

# Esclangon, Ernest Benjamin | Encyclopedia.com

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(*b.* Mison, France, 17 March 1876; *d.* Eyrenville, France, 28 January 1954)

*astronomy, mathematics, physics.*

Esclangon came from a family of landed proprietors. The practical attitudes of his class are apparent in his realistic approach to problems in pure mathematics, applied [celestial mechanics](#), relativity, observational astronomy, instrumental astronomy, astronomical chronometry, aerodynamics, interior and exterior ballistics, and aerial and underwater acoustic detection. He contributed to all of these fields to a greater or lesser degree, but always effectively.

Esclangon's first training was as a mathematician. As a student at the *École Normale Supérieure* (1895–1898) and an *agrégé* in mathematics (1898), he took up the problem of quasi-periodic functions. (Quasi-periodic functions, newly introduced, constitute a remarkable class among the almost periodic functions; their Fourier expansion is formed by a limited number of terms.) Esclangon elaborated a theory for these functions, studied their differentiation and integration, and examined the differential equations which allow them as coefficients. His doctoral thesis established a basis for their employment at a time when their role in mathematical physics was only beginning to be developed.

Esclangon's subsequent career as an astronomer and teacher was the result of chance—in the form of a vacant position—and of his own curiosity that led him to accept it. He was an astronomer at Bordeaux, beginning in 1899, then director of the observatories of Strasbourg (1918) and Paris (1929–1944). In addition, he taught mathematics at the Bordeaux Faculty of Science (from 1902), then became professor of astronomy at Strasbourg (in 1919) and then at Paris (1930–1946).

For fifty years Esclangon explored all the branches of fundamental astronomy. He devoted special attention to perfecting instruments, with a view to increasing the precision of observations. Of particular interest is his solution to a critical problem in positional astronomy, the rigorous definition of the axis of rotation of a transit instrument. Esclangon demonstrated that by fitting an objective in one of the extremities of this axis, which is hollow, and fitting a reticle to the other, the observer is permitted to measure the displacement of the instantaneous axis of rotation continuously throughout the course of the observation.

Esclangon's work in ballistics began in 1914 when, at the beginning of [World War I](#), he proposed to French military authorities that they employ sound-ranging techniques to localize enemy artillery. He was charged with organizing the experimental study of this method; he was thus able to analyze the two components of the wave emitted by the projectile, the conical [shock wave](#) and the spherical wave centered on the point of emission. Esclangon then succeeded in 1916 in eliminating the registration of the [shock wave](#) and thereby assured a great precision in pinpointing enemy gun locations.

As director of the Bureau International de l'Heure (1929–1944), Esclangon was led to devote himself to problems of time. In addition to making studies on the astronomical determination of time and on its conservation and diffusion, he devised the "talking clock" (employing time signals from an observatory clock) that has made telephonic announcements of the exact time available to the Paris public since 1933.

Esclangon's practical bias and his inclination to ward solid demonstrations (whether mathematical or experimental) caused him to be critical of the [general theory of relativity](#). In a memoir of 1937, "La notion de temps. Temps physique et relativité..." he discusses the restrictions necessary to certain conclusions that have been stated too absolutely and states how, for example, it is possible to conceive of phenomena faster than light and why the ordinary formulas are not strictly applicable to the motion of masses at great speeds.

Esclangon was a member of the Académie des Sciences (1939) and the Bureau des Longitudes (1932). He served as president of the Union Astronomique Internationale from 1935 to 1938. He assumed his official functions with simplicity and amiability; he was affable and loved to joke, and did not deny himself leisure time. It would almost seem that he accomplished his body of important work without effort.

## BIBLIOGRAPHY

I. Original Works. Esclangon published 247 memoirs, monographs, and articles, of which some of the most important are, in mathematical analysis, “Les fonctions quasi-périodiques,” his doctoral thesis, in *Annales de l’Observatoire de Bordeaux*, **11** (1904), 1–276; and “Nouvelle recherches sur les fonctions quasi-périodiques,” *ibid.*, **16** (1917), 51–176.

His astronomical works include “Sur les transformations de la comète Daniel...” in *Bulletin astronomique* **25** (1908), 81–91; “Mémoires sur la réfraction astronomique” in *Bulletin de Comité international permanent pour l’exécution photographique de la carte du ciel* **6** (1913), 319–389; “Sur la Précision des observations méridiennes,” et des mesures de longitudes,” in *Annales de l’Observatoire de Strasbourg*, **1** (1926), 373–405; “Mémoire sur l’amélioration des observations méridiennes,” in *Bulletin astronomique*, **6** (1930), 229–260; “L’horloge parlante de l’Observatoire de Paris,” in *L’astronomie*, **47** (1933), 145–155; “Horloges indiquant simultanément le temps moyen et le temps sidéral” in *Bulletin astronomique* **11** (1938), 181–189; and “Sur la transformation en satellites permanents de la terre de projectiles auto-propulsés,” in *Comptes rendus hebdomadaires des séances de l’Académie des sciences* **225** (1947), 513–55.

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His publications in military science comprise *Mémorize sur la détection sous-marine...* (Paris, 1918), in the Archives de la Marine de Guerre; and *L’acoustique des canons et des projectiles* (Paris, 1925).

II. Secondary Literature. On Esclangon and his work, see J. Chazy, “Notice nécrologique sur Ernest Esclangon,” in *Comptes rendus hebdomadaires des séances de l’Académie des sciences* **238** (1954), 629–623; and “Ernest Esclangon (1876–1954),” in *Annuaire du Bureau des longitudes* (1955), C1–C6; A. Donjon, “Obituary Notice: Ernest Esclangon,” in *Monthly Notices of the Royal Astronomical Society*, **115** (1955), 124; J. Jackson, “Obituaries: Prof. E. Esclangon,” in *Nature* **173** (1954), 567; and A. Pétard, “Quelques mots de l’oeuvre scientifique d’Ernest Esclangon,” in *L’astronomie*, **68** (1954), 201–204.

Jacques R. Lévy