John P. Holland, The Christian Brothers, And The Submarine

By Brother Harry M. Dunkak, Ph.D.

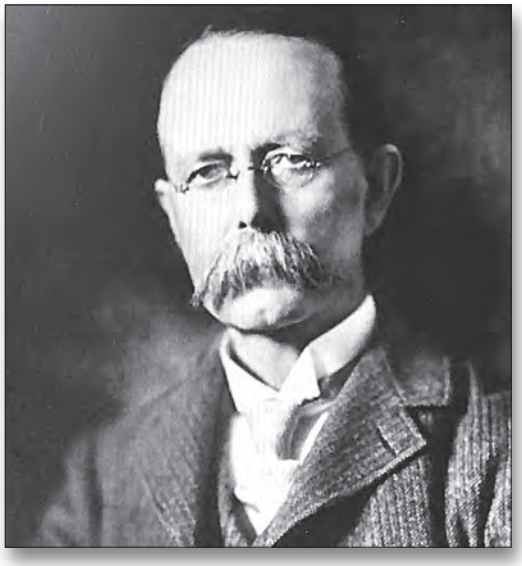

Photo:
A portrait of John Phillip Holland in middle age. Holland's work as the developer of technological applications leading to development of the modern submarine is well known. Less is known about his work as member of the Irish Christian Brothers, as a teacher, and as an inventor. Born in the 1840s, as a boy he was profoundly influenced by the Brothers and joined the order in 1858. He lived in Ireland until 1873 when he left for the United States where he eventually turned full-time to his designs and inventions for "underwater boats." Courtesy of Paterson Museum.

On May 17, 1897 the late edition of the *New York Times* carried the following rather cautious report of the launching of a ship earlier that day:

> …*the* Holland*, the little cigar-shaped vessel owned by her inventor, which may or may not play an important part in the navies of the world in the years to come, was launched from Lewis Nixon's shipyard this morning.*

The cigar-shaped vessel was a submarine. She was launched at the Lewis Nixon's Crescent Shipyard in Elizabethport, New Jersey. The designer and owner was John Philip Holland (1841–1914). Who was Holland? Where was he born and raised? Where was he educated? What was his life before the launching? Where and how did he get his ideas on the submarine?

We are quite certain that Holland was born in 1841, and we know that he was born, raised, and educated in Ireland. On the day the *Holland VI,* as the submarine was called, was launched, Holland had already spent twenty-six years thinking and studying the problems involved in submarine construction and navigation. Other submarine developers had preceded him, and others would follow him. Holland, however, holds a unique role in the history and development of submarines. He demonstrated persistence in developing the submarine and provided important technical improvements in design. At the time, it would have been nearly impossible to envision the consequences of his efforts and the years he spent contemplating and developing his ideas. The *Holland VI* was launched in 1897 and was commissioned as the *U.S.S. Holland* in the United States Navy in 1900, its first modern submarine. This vessel would become the prototype of the great submarine fleets developed by Great Britain, Japan, Germany, and Russia. The development and design of the *Holland VI* would culminate in the launching of the Skipjack nuclear-class submarine in 1958 by the U.S. Navy. This article concentrates on Holland during his Irish years when he developed his theory of the submarine.

BORN IN LISCANNOR

Along the west coast of Ireland from Galway Bay south to the River Shannon estuary there is one single harbor offering safety from the stormy and turbulent Atlantic Ocean. This is Liscannor Bay. On the north side of this harbor is the small village of Liscannor, where Holland was born and spent his early years. There are discrepancies about the date of his birth. The most probable date, supported by a manuscript written by him, is February 24, 1841. The County Clare coast, in which he was born, was bleak in winter but filled with green fields in summer. Ireland was under British rule at this time with the hated penal laws, passed by the British Parliament, in place.[1] Irish Catholics barely survived. When the potato failure and the Great Famine (more accurately called the "Great Hunger" since there was a surplus of food being exported by the British authorities) struck Ireland between 1845 and

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Photo: *The birthplace of Holland in the village Liscannor, Co. Clare. Holland was one of four sons born to Anne and John Holland. His father worked for the British Coastguard Service, an employment which helped sustain the family during the Great Hunger. Holland's interest in submarines may have been influenced by his father's work on the sea for the Coastguard Service. Courtesy of County Clare Library.*

1852, millions of Irish died as a result of starvation, cholera, and civil strife. Many migrated, especially to the United States.

