Enfield, Tottenham, Hornsey, and Stoke Newington, and is received into the reservoir in Clerkenwell known as the New River Head.

The Grand Junction Canal leaves the Thames at Brent

ford, proceeds in a westerly direction by way of Hanwell and Cranford to West Drayton; thence in a northerly direction it follows the valley of the Colne. It passes Uxbridge, and after leaving the county takes its further course by Rickmansworth through Hertfordshire. The Paddington Canal leaves the Grand Junction Canal at Cranford, and passes Northolt, Apperton, Twyford (where it is carried over the Brent by an aqueduct), and Kensal Green. At Paddington it joins the Regent's Canal, which passes the north of Regent's Park, and after proceeding through the eastern portions of London joins the Thames at Limehouse. The Regent's Canal is joined to the river Lea by means of Sir George Duckett's Canal, and thus there is a through communication from the north-eastern corner of the county to the south-eastern corner, thence from east to west, and northward to the north-west corner.

Climate, Soil, Agriculture, &c.—The climate of the county is equable and good, and the shelter of the northern hills makes the air mild. Highgate, Hampstead, and some other parts are supposed to be specially healthy, and are recommended for invalids by the medical profession.

The heavy poor clay in the north and north-western portion of Middlesex is chiefly covered with permanent grass. In some parts it has been made fit for arable cultivation by the addition of chalk, lime, and ashes. The rich deposits from the Thames have formed a soil which when well manured is specially suitable for market gardens. From its nearness to London the district has long been famous for high farming, and the divisions devoted to different kinds of farming are well marked. The greater part of Gore and Ossulston hundreds, portions of Spelthorne and Edmonton hundreds, and a strip down the western side of Elthorne hundred are devoted to meadow and pasture. The arable land is chiefly found on the western side, and between the Great Western Railway and the Thames. It is also to be seen in the north-western district. With the constant increase of London, houses have encroached upon the fields, and most of the market gardens which were situated in the neighbourhood of Islington and Hackney have disappeared. The strip of land by the Thames from Brentford to Chelsea was given up almost entirely to market gardens, but Fulham is fast being built over.

According to the returns for 1882, the area occupied by grain and green crops, grass, &c., was 116,470 acres. Of this amount, 16,337 acres were under corn crops (wheat, 6410; barley, 3083; oats, 3895, and beans and pease, 2636); 13,451 under green crops (including potatoes, 3019; turnips, 1539; mangolds, 1692; cabbage, &c., 1188); 3025 under clover and grasses sown in rotation; and 82,782 under permanent pasture. Orchards occupied 3413 acres; market gardens, 6900; nursery grounds, 447; and woods, 2382. In the same year the horses numbered 5939 (4188 used for agricultural purposes); cattle, 23,283 (cows, 15,390); sheep, 23,916; and pigs, 12,035.

The following were the landowners in the county (exclusive of London) at the time of the Domesday survey:—the king, the archbishop of Canterbury, the bishop and canons of London, the abbey of Westminster and Holy Trinity at Caen, the nunnery of Barking, the Earls Roger and Morton, Geoffrey de Mannevele, Ernulf de Heding, Walter Fitz Other, Walter de St Walery, Richard Fitz Gilbert, Robert Gernon, Robert Fafiton, Robert Fitz Roselin, Robert Blund, Roger de Rames, William Fitz Ansculf, Edmund de Salisbury, Aubrey de Vere, Ranulf Fitz Ilger, Derman, Countess Judith, and the king's almoners.

In 1873, according to the *Return of Owners of Land*, the total number of owners in the county (also exclusive of London) was 11,331, of whom 9006 owned less than an acre. The extent of lands (including common or waste lands) is given as 145,605. The gross estimated rental was £1,611,655. Sixteen owners each possessed over 1000 acres. The crown owned 2382 acres (annual value £5503); the duchy of Lancaster, 2273 acres (£4492); Ecclesiastical Commissioners, 1308 acres (£46,519); All Souls' College, Oxford, 1813 acres (£4724); Christ Church, Oxford, 1132 acres (£1635); and King's College, Cambridge, 1097 (£1084).

Many villages of Middlesex, especially those near to London, were formerly famous for their mineral springs.

