seriousness, this statement requires some explanation. The lazy person would tend not to bother the man in the laboratory, but leave him to his own devices. Disregarding the reason for so doing, most of you will recognize that this would, in general, be a desirable course of action. Now, I do not advocate this do-nothing business, but it is no worse than to over-supervise or over-administer the research. Over-administration, I may say, represents a needless waste of energy since it is bound to fail. More serious, however, are the mental barriers which it may establish and the stifling effect it can have on individual initiative. Research administrators must recognize and keep in mind that progress in research is determined to a large extent by the man in the laboratory and by his mental capacity and attitude. If we impair or hinder individual initiative through over-supervision we will eventually drive our ship on to a barren shore.

Freedom in research is of the utmost importance and perhaps is the most difficult of all to achieve. It is also the least understood, particularly by the individual scientist. Graduation at any level from the best of our accredited educational institutions affords no guarantee that the individual will be capable of independent study. Only after he has had an opportunity to participate in an actual research project can his ability be determined. His situation is somewhat analogous to the trained but untried soldier. Only actual combat can establish his capacity to participate in battle. Similarly, the research man must demonstrate his mettle before he can be turned loose to work on his own initiative. To do so before an adequate trial period might well be disastrous for the individual, since, if he fails, it may take years to re-establish his lost confidence. Research independence is thus obviously not a right, but something to be earned. If this principle were better understood it would save the research supervisor a great many headaches.

The major problem, then, of any research supervisor is to avoid a system of arbitrary direction. He must establish instead not only the kind of conditions which are conducive to good research, but also to bring about in his associates an ever increasing ability to work independently and to exercise the freedom of mind so essential to creative work.

We speak of desirability of fostering and developing the proper atmosphere for research — a creative atmosphere, if you will. Just what is this elusive quality that should characterize every good research group, and how do you go about achieving it? It is a thing unreal, and yet at once apparent when there. It defies definition in any formal sense, yet in its presence the meaning becomes crystal clear. Optimism and hope in the face of repeated failure; faith that ignorance must always yield to truth; confidence in the power of objective reason. These are a few of the symbols. Like research itself they are things of the mind and of the spirit, and they can only be cultivated with kindred tools. We research administrators and supervisors can do most by expecting the best — a proper professional attitude, unselfishness, objectiveness, determination, diligence, and an uncompromising zeal for the truth. We can also do some other things; we must see that the right person is on the right job; we must see that achievement is recognized, we must encourage and suggest, we must provide a proper degree of freedom, and last, but not the least, we must have a patient faith that the efforts of our colleagues will succeed.

P. A. Wells—Director and Manager of Research

Dr. J. J. Willaman

Eastern Regional Laboratory, U. S. Department of Agriculture, Philadelphia 18, Pa.

(Presented when Dr. Wells received the Honor Scroll of the AIC Pennsylvania Chapter.)

THE complimentary things I will say about P. A. Wells are said every day by someone around the Eastern Lab. I have often wanted a chance to say publicly what I and the rest of our staff think about our director. He is a friend of everybody. He is sincerely respected and admired and liked. We take to him our troubles and our triumphs. We make requests. He loves to say yes to them, but if it has to be no, he will patiently explain why, and the requester goes away satisfied. Often he has to make requests of us — sometimes irksome and bothersome things, as in any one's day's work. He does so almost apologetically. He is really loath to bother us. He likes to leave us alone. It is inconceivable that he would call in Jim Smith and say, "Dr. Smith, Washington wants so and so prepared by a week from now. Let me have it by tomorrow afternoon. And they want it complete and they want it better prepared than the last time. Drop everything and do it". No, Wells doesn't direct us that way. He would say, "Jim, remember that so and so report we prepared last year? Well, Washington wants it again and they want it a week from today. Do you suppose you can sandwich it in and get it ready in four or five days? Might make it a little longer than last year's. You have it all at your fingertips anyway." That's the way he directs and manages.

Dr. Wells was born on October 3, 1906, at Spooner, Wisconsin. That was still rugged country — heavy forests near by, fishing streams everywhere, Indian reservation not far away. He grew up as part of it. He can't remember when he couldn't swim, fish, and skate. One day, when he was about twelve, he caught a 12-pound great northern pike, and carried it fifteen miles to his home.

