

ture is the method adopted by Nature, according to my own viewpoint. It explains the process we term "fever," long deemed an enemy, but in reality a defensive function calculated to destroy poisonous substances or germs that have found their way into the body fluids and cells from a focus somewhere, either in the superficial or deep tissues. In the course of fever, the germ destroyers, or phagocytes, are not alone at work in the blood streams, but the whole internal lining of the blood vessels themselves is made up of these germ-destroying cells. Again, the lymphatic vessels which act as drains for the tissue cells, we have seen, afford additional aid in the defensive process by means of the multitude of phagocyte-laden glands through which the serum obtained from the blood by the tissue cells must pass before it is returned to the circulation.

Of course, abnormally high fever, *i. e.*, fever above 104° F., for instance, may become dangerous in the sense that the very digestive ferments which have their purpose to defend, become too active and begin to digest not only the red blood corpuscles, a process physicians term "hemolysis," but also certain tissues, a process known as "autolysis." To offset these morbid effects of excessive radiation during hot weather, the skin protects the body by perspiring; the water which moistens the skin, by evaporating, keeps the surface temperature within normal limits. The cool baths physicians employ in the treatment of typhoid fever have the same end in view; they keep the fever within safe limits.

On the whole, the relation of light to health may be summarized, in view of the few data submitted, by the statement that it is intimately bound up with the perpetuation of life, whether the tissues be normal or diseased. It tends to sustain health by promoting, as radiant energy, the activity of the oxidizing ferment adrenoxidase, which sustains the oxidation of tissue cells, an essential function of their life. It tends to defend the cell, when endangered by certain germs and poisons, by enhancing through the heat energy developed the efficiency of the defensive ferments which submit these harmful agencies to digestive destruction.

PHARMACY FROM AN EDUCATOR'S VIEWPOINT.*

I cannot help associating in my mind the profession of the pharmacist with that of the physician. It seems to me as if they are inseparably connected with each other. There was a time, long ago, when it was difficult to distinguish between the pharmacist and the physician. In fact, in early times, the man who attempted to heal the ills of the human race was both physician and pharmacist. It was in these same early days of the professions that their practice and methods relied more upon the superstition and credulity of their patrons than upon any scientific knowledge. We may still read in some of the old books how healing recipes and medicines were compounded from dried bats. How live toads and mystical plants, plucked from a murderer's grave at midnight, would be efficacious in curing disease. We have long since passed out of that period into what might be called the scientific age of these professions in which they have made enormous strides. The last fifty years have seen scientific developments in every profession

* Parts of an address by Dr. W. E. Stone, President of Purdue University, before the Indiana Pharmaceutical Association.

but in none more than in medicine and pharmacy. But it is apparent that this association between medicine and pharmacy is not so close as it used to be; that the profession of pharmacy has not kept pace with the profession of medicine on its scientific side; at least this is my impression.

We cannot conceive of a profession of pharmacy which is not based primarily on science, and dependent upon scientific training for its growth. There was a time when a pharmacist could be trained for his duties by an apprenticeship in the druggist's shop just as the physician was trained by associating himself with the practicing physician and the lawyer was trained by working in the lawyer's office, but that time has now passed. One might say it is practically impossible to train a competent pharmacist simply by a drug store apprenticeship. It would be impracticable even if possible since it requires a long time to arrive at proficiency under such conditions and the average young man would not be persistent enough or have the ability to do it. It becomes necessary, therefore, in this as in all professions, to depend upon systematic instruction to fit men for practice. It is necessary because the art and science itself has advanced so far and embraces so much that the services of the professional teacher, supplemented by scientific equipment, are indispensable to the student who would prepare himself thoroughly without loss of time. The scientific field in any profession is unlimited and even the fundamental principles which have been discovered, and rest at the foundation, embody a vast amount of knowledge. This elementary body of knowledge it takes time to acquire.

For the profession of pharmacy, the biological, chemical and physical sciences are fundamental. Chemistry particularly, and with more recent developments in the production of serums and antitoxins and the various treatments for germ diseases, biological science, are of tremendous importance. There is no getting away from the fact that the pharmacist who is competently trained for his profession must have a thorough preliminary instruction in those sciences as well as the technical and practical phases of his practice. Recurring to the comparison of pharmacy with medicine. I call to your attention, how in recent years, the educational requirements for the practice of medicine have been steadily increasing until one cannot now enter a reputable medical college until he has had a certain amount of college training, and this preparatory education is strictly taken into account in licensing the practitioner. Even a college degree is required for entrance to some of the more advanced medical schools. We are, unfortunately, far short of any such requirements in the case of pharmacy. There is no recognized profession in which educational and technical requirements are so low as for pharmacy, if we except the anomalous and absurd provision for admission to the bar embodied in the Indiana State Constitution. As far as our state law is concerned, the requirements for licensing pharmacists are nominal and may be satisfied by a minimum of training which is a disgrace to the profession. I am unwilling to admit that pharmacy as a profession should remain on a plane inferior to medicine. From this standpoint it is indisputable that the educational standards of the profession of pharmacy are not where they ought to be.