Holland's father, also named John, lost his first wife, Anne Foley Holland, in 1835. He soon remarried Mary Scanlon, a Liscannor young lady. She bore him four sons, the second being John Philip. The third son, Robert, was born in 1845 and died two years later of cholera, during the Great Hunger. John Philip also lost two uncles to cholera and saw his younger brother, Michael, plagued by smallpox during this period. The elder Holland was employed by the British Coastguard Service, a fact that would have an influence on John Philip. This employment helped the family during this terrible period; the family lived in a Coastguard cottage and thus had a decent place in which to reside.

This is little doubt that these events in Holland's early life produced deep resentment toward Great Britain. He and his fellow Catholic Irish rightfully believed that Britain was largely responsible for their sufferings. However, this resentment, held by many Irish, was checked in Holland by three factors. First, there was the occupation of his father and the assets that came with his position in the British Coastguard. Second, there was the family's devotion to the Roman Catholic Church. The Church opposed violence as a solution to problems and urged peaceful solutions. Third, there was Holland's membership in the Irish Christian Brothers. This order was rigidly disciplined and expected exemplary behavior from members, although its collective desire was an end to the union with Great Britain.

HOLLAND'S EDUCATION

Holland's education began with sea stories related to the family by his father. These sessions about the sea were combined with occasional trips by Holland on the sea with his father, perhaps taking him as far north as the Cliffs of Moher. Holland lived under the penal laws passed in the seventeenth and eighteenth centuries, but by Holland's time, the Laws were being liberally interpreted in many parts of Ireland. For example, during his early years formal education was afforded to non-Anglicans. (The threat of new penal laws remained, however, until Irish independence from Great Britain in 1922.) Consequently, Holland's formal education began at the new St. Macreehy's National School which was under the management of the Bishop of Kilfenora. This primary school was a short walk down Castle Street from the Coastguard cottage in which the family lived. Holland's secondary education began at St. Joseph's School in Ennistymon, some five miles from his home. Here he first came into contact with the Irish Christian Brothers, who operated the school.

In 1853 the family moved from Liscannor to Limerick where he entered the Monastery School on Sexton Street. He was again under the Irish Christian Brothers, who operated this school. The Limerick school had a much broader curriculum than that of the Ennistymon school, one designed to attract boys and prepare them for profitable careers. The Limerick school presented such subjects as book-keeping, commercial arithmetic, mensuration, geometry, trigonometry, architectural drawing, art, music, elementary science, and navigation. Not surprisingly, young Holland, given his background, was attracted to a maritime career. He hoped eventually to study for a captain's certificate. Unfortunately, he would be denied this career.

At the Sexton Street school, Holland came under the influence of Brother Bernard O'Brien. (He may also have been taught by this Brother at Ennistymon.) Brother O'Brien was very interested in science, in fact he was known as a "scientific man." He built several telescopes, complete with clockwork mechanisms to track the movement of the stars. He also constructed various apparatuses to demonstrate electro-magnetism. Brother O'Brien gained great distinction for his knowl-

edge and exhibits concerning science. He was also an excellent mechanic, greatly skilled in using the lathe and the vise. Around 1885, Brother O'Brien was recognized for his knowledge and accomplishments in science when he was awarded a high-class certificate and a silver medal.

Brother O'Brien's experiments and apparatuses certainly attracted John Holland. As a result, in the secondary school on Sexton Street he diligently plunged into his studies, especially the physical sciences to which he was strongly attracted. He would rise early each school day and prepare himself for the classes for that day. (Holland remained attracted to a career on the sea. In 1854 he had passed a government navigation exam, but was denied a future career on the sea. He failed the physical exam, due to his poor eyesight.)

