Méchain, Pierre-Fran | Encyclopedia.com

(*b*. Laon, Aisne, France, 16 August 1744: *d*. Castellòn de la Plana, Spain, 20 September 1804)

geodesy, astronomy.

Méchain was the son of Pierre-François Méchain, a master ceiling plasterer of modest means, and MarieMarguerite Roze. Young Méchains mathematical ability attracted the attention of various local notables, who advised sending him to the école des Ponts et Chaussées in Paris. Lack of financial resources interrupted his studies there and he accepted a tutorship for two young noblemen about thirty miles from Paris.

In some fashion Méchain came into communication with Lalande, who sent him the proofs of the new second edition of his *Astronomie*. Filled with enthusiasm, Méchain made such rapid progress in this study that in 1772 Lalande procured for him a position as hydrographer at the naval map archives (Depôt de la Marine) in Versailles. The archives were then a seat of political patronage and intrigue, and, caught in the political crosscurrents, Méchain twice lost his job; but each time he was reinstated because of his competence as a map-maker. The archives were soon transferred to Paris, and there he drew up the maps for the shoreline from Nieuwpoort in Flanders to Saint-Mato. In 1777 Méchain married Thérèse Marjou, whom he met while working in Versailles; they had a daughter and two sons.

Beginning in 1780 he determined the network of fundamental points for large military maps of Germany and northern Italy.

Meanwhile Méchain was also active as an astronomical observer, his early efforts being crowned in 1781 with the discovery of not one but two comets. He calculated the orbits for both, and in the following year he calculated orbits for the comets of 1532 and 1661, proving, contrary to general expectation, that they were not the same. This research won both the 1782 prize of the Académic Royale des Sciences and admission to its ranks. Encouraged by these successes, Méchain threw himself into observing with still greater zeal, and ultimately discovered nine more comets, including the remarkable short-period one now named after Encke. He calculated the orbits for all of these, as well as thirteen found by other observers. In addition he found many nebulae, which were incorporated by Charles Messier into his famous catalogue of clusters and nebulae. In 1785 he became editor of the French national almanac, *Connoissance des temps*, and he prepared the seven volumes for 1788 to 1794.

In 1787 a joint Anglo-French project undertook the triangulation between the Greenwich and Paris observatories. Méchain was chosen as one of the French commissioners, along with Legendre and J.-D. Cassini. Both countries engaged in a friendly rivalry to produce new and more accurate measuring instruments. In France, Borda developed the principle of the *cercle répétiteur*, or repeating transit, in which after the first set of readings, the circle was clamped with the telescope and moved back to the original line of sight. In this way the angles could be measured against different segments of the circle, thus averaging out graduation errors. The commissioners systematically tested Borda's device, with Méchain using the older equipment; the tests demonstrated the great superiority of this new circle.

In 1790 the National Assembly approved an Academy proposal to establish a decimal system of measures, and Méchain and Delambre were designated to carry out the fundamental geodetic measurements for a new unit of length. This unit, the meter, was intended to be one ten-millionth part of the distance from the terrestrial pole to the equator, and it was to be based on an extended survey from Dunkerque to Barcelona, Méchain was assigned the shorter but more difficult southern zone, the previously unsurveyed region across the Pyrenees.

The new repeating transit became the fundamental instrument of the survey, but not until June 1792 was the new equipment, including parabolic mirrors for reflecting signals, ready. By this time the Revolution was engulfing France and the monarchy was tottering; Méchain with his suspicious array of instruments was arrested at Essonnes just south of Paris as a potential counterrevolutionary. Only with much difficulty was he located and released two months later, so that he could continue his journey to Spain. In September and October he swiftly carried out the triangulation between Perpignan and Barcelona. During the winter of 1792–1793 he undertook the astronomical observations to establish the latitude of Barcelona, almost at the southernmost limit of the meridian. At the same time he investigated the possibility of extending the meridian 2½° southward to the Balearic Islands. Otherwise, only a few weeks of work remained to complete the network across the frontier.

His plans were abruptly interrupted at the beginning of spring in 1793 when, invited by a friend to inspect a new hydraulic pump in the outskirts of Barcelona, he was invoked in an accident. While trying to start the machine, the friend and an assistant were caught in the mechanism. Méchain, rushing to aid them, was struck by a lever that knocked him violently against the wall, breaking some ribs and a collarbone. He was unconscious for three days and afterward was forced to remain completely

immobile for two months. By June he still did not have the use of his right arm; but, undeterred, he used his left hand to make the solar observations at the summer solstice.