Also at twelve he worked in the yards of the Omaha Railroad at Superior, Wisconsin. That is where he was at 11:00 A.M., November 11, 1918. An extracurricular activity was to go to the yards after school, sweep grain out of the emptied cars and sell it for chicken feed — and I mean that both ways. One night his gang got into a watermelon car, by mistake, but their efforts went fruitless when trainmen arrived on the scene.

He went through high school at Monmouth, Illinois, and attended Monmouth College one year. But in that year he came under the spell of Professor W. S. Haldeman, and from then on it was chemistry for Perce Wells. Haldeman was recently honored by the St. Louis Section of the A. C. S. for his lifetime work in thus influencing students.

Then the family moved to Minneapolis and Perce finished his undergraduate course at the university in 1928. He went right into the Bureau of Chemistry and Soils and has been in it or its successors ever since. His first professional job was determining arsenic on apples in a windowless lab in the post office in Wenatchee, Washington. His next job was again in a lab without windows, because it was the great outdoors around the smelter at Trail, B. C. He was part of a crew that lugged apparatus around the area to determine the incidence of sulfur dioxide at varying distances and directions from the smelter. Sometimes this lugging was for sixty miles.

In 1929 he went to Washington, D. C. He got into a laboratory with windows, but he was still analyzing for SO_2. In 1930 he got his real start in biochemistry by working with the well-known team of H. T. Herrick and O. E. May. For the next eight years he was delving into the mysteries of mold fermentations and coaxing more and more efficiency out of them in the production of gluconic, citric, kojic, and ketogluconic acids. Many times during this period the clock and the calendar meant little, since there was no instrumentation beyond an indicating pressure gauge and the fermenters had to be watched constantly and sampled frequently. Then they got to teaching *Acetobacter suboxydans* how to make sorbose from sorbitol, and this was even trickier. Wells says of this period, "I was too poor to continue graduate work at night school, so I just worked." When the Regional Laboratories came into being later, he had the satisfaction of seeing this fermentation laboratory evolve into the fermentation division at the Northern Lab in Peoria and go on to fame by its part in the development of penicillin.

In 1936 the group was sent to Ames, Iowa, to the Bureau's by-products lab to set up a pilot plant size rotary fermenter for the submerged culture of molds under oxygen pressure for the production of gluconic acid. It seems that at this lab the motto was "Each chemist his own pipe fitter and carpenter." Wells says, "This was a waste of professional salaries, and I vowed I'd have it different if I ever got the chance. I have had that chance at the regional lab and I have done it. But at the current rates for chemists and plumbers perhaps we don't save so much after all." At Arlington Farm in Virginia, Mr. Herrick had had a gallon of corn steep liquor in a corner for several years. He didn't know how he got it or why. Funds for media were running low. Then one of the boys said, "Let's put some of Horace's corn liquor in this one". Improvement in the fermentation was immediate and amazing. A few years later corn steep liquor really came into its own in penicillin production.

In 1937 Wells was back in Washington. And in 1939 he completed his work for the doctorate at Georgetown under Dr. M. X. Sullivan, his thesis being in the fermentation field.

About 1937 Senator Bilbo's constituency had persuaded him that the federal government should set up a research lab in the south to develop more uses for cotton, badly distressed at the time. As he discussed the idea around Congress, others caught on quickly. "We should have one for milk". "We need one for corn". Thus the idea of the four regional labs took shape and they were established in 1938. By means of chemistry and chemical engineering, they were to conduct research on the utilization of farm crops, especially industrial utilization, since "Although the human stomach is easily filled, the industrial stomach never is". There were to be four laboratories, in the north, south, east, and west.

This was the groundwork. But in the office of the Bureau of Agricultural Chemistry and Engineering many questions immediately began to pop up. What commodities? What crop for each region? Just the wastes, or the main crops? Just industrial use, or food also? What really were the possibilities? What did industry think? Did the universities and state experiment stations have any ideas?

