Commonwealth have found themselves in this predicament, which is by no means a new one. The rate of acquisition of land is still giving the Commission concern. The net additions of the past two years including acquired plantations have been substantially less than the areas planted. In 1951–52 they were less by eight thousand acres; this year by fourteen thousand acres. The total area of land acquired at September 30, 1953, was 1,909,400 acres. This comprised 1,181,400 acres classed as "Forest Land", which is either already planted or will be in due course, and 728,000 of "Other Land", which includes nurseries, rough grazing and agricultural land and other land unsuitable for planting. Twenty-six new forests were started during the year, nineteen in England, two in Scotland and five in Wales. The area planted was 67,610 acres, exceeding 1951–52 by almost six thousand acres. More than 118 million trees were used for the plantations and for replacing failures in recently planted ones. Fire damage was not high during the year.

The dedication scheme pursues its somewhat chequered course, dedication deeds being completed on 227 estates covering a total of 76,810 acres of woodland while another 139,730 acres of woodlands are in an advanced state of preparation; the total area thus approached a quarter of a million acres at the end of the year under review. It might be suggested as a matter for consideration, and to allay the difficulties of acquiring land, whether the Commission could not be advised to lay down a fixed minimum of land considered essential to be managed as State Forest and trust the private proprietor, with the Commission's advice and help where necessary, to work up to the balance of forest considered to be necessary for the requirements and protection of the population. France furnishes a good example. A considerable percentage of the French forests are privately owned and well managed. A question was once put to a senior French conservator of forests on the management of certain privately owned forests and whether the conservator ever gave advice, as they had a common boundary with the Government forests. He replied the private owner knew as much about forest management as he did. It may be concluded that British forest proprietors may in time attain as a body the same equality of knowledge as their French opposite numbers.

E. P. STEBBING

MANUFACTURE OF THE TEN-TOLA PRIMARY STANDARD WEIGHT FOR PAKISTAN

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THE first primary standard of mass to be produced commercially in Britain for many years, the ten-tola primary standard for the Karachi Mint, Pakistan, has recently been completed by L. Oertling, Ltd., in conjunction with Johnson, Matthey and Co., Ltd. (see *Nature*, August 14, p. 206). The standard of mass has been prepared to an exacting specification for the Pakistan Government, and its manufacture involved a number of special problems which are of general interest, especially to those concerned with precision weighing.

In order that a self-consistent system of weights can be established throughout the world, weights must be related through individual manufacturers' standards to some recognized ultimate standard of mass. It is not yet possible to rely on any natural phenomenon for such a standard, as is possible, for example, with length, which can be related to wavelengths of light. Recourse must of necessity be made to the mass of an actual piece of material, which in the case of metric weights is the International Kilogramme, located at the Bureau International des Poids et Mesures at Sèvres, near Paris. Most countries, including Britain, have primary standards of mass, which form the basis of their own weight system, the primary standard in Britain being the Imperial Pound. The weight system in Pakistan is based on the tola, which is defined as 180 grains (7,000 grains equals one imperial pound); the recently completed primary standard of 10 tolas thus has a mass of 1,800 grains (about 120 gm.).

A satisfactory primary standard must fulfil a number of requirements, the most important of which is stability, and its construction must be such as to ensure constancy and reliability of mass over a period of many years. The Imperial Pound, for example, is believed to have remained constant within one part in five million during the past seventy years. It is the achieving of this stability which presents the manufacturer with some of his most difficult problems.

The primary standard should be as near its nominal mass as is reasonably possible in order to avoid the difficulties surrounding the use of small 'make-weights' when comparing the standard with sub-standards. The standard should also be of reasonable size in relation to the sub-multiples and multiples in common use. For this reason, the 10 tola has been chosen as the primary standard as being a better intermediate value than 1 tola, which would involve difficulties in standardizing large multiples.

The Pakistan standard is made from an alloy containing 90 per cent platinum and 10 per cent iridium—an alloy which experience has shown to be exceptionally stable and durable. Since both these metals have a high density, the weight occupies a small volume and consequently has a small surface area, which also enhances stability. The density of the weight must not be less than 21·50 gm./ml. at 20° C. to ensure that it is sufficiently free from cavities and inclusions, which might affect its stability.

The alloy billet was forged by the firm of Johnson, Matthey and Co., Ltd., in Hatton Garden, London, and was subjected to gamma-ray examination to reveal any major internal defect. It was then roughly turned and polished and subjected to a density determination by the National Physical Laboratory at Teddington. The billet used for the weight was free from all inclusions and achieved a density of 21·54 gm./ml., which indicates a high degree of freedom from inclusions.

The shape of the final weight is a simple cylinder with a height and diameter of approximately one inch, the under-surface being relieved over its central portion, to provide an annular seating for the weight and to minimize the risk of foreign matter adhering to the under-surface when the weight is in use.

