THE AMERICAN CHEMIST

BY L. M. HUSSEY

DURING the concluding years of my nonage I used to receive the monthly issue of a house-organ published by a manufacturer of compounded oils such as are employed in the preservation and softening of leather, cotton, silk and the like. The president of this oil works was the editor and author of the magazine, and beyond doubt he had a talent for the convincing phrase. He could be both witty and eloquent, but to me his eloquent moments were by far the more arresting. A new wool-softener, about to be marketed by his house, would inspire him to paragraphs of almost passionate exaltation. The older products always came in for their share of the incense, too, but it was the new thing, the innovation, the recent masterful discovery that stirred, that aroused him and led him to what seems in memory a worshipful lyricism of expression.

Striking out resounding chords of praise, he never failed to announce his well-beloved theme—the Research Laboratory. This laboratory, *his* laboratory, was a fountain of ceaseless wonders. It was a Fortunatus' horn of splendid achievement. Being a student then, and saturated with the romantic aspects of the chemical arts, my imagination conceived it as a place of unlimited facilities, a succession of experimental chambers agleam with countless flasks and beakers, shelves of reagents, fascinating closets housing platinum ware, calorimeters, refractometers, spectroscopes, the apparatus of cryoscopy, and inhabited by a score or more of grave and marvelous chemists, each endowed with the experimental skill of a Cavendish.

I had read, of course, of Adolf Baeyer's extraordinary work on the constitution and synthesis of indigo—twelve or fifteen years of uninterrupted striving. To me there was something thrillingly romantic in such magnificent patience. Now the oil manufacturer, by the power of his eloquent word, gave me new heroes, although nameless. They were the grave, anonymous geniuses laboring in his Research Laboratories, whence came the new softeners for leather and silk.

Five or six years later, being out of employment, my thoughts turned once more to those laboratories. My earlier vision was reëstablished, albeit a bit tempered by my intervening experiences. Nevertheless, it was with a distinct sense of personal insufficiency that I wrote the oil manufacturer suggesting that one of my talents might be useful to him. I really expected no reply. But a letter came; moreover, it granted an interview.

A few days later I entered the oil gentleman's offices. They were sufficiently impressive. Ranks of stenographers sat imprisoned behind wedged desks like wasps in their separate cells. After a decent interval of waiting a boy conducted me to the private office of the Works Manager. He, a snappish man, inquired of my experience. Although I deemed myself hopelessly wanting, I was vain enough to make a show of what practical work I had done. The Works Manager listened. Then, abruptly, he told me there was an opening in the Research Laboratories. Hardly had this startling news been spoken when he continued with the almost fabulous statement that the company was dissatisfied with its

laboratory chief! Did I believe myself competent to take charge?

What! take charge of that Olympus of laboratories? Discover myself the superintendent of all those profound magnificos of research? After an instant of voiceless astonishment I was able to say yes. I had committed myself to a desperate undertaking, but the bridge was in flames; there was no retreat. Vaguely I heard the practical words this Works Manager was speaking.

"The President," he said, "is determined to keep down laboratory expenses. The figure you named a moment ago is a little stiff. We'd be willing to let you start, though, at twenty dollars a week . . ."

Twenty dollars—it did not matter! The hard fact of this very modest wage was somehow engauded, multiplied, by the grandeur of the opportunity. At the moment I achieved no active sense of the incongruous. Would I, the Works Manager inquired, like first to inspect the laboratories? I followed him through a metal fire-door and we were at once in an atmosphere of vaporized oils. It proceeded from a submerged iron tank, bubbling with an unpleasant mixture of wool-grease and rosin. Near the iron railing about the tank was another door. Here, he said, were the laboratories.

The plural word was justly used. There were two rooms. One of them was about twice the size of a Pullman smoking compartment. The other, the greater, was three or four times as large. In the latter were two young men, neither of voting age. At the sink a very oily boy, a boy extremely inuncted, stood washing out a beaker. As he worked his greasy hair fell into his eyes. Nearby one of the young men was engaged upon what seemed to be, considering the apparatus at his disposal, an inevitably futile effort at a saponifaction value. The other youth, over a sandbath improvised from a pie-plate, was taking the flash-point of an oil. And the shelves of reagents, the gleaming flasks and beakers, the mysterious closets crammed with seductive apparatus? They had no more existence than marital fidelity in a tom cat! That is to say, they had no existence at all; their state of being was imaginary, artistic—a product of the manufacturer's lyrical imagination.