Obviously, these hosts of questions had to be answered before a firm plan of organization and of research could be established. They organized a survey team under H. T. Herrick, and D. F. J. Lynch covered the South, T. L. Swenson the West, O. E. May

the North, and P. A. Wells the East. They asked hundreds of questions at hundreds of interviews with industry, institutions, universities, and experiment stations. Then they boiled it all down and published the findings in *Senate Document* 65. This document became the basis for the projects in the four labs. Even now, after twelve years, the facts, ideas and relative importance of problems considered there are still valid. The four men who headed the survey became the directors of the labs in their repective regions, with Wells at the Eastern.

On the occasion of the laying of the cornerstone of the new lab, Wells was there, in the mud, expediting everything, guiding the V.I.P.'s to dry spots, generally looking after things, but really remaining inconspicuous. My wife remarked, "What a young looking fellow to head this lab". He looked young because he was young.

And he still looks that way. But he has had the enthusiasm, the technical knowledge, the human understanding, that has enabled him to guide this lab in what I think has been a successful career. There has been a notable stream of publications, of both basic and applied nature. There have been new products and they have been developed commercially. There have been patents, a normal proportion of which have been used by industry. The program of research has shifted with the demands of changing times, but never just for the sake of change, and never because of some whim of the director.

His task has not been light, of course, but you would never know it to be with him at off hours. He gardens furiously; he cans the stuff assiduously. He plays bridge intently. He talks football like Walter Camp. He pitches a mean game of horseshoes. He ardently goes deer hunting each year, still looking for his first one. He brags about his two daughters to the degree that any proper father should.

He has always insisted that, whereas a man may direct the research of a few others, when the number gets up to one-hundred or more he can at best be only a guide and manager — sifting project ideas that are brought to him, helping to get them crystallized, seeing that the staff gets what it needs in the way of space and equipment and what it deserves in the way of salary; keeping the research in line with the budget and objectives prescribed by the ultimate boss, in his case Congress. At any rate, title him what you wish, he is doing a splendid job at it. And, like the big league ball player, makes the job look easy. All of his present and former colleagues will be gratified at the honor and recognition that are being given him.

Presentation of the Honor Scroll to Dr. P. A. Wells

DR. PERCY A. WELLS, director of the Eastern Regional Research Laboratory of the U. S. Bureau of Agricultural and Industrial Chemistry, Philadelphia, Pa., received the 1952 Honor Scroll of the Pennsylvania AIC Chapter at ceremonies held in Philadelphia at the Penn-Sheraton Hotel, December fourth.

Dr. Arthur Osol, F.A.I.C., professor of chemistry and director of the chemistry department at Philadelphia College of Pharmacy and Science, acted as toastmaster. Adalbert Farkas, chairman of the Chapter, presided. Dr. J. J. Willaman of the staff of the Eastern Regional Research Laboratory spoke on "P. A. Wells — Director and Manager of Research." AIC President Lincoln T. Work then presented the Honor Scroll to Dr. Wells, who responded with "Some Problems in Research." (These papers appear in this issue of THE CHEMIST).

Dr. Wells, who has been head of the Eastern Laboratory since it was established by Congress in 1938, has been preeminent in research on the utilization of farm products. Under his guidance, laboratory scientists developed the drug, rutin, used in treating certain blood vessel disorders, from buckwheat plants. Laboratory scientists also perfected methods for recovering the volatile flavors from fruit juices. The flavors are used to restore the full fruit flavor to jams, jellies, beverages and fruit juice concentrates.

Other Laboratory accomplishments include the production of valuable industrial oils from waste animal fats, a superior varnish from potatoes, bristles from skim milk, and chemicals and animal feeds from waste leafy vegetables.

The most recent Laboratory development is a superconcentrated grape juice which makes 75 per cent more full-strength juice than is obtained from the same volume of frozen concentrates now on the market.

Dr. Wells is an alumnus of the University of Minnesota and received the Ph.D. degree from Georgetown University. He is a career Federal employee, having entered the civil service as chemist in 1928. He was appointed head of the Eastern Laboratory when only thirty-two, charged with the responsibility for research aimed at finding new uses and expanding markets for various research farm products of sixteen northeastern states.

The Honor Scroll, given in recognition of technical proficiency and service to the profession of chemistry,