obtained by treating the monochloride with chlorine under water; evaporation in a vacuum gives colourless deliquescent crystals of TlCl3∙H2O. By heating the metal or thallous chloride in chlorine, TlCl∙TlCl2 is obtained, which on further heating gives 3TlCl∙TlCl3. as a yellowish brown mass. The chloride when anhydrous is a crystalline mass which melts at 24°. It forms several double salts, *e.g*. with hydrochloric acid and the alkaline chlorides, and also with nitrosyl chloride. The chlorine is not completely precipitated by silver nitrate in nitric acid solution, the ionization apparently not proceeding to all the chlorine atoms. *Thallic iodide,* TlI3, is interesting on account of its isomorphism with rubidium and caesium tri-iodides, a resemblance which suggests the formula TlI(I2) for the salt, in which the metal is obviously monovalent. On the halogen compounds see V. Thomas, *Abst. J.C.S.* (1907), ii. 547. *Thallic sulphate,* Tl2(SO4)3∙7H2O, and *thallic nitrate,* Tl(NO2)3∙8H2O, are obtained as colourless crystals on the evapora­tion of a solution of the oxide in the corresponding acid. The sulphate decomposes into sulphuric acid and the trioxide on warming with water, and differs from aluminium sulphate in not forming alums.

*Analysis.—*All thallium compounds volatile or liable to dissocia­tion at the temperature of the flame of a Bunsen lamp impart to such flame an intense green colour. The spectrum contains a bright green of wave-length 5351. From solutions containing it as thallous salt the metal is easily precipitated as chloride, iodide, or chloroplatinate by the corresponding reagents. Sulphuretted hydrogen, in the presence of free mineral acid, gives no precipitate; sulphide of ammonium, from neutral solutions, precipitates Tl2S as a dark brown or black precipitate, insoluble in excess of reagent. Thallic salts are easily reduced to thallous by means of solution of sulphurous acid, and thus rendered amenable to the above reactions. The chloroplatinate serves for the quantitative estima­tion. L. F. Hawley employs sodium thiostannate which precipi­tates thallium as Tl2SnS4, insoluble in water, and which may be dried on a Gooch filter at 105°. It may be noted that all thallium compounds are poisonous.

The atomic weight of thallium was determined very carefully by Crookes, who found Tl=204∙2 (O = 16); this figure was con­firmed by Lepierre in 1893.

**THALWEG** (a German word compounded from *Thal,* valley, and *Weg,* way) in physical geography, a term adopted into English usage signifying the line of greatest slope along the bottom of a valley, *i.e.* a line drawn through the lowest points of a valley in its downward slope. It thus marks the natural direction of a watercourse.

**THAMES,** the chief river of England, rising in several small streams among the Cotteswold Hills in Gloucestershire. Its source is generally held to be at a place known as Thames Head, in the parish of Coates, 3 m. W. by S. of Cirencester; but claims have also been advanced on behalf of the Seven Springs, the head waters of the river Churn, 5 m. S. of Cheltenham. The length of the river from Thames Head Bridge to London Bridge is 161¼ m. and from London Bridge to the Nore, 47¾ m., a total of 209 m. The width at Oxford is about 150 ft., at Teddington 250 ft., at London Bridge 750 ft., at Gravesend 2100 ft., and between Sheerness and Shoeburyness, immediately above the Nore, 5½ m. The height of Thames Head above sea-level is 356 ft., but that of Seven Springs, the adoption of which as the source would extend the length of the river by several miles, is 700 ft. The height of the river at Lechlade is 237 ft., the average fall between Lechlade and London, 143¼ m., being rather less than 20 in. per mile. The drainage area of the Thames is 5924 sq. m., including that of the Medway, which, as it joins the estuary immediately above Sheerness, may be considered a tributary of the Thames. The Thames forms part of the Gloucestershire-Wiltshire boundary to a point below Lechlade; thence for a short distance it separates Gloucestershire from Berkshire; after which it separates successively Oxfordshire and Berkshire, Buckinghamshire and Berkshire, Middlesex and Surrey, and finally, at its estuary, Essex and Kent. In the succeeding paragraph the bracketed figures indicate the dis­tance in miles above London Bridge.

