The Remarkable W.B. O'Shaughnessy

By Michael R. Aldrich, Ph.D.

Many medical marijuana users know that Dr. William Brooke O'Shaughnessy (1809-1889) introduced cannabis to modern Western medicine, but know little else of this Irishman's extraordinary life. In addition to his pioneering work on cannabis therapy, O'Shaughnessy invented the modern treatment for cholera, laid the first telegraph system in Asia, and made significant contributions to pharmacology, chemistry, drug clinical trials, science education, and underwater engineering. There has never been a full biography of him, yet his genius shines through 19th-century science in all those fields.

O'Shaughnessy was born in Limerick in 1809 (or late 1808), and displayed such intelligence during his schooling that he was admitted to the best medical school in the world at the University of Edinburgh in 1827 —quite unusual for a poor Irish lad barely 18 years old. At Edinburgh he studied medicine, chemistry, and forensic toxicology with Sir Robert Christison, and anatomy with Professor Robert Knox, dissecting cadavers supplied by the infamous graverobbers Burke and Hare.

Treatment for Cholera, 1831

Graduating MD from the University of Edinburgh in 1829, O'Shaughnessy tutored chemistry students for a year, then moved to London, but was unable to get a license to practice medicine there. So he set up his own forensic toxicology lab, doing chemical analyses of blood, feces, urine and tissue for doctors, hospitals, and the courts. (Need work? Invent your own CSI lab.)

An outbreak of cholera in 1831, possibly introduced to England by soldiers returning from India, led O'Shaughnessy to investigate the blood of cholera victims. At the time it was not known what caused cholera, an insidious disease that kills by dehydration due to uncontrollable diarrhea and vomiting.

(*Vibrio cholerae* was first isolated in 1883 by the German scientist Robert Koch. Its primary vector of transmission is drinking sewage-contaminated water, as shown by John Snow in 1849. Snow plotted the incidence of cholera in London on a map, discovered that it clustered around public water pumps, and when he famously broke the handle off the Broad Street pump, the epidemic in that neighborhood subsided. It was the beginning of modern epidemiology.)

On December 29, 1831, O'Shaughnessy sent to *The Lancet* "one of the shortest and yet most significant letters ever sent to the journal" (Coakley 1992:151), presenting the results of his blood analyses. He showed that "the copious diarrhoea of cholera leads to dehydration, electrolytic depletion, acidosis and nitrogen retention," and that "treatment must depend on intravenous replacement of the deficient salt and water" (Coakley: 152).

In January, 1832, O'Shaughnessy published the details of his discovery, and doctors began testing his suggestion—successfully saving the lives of nearly half their patients (Moon 1967, Gorman 1971). Intravenous electrolyte-replacement fluid therapy is still the modern treatment for cholera, using the same principle as contemporary athletes who drink Gatorade to prevent dehydration. Moreover it was one of the first experiments in treatment by i.v. injection, before the invention of the hypodermic needle. It was the 19th-century equivalent of finding a cure for AIDS without knowing what HIV was.

Off to India, 1833

O'Shaughnessy's cholera findings came to the attention of Sir William Russell, M.D., a British physician who had returned from Calcutta to form the Cholera Commission in London. He obtained for O'Shaughnessy a commission as an assistant surgeon in the East India Company —a plum assignment for English aristocrats, much less a poor Irishman. O'Shaughnessy arrived in Calcutta in 1833.

Posted to various medical units of the Bengal Army, O'Shaughnessy moved around a lot, learned the rudiments of several native languages, made friends with local Ayurvedic and Islamic physicians, and helped found the Calcutta Medical College, where he became Professor of Chemistry and Materia Medica.

He was appointed first assistant to the opium agent at Behar and later chemical examiner for the Raj. In 1836 he married Margaret O'Shaughnessy and also arranged for his cousin, Richard O'Shaughnessy, to join him at the college. He wrote A Manual of Chemistry, in English, for his Indian students —one of the earliest textbooks of biochemistry— and did experiments on electromagnetism and on the constituents of Indian medical plants, starting with opium. Almost as an aside, he invented a new way of extracting acids from charcoal to make gunpowder-a practical discovery much appreciated by the military.

In 1838 O'Shaughnessy discovered Narcotine (noscapine), a previously unknown alkaloid in opium, visited an opium den to see for himself how it was prepared, and wrote an elegant paper on "cases of real and suspected poisoning" in India in 1839. Then he widened his research into the Indian materia medica to demonstrate "the valuable therapeutic properties of some Indian vegetable remedies" ... (and) "to construct a pharmacopoeia for the poor to whom the costly remedies of Europe and South America are inaccessible" (O'Shaughnessy 1838:13).