During Méchain's convalescence, open war had broken out between Spain and France, and he was denied a passport to return home. Profiting from his captivity, he determined the latitude of Montjouy, just south of Barcelona, and surveyed the triangle connecting these points. He then noticed a 3″ discrepancy in the latitude previously obtained for Barcelona. Anguished by his failure to find the cause, and blaming himself for the error, he kept the discrepancy a carefully guarded secret. In the remaining years of his life he became a driven and tormented man, whose behavior was mysterious and inexplicable to his colleagues. Delambre, who found out the secret only when he inherited the notes, intimated that Méchain simply put too much trust in the precision of the repeating transit.

Eventually Méchain obtained a passport for Italy, and he managed to reach Genoa in September 1794. Saddened by the guillotining of several of his colleagues and in poor health, he delayed his return to France, not embarking for Marseilles until the following year. After additional hesitation he journeyed to the vicinity of Perpignan and in September 1795 resumed the triangulation. Méchain slowly continued his work through 1796 and 1797. Meanwhile, after a fifteen-month suspension for political reasons, Delambre proceeded with measurements of the northern part of the network and in April 1798 he invited Méchain to join him in linking the sections. Méchain remained incommunicado, and Delambre finally sought him out in Carcassonne. Méchain expressed a stubborn desire, inexplicable to Delambre, to return to Spain for further latitude determinations. Faced with the choice of returning to Paris and the warm welcome of his colleagues, or remaining forever an expatriate, Méchain reluctantly came back to Paris. There he was less than cooperative in presenting his observations to the commissioners charged with setting up the decimal metric system.

In Paris he was made director of the observatory, considered a just and tranquil reward for an astronomer who had labored so faithfully without a real astronomical position. But to Méchain nothing was right, and in a remarkable letter to Franz von Zach he aired his complaints publicly (*Monatliche Correspondenz*, **2** [1800], 290–302). Always he yearned to return to Spain; and eventually the Bureau of Longitudes approved the extension of the meridian to the Balearic Islands, a project that would render his imperfect latitude of Barcelona unnecessary. The Bureau, believing that Méchain's abilities were best employed as director of the observatory, appointed another astronomer to extend the meridian, but to their surprise Méchain insisted on doing it himself.

The expedition left Paris on 26 April 1803, but encountered unexpected delays in Spain. When the ship at last departed for the islands, an epidemic of yellow fever broke out on board. Méchain eventually reached Ibiza, but he discovered that his mainland station at Montsia could not be sighted from the island. Thus he was obliged to change the pattern of triangles and survey a greater distance southward in the mountains along the Spanish coast. Exhausted by the work and further weakened by fever and a poor diet, he collapsed and died on 20 September 1804. Several years later the extension of the meridian was completed by Biot and Arago.

BIBLIOGRAPHY

I. Original Works. Méchain's bibliography is found in J. M. Quérard, *La France littéraire*, V (Paris, 1830), 10–11, which along with several biographical encyclopedias, gives his death erroneously as 1805. Méchani's most important work was edited in three volumes by J. B. Delambre, *Base du systéme métrique décimal, ou Mesure de l'arc du méridien compris entre les paralléles de Dunkerque et Barcelona, exécutée en 1792 et années suivantes, par MM. Méchain et Delambre* (Paris, 1806–1810).

Many of Méchain's MSS are preserved at the Paris observatory; they are catalogued as C6.6–7 and E2.1–21 in G. Bigourdan, "Inventaire des manuscrits," in *Annales de l'observatoire de Paris. Mémoires*, **21** (Paris, 1895), 1–60, See also his "La prolongation de la méridienne de Paris, de Barcetone aux Baléares, d'aprés les correspondances inédites de Méchain, de Biot et d'Arago," in *Bulletin astronomique*, **17** (Paris, 1900), 348–368, 390–400, 467–480.

II. Secondary Literature. J. B. Delambre's florid "Notice," in *Mémoires de l'Institut des sciences, lettres et arts, sciences mathétmatiques et physiques*, **6** (Paris, 1806), 1–28 was written before he knew why Méchain desired so ardently to return to Spain; for the earlier biography he refers the reader to Franz von Zach, "Pierre-Francois-André Méchain," in *Monatliche Correspondenz*, **2** (Gotha, 1800), 96–120. More balanced accounts by Delambre are in *Histoire de l'astronomie au dix-huitiéme siécle* (Paris, 1827), 755–767, and in Michaud's *Biographie universelle ancienne et moderne*, XXVII (Paris, after 1815), 454–458. See also Delambre's *Grandeur et figure de la terre*, G. Bigourdan, ed. (Paris, 1912).

An excellent modern account with new material is by Joseph Laissus, "Un astronome Français en Espagne: Pierre-François-André Méchain (1744–1804)," in *Comptes rendus 94° Congrél national des sociétés savantes, Pau, 1969, sciences*, **1** (Paris, 1970), 37–59.

Owen Gingerich