This, indeed, was a devastating discovery, but being out of employment, I took charge of the Research Laboratories. Shortly afterward I was called to the private office of that eloquent man, the president. There I was commissioned to solve a pressing problem. In the works they were making, he explained, certain sulphonated oils for the leather trade. Expensive fish oils were being used in the process. "Now what I want," he said, "is to sulphonate mineral oil. Petroleum. It's cheaper!"

Brashly assured, suddenly confident, I told that poetic man that he entertained an impossible hope. With a great display of learning, I revealed to him the unhappy truth that mineral oil is not attacked by sulphuric acid, and that therefore it cannot be sulphonated. He vouchsafed me a gaze of profound disapproval.

"Did you ever read," he inquired, "an essay by Elbert Hubbard called, 'A Message to Garcia'?"

Although I had made shift to sweat through a bit of inspirational reading, I was ignorant of this classic.

"Well," he admonished, with deepening disapproval, "you read it. I don't say it's easy to sulphonate a mineral oil. But I say it can be done. Look at Edison! What you have to do, young man, is carry a message to Garcia. That's your task. You go back to the Research Laboratories and do it!"

I was flabbergasted and at the same time obscurely indignant. To me it seemed unfair that the information I had so patiently acquired after years of toilsome application should be so airily brushed aside by poetic ignorance. But meanwhile, the man's supreme confidence made me uncertain. He was so immeasurably assured. *Voilá*, I return to the Research Laboratories and the experiments.

I discovered that there were only four whole beakers in the equipment. Presumably the messenger had to have some means

of reaching Garcia. I requisitioned a dozen. The requisition was refused. The president himself instructed me upon the topic of *laboratory* expense.

"Goodyear," he said, "learned how to vulcanize rubber in a tea-cup. Then what do you need with all that stuff?"

I was, perhaps, lacking in that heroic spirit which declines to credit the impossibility of anything. For me the force of attraction between any two bodies was still inversely as the square of the distance, despite the poet's [illegible] otherwise. By my [illegible] tion to believe [illegible] the sulphonation of mineral oil [illegible] end of a few weeks, alas, to be [illegible] At the search Laboratory [illegible] through no fault [illegible] signed from the Re[illegible] where there were [illegible] me, [illegible] speakers [illegible] mainly four.

The experience, however, [illegible] was useful. It was the first disillusioning, dramatic knowledge that had come to me of the American successors to the Boyles, the Priestleys, the Scheeles. My further experience, if never so extravagant, was not dissimilar to that first. Out of disillusionment I came to the understanding that the number of grave chemists in America, elaborating their discoveries with the magnificent patience of a Baeyer, ran in direct proportion to the number of employers possessing a culture sufficient to comprehend such men and such work. In other words, I found that they scarcely existed at all. This my painful discovery, I now hand on belatedly to all patriots. The fact, however, remains unchanged: in the industries of this great and opulent democracy the research chemist is still conspicuously without honor. His importance, in the eyes of the average manufacturer, is yet below that of the most mediocre drummer in the sales department. And more often than not this obscure fellow, who receives less money than the drummer and [illegible] honor, is not actually a chemist at all. [illegible] too frequently he knows nothing whatever of the fundamentals of his art and science. He has been reared in a certain laboratory to do one thing—usually some sort of tedious and futile testing of materials. He does that—and nothing more. He is not a scientist at all; he is a mere technician, a workman.

Hundreds of such pathetic incompetents, with a natural disinclination for trench warfare, served during the late war of liberation in the Chemical Warfare Service, the most astounding goulash of chemists, [illegible] and unsavory, ever assembled in [illegible] I do not say that that Service, one stew [illegible] gargantuan personnel, its fabulous [illegible] with its [illegible]ies, its unparalleled confusion, its laborator[illegible] of scientific research to the goose reduction [illegible]plished absolutely nothing. Far step, acc[illegible] I myself, in fact, was a witness to [illegible] accomplishment. It happened on an [illegible] evening when I attended a local chapter of the American Chemical Society. An Arrhenius in olive drab, wearing spurs, lectured on the manufacture of poison gases. He passed around a bottle containing a milligram or so of mustard gas. The bottle was cunningly arranged so that one could get an innocuous whiff of the vapor. I took that whiff with a peculiarly luxurious, yes, Lucullan satisfaction. That single atom of poisonous stench probably cost the people of this great democracy no less than a million dollars!

