

of the actual, free triphenylmethyl radical, whatever its immediate predecessor. Soon after that many other analogues of triphenylmethyl were found to be monomolecular. The existence of free radicals, with C as trivalent, becomes therefore indisputable.

Analogues of Triphenylmethyl—As has been mentioned in the introduction, triphenylmethyl is but an example, the simplest example, of a large class of triarylmethyls. The three aromatic groups around the central carbon atom may vary to any extent: some may be nitrophenyl groups, or hydroxy-, methoxy-, brom-, carboxyphenyl, or they may be naphthyl groups. Also, as has recently been shown in our laboratory, one of the three aromatic groups may be replaced by the non-aromatic thienyl group, C_4H_3S . Furthermore, free radicals with a trivalent carbon atom have been obtained from compounds which belong to the following well known series:

Xanthone series (Gomberg and Cone); thioxanthone series (Gomberg and Cone); anthraquinone series (Liebermann); indene series (Kohler); thioindigo series (Kalb); acridine series (Cone); benzophenonsulphone series (Gomberg); etc.

Historical—Gay Lussac, in 1815, prepared for the first time cyanogen, and called it a "compound element," or a radical, because it behaved like an element in its reactions. He assumed the existence of the free cyanogen, CN , as a free radical. Wöhler and Liebig, in their classic paper in 1832, on the benzoyl radical, defined radicals very much as we do now, a group which remains

unchanged in a complex molecule through a series of chemical reactions. He did not claim the possible existence of "free" radicals, nor did he oppose such a view. Bunsen, in 1839-40, prepared the various derivatives of cacodyl: the chloride, oxide, etc., and the cacodyl itself, which he considered as a free radical, AsC_2H_5 . Then followed the important work of Frankland, and of Kolbe, 1849-50. The former claimed to have isolated the radicals, *methyl*, *ethyl*, etc., by the action of zinc on the corresponding alkyl iodides, while Kolbe obtained the same radicals by the electrolysis of the sodium salts of acetic, propionic, etc., acids. In vain did Gerhard and Laurent insist that the molecular formulae of all these so-called radicals must be doubled, in accordance with Avogadro's hypothesis. The existence of free radicals was generally accepted as late as 1865, fifty years after Gay Lussac's introduction of this idea into chemistry. But in 1865, Schorlemmer showed by experimental evidence that Frankland's and Kolbe's methyl and ethyl were nothing else than ethane and butane. From that time on the question relative to the existence of free radicals was never seriously raised until the discovery of triphenylmethyl. What the future holds in regard to this new revival of the much disputed question is difficult to foretell. As a working hypothesis it has fully justified its existence—it has opened a new branch of organic chemistry.

UNIVERSITY OF MICHIGAN
ANN ARBOR

MORRIS LOEB MEMORIAL

The Morris Loeb Memorial meeting of the Chemists' Club was held in conjunction with the regular meeting of the New York Section of the American Chemical Society at The Chemists' Club, on Friday, March 6th.

A bronze bust of Dr. Loeb, executed by Mr. Karl Bitter, was presented by friends to The Chemists' Club. The presentation address was given by Dr. L. H. Baekeland, and the bust was accepted for the Club by President Charles F. McKenna.

A Morris Loeb Memorial volume prepared by a committee of the trustees of the Club was distributed to the members. This volume is a handsomely prepared book containing:

A REPRODUCTION OF A RECENT PHOTOGRAPH OF DR. LOEB
RESOLUTIONS OF THE TRUSTEES OF THE CHEMISTS' CLUB
RESOLUTIONS OF THE DIRECTORS OF THE CHEMISTS' BUILDING COMPANY

MORRIS LOEB AS A MAN, by L. H. Baekeland
SCIENTIFIC CAREER OF MORRIS LOEB, by Charles Baskerville
MORRIS LOEB AS A PHILANTHROPIST, by Maximilian Toch
MORRIS LOEB AS A TEACHER, by Arthur E. Hill
MORRIS LOEB AND HARVARD, Letter from Clifford Richardson
MEMORIES OF A CLASSMATE AT HARVARD, Letter from J. D. Pennock

