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"The Life and Times of Martha Annie Whiteley, 1910-1920"
by
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You who did your duty and often distinguished yourselves in two world wars, pray listen to the tale of one who did nothing heroic and can promise you only a moment of nostalgic diversion. The scene extends from the West End of London to some country fields which have since become the Wembley football stadium. The period was 1910 to 1919.

The Reverend Raven and another tutor, Mr. Campbell Partridge, a couple of odd birds who had instructed me in arithmetic, Latin, and French through five years of invalidism released me to my parents with suggestions for a cram course before I could possibly enter college. "My French," quoth the Raven, "was hopeless. Poulet is French for chicken not chacun--good god, boy, where did you get that?" I explained that Father always enquired "voulez vous de chacun" when carving the Sunday fowl with its roast potatoes.

My passion for Engineering was transmuted by my parents into a less arduous Chemistry, since my heart would never let me lift heavy weights (what did they think engineers did?), and their selection of a college narrowed down to Cambridge University or the Royal College of Science in London. The choice was the London College where the fees were £36-0-0 a year, and cheap student lodgings were available nearby.

First, let me tell you about the cram school--Klemin Schmidt's Academy for the Backward Sons of Gentlemen. A more pathetic collection of dropouts, dagos, and unfortunates you seldom saw; Gilbert and Sullivan should have caricatured them. One handsome but debilitated lady-chaser was such a bundle of nerves that he would threaten to kill you in voluble Roumanian if you so much as brushed his sleeve in wending through the crowded classroom. The outfit occupied the upper floors of a grim mansion, one of hundreds, solidly connected

and stretching as far as you could see on the south side of Cromwell Road. When the sun occasionally flooded the classrooms, the mob converged on the windows with hand mirrors to flash beams into the bedrooms of the houses across the street where the young ladies would be preparing for their next night's assay at a theatrical career; window shades or curtains were an unaffordable luxury. Into this menage I was catapulted with only the innocence of ignorance to guide me. Two protectors appeared, one being the young, undernourished head tutor. I remember, while he was helping me, using a newly acquired blasphemy without knowing what it meant and pronouncing it wrong. "Oh dear, oh dear!" he sighed, and a tear fell on my notebook.

My other champion was a tall, magnificent Scandinavian, vonArmholtz--handsome as a Greek God is the usual cliché--and a man of decency. We roomed at Mrs. O'Shaughnessy's boarding house. Mrs. O was, to use another cliché, a (real) "lady in reduced circumstances" and a faded beauty at that. She suffered from a nervous tremor and would preside at breakfast and dinner but allow a lodger to carve the roast. Her method of dispensing tea filled one with awe but never laughter. The cups were packed closely together on a tin tray while she bobbed the teapot over them. They were then placed on dry saucers by the person on her left and passed down the table.

Armholtz and I occupied a large bedroom in the attic near an oversize bathroom, evidently converted from a boxroom. The "pre-Sears" plumbing was installed--by foresight or sad experience--on a galvanized iron floor with the metal carried a couple of inches up the walls. Visualize a long bath tub against one side with a built-in towel cabinet at one end and at the other end an ample "john" serviced by a tank near the ceiling with a chain and handle labelled, "Pull sharply, count two and let go." The real problem was the hot water. A primitive gas-fired geyser supplied it at a trickle, taking

ten minutes for minimum depth, twenty for a civilized soak, and perhaps 40 minutes to overflow the tub. It was our custom twice a week to light the geyser and stroll down Gloucester Road to a candy store for a bar of chocolate and be back in the bathroom, disrobed within 15 minutes. Thus, the allowable weekly bath, one per person, was organized. Midweek, I would take up position on the john while Armholtz negotiated the bath, and weekends john would assume the seat of authority while I bathed. If we arrived back late, the bath would be fuller than usual, and Armholtz would rise on the towel cabinet, leap into the tub, knees and shoulders high, splashing water to the ceiling and sending most of the contents to the floor drain. Great times, unmonitored by the folks below. The unhappy pay off, however, was a monumental bill rendered after vacation and honored by Armholtz--for a new stair carpet and replacement of telephone wires (we had telephones in those days) damaged by the seepage. Armholtz died suddenly from septic pneumonia, and I departed soon after from O'Shaughnessy and Klemen Schmidt to become a freshman at the R.C.S.