In theory, a chemist is a professional man, practicing one of the learned professions. Theoretically, his dignity should be no less than that of an engineer, a physician or even an attorney-and-counsellor-at-law. I do not go so far as to suggest for him all the august dignity of a justice on the bench. But I do say that the amount of academic and practical training necessary for the production of a first-class chemist is no less than that required to make a competent doctor of medicine. But now to compare the chemists of the Republic with a body of medicos! [illegible] g when the

Choose an evening [illegible] Chemical Society local chapter of the American Society happens to hold service [illegible] same night as the accredited Co[illegible] Medical Society.

Spend fifteen minutes at both sessions. Observe the solemn deportment, the pontifical magnificence of the Aesculapians and then compare it with the timidities of the chemists. What if the speaker at the medical meeting emits words no less nonsensical [illegible] those of the appointed orator of the chemists? There is a difference between nonsense spoken with the holy wafer upraised, the choir chanting, the censers swinging, and nonsense said in the manner of the half-wit behind the stove [illegible] village store. The proceedings of the County Society have the semblance of a sacerdotal function, with overtones of a faint diabolism; the deliberations of the Local Chapter [illegible] might well be mistaken for a singularly spiritless conclave of the [illegible] Haymakers, the Owls, or the Junior Order of United American Mechanics.

III

During the late war, while the freedom of the seas and the self-determination of the little peoples were still in jeopardy, before justice had prevailed, and a just and permanent peace had been made, I was a reader of the instructive literature issued by the Hon. George Creel, then of Washington. I was, I trust, no more ready than any other patriot to question the veracity of this official enlightenment. Most of the pills, in fact, went down easily enough, but now and then, it is necessary to confess, I faltered before an especially formidable one. One of the latter was a modest pamphlet which undertook to demonstrate how the preëminence of the enemy's chemical establishment was but a result of his familiar, insidious wickedness, and how his chemists had actually stolen most of their ba[illegible]deas from—*les Américains du Nord!*

This revelation, while gratifying to my deepest patriotic instincts, was naturally confoundin[illegible]mical achie[illegible] estimate of the relative c[illegible]owever, [illegible]vements of the two nations. H[illegible] me[illegible]raying that faith might be accord[illegible] had almost come to the point where the insignificance of the Bertheims, the Ehrlichs, and the Fischers was made apparent to me when, boomerang-like, a second encyclical arrived shamelessly admitting the exploits of the enemy Berzeliuses, but affirming, at the same time, the aptness of our own chemists for the same and for better [illegible]tricks. In short, the burden of this second [illegible] pamphlet was that the national chemical [illegible] soul was about to live, that for long it had been *in statu nasciendi*, but that now its accouchement and achievement was at hand. Grandeur [illegible]w. Synthetics were [illegible] shortly to follow with a potency and presently to be built u[illegible] Emil Fischer's complexity that wou[illegible] make [illegible]ble a tyro's trivial work in the [illegible] dabbling with [illegible]est-tube [illegible] [illegible]n organization known as the Chemical [illegible]rs Foundation [illegible] was to be the cunning obstetr[illegible] of that illus[illegible]rious delivery. It was [illegible] to be the guardian and executor of [illegible] infant's patrimony, a neat total o[illegible] enemy chemical patents, valued a[illegible] [illegible] million dollars, all stolen [illegible] the sinful Hun, and [illegible] Foundation for the bargain price of \$271,000.

First, the dyes and medicinals of old must be reproduced. The medicinals in particular must be reproduced. Ehrlich's celebrated antiluetic had, for example, been basely withdrawn from our market. In spite of the high moral status of the Republic, it must be made at once available, lest, in another generation, the complement fixation test of our infants show a four-plus positive. Overnight a thousand factories for the elaboration of aniline products appeared where one had been before. A vast, and it seemed permanent, industry came into instant being. Hosannas to the national chemical genius were raised. Benzene, toluene and other aromatic hydrocarbons were being nitrated on every hillside. Passing through certain areas in northern New Jersey one encountered sudden blankets of red vapor embracing whole cities, as if the inhabitants had delivered themselves [illegible] hellish rites. Nitration pots without number were issuing red nitrous

oxide gas into the air. The nation's chemists were at work!

