

A MEDLEY OF REFLECTIONS

by DR. H. RUPERT HANMER

Dr. Hanmer made these delightful remarks after dinner at the 50th Anniversary celebration of the Virginia Section in Williamsburg, Saturday, April 24, 1965. Although we cannot reproduce in print the speaker's witty style we hope his many friends will enjoy this text of the complete talk.

To state that the scope and pace of progress in Science and Technology have been prodigious during the last 50 years is to labor the obvious.

I perceived one reason for such an accelerated rate of progress this afternoon as I heard Dr. Price project his personality, interest and enthusiasm across the lecture room as he discussed the Stereochemistry of Epoxide Polymerization. I didn't understand a word he said but I came away full of motivation. From where I sit, I haven't the faintest idea what I can do with it.

Fifty years ago there were three elementary particles; there are now 100, more or less, depending on who counts them. And while we pierce the heart of the atom, we probe interstellar space.

Man's curiosity is insatiable; woman's, too, for that matter. I want to be impartial, of course, and when I say "He," I also mean "She," or "His," "Her." Although, as a matter of fact, there is little that is exclusively "His" any more. "She" retains title to the ships of sea and air and (for reasons about which I should not care to speculate) the hurricanes. In science He and She are equal and interchangeable, up to a point. I am not aware that it was a scientist who said, "There is nothing like a dame"; but, true or false, I daresay he could prove it with vital statistics.

This is not what I was thinking about when I took this assignment, words to the contrary notwithstanding. Nor was I thinking of a recent "beauty" contest which disclosed that chemists are not so pretty as the members of eight other professions; whereas, (our Gold Medalist, General Cox, reminded us of this at the banquet in his honor) in a previous contest, we ranked 32nd. In other words, we are not so ugly, by more than 20 disciplines, as we once were. This is progress of a sort.

I was really thinking of the greatly changed status of the chemist in relation to industry and I opened an old textbook, revised to 1916. It was called an "Outline of Industrial Chemistry." Reading it now, one wonders why the word "chemistry" appears in the title. In its day it was authoritative; the authors were professors of Industrial Chemistry at MIT. A few excerpts and quotations from this old text may be illuminating—if not informative.

The emphasis is mine, not the authors'.

"The use of oxygen has been *proposed* to enrich the air in blast furnace-and steel converters."

"Aluminum alloys readily. It is, however, difficult to solder, a fact which has *limited its use very much.*" (A few more defects of this order and we might be eating it for breakfast.)

We are prone to forget our blessings. The section on glue (relatively a much more important commodity then than now) reminds us that only a few years ago we were at the mercy of temperature and humidity. In the final paragraph we read. "In summer it is almost impossible to

dry the film properly. No glue is made."

The subject of adhesives from starch is covered in nine words. The last four, to wit: "Wheat starch is best," will surprise the starch chemists. I recall that 50 years ago the formula for making tapioca "paste" was a closely guarded secret.

In the chapter on Petroleum, the word "gasoline" appears once only—as a component of naphtha. The authors do tell how to remove the "bloom" from mineral oil so that it can be used to adulterate edible oils.

This reminds me that one of the early, often the only, services of the chemist to industry was to detect adulteration or, as it was politely called in those days, "sophistication."

Promptly some malfactors thought to engage chemists to circumvent detection. Dare I say that no chemist became a party to this nefarious practice? In the presence of this sympathetic company, I dare—and I will.

The section on Fermentation (*Spiritus Fermenti*) is extensive, but I gather (from ignorance perhaps) that here changes have been less dramatic—in process, product, and use. Labels, I am told, go in and out of vogue. The basic ingredient remains the same. Here, at least, our mores seem to have withstood the onslaught of progress. Some may take comfort from this symbol of stability in a turbulent world.

Of synthetic resins there is not one word. Indeed the word "synthetic" seems to be a stranger to the text. It is used with rubber, in a generic sense, printed in italics and supported by a footnote. The reference is accompanied by this cautious prediction: "The lower cost of natural rubber would seem to *prevent further development* in this field. . . ."

The word "artificial" is more acceptable. There are over two pages devoted to artificial plastics—mostly about celluloid and its shortcomings. You never heard of celluloid? Hair combs, among other things, were molded from it. Suffice it to say that along with curling irons and woman's crowning glory, celluloid went down and out a long time ago.

Small wonder we oldsters feel practically illiterate; a distinction which, sooner or later, all will share in varying degrees.

It was a few short years after the Virginia Section received its charter that I met an official of The American Tobacco Company, by whom I was employed. He was a forthright fellow. After the exchange of amenities, he asked (forgive my language—I am quoting) : "What in the H - - - is a chemist doing in the tobacco business?" A good question, for which I didn't have a ready answer, for two reasons. First—I had just come from an industrial plant of the duPont Company where, even then, a chemist was not regarded as a misplaced person; and second—I didn't yet know, myself, what I was doing there. I hadn't done anything yet.