O'Shaughnessy's work over the next few years produced the first textbooks of Indian medicinal plants in English, the *Bengal Dispensatory* (1841-42) and the *Bengal Pharmacopoeia* (1844).

All three of O'Shaughnessy's books during this period were magnificent early examples of teaching science to students for whom English was a foreign language. Having textbooks in English overcame the barriers imposed by the 360 different languages spoken in India, making biochemistry and Indian medical lore available in schools and libraries throughout the subcontinent —indeed, throughout the Empire. This type of education, imperialist to the core, is one reason that English is spoken all over the world today.

This essay is dedicated to Tod H. Mikuriya, M.D., who turned me on to the works of W. B. O'Shaughnessy more than 30 years ago, and changed my life. —M.R.A.

Introduction of Cannabis, 1839

Although cannabis was mentioned occasionally by early botanists and explorers describing their travels, little was actually known about cannabis therapy in Europe and America until O'Shaugh-nessy read a paper to a group of students and scholars of the Medical and Physical Society of Calcutta in 1839. The 40-page paper was a model of modern pharmaceutical research. It

SIR WILLIAM BROOKE O'SHAUGHNESSY

included a thorough review of the history of cannabis medical uses by Ayurvedic and Persian physicians in India and the Middle East-some of whom (his local sources) were doubtless in the room.

O'Shaughnessy conducted the first clinical trials of cannabis preparations, first with safety experiments on mice, dogs, rabbits and cats, then by giving extracts and tinctures (of his own devising, based on native recipes) to some of his patients. O'Shaughnessy presented concise case studies of patients suffering from rheumatism, hydrophobia, cholera, and tetanus, as well as a 40-day-old baby with convulsions, who responded well to cannabis therapy, leaping from near death to "the enjoyment of robust health" in a few days.

O'Shaughnessy appended a paper by his cousin Richard on a case of tetanus cured by a cannabis preparation. He also warned that a peculiar form of delirium may be "occasioned by continual Hemp inebriation," and cautioned doctors to start with low doses. O'Shaughnessy concludes that these clinical studies have "led me to the belief that in Hemp the profession has gained an anti-convulsive remedy of the greatest value." (O'Shaughnessy 1839a).

He brought quantities of hemp for the Pharmaceutical Society and specimens of Cannabis Indica back to England.

Exhausted from preparing three large books, and from his double duties as professor and chemical examiner, O'Shaughnessy took a "sick leave" furlough back to England in 1841. He brought quantities of hemp for the Pharmaceutical Society and specimens of Cannabis Indica and Nux vomica back to the Royal Botanical Gardens at Kew, and shepherded the reprints of his article in the *Provincial Medical Journal*. Chemists vied with each other to make potent tinctures and extracts with O'Shaughnessy's recipes, struggling to identify and isolate the active principles of the drug —a goal not achieved until 1964 (Gaoni & Mechoulam 1964).

Sir J. Russell Reynolds, M.D., personal physician to Queen Victoria, recommended it to his patients for menstrual cramps (Reynolds 1890), and O'Shaughnessy was elected a Fellow of the Royal Society in 1843.

Queen Victoria

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O'Shaughnessy's paper in the *Provincial Medical Journal* (1843) caused a sensation when it became widely available in England. He had introduced a wonder drug to treat some of the most awful medical conditions of the 19th century. Physicians throughout Europe and America tried cannabis for a huge variety of illnesses. As Dr. Lester Grinspoon noted in Marihuana Reconsidered (1971:15), "Between 1839 and 1900 more than one hundred articles appeared in scientific journals describing the medicinal properties of the plant."

A similar thing happened when Dr. Tod Mikuriya reprinted O'Shaughnessy's paper as the lead article in Marijuana: Medical Papers 1839-1972 (1973) —it reinvigorated medical interest in the drug and sparked hundreds more articles on cannabis therapy into the 21st century.

The Indian Telegraph

O'Shaughnessy had done experiments in electric telegraphy as early as 1838, without exciting much government interest. Nevertheless, his carrying of electric signals under Calcutta's River Hooghly in insulated iron wires in 1838 was the first successful underwater telegraphy in the world. O'Shaughnessy doubtless knew of Samuel F. B. Morse's successful transmission ("What hath God wrought?") in the United States in 1844, but his work was completely independent of Morse's.