AN APPRECIATION, by Ellwood Hendrick
BERLIN REMINISCENCES, by Walker Bowman
A PERSONAL REMINISCENCE, by William J. Hammer
TRIBUTE AT THE GRAVE, by Theodore W. Richards

RESOLUTIONS FROM SOCIETIES

New York, Chicago and Washington Sections of the American Chemical Society
New York and Canadian Sections of the Society of Chemical Industry
New York Section of the Verein Deutscher Chemiker

EXPRESSIONS OF FOREIGN SCIENTIFIC SOCIETIES

Imperial Academy of St. Petersburg Universidade Do Pôrto
The Faraday Society R. Università de Bologna
Sociedade Chimica Portuguesa

—[EDITOR]

PRESENTATION ADDRESS

By L. H. BAEKELAND

MR. CHAIRMAN, LADIES AND GENTLEMEN:

One of the founders and most devoted members of this Section of the American Chemical Society was Dr. Morris Loeb.

He was also its first secretary, and in 1909, he was its chairman: a more efficient secretary or chairman never existed.

It seems timely to quote here some words from his opening address when he presided at these meetings.¹

"Eighteen years ago, when the men who had carried the American Chemical Society through so many vicissitudes organized this section, in order that the general society might become a truly national one, I had the honor, rather than the duty, of being the first local secretary. The meetings were so poorly attended, the original papers so scarce, and the general business so unimportant, that no heavy work devolved upon its officers. We met in the chapel of the old university building, out of which we carved, with some difficulty, shelf-room for the fragmentary society library. When we felt in need of a little variety, we sat in Professor Chandler's lecture-room in 49th Street and listened to the passing trains; or in East 23rd Street peered at the chairman ensconced behind batteries of Professor Doremus's bell-jars and air-pumps. An attendance of forty members, I believe, was a record-breaking event...."

The following paragraphs relate more particularly to his plan of founding the chemical museum:

"Every year scores of New Yorkers graduate in chemistry from our local institutions and return from years of protracted study in other American and European institutions. They are enthusiastic for research; in completing their theses they have laid aside definite ideas for subsequent experimentation; but they have no laboratory. While waiting to hear from the teachers' agency, where they have registered, while carrying on desultory correspondence with manufacturers who may give them a chance, they do not venture upon expenditure of time and money to fit out a private laboratory, which they may be called upon to quit any minute upon the appearance of that desired appointment. Often necessity or tedium will cause them to accept temporary work of an entirely different character and indefinitely postpone the execution of the experiments

¹ "Scientific Work of Morris Loeb," by Theodore W. Richards, Harvard University Press, Cambridge, Mass., p. 94.

which they had mapped out. Who will estimate the loss of scientific momentum, the economic and intellectual waste, which this lack of laboratory facilities for the graduate inflicts upon New York, as compared with Berlin, Vienna, Paris and London? Either our universities and colleges, or private enterprise, should provide temporary desk-room for the independent research chemist. . . ."

"There is still another point, however, in which the American chemist is at a great disadvantage as compared with the European: the ease of securing material for his research and of comparing his results with those of others. In Europe, especially in Germany, research is never seriously delayed by lack of a needed preparation, whereas none of our supply houses carry a full stock of chemicals.