Let us recognize that the pharmacist has to deal with the issues of life and death just as much as the physician. He is the physician's right hand man in the fight against disease and death; he must be competent to deal with those substances

and combinations which save life and prevent death, and if a mistake is made, responsible for fatal consequences. In such a profession, with such responsibilities, can any educational or professional standard be too high?

It is absolutely essential that a competent pharmacist have thorough scientific training of the broadest kind, not the sort of training given in a cram course in order to pass a nominal examination, but the training which can only be acquired by systematic study of elementary principles leading on step by step into the advanced phases of a science, with competent teachers and scientific facilities. Pharmaceutical practice should be based not on some rule of thumb, but on scientific knowledge. A ten year old boy can be taught how to make a chemical analysis or compound medicines by rule of thumb until he encounters some condition which he does not understand; then he is helpless or worse than that, dangerous, for the old adage, "a little knowledge is a dangerous thing," is nowhere so true as behind the prescription counter. The man who undertakes to do something based upon the application of scientific principles must know the *reasons why* it is done and what to do in any variations from the regular procedure. The pharmacist who is responsible for compounding medicines or preparing prescriptions ought to know the biological, physical, and chemical principles which underlie his processes; otherwise he is a public menace and a clog upon the profession. One cannot become such a pharmacist except by careful study and preparation; one cannot learn these things in a few days' time; it cannot be crammed into his head so that he knows it in a dependable, competent way. Therefore, my friends, if the profession of pharmacy is ever to advance as the profession of medicine has advanced, to a scientific basis and to a high plane in the confidence of the public, it will be through recognition of the absolute necessity of the thorough education and training of the prospective pharmacist.

I am not saying this to express the policy of our school of Pharmacy, which is standing squarely for higher education and technical standards for the profession. I am saying it because it is my conviction in the light of progress in all professions, and in the light of my experience as a scientific student and teacher. There is no calling, no occupation, even though it is not a scientific one, these days in which you can succeed without education, and the profession of pharmacy is no exception.

The pharmacist should also enjoy the benefits of a good general education in addition to this technical training, for professional as well as other reasons. Probably you would not dispute with me my claim that he must have thorough special and professional scientific training, but I submit he ought also to have a good general education besides. The pharmacist should stand on an equal footing with the physician in the community. He deals with all classes of people; deals with the best people. He ought to cultivate the acquaintance and patronage of the best class of people, and he ought to be so educated and so qualified that he can meet and deal with those classes of people in the same intimate way as the physician meets and deals with them—and that means he ought to have a special professional education and a good general education as well. As a good citizen, as a force in his community, as a leader in his profession, no educational advantages will come amiss.

A word about the relation of the State to the profession of pharmacy. Be-

cause the pharmacist deals with such vital issues, and because the results of his dealing may be of such importance, the State undertakes to protect the people from ignorance in this profession by setting standards and regulations for the practice of pharmacy. This is a very proper and very necessary thing to do. The Government regulates where it pleases these days. It says what preparation and training the physician shall have. It undertakes to tell the groceryman what he may sell and what he may not sell, and the farmer the price for which he may sell his wheat. Doubtless the state will more and more interpose its restriction between the public and the representatives of all kinds of callings dealing with the public. This is especially important in all things pertaining to public health and to such professions as those of the physician and pharmacist. So it is consistent with public progress and welfare for the State to say what preparations and what qualifications a man shall have who proposes to compound and distribute medicines to the people.

These regulations applying to physicians have become so standardized that they apply pretty generally and interchangeably between all states so that a physician who is qualified to practice in Ohio is automatically qualified to practice in Indiana. Practically all of the states now unite in a common standard for the practice of medicine. But I am sorry to say in this respect pharmacy lags behind medicine, and Indiana lags behind other states with which we like to rank.¹ An important aspect of such a situation is that the State maintaining a low standard becomes the refuge for those who cannot qualify in the states maintaining higher standards and this condition tends to perpetuate itself. The State which does not have its qualifications fixed at a high standard or at least as high as other states suffers immeasurably. As a first step to progress in pharmacy the states, or the Pharmacists' Association, should make earnest and persistent efforts to secure reasonably uniform standards, both educational and legal, in all states. I think this standard cannot be too high. In our own State it is very low, too low for the best interests of the public, too low for the best interests of the pharmacists themselves. I hope to see the time when these standards can be raised to a very decided degree in the State of Indiana.