The Royal College of Science was less an establishment than the embodiment of an idea. From earlier beginnings, it had moved to Price Consort Road in South Kensington before the Albert Hall was built and under Prof. Hoffman had become the center of British mathematics and a stronghold of Chemistry in London. In 1912 the staff was again moved to a brand new building on Imperial Institute Road. This was the R.C.S. that I joined a year later--a magnificent stone-faced pile, one-half story below ground and two and a half stories above the street. You went into a marble paved hall and stair well from which Physics extended to the right and Chemistry to the left. The decor was massive cream Doulton tile framing green-washed walls; business offices and the Rector's quarters projected beyond Chemistry. The Freshmen (first year students we called them) Chemistry laboratory rose from

the basement and towered three stories to a roof supported on tiled columns rising between the 36 workbenches which accommodated a class of 144 men. Demonstrators (associate professors to you) sat behind four opposing and imposing desks in the wings. Each workbench housed our lock-up cupboards and a set of reagents, common property of the four occupants. On a September afternoon in 1913, I found my way there, gaped at the ceiling, and then looked around for my bench. Fellows sauntered in, and soon I had met my three companions. We were a motley group with zero social graces or experience, and conversation lagged. I had spied a bottle of potassium chlorate among our chemicals and nearby a vial of magnesium turnings, which was a rarity in those days. I broke the silence with, "Let's make a flashlight." How such competence was acquired you will learn later. The trick was to mix the two powders using a sliver of paper so they wouldn't explode and then to set fire to the heaped mixture by throwing lighted matches at it. After a few tries there was a modest bang, a bright flash of light, and a column of smoke that curled to the ceiling and unfolded in a 30-year anticipation of an atom bomb. A tall, grave young man approached, "What are you doing?" "Fireworks, Sir," I answered; long pause. "Your name?"; name was written in notebook, pause, "your address?" more notebook, and the young man stalked away. I spent the first month at College in fear of reprimand, but nothing happened. Years later, I asked Eldridge, "Remember that flashlight episode, whom did you report me to? You scared me." "No one," he said, "it was my first year of teaching and I could think of nothing better to do than pretend to write your name on the back of my checkbook." An intimidating trick which I have since found most useful.

First year lectures by the head professor known irreverently as His Imperial Dryness, H. Brereton Baker, were famous. He was a remarkable little man with a massive black moustache, a diminutive figure but impressive presence.

Starting as a suburban schoolmaster, he had become a fellow of the Royal Society (England's highest accolade in Science) and in my time was President of the (London) Chemical Society. He made elementary science live for us, and I, because of a precocious knowledge born of sickbed reading with an absence of fundamentals and background science which regrettably I never repaired in later life, was soon his favorite. He would pose a question to the class and after the briefest pause say, "Never mind, you shall tell us, Hickman." I loved it all and lost it all later--due to world events but chiefly through crass bad manners.

The college year passed in a dream of scientific romance and personal emancipation. For the first long vacation in 1914, my "rich aunt" Fanny took Mother and me to Switzerland, St. Moritz in the Engadine. War clouds were gathering, and at the end of July, she brought us home in one of the last crowded trains to get through to Paris. Four days later, England declared war on Germany.

When college convened in September, a sprinkling of the more adventurous were absent having enlisted and gone off to training. The prediction was "Peace by Christmas, Germany licked by the British Navy." This was at first a war of traditional soldiery. Men in bright uniforms stood up to shoot and (in turn) were mowed down and the cavalry charged over their corpses. Colonels and generals totted up the dead-- "Nothing to worry about, less than a percent of potential man power--and by God, Sir, we've got the Navy!" Came the reverses of the Marne and the Somme, kahki replaced the colored tunics and muddy trenches the open field of battle. Peace by Christmas was a forgotten dream. Students began to enlist; classes shrank. Patriotic songs and skits filled the music halls, dear old ladies handed out white feathers of cowardice on street corners to any young man in mufti, and shortly there was conscription. I was a chubby boy with a high color and auburn hair and could soon have stuffed a

pillow with the white feathers I collected. When I reported for my military examination, I was armed with a certificate from the Harley Street specialist who had guided my recovery. Standing in a long line of nude inductees, I handed the paper to a sarcastic gentleman with a stethoscope. "How do I know you are telling the truth and this thing isn't a fake?" My reply, "Perhaps, Sir, you have difficulty in recognizing a gentleman without his clothes," ought to have sent me to K.P., but I got off with a token kick in the butt and the equivalent of a 4-F classification.