Around this time, the Bishop asked the Christian Brothers to provide evening and Sunday classes for adults. The adults were to be taught the "three Rs" (reading, writing, and arithmetic) and religion. Since the Brothers were short of teachers, they asked their more gifted students to volunteer for this project. Holland was among those students who agreed to teach. The high point in the Sunday teaching sessions was a thirty minute presentation on Christian living, given by one of the Christian Brothers. Holland was so struck and edified by these presentations that he began to contemplate joining the Congregation of Irish Christian Brothers.[2]

Holland obviously was assisted in his educational desires and development by the encouragement and assistance of the Irish Christian Brothers. In addition, he was attracted by the educational approach and efforts of the Brothers. On June 15, 1858 he joined the Congregation and, following tradition, was given the name Philip, which he maintained for the remainder of his life. In the Brothers' community he was called Brother Philip. After a brief training period in the Novitiate at North Richmond Street in Dublin, he was assigned on November 3, 1858 to the prestigious North Monastery School (usually called "North Mon" by the Brothers) and the Brothers' community in Cork City. This assignment turned out to be very important, if not vital, in his interests and the development of the submarine. At the North Monastery School, he met and came under the influence of Brother James Dominic Burke. Brother Burke had a great reputation as a science teacher and the founder of vocational training in Ireland. Up to this time the schools in Ireland concentrated upon reading, writing and arithmetic. Brother Burke was at this time demonstrating the powers of electricity in underwater propulsion at public gatherings and at the school. He was soon conducting demonstrations of a model torpedo destroying a vessel anchored in a large tub of water. Tradition informs us that, at the North Monastery, Holland prepared designs, drawings, and specifications for a submarine. In addition, legend informs us that Brother Burke constructed a model in wood for him. This seems likely, since the Burke family for generations was noted cabinet makers and wood-carvers.

ABSENCE FROM THE CONGREGATION

Holland did experience a serious failing at the Cork North Monastery School. Apparently, as a result of his preoccupation with inventions and improvements in mechanics, he was not a very successful teacher of the ordinary subjects. He found teaching such subjects as reading, writing, and arithmetic very boring and dull, whereas he loved to instruct the students in drawing, science, and music. As a result, early in 1860 he was changed to the Christian Brothers School in Armagh. It was hoped that his teaching basic subjects would improve in a smaller school. He must have missed the atmosphere of the school and the Brothers' community in Cork. Added to these conditions was the fact

Photo:
A view of the harbor on Liscannor Bay taken in the 1880s. The harbor was developed in the late 1820s and was used as a base for shipping and commercial fishing. It now also supports recreational fishing. The town of Liscannor is on the northern coast of the Bay and has a visitor's center devoted to Holland and his accomplishments. Courtesy of County Clare Library.

that he never was very robust and possessed a nervous disposition. As a result, he soon fell ill. On July 14, 1860 he was directed to return to the novitiate in Dublin, where he could receive proper treatment for a growing sore on his neck. A surgeon diagnosed him with scrofula and treated him for this affliction. He soon recovered and on August 9, 1860 he returned to Armagh. In early 1861, Holland was changed to the school and community in Maryborough (now Portlaoise).

Photo:
A class early in the last century in the chemistry laboratory at St. Joseph's School in Ennistymon, Co. Clare. Holland began his secondary education at St. Joseph's, where he may have first met Brother Bernard O'Brien (a "scientific man") who was to have a strong influence on him. Holland's interest in science and technology began early and continued throughout his life. Courtesy of County Clare Library.

But the scrofula flared up again, and in December of 1861 he was advised to take a leave of absence from the Congregation. This was a severe setback for him, since Holland had developed a deep affection for the life of an Irish Christian Brother.

He lived for time in Cork with his aunt, who was well-to-do. There is a strong traditional belief that Holland taught for a time at St. Brigid's Well national school, near Liscannor, County Clare. It is possible that he visited his birthplace and successfully applied for a temporary position as an untrained assistant teacher in order to make a living.

During his leave of absence from the Christian Bothers, an important event occurred in the United States during the American Civil War. On March 9, 1862 there was a naval battle between the Confederate ship, *Merrimac*, and the *U.S.S. Monitor*. Holland read about the engagement between these two ironclad vessels. (The *Monitor* also had a unique revolving turret.) The battle lasted four hours, but neither ship could destroy or seriously damage the other. This battle marked the first engagement between two armored vessels and was a turning point in naval warfare. Holland later commented in a newspaper article that the time for wooden ships was coming to an end and that the future of naval warfare rested in ironclad vessels.