Then a whisper began to insinuate itself, like a miasmatic vapor, through the clear paens of praise. The genius of the American chemists was not at fault, but the enemy had been taken in another scoundrelly betrayal of civilization. Nothing less, this time, than a falsification of his written word! Yes, his patents, awarded by the Foundation, were found to be sophisticated! Sometimes the processes he described would not work. The national chemists had been victimized by low jokes. A new diablerie was revealed. Then other whispers were spoken. They gathered volume; they became a voice. It was a voice of disillusionment. Something was wrong, someone was to blame. Intermediates were difficult to obtain, labor was costly, processes uncertain, the promised abundance of synthetics was not forthcoming. The smaller factories disappeared. The larger, in some instances, hung on. But the establishment, on a permanent and indestructible foundation, of a great national chemical industry did not, alas, take place.

Balked momentarily by this curious frustration of high hopes, I turned, for an appropriate key to the enigma, to the person of my former employer, he of the Garcia mood. Once more I recalled myself denied, in my effort to obtain beakers, by his severe pronouncement: "Goodyear learned how to make vulcanized rubber in a teacup. What do you need with all that stuff?" Then the man actually believed that chemical research was no more than a sort of exalted cookery! You mixed up the stuff and waited until something happened. To do that you needed, in his opinion, some little determination, perhaps, and a tolerant nose for stenches, but very little sagacity and less equipment. Here was one manufacturer's opinion of the chemist and his work. And he represented, unhappily, a numerous American type. That type is responsible for the backwardness of practical chemical research in the Republic.

IV

The inability of my poet of the oil works and his colleagues throughout the nation to comprehend the nature of the chemist and his activities is explained, I fear, by their general deficiency in culture. The work of the chemist is in close relation to many of the intimacies of every day life; in some respect, then, his relation to life must be known to everyone, even employers of chemists. But what remains a mystery is the precise manner in which he functions. Of what, exactly, does his knowledge consist? How can his information be applied to industry?

No one of the sciences, in its more detailed aspects, is so little known to the uninitiated as that of the chemist. Thousands of laymen can be found with considerable accretions of medical knowledge. When the family doctor writes *spiritus frumenti* on the prescription pad, the Latin may be a bit flabbergasting but the general purpose is understood. Likewise, all the solons have not been admitted to the bar; amateurs in law are as common as blackberries; there are business men who know as much about sophisticating an income-tax return as a Federal judge. The detailed information of the engineer, being largely mathematical, is less accessible to common understanding, but the broad outlines of the engineer's work are also well comprehended.

But what of the chemist? Popular imagination conceives him as a fellow inured to stenches, liable to an instant taking-off by incalculable explosions, capable of taking a bit of unknown earthy stuff and by stewing it a moment in a test-tube, coming to an instant and necromantic knowledge of its constituents. The informed will at once observe that this picture caricatures the chemist. Yet the average employer of chemists, at one with the common citizenry of the Republic, gets but little further in his comprehension of the chemist's real significance. As I have intimated, the Babbitts are balked by the de-

ficiencies of their general culture. Chemistry, in spite of its intimate relation to civilized life, is an extraordinary abstruse and difficult science. It holds out little promise for the smatterer. At its portals stand sentinel the harsh laws of atomicity, whose forbidding aspect repels the casual inquirer. The inner mysteries are, to the superficial, no less entangling and repellent. Yet if chemists are intelligently to be used in industry some comprehension of these mysteries must be achieved. That comprehension is now lacking.