The war was now a war of attrition, and, because new weapons were needed, a war of engineers, but it did not yet involve Big Science. What the Lusitania did later to precipitate American involvement, the first German gas attack in 1915 did to chemists of the Allied countries, capaulted us into a frenzy of righteous activity and mortal fear. The antidote to chlorine gas was thought to be ammonia;--rush ammonia to the Front. But ammonia reacted to produce chloramines which were more deadly than the original chlorine. The solution was instead (literally) a "solution of photographic hypo"--at first just sprayed into the air and soon afterwards used to impregnate flannel hoods with eye holes and valves for expired air, which were issued to the trenches and pulled over the heads of the infantry.

There happened to be on each corridor at the Royal College the then latest invention in fire extinguishers, 50 gallon open vertical tanks mounted on wheels and equipped with push bars, hand pumps, and hoses. One person pushed whilst another manned the pump and pointed the nozzle. Why not send these out to the trenches, fill them with hypo, and clear the air of gas? A team was assembled under a distinguished Professor--Dr. Watson. Watson was mortally gassed, and we never again saw the others. In Professor Phillips department, experiments with absorbent charcoal continued day and night. Cherry pits, peach kernels,

cocoanut shells, chips of mahogany, you name it, were charred in the lab furnace and tested for ability to remove chlorine. As you may know, cocoanut charcoal soon outperformed the others, and the first primitive canister gas masks were born.

When my third year started (they were then three-year courses for the Bachelor's degree), there were insufficient male teachers for the third remnant of the physical rejects remaining in the class. The new subject for the year was organic chemistry, and the surviving teachers were Professor Jocelyn Thorpe, Chairman of the Department, who was forced to spend half time at the War Office and an austere but gracious lady, Martha Annie Whiteley, the heroine of this yarn.

Martha was a saintly woman, slender, an aquiline colorless blond, ageless and of indeterminant age. Dressed in a black skirt and white shirtwaist, she was a wizard in the laboratory and a stern disciplinarian and a fiend for tidyness. Later, when I became her assistant, I carried a towel or large duster under my left arm, and, if the smallest drop were spilt, would seize this with my right hand, mop the drop, and finish with a courtesy polish of the bench. In spite of what happened, we got on well together, and my crime became a precious jewel in her crown of accomplishment.

Martha was a natural victim or target for pranksters. Dangerous chemicals used to be stored in a large "real ice" refrigerator; there Martha deposited her milk bottle, butter, and daily lunch. Somebody spiked her butter with phenolphthalein (essence of ex-lax), and Martha retired to her estates for three weeks to return the ghost of her gossamer self. She bore no malice. Her donnybrook was the lecture platform. Precise, assuming background knowledge we did not have, dry as dust and utterly humorless, she trotted out one long chemical name after another without relating them to anything we could touch, see or smell. One simple aromatic compound, "phenytol," for some obscure reason sent thirty pimply youths

into gales of ribaldry and triggered a revolt. A post lecture conclave determined something should be done.

Here we must backtrack to a hot pre-war summer in my Aunt Alice's rose garden. Roses are profuse in England, and so are rosebugs. Aunt had a fascinating device, no longer on the market, for smoking-out rosebugs. It was a tin can with a cheap bellows fastened to the side. You rolled up a length of crinkly cardboard, of the kind bottles are wrapped in, and pushed the bundle into the can. You then lit the open end, put the lid on, and operated the bellows. Clouds of brown smoke issued from the nozzle at the other end, and this I was instructed to direct at the rosebugs--Aunt delighted to have me amused, out of mischief, and doing her a favor. In a few days not a bug survived (and in a month or so not a blossom, but that is another story).

This delightful episode, now discredited, left me with the seed, the latent spore, of an idea. In the post lecture conclave, the spore germinated. We would make a smoke bomb, place it under the back row seats, and attach a fuse to go off five minutes after the start of a lecture. I would make the bomb--out of corrugated cardboard soaked in nitrate solution and dried, afterwards smearing on a little crankcase oil. The bundle, as before, would be coiled in a tin can with holes drilled in one end and the lid tied tightly on to the other. Because of the nitrate, the device would be self-firing, without the aid of bellows. For a fuse, we soaked string in nitrate and determined that it would smoulder at about an inch a minute; we left six inches poking out of the can.

