

## EXPERIMENT WITH REFERENCE TO THE PROPAGATION OF SUBMARINE SOUND-WAVES.

(Extracted from the *Reports of Proceedings and Memoranda of the Meetings of the International Committee for the Scientific Exploration of the Mediterranean Sea* - Vol. III. - Paris, May 1928, p. 31. Article : *Méthodes Acoustiques* (Acoustic Methods), by Ingénieur Hydrographe Principal MARTI).

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An interesting experiment with reference to the propagation of submarine sound-waves to a great distance was made in 1925 by the French Navy between the Algerian coast and the South coast of France. Submarine detonations of charges of about 30 kilogrammes (66 lbs) of explosive off Toulon were listened for off Cape Rose near La Calle (Algeria); then the detonations of similar charges fired off Cape Rose were listened for at Toulon. In both directions, in spite of the great distance (approximately 400 nautical miles to cover which the sound required little more than 8 minutes), the sound of the detonations crossed the Mediterranean, its intensity on arrival being sufficient to permit it to be recorded even with instruments of rudimentary sensitiveness. This result had been looked-for, for it was already known that the detonation of 1 kilog. (2.2 lbs) only of explosive is heard very loudly at a distance of about a hundred miles. However, though in the latter case the detonations are received as very intense sounds of short duration, those which travelled across the Mediterranean are received as prolonged sounds comparable to the roll of thunder heard at a great distance; in fact, the heavier part of the sound which arrived after each detonation lasted at least some ten seconds.

The spreading of sound noted is very likely due to the fact that the existence of great depths (from 2,500 to 3,000 metres = 1365 to 1640 fathoms) over the greater part of the path allowed part of the acoustic energy to arrive at the microphone from the point of explosion almost always through great depths (where the velocity of sound is higher); while another part of this energy spread mainly near the surface (where the velocity of sound is less).

It may perhaps be necessary to add to this action certain complex effects of sound-mirage similar to those a short summary of which appeared in Volume I of the *Reports of Proceedings and Memoranda of the Meetings of the International Committee for the Scientific Exploration of the Mediterranean Sea*, page 34. Finally, it may be the case that acoustic reflections on the coast, particularly near the point of reception, caused a still further spread of the sound heard; as a matter of fact, very distinct reinforcements of the sound were noted during the period of dying away.