To obtain a single gram of some particular substance, needed for a few preliminary tests, frequently causes weeks of delay, *as well as the disproportionate custom house and brokerage expenses involved in the importation of small quantities.* Besides, owing to the better centralization of scientific laboratories in Europe, and the existence in each case of a fairly complete set of specimens accumulated in the researches of large numbers of academic investigators, it is comparatively easy to obtain by correspondence research material or typical specimens for comparison. In this country, on the other hand, laboratories are scattered throughout the numerous colleges and universities, and there are no established rules by which specimens must be deposited with the laboratory. In smaller laboratories, especially, the chances of preservation after the departure of the investigator are not very good. It would be, consequently, very much more difficult to obtain such specimens here. I would suggest, therefore,

that a chemical museum be established in New York, to perform for the American chemists the functions that the Smithsonian Institution so admirably carries on for the benefit of American naturalists. This museum would not attempt to be a popular show-place, but would embody, in the first place, as complete a collection as possible of chemically pure materials of the rarer kinds, so as to supplement, but not in any manner compete with, the stock of commercial supply-houses. Any scientific investigator would be entitled to borrow or purchase material required for immediate experimentation, and all used articles would be replaced as quickly as possible.

"In the *second* place, it would be a depository for specimens of new substances obtained in American research. Every

chemist would be invited to send to the museum a small quantity of each substance newly prepared by him, not, indeed, as an evidence of the good faith of his investigation, but, rather, to enable future workers to obtain such material, either for comparison, or for further experimentation with the least possible delay. Many substances that are now carried away from universities by students who subsequently abandon chemical research, or which belong to the families of deceased chemists who do not know what to do with them, would thereby be rescued from oblivion, and might ultimately become of the greatest value for a special purpose.

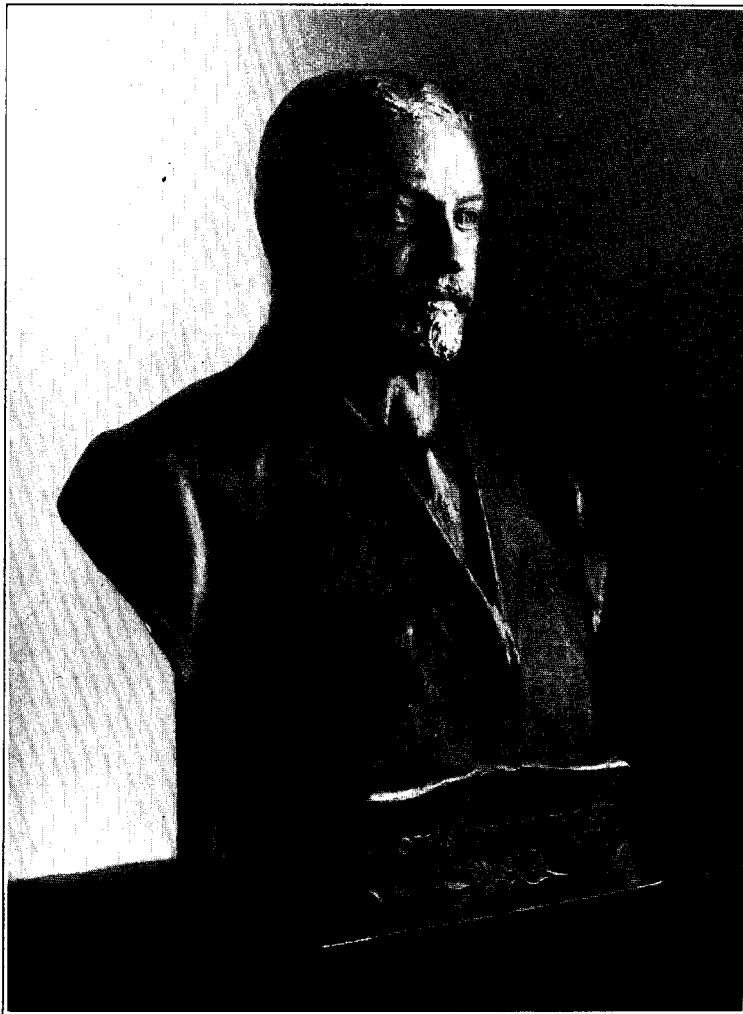
"*Thirdly*, this museum would invite chemical manufacturers to send standard samples of their products, and thereby facilitate the commercial relations between consumer and manufacturer.

