

space of time. The destroyer, because of its additional usefulness and seaworthiness, is rapidly crowding out the vessel that it was intended to destroy, thus opening a field for the destroyer of the torpedo boat destroyer, and giving rise to the very natural question of the layman: "Where is it going to stop?"

According to naval authorities the uses for which destroyers are intended are to overtake and capture or destroy smaller torpedo craft, their size, speed, and superior armament making this possible; to serve as a torpedo boat and attack larger vessels, trusting to their speed to approach and discharge torpedoes without being disabled; and finally, as scouts, to follow the enemy, locate his vessels, and keep the commanding officers of their own fleet informed as to his movements. Their high power, the small surface they present as targets and the facility with which they can be handled, render them peculiarly fitting for this last duty.

#### Service Upon a Torpedo Boat

is no sinecure, and calls for only the bravest of sailors, for their only hope of safety in an attack lies in the speed they possess, everything, even armor, being sacrificed to this, and a single heavy shot might send one of them to the bottom with all on board.

The accommodations, too, are much poorer than in larger ships, and while every effort is made to have the quarters as comfortable as possible, they are not only small, but when the sea is running high are frequently flooded. Moreover, in stormy weather the vibration of the little vessel is so great that he is a good sleeper indeed who can secure a night's rest. The standard torpedoes are of the Whitehead pattern. These are mechanical fish, following somewhat the shape of a cigar, ranging from six to sixteen feet in length, and carrying a charge of from two hundred to five hundred pounds of gunpowder, and a quantity of delicate mechanism for the purpose of propulsion and steering. At the tail end is a screw, which is revolved by the electric power in the storage battery with which the torpedo is provided. The projectile is sent on its death-dealing mission by means of a lightly-constructed tube from which it is expelled by the explosion of a small charge of powder which compresses the air behind it and causes the exertion of a force just sufficient to overcome the inertia, for when the messenger of death drops into the sea it immediately moves forward of its own volition, travelling with accuracy in the direction in which it is aimed and exploding as soon as it comes in contact with any solid substance.

Experience has proved, however, that the proportion of the ordinary torpedoes which reach their destination is very small, and on this account the Herreschoffs have designed an improved projectile that is far more effective. This consists of a somewhat larger torpedo, and is used in the same way that a small whale-backed boat would be manipulated. It is probably the most deadly weapon known to modern warfare, though it cannot be used unless volunteers are willing to risk their lives in handling it. Two men wearing life preservers sit astride of the torpedo, guiding it until it comes within striking distance of the object it is intended to destroy, when they aim it, lock the steering gear, consisting of a vertical and horizontal rudder, and drop off, swimming about until picked up.

Another form of torpedo is the 'dirigible,' so called because, being supplied with a wireless transmitter, it can be manipulated from shore, the operator, safely sheltered, controlling it for miles; but this can only be made use of in fair weather. It is guided, of course, in the same way as if provided with electric wires, the wireless method merely rendering it capable of manipulation at a much greater distance than the use of wires would permit. The torpedo boat, experts tell us, will be

The Key to Supremacy in Future Wars, though the battleships and cruisers, capable of services peculiarly their own, will always retain their importance. A torpedo boat, for instance, cannot convey troops, bombard coast towns, reduce forts, or serve as aids to a land army; but can sink the vessels used for this purpose.

The torpedo boat is essentially a weapon of surprise, and the fearfully destructive power it possesses can scarcely be imagined. We have had some slight proof of this in the two recent wars, particularly in the struggle between Russia

and Japan. In a single night a number of Russia's proudest ships, seemingly safe from harm within the landlocked harbor of Port Arthur, were rendered as useless to that nation as so much scrap iron.

Naturally, every kind of safeguard is made use of to prevent the destruction of the great battleships by these terrors of the sea. But commanders will make use of them in ways that as yet have not been even attempted and with results that may possibly bring to the world a salutary realisation of the horrors of war.

## The Church and Science

That bright intellect, Dr. Walsh (says the New York 'Freeman's Journal'), contributes a timely paper to the 'American Catholic Quarterly Review' on the subject of the Church's attitude towards scientific investigation, teachings, and method. He was prompted (he tells us) to write for the reason that, as a result of the Encyclical 'Pascendi,' one of the most prominent notes that has been sounded by those outside of the Church is the supposed opposition of the Church to science and scientific methods and scientific investigations.

Any one, he says, who knows anything of the history of modern science, is aware that there is absolutely no foundation for this prejudice. Most of the men who did the great original work in the last century in medicine were Catholics. The same is true of electricity, and men like Galvani, Volta, Ampere, Coulomb, and Ohm were not only members of the Church but were also devout Catholics.

The modern method of scientific inquiry, known as the a posteriori, or inductive or analytical method, Dr. Walsh points out, is nearly always attributed to Lord Bacon, who was thereby said to have overthrown the Aristotelian, or deductive, or synthetic mode of inquiry. But as it is shown, the experimental method existed from the earliest ages, may be traced indeed back to the Miletian school, and was thriving in the thirteenth century in the days of Verulam's great namesake, Roger Bacon, a Catholic monk, who declared (what the genius of Aristotle could not certainly have overlooked) that 'nothing can be known without experiment'—*nihil sine experientia sciri potest* (opus Majus).

Roger Bacon, says Doctor Walsh, laid down very distinctly the principle that only by careful observation and experimental demonstration could any real knowledge with regard to natural phenomena be obtained. He not only laid down the principle, however, but in this, quite a contrast to his later namesake, he followed the route himself very wonderfully.

Friar Bacon, says Dr. Walsh, starts out with the principle that there are four grounds of human ignorance. First, trust in inadequate authority; second, that force of custom which leads men to accept too unquestioningly what has been accepted before their time; third, the placing of confidence in the opinion of the inexperienced; and fourth, the hiding of one's own ignorance with the parade of superficial knowledge.

These reasons contain the very essence of the experimental method, and continue to be as important in the twentieth century as they were in the thirteenth. They could only have emanated from an eminently practical mind, accustomed to test by observation and by careful searching of authorities every proposition that came to him. It is very evident that modern scientists would have more of kinship and intellectual sympathy with Friar Bacon than most of them are apt to think possible.

Simply put, the idea of the opponent of Catholicism is that if the scientific method of investigation were pushed to its extreme, it must, if it does not prove that there is no God, at least be to show that it has demonstrated more towards His non-existence than the Catholic Church has proved in His favor. We at least have a series of co-ordinated facts, the science party declare, which we know to be true by experience. We go as far as we may, and stop short only of the first principle.

The Catholic, on the contrary, they say, starts out with an assumption, and makes his deduction therefrom, with the result that if his assumption (i.e., the existence of a self-revealed God) is wrong, all his deductions count for nothing.

Yet this great pioneer of science, Friar Bacon, urged the Pope of his day, Clement IV., to have the works of Aristotle burned in order to stop the propagation of error in the schools.

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