When O'Shaughnessy returned to India in 1844, he effectively changed careers. Officially, he was assayist for the Mint, in charge of unifying India's dozens of different currencies with standard coinage. He also tackled a tricky problem in engineering: how to lay out telegraph lines in a country frequently ravaged by electrical storms, a land of treacherous rivers and bays, snake-infested swamps, wild jungles and arid plains, many languages, religions and cultures, dangerous assassins (the Thugs) and insurrectionist armies —Sikh, Muslim, and Hindu— fighting desperately to keep the British from taking their lands.

O'Shaughnessy finally found his champion in Lord Dalhousie —James A.B. Ramsey, tenth Earl and first Marquess of Dalhousie (1812-1860) —who arrived as governor-general of India in 1848. Dalhousie is remembered as the man who expanded British control of India to practically its modern borders through military campaigns in the Punjab, Oudh, Kashmir, and Burma, and by annexing the lands of rajas who had no male heirs. He is even more famous, however, as the governor-general who

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built the civil infrastructure of modern India —the railroads, telegraph, public education (in English), cheap postage, irrigation and canals, suppression of thuggee and suttee (wives burning themselves on their husband's funeral pyre), and other programs to unite the country under the Raj (Arnold 1862/1865).

Dalhousie learned of O'Shaughnessy's idea of stringing the telegraph across India and instantly espoused it as his own. The Dictionary of National Biography says, "The introduction of the electric telegraph was Dalhousie's idea, and was carried out entirely upon his recommendation." He named O'Shaugh-nessy the first superintendent (later director-general) of telegraphy, and provided funding in 1850-52 for O'Shaugh-nessy to try an experimental line between Alipore (south of Calcutta) and Diamond Harbor. This first line was 27 miles long at a time when the only telegraph line in England was just 18 miles long (Gorman 1971).

The real challenge for O'Shaughnessy was to invent a telegraph that did not rely on copper wires, which were used in England and America but were too fragile for use in India. He had learned this in 1838, when fierce thunderstorms tore up his copper lines. Instead, he substituted iron rods 3/8 of an inch in diameter, carried underground in cement and overground mounted on bamboo poles. These were practically immune from damage by the elements, and "are not injured, although passengers, bullocks, buffaloes and elephants trample on them." (O'Shaughnessy 1852: 5.)

Moreover, the overground lines required no insulation: "The moment the rain falls we are almost safe, as the lightning which strikes the line escapes by the wet posts to the ground." He supervised the laying of seven routes in Bengal— including re-crossing the turbulent Hooghly with this new system— and in 1852 triumphantly gave Dalhousie his official Report on the Electric Telegraph between Calcutta and Kedgeree.

Dalhousie's support

Dalhousie understood it immediately —a drastic decrease in the time it took for British military outposts to communicate with each other, as well as the potential for colonial business and trade. He sent O'Shaughnessy back to England for supplies, and ordered British officers to help him pursue his dream —the construction of lines to Agra, Bombay, the Punjab, and Madras.

While in England, O'Shaughnessy may have gone on the one-day (May 22, 1853) voyage of the HMS William Hutt, which laid a submarine telegraph linking Ireland with Scotland. With Dalhousie's support, O'Shaughnessy won Company approval for the project, trained 60 officers assigned to help him, wrote an instruction manual for native workers, sailed back to India, and commenced construction of the telegraph in November, 1853.

Only four months later, Dalhousie wrote: "An event has occurred which is of infinite public moment, and which almost deserves to be regarded as historical. In November last we began to lay the electric telegraph. Five days ago I received a message from Agra —800 miles distant— transmitted in one hour and 50 minutes! ...In a short time we shall complete the line to Bombay, and thus in a few months we shall have reduced the period of communication with England from 35 to 26 days. The results of this in peace or war outrun calculation." (Baird 1910: 293.)

In January, 1855 Dalhousie added: "Yesterday the Bengal railway was opened for 122 miles... Two days before, the electric telegraph was opened to the public from Calcutta to Bombay, to Madras, and to Attock on the Indus. Fifteen months ago not a yard of this was laid, or a signaler trained. Now we have 3050 miles opened. The communication between Calcutta and Madras, direct by land, a month ago, took 12 days— yesterday a communication was made, round by Bombay, in two hours. Again, I ask, are we such slow coaches out here?" (Baird 1910: 336.)

Another 1,000 miles were laid in 1855. It was truly an amazing feat. In less than two years, O'Shaughnessy had strung the first telegraph system in Asia, using native labor and materials, which cut the speed of communications around India from weeks to hours. In addition to bamboo posts, O'Shaughnessy used stone obelisks to carry the heavy rods over rugged terrain, and invented an insulation system using a cement of rosin and sand wrapped in pitched yarn for the underwater sections.