During these months outside the Congregation, Holland's heart rested with his beloved Irish Christian Brothers. In September, 1862 he was readmitted to the order and returned to the Dublin Novitiate. After a brief period of training, he was transferred to the Christian Brothers' school in Enniscorthy, County Wexford, where he spent the next three years. There is no mention of any sickness during this time, and he made annual vows for each of these three years. A Brother Sergius Kelly, who taught at Enniscorthy in the early 1900s, noted that he had heard that Holland taught physiography (the science of physical geography) at the school and was accustomed to take his students on fieldtrips to the local mill where he demonstrated the power of water.

Around this time, while watching and studying the great water wheel in the local mill, Holland began to think about flying machines. He reported in his own publication, "How to Fly as a Bird," that his first design of a flying machine was made in 1863, shortly before he began studying the construction of submarines. His thoughts about flying may be traced to his early years on the Atlantic coast in Liscannor where he could see and witness the flight of land birds and waterfowl in great abundance. It is not surprising that the flights of these birds aroused his interest and later prompted him to seek explanations. He wondered about what kept these birds flying. His major work on flying machines was part of a different period in his life, but the beginning can be traced to Liscannor and St. Joseph's School in Ennistymon. His attention to flying machines indicates his great interest in the various aspects of invention and mechanics.

In 1865 Holland was transferred to the Christian Brothers' School in Drogheda, where he was to spend the next four years. Drogheda was an active seaport on the River Boyne north of Dublin. Here he made efforts to improve his teaching methods, and he was among the pioneers in Ireland to offer singing courses by the Tonic Solfa method.[3] Besides singing, he used the knowledge received from Brother Burke and

taught natural philosophy, properties of bodies, mechanics, and mensuration. He constructed a mechanical duck which could walk about the grounds and when put into water could swim, dive, and come up to the surface. His former Drogheda students were fascinated by him and his knowledge of science. They often later reminisced on how he could keep them interested for many hours discussing and demonstrating mechanical objects.

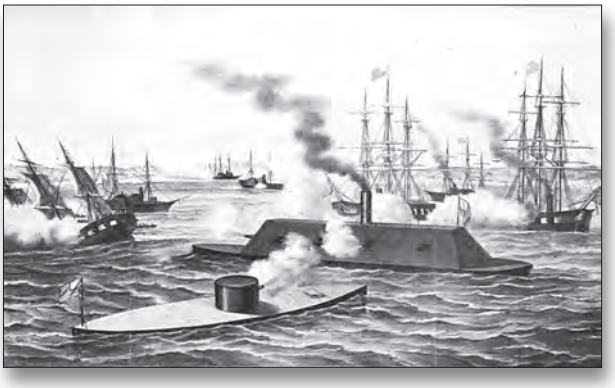

Illustration: *A depiction of what is known as the 1862 battle between the* Monitor *and the* Merrimac *in Hampton Roads during the American Civil War. The battle received worldwide attention because it was the first encounter between ironclad vessels in wartime conditions, and marked the transition in naval warfare away from reliance on wooden ships—a point noted by John Holland. The* U.S.S. Monitor *had been built in Greenpoint, Brooklyn, in 101 days. The* Merrimac*, originally built by the Union, was captured by Confederate forces, fitted with iron plating, and re-named the* C.S.S. Virginia *before its encounter with* Monitor. *Courtesy of Library of Congress.*

INTERESTS OLD AND NEW IN DUNDALK

On July 3, 1869, Holland was transferred from Drogheda to the Christian Brothers' school in Dundalk, south of Dublin. He was fondly remembered by many of the students in that school for his knowledge, teaching ability, and for pleasing disposition. Holland also had a great interest in drawing and taught mechanical drawing, in which many of his students excelled. One was Valentine Wynne, who later established a very successful building business. This gentleman always attributed his success to the inspiration and Holland's teaching. Holland continued to have a great love of music and was the first teacher of the Dundalk Boys' Choir, whose fame spread throughout Ireland. The Choir was established in September, 1869, and on Easter Sunday of 1870 they sang a High Mass in four parts in the Church of St. Patrick, which performance was completed with a most memorable rendition of Handel's *Hallelujah Chorus*. One pupil, Tom Parkes, later became an organist in Dundalk and achieved great fame as a choirmaster.[4]