I come to another matter in connection with the profession of pharmacy which to my mind is really one of the greatest obstacles to professional advancement. I hope you won't misunderstand me when I speak of this, referring to the business or trade conditions connected with pharmacy. What would be thought of a physician who combined with his medical practice a real estate or insurance business? But the pharmacist, as a general rule, does a general and miscellaneous business. Indeed it is extremely rare to find a pharmacist confining his activities to his profession. I understand very well that this condition arises out of a state of affairs which no individual can alter; it has simply grown to proportions which are inexcusable and intolerable from the professional standpoint. But I will venture to say that all of you gentlemen would very much prefer to conduct strictly professional pharmacies if by so doing you could make a living and succeed as well as you do when you combine a miscellaneous merchandising business with the profession. I think you would all like to see pharmacy on such a basis. This

¹ Indiana now has a "prerequisite" law.

situation is wholly anomalous and inconsistent. No profession is more strictly on a scientific basis than pharmacy; no business is more miscellaneous or nondescript from the merchandise standpoint than that of the ordinary drug store. The two are wholly incomparable. There will not be much chance for elevating the standard of the profession as long as it continues to be a mere adjunct of a general department store business. If it were possible to put pharmacy on a strictly professional basis it would assist immeasurably in the other steps necessary to progress, but so long as the practice of pharmacy is mixed with the business of general merchandising we cannot expect to advance very far beyond present conditions. I do not say this in any criticism of you men, who are probably doing the best you can in both business and professional ways, but a druggist who in a single business room is selling paint, soda water, dry goods, stationery, school books, and innumerable other wares, and incidentally compounding preparations, will naturally not place a high value upon extensive technical education and high professional qualifications. The further development and raising of the standards of pharmacy as a profession alongside the profession of medicine are dependent in no small degree upon business conditions. I do not see an immediate solution to this problem. I do not expect that you will be so unwise as to open an exclusively professional pharmacy at present. You would soon starve to death, so as a matter of business you have to go on in the old way. But I am confident eventually things will be different. It is inconceivable that the leaders in the profession and the public will not in the near future demand educational, legal and practical standards for pharmacists as high in Indiana as in any state of the Union. Therefore, the pharmacists of Indiana ought to think of these matters seriously. While you, perhaps, cannot accomplish much as individuals, yet when you are assembled in an association like this, you should, if you believe in progress, put yourselves on record as in favor of these forward steps in your profession so that gradually the professional side of the pharmacists' business may come out from its subordinate place onto a higher plane than at present.

I should like to go about making a crusade for this thing. I believe the people of the State, did they understand, would be very desirous that progress be made in this direction so that they would recognize in pharmacy a high profession, in the hands of well educated, thoroughly trained professional men, competent to perform all the duties of their important calling. I wish that this association might discuss such questions; that you might put yourselves on record as in favor of higher standards for the qualifications of pharmacists in the State; as in favor of more thorough training and education of pharmacists in order to meet those standards; and for a more strict administration of the laws regulating pharmaceutical practice. It is true that the professional side of pharmacy has been subordinated and neglected; that the general druggists' business with its presumably profitable aspects has led even our best pharmacists to overlook the claims of their profession. For the good of the profession, as well as for the welfare of the people of the State, pharmacy ought to keep pace with the progress that has been made in medicine and every other profession. The only way this can come about is by the working of a strong consciousness of the needs of the profession, from within its ranks. I cannot say anything here that will make you do what you do not desire to do, but if your deliberations and thought are centered on this subject certainly there

will be developed in your profession a strong desire to see things move forward and upward and nobody will profit by this more than the pharmacists themselves.

I will say, in closing, that my remarks have not been made in any sense of depreciation or criticism. I understand quite well that you have puzzling problems. The pharmacists of Indiana are a loyal and competent body of men, but just in proportion as they are such they should have the ambition and desire to see their profession and its place in our State stand out more prominently and more effectively as compared with other states. When you begin to take collective pride in your profession as such, then will be the dawn of growth and development.

PHARMACY AS A HOBBY AS WELL AS AN INTEREST.*

BY CHARLES H. LAWALL.

When Bryant said, "To him who in the love of nature holds communion with her visible forms she speaks a various language," he uttered a truth which has many applications, not the least of which is, Pharmacy.

Substituting the word Pharmacy for the word Nature, in the foregoing quotation, gives a clue to the real reason why Pharmacy holds its own in spite of commercialism and other handicaps.

There are various motives which impel a man to choose a profession; one, and probably the strongest one, is self-interest. This frequently changes in later life to a realization of opportunity for service and a desire to be helpful to one's fellow-man, motives, which, as a rule, have no place in the make-up of a young man.

By far the strongest and most valuable motive, from the standpoint of the development and progress of any profession, is the one which has to do with the desire for mental development through the acquisition of knowledge.

The answer to the eternal "Why?" has been sought by individuals in all ages and out of this quest has arisen all that we prize in the shape of knowledge. Those who have contributed most largely to the progress of the past are not necessarily the ones who stand out like beacon lights as having enunciated important axioms, or laws, or discovered valuable elements, but the real credit belongs to the silent, patient, plodding workers, who investigate from sheer love of the work and who, little caring whether results have any practical value at the time, store up the material which genius later arranges into that classified coherence which men call Science.

Much of the pioneer work of this kind in Chemistry and Medicine has been done by pharmacists, whose successors too frequently see themselves frowned upon and discredited by members of both the sister professions which have been founded and developed through her help.

Much has been written regarding these matters in order to bring pharmacists to a realization of their neglected opportunities. It is doubtful whether any change has been, or could be, effected in the habits of work and of thought of older pharmacists. It is the younger members of the profession with whom the hope of advancement lies, and the responsibility for their guidance is largely in the

* Read before Pennsylvania Pharmaceutical Association, Buena Vista meeting, 1919.