In spite of my prejudice in favor of the dolicocephalic over-men of North American business enterprise, I am obliged, in melancholy, to admit that their brethren of Europe seem somewhat more enlightened. The industrial chemist of the Continent is no such hang-dog fellow as his American brother. Nor is he, in most cases, so incompetent. An able chemist, in France or Germany, does not turn, for refuge, as he usually does on these shores, to the haven of an institution or university. Opportunities for significant rewards and notable work exist in industry. Executives with sufficient enlightenment to forsee the possibilities of chemistry equip laboratories with beakers to repletion and their gestures are far more practical than that oracular spread of the arms that accompanies a mention of Garcia. As a result, as everyone knows, an elaborate chemical industry prevails in Europe, with plenty of able chemists to serve it.

Returning to the national spectacle, and to the prospects for American industrial chemistry, I grow pessimistic. I am unable to predict how long it will take my poet of the oil works before he possesses sufficient information to make use of the indigenous Boyles and Lavoisiers. It would not, in this case, pay to advertise. The gyrations of the Rotarians will not speed the day of comprehension. Patriotism fails. Even a constitutional amendment might not succeed.

I fear, indeed, that for some time ahead the newer dyestuffs, the newer synthetics, the new additions to materia medica and the new discoveries of chemical law will continue to come from across the seas that we fought, in the late conflict, to free. Something practical, however, can be done to deal more effectively with the slippery—and being foreigners, naturally iniquitous—fellows who apply from overseas for patents on their chemical discoveries. Let it be enacted that each foreign applicant must make a demonstration of his process before two qualified agents, one from the Attorney General's Office, the other from the Chemical Warfare Service. Let no patent be allowed where the slightest discrepancy appears between the written directions and their practical demonstration. This done, when the next great crisis comes great good will ensue. The cabbaging of enemy patents will be followed, then, by no such revelation of obscene enemy joking as was vouchsafed in the late glorious conflict.

THE MOUSE

BY MAY FREUD DICKENSON

She hated mice. At Woolworth's she bought traps, two for five. At night, as she sat reading the newspaper, her slipshod feet propped up off the floor on the rung of the painted oak dining-room chair, it was music to her to hear the sharp click of a trap, the tiny futile squeal of extinction.

She had rid the place of them. She had stopped up all the holes with pieces of tin from tomato cans. The flat had been overrun when they had moved in that May. It was just like Charlie to insist that they take this dirty old-fashioned place instead of going farther up town, where for the same rent they could have got three brand-new, clean rooms.

"Think I want to spend two hours and a half every day riding up and down town in the Subway? All very well for you to talk, Minna. You stay home all day."

Yes, she stayed home all day, in those three dingy, sunless rooms looking out on the back court; cooking meals and washing dishes and fighting mice.

But she'd got rid of all the mice now. Only one was left and she'd get him. She knew the hole he came out of, in the wall just behind the pipe of the gas stove. She could not get at the hole to plug it up. Every night he came out. When she went out to the kitchen about half past ten to soak Charlie's oatmeal for the morning she always saw that mouse. A dark gray streak across the floor, behind the garbage pail, to the black shadows under the stove.

Mrs. Grebe was not afraid of that mouse. She hated it.

She laid in a new supply of the two-for-five traps, baited them with yellow cheese, set them in all the corners of the kitchen. Two even in the dining room, one beside the radiator, the other in the fireplace with its empty iron rack for gas logs.

Nights when Charlie was off to play billiards, as she sat alone, reading or idly turning over the illustrated pages of some florid magazine the woman next door had lent her, she listened with acute subconscious interest for the click of the mouse trap, which at one clever nip of the little steel jaws would announce the destruction of her enemy.

But though she listened sharply for five nights and examined all the traps in the morning the mouse remained uncaught.

Her desire to catch it became a fixed purpose in her dull eventless life. The cheese had failed. She consulted the Finnish janitress.

Mrs. Saltah suggested bits of bacon.

Mrs. Grebe bought three strips at the delicatessen store. Charlie did not like bacon. It was too greasy. It gave him indigestion. She was fond of a bit for supper, but the smell of frying it was apt to linger in the air and it annoyed Charlie.

But she could tell him if he complained that she had bought this bacon, not for herself, but to catch the mouse. She cooked it with the windows open. She nibbled two or three of the snippets as she took them from the pan. It did seem a shame to use that nice bacon to bait the traps. Still she must get rid of that mouse.

A week passed and the traps were untouched. The mouse was still at large.

Minna Grebe was irritated. Why had that janitress told her to use bacon, when it was no good? She might better have