Some places are still supplied with water from wells; but the Barnet, the East Middlesex, the Grand Junction, the West Middlesex, and the New River Water Companies serve a large part of the county.

Manufactures and Trade.—There is little to remark with regard to the manufactures of the county outside of London. Brick-making and tile-making have always flourished, and malting, distilling, and soap-making are favourite industries. Gunpowder mills exist at Twickenham and Bedfont. The market-towns for corn are Uxbridge, Brentford, and Staines, for cattle and sheep Southall. A horse and cattle fair is held at South Mimms and Barnet.

Railways and Roads.—As London is the centre of the railway system of England, it is evident that many of the lines must run through Middlesex. For similar reasons it is well provided with roads.

Population.—The total population of Middlesex was 2,539,765 in 1871 and 2,920,485 in 1881, or excluding the seven metropolitan boroughs lying within the county 276,023 in 1871 and 394,089 in 1881. Most of the towns and villages have largely increased during the period between 1871 and 1881; the populations of Acton and Tottenham have more than doubled, and Chiswick, Ealing, Edmonton, and Willesden have almost doubled. Of the larger places the least increase has been at Brentford, which numbered 10,271 in 1871, and reached 11,808 in 1881. At the time of the Domesday survey the population of Middlesex, exclusive of London, was 2302.

Government.—Unlike other counties, Middlesex has no high sheriff appointed by the sovereign. It is subject to the City of London, and one of the sheriffs appointed by the lord mayor is sheriff for Middlesex. When Henry I. came to the throne he gave the city an extensive charter, and one of the privileges either granted or confirmed by the king was the perpetual sheriffwick of Middlesex.

The whole of the county is included in the diocese of London, and is divided between the archdeaconries of London and Middlesex. When Henry VIII. created the bishopric of Westminster he allotted the whole county (the parish of Fulham alone excepted) for its diocese. Edward VI. however, dissolved the bishopric in the fourth year of his reign.

The county is divided into six hundreds, which remain the same as they were at the time of the Domesday survey, except that the name of one has been changed:—Ossulston (Ossulvestane D.), Edmonton (Delmetone D.), Gore (Gara D.), Elthorne (Helethorne or Helethorne D.), Spelthorne (Speletorne or Spelethorne D.), Isleworth (Honeslaw D., i.e., Hounslow). The division into hundreds is now merely a name, and a record of a former system of local government.

There are thirty-two poor-law unions, but the unions beyond London are only eight in number, viz.; Brentford, Edmonton, Fulham, Hackney, Hampstead, Hendon, Staines, Uxbridge.

The majority of hospitals are in London, but there is a training hospital at Tottenham, St John's Hospital at Twickenham, and cottage hospitals at Enfield, Ealing, Hayes, Hillingdon, Sudbury, and Teddington. The Royal India Lunatic Asylum is at Ealing, and the two county asylums at Colney Hatch and Hanwell.

The county is within the jurisdiction of the central criminal court and also of the metropolitan police (with the exception of the City).

Parliamentary Representation.—There are nine constituencies in Middlesex, returning nineteen members, viz., two for the county, four for the City of London, two for each of the boroughs of Westminster, Finsbury, Marylebone, the Tower Hamlets, Chelsea, and Hackney, with one for the university of London.

In the parliament of 1295 Middlesex was represented by two members; in 1298 London sent two members as well as the county. For the parliament of 1320 and subsequent parliaments London elected four members, but it does not appear that all were allowed to sit. From the 15th century, however, the city has always sent four members to parliament. In 1547 Westminster first sent her two members, and from that time until 1832 the only seats were those for the county and the two boroughs. In 1832 the boroughs of Finsbury, Marylebone, and Tower Hamlets were added, and in 1866 the boroughs of Chelsea and Hackney and the university of London.

History.—The district now included in Middlesex was largely occupied by forest up to a comparatively recent period, and its population must always have been very sparse. A few prehistoric remains have been discovered at various times,—bones of the elephant, hippopotamus, deer, &c., at Old Brentford, elk horns near Chelsea Hospital, fossil teeth, fish, fruit, &c., at Highgate, and quite recently, in 1879, while the foundations were being dug out for Drummond's New Bank at Charing Cross, a large number of prehistoric animal remains. Flint instruments have also been found to cover a considerable area. During the British period the district is supposed to have been inhabited by the Trinobantes, but