And in Dundalk, Holland first seriously spent time thinking about submarines and sketching the necessary principles in his mind. The story was reported by Holland himself in the *Evening Star* newspaper.[5] He had been forced to take time from teaching because his health was again failing, and with no duties to occupy himself, he started to think seriously about the submarine. At first he thought submarines were impossible, that they could not be controlled and would sink. As a scientist, however, he determined that it was incorrect to condemn a notion without sensible thought and investigation. After some thought, he found the solution. If the weight of a boat and its contents were equal to the weight of the water it displaced, the boat would not sink. In addition, he concluded that a slight force could propel the boat in any direction, up or down or horizontally. The motion of the boat could be controlled by ordinary rudders. According to local tradition in Dundalk, he constructed a clock-driven model submarine of iron and experimented with it in a large tub filled with water.

However, in 1872 a significant interruption in Holland's life occurred. A Brother McDonnell, assistant to the Congregation's superior general, was conducting a crusade for what he considered highly efficient schools. And in this campaign he hurt the feelings of some Brothers who possessed rather timid personalities. Holland was one of those Brothers. At the same time, Holland was experiencing bad health, the result of his many activities at Dundalk. He had periods of tiredness, lost hair at his temples, and lost a considerable weight. As a result, he declined to make perpetual vows at Christmas, 1872, and sailed for America, by way of Liverpool, on May 26, 1873. His mother and two brothers had preceded him and were living in Untied States. Holland sailed to the United States with a thorough grounding in the physical sciences and a considerable knowledge of draftsmanship. Most important, he carried the memory of living with Brother James Dominic Burke, a most inspiring, knowledgeable teacher in the sciences and a man who was widely admired.

HOLLAND IN AMERICA

Holland sailed as a steerage passenger with few assets and arrived in Boston in November,

1873. Among the few possessions he carried were his first drawings of a submarine. Soon after arriving in Boston, he slipped on the ice, broke his leg and was laid up for some three months. During this time he began to think about the designs he had made for a submarine. A successful search for them among his possessions was made by a friend. After studying the designs, he concluded they were sound, but he was not in a financial position to build a prototype. To make a living he was able to secure a teaching position at St. John's School in Paterson, New Jersey, a school under direction of the French Christian Brothers. Holland remained at this school until 1878, when he retired to devote his time to development of the submarine. (In 1875 he had submitted to the United States Navy his designs for the submarine, but they were dismissed as unworkable. Through his brother, Robert, the Fenian Brotherhood, formed in 1858 to promote Irish Independence from Great Britain, became interested in his submarine plans. This organization supported Holland and his plans, which enabled him to resign from his teaching position.) The American press, however, generally viewed his efforts with amusement.

In 1881 the *Fenian Ram,* one of Holland's earliest submarines was launched. When the Fenians decided to cease supporting John Philip Holland he continued to make improvements in his designs of the submarine. On May 17, 1897 he successfully launched the first submarine with power to run submerged for a considerable distance. This vessel used electric motors when submerged and gasoline engines on the surface. After thorough testing, the United States Navy purchased the vessel. On April 11, 1900 it was commissioned as the *U.S.S. Holland*. Six additional vessels of this type were ordered and built at the Crescent Shipyard in Elizabeth, New Jersey. During these developments, the Electric Boat Company had been founded on February 7, 1899, and the era of modern submarines had been started.

John Philip Holland spent some fifty-six of his seventy-three years developing submarines and died on August 12, 1914 in Newark, New Jersey. He was interred at the Holy Sepulchre Cemetery in Totowa, New Jersey.

SUBMARINES DESIGNED BY JOHN PHILIP HOLLAND

Holland I: A small unarmed submersible that is now on display at the Paterson Museum.

Holland II: (also named the *Fenian Ram*): Built for the Irish revolutionaries and now on display at the Paterson, N.J. Museum. Launched in 1881.