The mass of the weight was required to be adjusted within ± 0·005 grain (that is, ± 0·3 mgm.), which is about three parts per million of nominal value; the actual mass of the weight was required to be known within ± 0·0002 grain. In addition, a high degree of surface finish is necessary, for any imperfections in the surface are centres of potential corrosion and dust location. The problem facing the manufacturer, therefore, is gradually to improve the surface finish, removing smaller and smaller amounts of material as the nominal value is approached so that correct mass and optimum polish are achieved simultaneously. If the correct mass is achieved before optimum polish, the surface defects cannot be removed and the weight becomes scrap metal. If optimum polish is achieved before correct mass, it is difficult and sometimes impossible to reduce to correct mass without damaging the surface. The simultaneous achievement of these twin conditions is a process requiring exceptional skill by the polisher, together with a series of accurate weighings. It is a process which occupies many months of painstaking and patient work using successively finer and finer polishes. The manipulation of the weight during the long period of adjustment, with the ever-present necessity of avoiding damage throughout every second of this time, imposes a considerable strain on the adjuster.

Primary standards are standards of mass and, therefore, when compared in air with standards of different density, allowance must be made for the different buoyancy effects on the two sides of the balance. For the adjustment of the Pakistan standard, a secondary standard made from an alloy of 80 per cent nickel and 20 per cent chromium was used as a counterpoise. This counterpoise was prepared, finished and adjusted in the same way as the standard and was calibrated for mass and density by the National Physical Laboratory. The Pakistan standard was then compared with this nickel–chromium standard on a reference balance built by L. Oertling specially for the work. The balance was capable of indicating weight differences of 0·01 mgm. with a load of 120 gm. in each pan. At the final adjustment stages, Gaussian weighings were used, the platinum standard being allowed forty-eight hours to become stabilized after each adjustment and before re-weighing.

The final certification of the weight by the National Physical Laboratory records a value of 1800·0007 grains for the mass, the deviation from nominal value being only 0·0007 grain. This deviation is about one part in three million and is comfortably within the permitted tolerance.

THE *O* CHROMOSOMES AND THE DISTRIBUTION OF THE DENTAL FRICATIVES IN EUROPE

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IN their well-known introduction[1] to genetics, Darlington and Mather bring up once more the question of the relationship between race and language. Their thesis is that the 64·5 per cent line for the *O* chromosomes (in the *A—B—O* series) coincides with the boundary which separates those Europeans who pronounce a *TH* sound (as in English *think* and *then*; *AIP* notation [θ] and [ð]) from those who do not. Their story is ingenious, as are their sketch-maps. Unfortunately, they have simplified the issue and arrived at conclusions which we are not yet in a position to accept in the light of present knowledge. They themselves would appear to regard their paragraphs on this subject as mainly speculative.

Let us agree with Darlington and Mather's definition of *TH* as a 'dental fricative', unvoiced [θ] as in English *think* and voiced [ð] as in English *then*. Sounds with approximately the same values as these exist in other European languages but are often developments from a completely different phonetic base. For example, the [θ] of Spanish in *cielo* is derived from a primitive *k*-sound, whereas that of English *thin* descends from a postulated primitive *t*. While [θ], [ð] do not occur in many of the European languages, there is no reason for believing that normal Europeans have any *congenital* difficulty in pronouncing them. Children rapidly learn to discard myriads of sounds which do not conform to the type found in the language used by their parents.

At this point we shall look at the map of Europe and see what the position is in several of the areas where Darlington and Mather have registered the presence of the dental fricatives.

In the west, in Ireland it is claimed that the dental fricatives are extant. For some reason, West Kerry is marked 'extant variable'. The facts are that this group of sounds is absent from popular speech over most of Ireland, and only parts of the north-east could be labelled 'extant variable'. Orthography often confuses the layman. It should therefore be remembered that forms such as stage-Irish 'butther', 'Pathrick', 'murdher' represent a special group of sounds for which there is no provision in standard English spelling. They are 'velarized dental plosives' (voiced or unvoiced) and are produced by pressing the tip and blade of the tongue against the upper incisors. In the formation of these sounds the breath is cut off as in the production of English [*t*] and [*d*]. In the pronunciation of [θ], [ð] the flow of breath is continuous. The velarized dental plosives in the English of Ireland are examples of Gaelic 'substratum'. Children of Irish parentage, born in London, seem to have no difficulty in pronouncing [θ], [ð] in the English manner. One feels that the children of those who 'could not frame to pronounce' the word 'shibboleth' (Judges, xii, 4–6), if taken early enough, could have been taught to palatalize initial *s* in spite of the arrangement of their chromosomes.

Turning again to Spain, where orthographic *c* (before *e* and *i*) and *z* = [θ] in the standard language, we see that the phenomenon has not yet covered the whole country. Throughout Catalonia and Valencia in the east, the mother-tongue of the people shows *c*, *z* = [*s*], [*z*], respectively. Yet when Catalans or Valencians are obliged to speak the national language in the school or upon official occasions they are quite capable of pronouncing the *c* and the *z* in the Castilian fashion. In the south of Spain both these letters are pronounced somewhat like an English [*s*] in many districts, although written *s* is sometimes rendered as [θ]. Which means that *si señor* may sound like *thee thenyor*. Now so far as the relationship between the use of [θ] and blood group genes is concerned, in Spain we must realize that (according to the recent researches of the late Amado Alonso[2]) the final passage of earlier *ts* and *dz* (written *c*, *ç*, *z*) > θ was not complete in either the dialect of Castile or