The upper course lies through a broad valley, between the foot-hills of the Cotteswolds on the north, and the slight eleva­tions dividing it from the Vale of White Horse on the south. The scenery is rural and pleasant; the course of the river winding. Before reaching Oxford the stream swings north, east and south to encircle the wooded hills of Wytham and Cumnor, which overlook the city from the west. The Windrush joins from the north (left) at New Bridge (126¾), the Evenlode near Eynsham (119), and the Cherwell at Oxford (112). Be­tween Lechlade and Oxford the main channel sends off many narrow branches; the waters of the Windrush are similarly distributed, and the branches in the neighbourhood of Oxford form the picturesque “backwaters ” which only light pleasure boats can penetrate. The river then follows a valley confined between the hills on either side of Oxford, passes the pleasant woods of Nuneham, and at Abingdon (103½) receives the Ock from the Vale of White Horse. At Dorchester (95¼) the Thame enters on the left, and the river then passes Wallingford (90¾) and Goring (85). Hitherto from Oxford its course, though greatly winding, has. lain generally in a southerly direction, but it now bends eastward, and breaches the chalk hills in a narrow gap, dividing the Chilterns from the downs of Berkshire or White Horse Hills. From this point as far as Taplow the southern slopes of the Chilterns descend more or less closely upon the river; they are finely wooded, and the scenery is peculiarly beautiful, especially in early summer. The charm of the Thames is indeed maintained throughout its course; the view of the rich valley from Richmond Hill, of the outskirts of London, is celebrated; the river is practically the only physical attribute to the beauty of the metropolis itself, and the estuary, with its burden of shipping and its industrial activity, is no less admirable. At Pangbourne (80¾) the Thames receives the Pang on the right, and at Reading (74½) the Kennet on the same side. After passing Reading it bends northward to Henley (65), eastward past Great Marlow (57) to Bourne End (54), and southward to Taplow and Maidenhead (49¾), receiving the Loddon on the right near Shiplake above Henley. Winding in a south-easterly direction, it passes Eton and Windsor (43¼), Datchet (41½), Staines (36), Chertsey (32), Shepperton (30) and Sunbury (26½), receiving the Coin from the left at Staines, and the Wey from the right near Shepperton. Flowing past Hampton Court, opposite to which it receives the Mole on the right, and past Kingston (20½), it reaches Teddington (18¾). Passing Richmond (16) and Kew the river flows through London and its suburbs for a distance of about 25 m., till it has passed Woolwich. Gravesend, the principal town below Woolwich, is 26½ m. from London Bridge. The estuary may be taken to extend to the North Foreland of Kent. In the tideway the principal affluents of the Thames are the Brent at Brentford, the Wandle at Wandsworth, the Ravensbourne at Deptford, the Lea at Blackwall, the Darent just below Erith, and the Ingrebourne at Rainham, besides the Medway.

The basin of the Thames is of curiously composite character. Thus, the upper portion of the system, above the gap at Goring, is a basin in itself, defined on the west and south by the Cotteswold and White Horse Hills and on the east and north by the Chilterns and the uplands of Northamptonshire. But there are several points at which its division from other river basins is only marked by a very low parting. Thus a well-marked depression in the Cotteswolds brings the head of the (Gloucestershire) Coin, one of the head-streams of the Thames, very close to that of the Isborne, a tributary of the upper Avon; the parting between the head­streams of the Thames and the Bristol Avon sinks at one point, near Malmesbury, below 300 ft.; and head-streams of the Great Ouse rise little more than two miles from, and only some 300 ft. above, the middle valley of the Cherwell. The White Horse Hills and the Chilterns strike right across the Thames basin, but almost their entire drainage from either flank lies within it, and similarly a great part of the low-lying Weald, though marked off from the rest of the basin by the North Downs, drains into it through these hills. It may be noted further that the Kennet continues upward the line of the main valley below the Goring gap, and the Cherwell that of the main valley above it. The basin thus presents interest­ing problems. The existence of wide valleys where the small upper waters of the Cherwell, Evenlode and Coin now flow, the occurrence of waterborne deposits in their beds from the north­west of England and from Wales, and the fact that the Thames, like its lower southern tributaries which pierce the North Downs, has been able to maintain a deep valley through the chalk eleva­tion at Goring, are considered to point to the former existence of a much larger river, in the system of which were included the upper waters of the present Severn, Dee and other rivers of the west. The question, in fact, involves that of the development of a large part of the hydrography of England.