Just a harmless prank(!) we didn't want to cause a fire or explosion--so the canister was put in a bucket, while a second bucket and two large beakers full of water were stood nearby.

Again, I must digress, if you are to get the full picture. At that time a notorious Dr. Crippen had murdered his wife and

with his paramour--A miss LaNeve--had fled by ocean liner to America. Their names and the antics of Scotland Yard were on everyone's lips. It so happened that the attendant who presided with Martha at the lecture table was a wispy, undernourished little man with tobacco-colored moustachios waxed to two beautiful upturned tips. His name was Coppen, recently changed by popular acclaim to Dr. Crippen. He, Martha, and a half-filled theatre complete the scenario. The first six minutes of lecture passed without incident if the unnatural quiet of the audience can be so described, then ten minutes, half an hour, and it is now ten minutes to the hour.

It began without sound--the first sign was Martha's mouth which dropped open and stayed that way. Then there was a rushing noise towards the back benches, and turning we observed a stately grey column, like the trunk of a palm tree ascending to the ceiling, where it unfolded then swept down the walls and windows to plunge the room into darkness. Someone opened a window, and as the murk cleared, we witnessed the noble Crippen staggering towards the lecture table with a bucket of water in one hand and two bottles clutched to his chest, having just saved the College, he would presume, from arson and nitroglycerine.

All this happened just before final exams and the end of the academic year. I would be allowed to sit, to establish my rank in this diminutive class--but would not be given a diploma. "Aren't you ashamed of this mean trick; aren't you sorry?" grunted Thorpe during a painful interview. I remember answering, "How can you be sorry for something you've spent two weeks planning?"

Well, I left for home, unwanted by family or country in war or peace and sat with nothing to do. But not for long. Within a couple of days of one another my diploma arrived and a long brown envelope marked O.H.M.S. (On His Majesty's Service). "My God! is this a summons or a court martial?"

Inside was a letter stating that the government was establishing an experimental station for military flares and smokes. I was offered the position of chemist in charge of smoke at a salary of £150, or \$750 per annum; but first I must spend three months in training by--Martha Annie Whiteley.

I accepted and reported to her little laboratory at the College, astonished to learn that behind the teaching facade she had devised an explosive called "ophorite" which became the only certain means for igniting the then new thermite bombs. My first assignment was to carry one of these to the air command at Orford Ness, take it up in a plane with an open cockpit, light the fuse and heave it overboard and report what I saw. Not knowing what I was supposed to see, I saw nothing and returned to College where Martha was turning her high explosive into a parachute flare for illuminating battle fields--by the simple expedient of coating the magnesium turnings with boiled linseed oil! A great woman.

In the autumn of 1916, the huts that were to form the laboratory complex were ready in a group of fields in Wembley a suburb northwest of London, and in Wembley I secured some dismal lodgings. The experimental station was operated by a contingent of 200 soldiers, army engineers, and mechanics, salted with half a dozen junior officers who were graduate scientists invalided from active duty. J.N.E. Day and myself, both from the Royal College, were the only civilians. The undertaking was dreamed up by Professor Thorpe and continually supervised by him. War Office supervision came by way of a Major Lister--who, it was rumored, arose to fame and fortune in Mexico by laying the drains of Tuantipeec (what a shame he didn't break his neck!). Actually, Lister was a fine engineer and gentleman and a spare, handsome figure in his braid and ribbons; I wish I had honored his worth at the time. The three years that elapsed before the Armistice, at which time the station was closed, were a period of high adventure and lasting friendship, particularly with two of

the officers, Broughton Edge and Frank Oates; more of them in the epilogue.

You folks who are accustomed to American safety rules would shudder at the way we experimented. In my enforced idleness before I got to college, I had blown myself up, figuratively and literally, a dozen times. I had made gunpowder, had nearly killed my grandmother's housemaid testing the anaesthetic potency of homemade ether, and had invented a flush toilet with no moving parts. Why it never reached public use I can explain by appointment.