"To such a museum there could be attached a competent staff of workers for the preparation of samples not otherwise available. In the analysis of samples submitted as official standards, we should have the beginning of that *Chemische Reichsanstalt* which is now the chief object to which German chemists are directing their attention."

Later on, when through his enthusiasm, untiring energy and financial aid, the Chemists' Building had become an accomplished fact, he wrote as follows:¹

"We have detailed some of the more striking advantages which the new building is expected to confer upon the chemical profession as a whole, as well as upon its individual votaries; is it an exaggeration to characterize the constitution of the Chemists' Building Company itself as a new era in the chemical industry of our country? In scanning the list of shareholders, we find representatives of nearly every important concern,

or even the larger companies themselves; but that this is not a 'trust,' in the sense so obnoxious to the yellow journalist, is demonstrated by the conditions of the partnership. No shareholder can receive more than 3 per cent dividends, and the surplus cannot, under any circumstances, accrue to his benefit within the next fifty years. This association, therefore, is not for individual profit, but for the raising of the standards of chemical industry and research in the United States. If we recognize what the Verein zur Hebung der chemischen Industrie, founded by Hofmann and Werner Siemens, has done for Germany, we may well hope for further fruits of this initiative here. Perhaps this building will house joint laboratories



MORRIS LOEB BUST

¹ Theodore W. Richards, *loc. cit.*, p. 126, etc.

for the solution of questions affecting all manufactures alike; or experimental stations for the study of natural products not yet utilized; or a coöperative bureau of standardization for analytical methods; or a national welfare bureau for employees in chemical factories. This building does not owe its erection to some benevolent demigod, extending his protecting wing over people unable to care for themselves; it is a building by the chemists, of the chemists, and for the chemists. May it ever serve as an exemplar of unselfish patriotic coöperation!.....

"For, strange as it may seem to the layman, who has seen the ugliest blots on a landscape designated as chemical factories, who has sniffed with disgust a chemical odor, has been urged to believe that the chemist's shadow contaminates pure foods, and has been taught in school that alchemy spelled fraud and sorcery, *our science is one calculated to develop the ideal side of human nature, and the chemist, more perhaps than the votary of natural science or the devotee of the so-called humanities, is led to an intense interest in human development.*.....

"Our science aspires not only to know, but also to do. On the one hand, it leads us to delve into the secrets of nature, in the minute atom as well as in the far distant stars, in the living cell as well as in the crystallized relics of the convulsions from which this earth was born; on the other, it leads us to apply this knowledge to the immediate needs of man, be it in safeguarding his health, in ministering to his material or esthetic wants, or in regulating his commerce and in facilitating his utilization of the earth's resources.... There are two ways of aiding a man or a cause: by addition to the income or reduction of the expense. The pecuniary result to the beneficiary may be the same, but the moral one is far different; it is not only the beggar who is pauperized by the cash gift and uplifted by the aid which enables him to earn his own livelihood. Arts and sciences may be stimulated by prizes and scholarships beyond a doubt, but the relation between donor and recipient is not free from restraint, and the probability of human error in the selection of the right incumbent makes the method a wasteful one at best.... To remove these disadvantages in time and cost, to provide easy access to books and apparatus, to make room for the independent scientific worker, are the ideals which hovered before the eyes of those who planned this present enterprise. Time will show whether they can all be realized, but whatever is done in this beautiful building, which we are about to dedicate, must open free opportunities to all and show favoritism toward none, if the trust imposed upon its management be administered in the spirit of those who have contributed toward its erection....."

After his untimely death, which left so many in sorrow, it was found that by his will, he had planned the realization of the ideals he had preached.

To his University, Harvard, he left a large sum of money for chemical research; to the Chemists' Building, he gave all his shares; to the American Chemical Society, he left a fund for the creation of a chemical museum along the lines conceived and clearly described by him.