Holland III: A smaller version of the *Fenian Ram* used for navigation tests.

Holland IV: (known as the *Zalinski*): An experimental submarine financed by U.S. Army Lieutenant Edmund Zalinski.

Holland V: (named *Plunger*): A prototype used to demonstrate the potential of submarines for naval warfare.

Holland VI: The first modern submarine in the United States Navy. Launched in 1897, it was acquired by the U.S. Navy in 1900 and commissioned as the *U.S.S. Holland.*

H.M.S. Holland: The first modern submarine commissioned in the British Navy. It was launched in 1901.

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Endnotes

1 The penal laws were passed between 1691 and 1770 by the British controlled Irish House of Parliament. They were designed to penalize Roman Catholics and Protestant dissenters, forcing them to accept religious beliefs and practices supported by the state. Under the laws, for example, Catholics and any dissenters from Anglicanism were forbidden formal education among many other prohibitions. There were some twenty- four penal laws passed over the years. A member of the British House of Lords, the well-known Edmund Burke, a great humanitarian in his own right, once described the penal laws as "one of the most frightful engines of oppression that the perverted ingenuity of man could conceive. They were fitted for the oppression, impoverishment and degradation of a people and the debasement in them of human nature itself."

2 The Irish are noted for the words or phrases they develop and use for various personal characteristics or incidents. Holland was gifted with what the Irish refer to as "the power of learning." The knowledge that he developed and possessed was far beyond that typical of someone the same age. He could use his knowledge and desire to learn to assist others to achieve the potential allotted to them by their Creator. Being a dedicated student of the Irish Christian Brothers ("Irish" has since been dropped because of the present diversity of the Congregation), I have no doubt that the Brothers suggested to him that he give consideration to joining the Congregation. John P. Holland applied, and he was accepted into the Congregation of Irish Christian Brothers on June 15, 1858.

To present Holland's story, it is important to provide information on the founding, mission, and development of this Congregation. The order was founded in 1802 by Blessed Edmund Ignatius Rice (1762–1844). He was declared "Blessed" by Pope John Paul II in 1996. Edmund Rice was a successful merchant in the port City of Waterford in County Waterford. The British government did not use the penal laws to restrict Rice in the merchant trade although he was a fervent practicing Catholic. The British were anxious to develop a world-wide empire, and a merchant would play an important role in this development.

Upon the death of his wife in 1789, Edmund Rice began to think of forsaking his very successful career as a merchant and help the poor and destitute, those individuals on the margins. He was especially inspired to establish a teaching congregation to help the homeless and destitute boys that he witnessed on the Waterford docks. He desired to provide to them and other Irish youths the best life could provide for them. He attracted other men with a similar desire, and thus began the Congregation of Irish Christian Brothers. Edmund Rice requested of his Brothers that they incorporate the following values into their educational philosophy and classroom teaching:

1) Assist the students to discover their God-given talents;

2) Help the students to develop these talents;

3) Send the students into the world to use these talents and especially to assist those people on the margins.

3 The Tonic Solfa singing method is a pedagogical technique for teaching sight singing invented by Sarah Ann Gloves (1785–1867) of Norwich, England. The usual simple method is for the pupils to sing "do, re, mi, fa, sol, la, ti, do" in any key. Anyone who has seen the Broadway musical "The Sound of Music" by Richard Rogers and Oscar Hammerstein will remember Maria leading the Trapp Family children in singing "Do, Re, Mi." This is a fine example of the Tonic Solfa method that Holland used in introducing into Ireland.

4 While at Dundalk, Holland also engaged in beautifying the grounds of the Monastery. Students competed with each other in securing an opportunity to assist him. In front of the Monastery he constructed a wooden replica of the famous Rock of Cashel, which people admired for many years. During the same period, water had to be pumped by hand from a well to the top of the Brothers' house; Holland constructed a windmill which eliminated the labor and proved a great asset to the Brothers. Until at least 1986, a sundial constructed by him remained in the Monastery garden, and in the Chapel a glass pane designed and produced by Holland represented the Sacred Heart of Jesus.

5 The story of his emerging interest in submarines is reported by Holland in the American newspaper, *The Evening Star,* January 6, 1900, p.15.