

# The metre and the pendulum

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In 1790 the French Assemblée Nationale set in train a process that would result in the metric system. But for quirks of history, the course of metrication might have had an Anglo-French dimension — and a different outcome.

NINETEEN eighty nine and 1990 have been marked by a striking contrast in the manner in which the bicentenaries of two related and singularly French happenings have been commemorated. The first — the Revolution of 1789 — was celebrated with a pageant of festivities which culminated in a Parisian extravaganza of *Son* (Jessye Norman's resounding rendering of La Marseillaise in the Place de la Concorde) et *Lumière* (the Arc de Triomphe ablaze with fireworks). The second — the laying of the foundations for the metric system in 1790 — has attracted scant, if any, attention.

There is historical precedent for this, in that metrication was not seen as a matter of any great moment at the time of its inception. It was only one of many similar proposals for reform, among which were an ill-fated ten-hour clock, and a circle divided into 400 degrees (*grades*), as well as an unpopular Republican calendar that must have caused untold confusion until it was abolished by Napoleon in 1805. The Republic's new calendar year, which began on 22 September (the Autumn equinox), was divided into twelve renamed months (January became Pluviose; April, Floreal; and July, Thermidor), each divided again into three ten-day periods (*decades*) with five (or in leap years six) additional Republican fête days. Thus, some ten years after the Revolution, 8 July 1799 was the 20 Messidor in the year seven.

In France at large, metrication was no more popular than the revolutionary calendar. The system faced considerable public resistance, and there was a serious setback in 1812 when, because of continuing opposition, the government of the day backed down and authorized the use of traditional weights and measures alongside the new system. But it survived and went on to flourish. It has since moved gradually but inexorably to its present quite universal acceptance as the foundation of the SI system of units (*Système Internationale d'Unités*).

In common with other European countries, before 1790 France had a system of weights and measures which had evolved over centuries and which reflected the varying needs of commerce, agriculture and industry. Thus the Parisians had their *pouce*, *pied-de-roi* and *perche* which were similar although not identical to the British inch, foot and perch. Discrepancies such as these were an impediment to inter-

national commerce, but the problem was much more serious within France because each province had its own jealously guarded and largely irreconcilable set of standards. The Parisian foot was eleven per cent longer than that of Strasbourg, but ten per cent shorter than that in Bordeaux, and the differences in the various measures of weight and volume were even greater.

The need for a more rational and unified system had long been recognized and the Revolution provided the opportunity to take action. In 1790 an act of parliament (*"Loi relative aux mesures à prendre pour arriver à la fixation de l'unité naturelle des poids et mesures"*) was passed which provided the statutory framework and which gave to the Académie des Sciences the responsibility of introducing a unified system of weights and measures.

In March of the following year the Assemblée Nationale accepted the Académie's proposal that a universal and invariable quantity — one quarter of the

Earth's meridian — should be used as a basis for the new system of weights and measures. The Académie also recommended that this distance should be established with the greatest possible degree of accuracy by undertaking a precise measurement of the length of the arc of the meridian between Dunkirk and Barcelona. And the academicians showed considerable foresight when they envisaged that the proposed new system would have the advantage of being internationally acceptable.

The measurement, which began in June 1792, was clearly going to be a lengthy undertaking. In consequence, in 1793 (year two of the Republic), the Convention, which by then had replaced the Assemblée Nationale, decided to introduce an interim scheme based on an earlier French survey of the geodesic line between Dunkirk and Collioure in the south of France. The linear unit — one ten millionth part of one quarter of the Earth's meridian — which was derived



« — Dites-moi donc ! m'ame Gavin, en v'là des inventions ! j'vas m'acheter une robe et on me parle étranger ; ils me baragouinent des Mètres, des Thermomètres et des Baromètres !... a-t-on vu ça !... »

— Et moi donc ; la fruitière au lieu de quatre onces de beurre, elle m'emberlificote avec des Grammes ! des Filigrammes et des Programmes ! »

(Loosely translated, the exchange runs: "You'll never guess, Mrs Gavin, what's new! I went to buy myself a dress and they spoke to me in a foreign language. They talked gibberish about metres, thermometers and barometers! . . . Would you believe it! . . ." "What about me: the grocer, instead of serving me with four ounces of butter, bamboozled me with grammes, filigrammes [untranslatable] and programmes!")

The enduring pains of going metric. Left, a cartoon from France (1840); below, one from the United States (1986). Both are reproduced from *L'Aventure du Mètre*, published by the Musée National des Techniques - CNAM, Paris, last year.



"We're studying the metric system in school. I weigh 24 kilometers Celsius."