Mr. Chairman, none of us, who have known Morris Loeb, who have lived, worked, or spoken with him, need a bust nor a portrait to remind us of the man, or his work. But as we grow older and death keeps thinning out our ranks, younger generations of chemists will use these halls. Our duties, our responsibilities, will become their duties, their responsibilities.

I have no doubt that their aims for good, will be of the highest; that they will better realize than the present generation, that to be a chemist, is to be an apostle of Progress and Civilization, of Justice and Truth. But the chemists of the coming generation will not have known Morris Loeb, and we must remind them of what one of our generation dreamt, planned and did for them. This is the reason why some friends of Dr. Loeb obtained a bronze bust from Mr. Karl Bitter, an artist whose

reputation is no longer to be made. It is their desire that this bust should adorn the halls of The Chemists' Club.

Dr. McKenna, upon you, as President of The Chemists' Club, devolves the responsibility of placing this bust where it will best serve its purpose.

ADDRESS OF ACCEPTANCE

By CHARLES F. MCKENNA

Dr. Baekeland and his generous friends have placed The Chemists' Club under a lasting debt of gratitude.

Ever since the death of Doctor Loeb the officers and members of the Club have repeatedly wondered how we should be able adequately to put on record here all that his name implies in our history.

Doctor Loeb left his impress upon many spheres of activity in the world that he was fated to leave early—on philanthropy, civics and education among the most noteworthy ones. But chemistry was his deepest love, and that science received most from the labor of his hands and the genius of his mind. Particularly did this agency which we find most forceful in the profession today, and which is known as The Chemists' Club, receive much from his generous impulses and constructive mentality. He gave to this club his best, not that it might be merely a social agency, but that it should be even more, a strong, suggestive, creative power in the purest realms in the science.

As you have heard from Dr. Baekeland's address, in all of the discussions which took place during the inception of this enterprise, Doctor Loeb was constantly insisting that provision should be made for furnishing facilities for research to scholarly chemists who had given proof of their devotion to the science and their possession of a field worthy of deep study.

I speak for the officers and members of the Club when I pledge its honor that in loving memory of Morris Loeb the same generous readiness with help shall always mark its attitude towards the scholar in chemistry.

The consequences of his activity will thus be read into the pages of American chemical history, and the glory of the discoveries to be made here shall reflect back to him.

It is pleasing, when depositing this bust in a place of honor in a chemists' hall, for us to know that it is a work of art, and that it is of bronze, the most enduring of monumental materials. Marble is fragile and cold; bronze is resistant but strangely attractive. To chisel in stone must be a hazard of skill; to model and mould and affectionately retouch the casting must be a satisfying art. Therefore all the world loves this metal. This beautiful specimen has been produced as a labor of affection, and Mr. Karl Bitter has put his best into it and given freely and gratuitously to The Chemists' Club the benefit of his artistic spirit.

It was my good fortune last week to listen to an address by Mr. Bitter upon the methods of sculpture in ancient times compared with those of modern times, and I have never been more charmed and instructed, and there is no one today so well fitted to give us this enlightenment. He is not only a master of his art, but he has that love that lingers over the triumphs of its history.

Therefore we appreciate the more the value of this bronze so thoughtfully secured for us by Dr. Baekeland and his friends.

The hand of a genius who is fit to stand beside the immortal sculptors of the ages has modeled it; its noble substance will preserve it, the *patine* of time will beautify it. What could be more pleasing to us all than thus to honor the memory of Morris Loeb, the idealist, the scholar, the lover of his fellow man?

Further to mark this sense of obligation that we feel, the Club has had a Committee at work preparing a literary memorial of our friend. It is beautiful in typography and in form, and contains the words of affectionate remembrance and regard which poured forth so sincerely when his friends in these circles wished to express their grief over his death. We take pleasure in making a distribution of this volume as far as we can make a limited edition go.