Copper wires were used where feasible, and O'Shaughnessy devised simple sending and receiving apparatus that native signalers —mostly teenagers— could employ with ease. Unlike his 1838 experiments, which conveyed messages by sending a shock through the wire into the receiver's hand, O'Shaughnessy's signals activated a pointer that alternated right or left depending on the direction of the current. He later (1857) invented a cryptographic code for transmission of secret messages (military or business).

O'Shaughnessy's genius lay in designing a system that was crude, cheap, easy to learn, and appropriate for the immense distances it had to span.

Finally, based on his years of experience with native signalers, O'Shaughnessy insisted that Morse's instruments be adopted in India, much to the distress of Cooke and Wheatstone, who had a monopoly on telegraph services in England. As Professor Mel Gorman of the University of San Francisco has pointed out, "It is impossible to imagine the foundation of a telegraph in mid-19th-century India with the complicated and expensive instruments of the Cooke-Wheatstone type." (Gorman 1971:592.) O'Shaughnessy's genius lay in designing a system that was crude, cheap, easy to learn, and appropriate for the immense distances it had to span throughout the subcontinent.

Neither O'Shaughnessy nor Dalhousie could have done it alone. O'Shaughnessy had the technical know-how, and Dalhousie the political clout, to get the project funded by the Crown. Together, they built 4,000 miles of homemade telegraph in less than two years. The introduction of the telegraph, an advanced Western technology into a colonial environment, was in some sense the opposite of his introduction of cannabis into Western medicine. O'Shaughnessy was adept at relaying scientific information in both directions, and therein lies his glory.

O'Shaughnessy was adept at relaying scientific information in both directions, and therein lies his glory.

Dalhousie, severely ill, was forced to return to England in 1855, and in the first letter he wrote when he landed at Southampton in 1856, he notes that one officer he recommended for knighthood had already been honored by the Queen, and "I am now going to fight for O'Shaughnessy (Director-General of Telegraphs) and Stevenson (built the first railway)." As a result, O'Shaughnessy was knighted by Queen Victoria in 1856.

While in England being knighted (March 1856 to December 1857), O'Shaughnessy met Samuel F. B. Morse and many other telegraph experts such as Charles Tilson Bright, who had led the 1853 expedition to lay the telegraph between Ireland and Scotland. O'Shaughnessy and Morse "became good friends in London in 1856 and on the 1857 Atlantic Cable expedition" (Gorman 1971:593). This was the voyage of the HMS Agamemnon and the USS Niagara, the first attempt to lay telegraph across the Atlantic, which ended disastrously when the cable broke after only four days at sea.

The telegraph proved its worth to the Crown in 1857 during the Sepoy Mutiny, when hundreds of native soldiers rebelled against their British officers (allegedly because beef and pig fat were used to grease their cartridges) and captured the British posts at Calcutta and Delhi. A message got through to Army units stationed north and south of Delhi before the telegraph lines were cut, alerting the Raj to the uprising and enabling them to send troops quickly to quell the mutiny. Sir John Lawrence, commander of British forces in the Punjab, later wrote a poem, "The Telegraph Saved India" (for the British Empire).

Unsolved Mysteries

O'Shaughnessy returned to India to supervise the rebuilding of the telegraph lines destroyed by the mutineers and to train his successors. He departed India for London for the last time in 1860. There he suddenly divorced his wife, married another (Julia Greenly), changed his name to Sir William O'Shaughnessy Brooke —perhaps to gain an inheritance from the Brooke side of his family — and dropped out of sight. There are many mysteries surrounding the last years of his life; we know nothing about what he actually did for 29 years before his death in 1889.

Dr. Mikuriya, following a lead that O'Shaughnessy Brooke was on the board of the Indo-European Telegraph Company, thinks that he may have traveled for them as an expert on laying lines in challenging terrains, particularly underwater. His friend Charles T. Bright was in charge of the Indo-European Telegraph to connect India to Europe through Turkey, and O'Shaughnessy's stay in England in 1857 had been extended pending arrangements for a line to India through Asiatic Turkey. One can only imagine the conversations between two geniuses —O'Shaughnessy and Bright— who fast-forwarded the 19th century into the 20th-century world of almost instant intercontinental communications, a feat only surpassed by the global Internet of the 21st century.

His gravestone in Southsea (Portsmouth, England) reads simply: "In Loving Memory of Sir Wm. O'S. Brooke, died January 8, 1889 in his 80th year."

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