At the Wembley Station, work plans were initiated during lunch conversations with Thorpe and Lister. Problems would be suggested, and the brass would depart for London in a staff car with a uniformed lady chauffeur and a cheery, "Good luck, anything you boys want to try will be all right with us." There was, of course, much routine testing of British and Allied smoke and flare devices, but I was left pretty free to try out the collective inspirations. Dangerous chemicals lay around in bins and bottles; we mixed them up with wooden spatulas on wooden benches to avoid explosions. When the mixture--for a bomb, or a flare, or smoke was ready, we took it "up the garden path" a long ramp in front of the lab, attached a fuse and ran. I experimented with Aunt Alice's smoke mixture, substituting sawdust for corrugated paper and loading the mixture into three inch trench mortar shells. We had a firing range at the end of the garden path, and our captive Sargent Major would shoot the thing at us so we could watch the head blow off and the smoke (occasionally) pour out. Once in awhile, the shell would detonate with a fearful bang, particularly if we had guest observers. Although the performance was a little uneven, the sawdust-and-oil smoke was a success. About that time, titanium tetrachloride was introduced as a far better smoke maker than engine oil; the problem was how to use it. "Why," thought I, "could it not be soaked into nitrated sawdust?"

Any modern chemist would have seen the enormity of such a mixture--I did not. You couldn't mix the two ingredients on a tray because of the fumes. Obviously, one should preload the shell with the sawdust, compress it, and then pour in the tetrachloride. My plans were relatively elaborate. The loaded shell was stood upright at the end of the garden path and a large glass funnel inserted through the top. Almost touching the shell was a chair and next to it the can of tetrachloride. I was clothed in seaman's sou'wester oilskins, rubber gloves and goggles and sat me on the chair where I safely poured the chloride into the shell. Unhappily, I couldn't see it had started to rain. The rain liberated free acid, and the charge exploded. More exactly, it furnished an inverted rocket of immense power, and, in a split second, the shell had vanished into the ground leaving a crater some six feet deep which terminated exactly at the legs of my chair but left it and me unharmed. I staggered back, tore off my robes, and looked up to see an immense plume of smoke. There was a whirring noise like an approaching buzz bomb, and the glass funnel unbroken and still attached to the brass gaine tube landed a yard away, sticking upright in the grass and still unbroken. It must have been in the air twenty or thirty seconds.

Laughable and disgraceful though this fiasco was, it did not diminish faith in oil as a smoke medium, merely that a new means was needed. Early in 1918, the idea occurred--to adapt a "primus" burner to vaporize light mineral oil. A local pipe shop bent up a coil of tubing, and this was placed on its side in a 30 gallon drum. Oil was forced in at one end by a hand pump; the far end terminated in two nozzles one pointing back into the drum and the other forwards to deliver smoke. For want of anything better, the drum was mounted on the chassis of a decrepit baby carriage and a chimney was stuck on top to avoid asphyxiating the operator. To start the contraption, the barrel was stuffed full of straw and

set afire. In a minute, smoke began to issue, the backward jet produced a roaring flame, the operator pumped furiously, and the forward jet belched clouds of impenetrable fog which sailed over the fields and into the railway cutting and played havoc with the trains to Scotland. Lister was jubilant and brought down carloads of brass from the War Office. One stout general with a monocle buttonholed me, "Good God, fella! do you expect us to wheel your damn baby carriage up and down the trenches?" I replied that all we were trying to do was to make smoke. The device was not ready for production before the war ended.

About 18 months earlier, there came a drastic and urgent change in our program at the station. The first "cough and choke" poison gas had been discovered--a coal tar product containing arsenic--dreadful stuff, code name, DM. It was a dull olive green solid that could be gassified to form a lethal smoke endowed with the uncanny ability to penetrate the best of the charcoal canister respirators. Our assignment was to make throw-bombs which in a few seconds would boil the stuff off--a grand challenge, right up our alley. Millions of them were made, most of them destined to be jettisoned in mid-Atlantic after the Armistice.

The chief difficulties in the way of development were discomfort and sickness, the impalpable dust getting everywhere. Arriving at the lab each morning, we were issued bath towels which we pinned to our shoulders and allowed to fall over our lab coats. By lunch time, the towels had become saturated from sneezing and coughing. Milk and eggnog were served every two hours to make up the loss of fluid, and every six weeks we were sent in staggered batches for two weeks, carriage paid, anywhere in the British Isles we wanted, for fresh air and exercise. A Lieut. Williams and I saw most of the West Coast of Scotland this way and made a walking tour round the Isle of Mull.