In 1915 you could count the tobacco chemists on your thumbs. Today, in house, there are hundreds of chemists or equivalent scientists (begging the issue for the moment, as to whether there is, or is not, a discipline equal to chemistry), not to mention countless others who are addressing their talents, (for the most part gratuitously) to the elucidation of that *divine herb*, that *stinking weed*—tobacco.

The tobacco industry was unique only in degree. The same question might have been asked (in less inelegant terms, I trust) of the paper industry, the textile industry and a score of others. Soon, Charles Herty was to show what the chemist's approach could do for paper, and our neighbors in Virginia and elsewhere were fomenting a veritable chemical revolution in textiles.

Fifty years ago it was a bold industrial manager who would hire a chemist. Some did, hoping he'd stumble onto something. With wider acceptance, the chemist's lot has both improved and become more exacting. Discovery, by chance, is increasingly rare.

I don't know the facts, but one may surmise that Leo Baekeland did not plan to invent Bakelite. He got tired of discarding glassware from which his reaction mixtures couldn't be dislodged by anything short of hammer and chisel. It occurred to him that anything so refractory might be useful.

Time was when a chemist could set out to make Pandemonium Di-Fiddlesticks. If he produced only pandemonium, it might be overlooked. But no longer can he wander aimlessly through the labyrinths of trial and error hoping something good will happen. He must have a solid background of preparation, training, and knowledge. He must know how to tap a vast storehouse of factual information; have the skills to use it. Needless to say, as of yore, a dash of imagination and native intelligence is no handicap.

We live in a marvelous age. It might be called the "Era of Altitude Unlimited"; the Higher, the Better!

This is not restricted to missiles and satellites. It runs the gamut from high-rise to hem-line.

It has even changed our language: "The sky is the limit," no longer has meaning.

"Whatever goes up comes down"—We've had things up there for years. They're just not coming down.

"Now I've seen everything" used to be a figure of speech. Now it's an observation.

At times the chemist seems to be overshadowed by the surgeon, the nuclear physicist, the electronics engineer; but you may be sure that behind each, unobtrusively, perhaps, stands the chemist, contributing to their successes. He has been worthy of his hire. In the next fifty years he will add immeasurably to knowledge, leisure, comfort, and material wealth. Is that all? Is that not enough?

The scientist and particularly the chemist has learned some unyielding truths which could profitably be imparted to others. He has sought and discovered great bodies of natural law. He has learned to respect them, to live with them, to put them to use. He accepts the physical constants and properties of matter as they are. He does not quarrel with the facts or waste time wishing they were different. Experience has taught that he ignores them at his peril.

Some years ago a young man at a large Eastern university was eagerly awaiting his Ph.D. degree in chemistry. Thesis completed, orals passed with flying colors, he was cleaning up his bench and putting everything in order. He discarded a variety of leftovers down the drain, including a bottle of kerosene containing a sizable lump of something or other which he had overlooked. It got past the trap—then—the concrete floor (outraged by this flagrant disregard for the properties of matter—in this case metallic sodium) erupted—at intervals for 100 ft. It created quite a stir. The young man's degree was withheld temporarily, pending further deliberations. When I read of some mysterious explosion in a chemical plant, I wonder where he went.

Following fairly simple rules, modern society, guided by scientists, has done brilliantly with the inanimate and very well with living things until it gets to the ultimate—man himself.

The record of reproducible experiments is history, a sure guide to the control of, or adaption to, our physical environment. In a manner of speaking, human history is a record of experiments—with mankind. Its pages are full of the acts of the few (both benevolent and malevolent) and the consequent behavior of the many. However, in lieu of history, we are prone to accept the notoriously unreliable testimony of individuals, or groups of individuals, as to what they want and what they will do after they get it. When man launches what he fancies to be a brand new excursion into the realm of human behavior, he seems (to use a homely aeronautical expression) to "fly by the seat of his pants." (I'd best confine this to the masculine gender.)

You can always tell the difference between the tyro and the expert.

The tyro is sure of himself.

The expert who knows how much of the "known" is half-known, guessed at, doubtful, or just plain not true tends to qualify what he says and often gains a reputation for not knowing what he is talking about.

On these terms, I think I can speak with confidence, prescribe for the manifold ills of a great society and predict:

Eventually and inevitably civilized man will turn the spotlight of honest, systematic, scientific inquiry inward. In time we shall be able to weigh the cost and the most probable consequences of a course of action. Then and then only can decisions be made on something other than faith, hope, and charity, or the cupidity of self-interest.

The space program may speed the day. It lends perspective. Sometime during the coming decades (after all the necessary material things have been done) a specimen of the genus *Homo Sapiens* may look down on Earth from the vantage point of some far off planet, view the scene with mixed emotions and exclaim: "How beautiful it all is! But what in the world is that benighted social creature doing in the midst of all of that magnificent hardware? Really, something must be done about Him—and Her."