To facilitate work in the laboratory--respirators, of course, were useless--I had fresh air brought in from a pump in the fields and distributed from a manifold in the center of the laboratory ceiling. Transparent celluloid boxes were made, like upside down cake tins, and these we wore over our heads and shoulders with long rubber pipes hanging down our backs and looping up to the manifold. The protection was absolute, and we could forget the towels. Getting by one another was more of a lark than a problem, but with care and good nature we avoided entanglement. The station had its own powerhouse which was shut down after working hours. When the zeppelin raids began, orders would come to douse the lights, and we would find ourselves in the late winter afternoons plunged into darkness, and the supply of fresh air stopped. Struggling out of the masks and protective clothing before suffocation or entanglement in a struggling heap on the floor led to some minor accidents--but we survived. Indeed, I emerged from this stint with the infection of my heart valves completely cured by the long contact with arsenic. When we were asked to give barber's cuttings of our hair for analysis, we were told our scalps contained enough arsenic to kill anyone who had not established a toleration for the poison. I learned later that Swiss mountaineers have for centuries taken arsenic to strengthen their hearts.

As we passed the summer of 1919, the health picture in Britain was depressing. Bread was adulterated, sugar was a luxury, meat and even fish were scarce. I remember the margarine and jams with greatest loathing--the first reeking of fish oil and the second tasting only of mangel wortzels, spiked with apple and plum. Then came the influenza epidemic which struck down the hardworking executives and leaders of government and the military. The Armistice came just in time; I remember sitting most of the night the news came on one of the lions in Trafalgar Square watching the crowds below.

I cannot leave the people I have told you about without an epilogue. His Majesty King George V created a new class of awards for civilians who had distinguished themselves in the War--the Order of the British Empire, in ascending degrees from member MBE, officer OBE, commander, CBE, and knight KBE; dame DBE was added later for very distinguished women. Martha and Lister got the OBE and Thorpe a KBE. Sir Jocelyn and his Lady spent many distinguished years, at the College and as scientific commissioner for India. A bon, bon viveur, it was his habit of an evening after half a bottle of vintage port to stroll through the laboratories. One night, he found Ingold, then the youngest fellow of the Royal Society since Newton, surrounded by a welter of filled and emptied utensils. "Hm," greeted Thorpe, "hell of a mess in here, hm!" "Of course there is, Professor, I've just given birth to a discovery."

Martha survived the Thorpes--to finish editing the current edition of Thorpe's Dictionary of Chemistry, an immense multi-volume compendium. The Royal College?--again torn down and rebuilt in 1968 as a glass skyscraper,--not my dish of tea.

Of the two firm friends I made at the Wembley Station, there are little but tragic memories. Lieut. Oates, cousin of the famous Captain Oates, who walked to his death in the Scott Antarctic Expedition to save his comrades from starvation, became stone deaf from shell shock and died after a brief but happy marriage. Lieut. Edge became a famous mining geologist who developed the electrical system of equipotential prospecting. Asked to what he attributed his success, he replied, "having three fingers shot off my right hand--had to stop picking up stones and use my brain."

Edge was bred on the fringe of high society. One weekend he invited me to accompany him as a guest of the Earl of Mar, my once-in-a-lifetime contact with the nobility. Now it happened that one of my front teeth had been knocked out

in an accident, and I wore a flimsy vulcanite plate with a false replica which I used to park by the bedside at night. I was wakened my first morning at the Mars' by a pretty housemaid opening the curtains and depositing a tea tray on my "appliance" which broke in two leaving the tooth on the smaller portion. After an agonizing period of dressing, I entered the breakfast room to report the calamity. His Lordship roared with laughter, telephoned his dentist, and drove me down in the dogcart and waited while the dentist drilled small holes in the two pieces and stitched them together with sewing thread.

Edge married late in life a beautiful woman who nursed him through the onset of inflammatory arthritis. As my wife and I were preparing to visit them in 1946, we were cabled that the wife had died of cancer. When cortisone was discovered, I was able to get him some of the earliest supplies. He was in traction, tended by three nurses, and shortly died. Nature magazine accorded him one of their rare obituary notices.

One last short paragraph. World War II started 22 years later, so did a Goldbergian endeavor, "The Rochester War Research Committee of the Chamber of Commerce." Here my smoke-belching perambulator was reconstructed and later demonstrated at an army proving ground in Maryland. Though it produced what they wanted, it was turned down as not automatic in operation nor sufficiently engineered. The Esso generator, invented by Dr. Langmuir, gave as good smoke and was fully engineered. However, our contraption weighed 400 pounds and the Esso machine many tons. Not long after the demonstration, the Esso generator shrank to a quarter its size and increased its output; could there be a connection?

Thank you for your patience.