introduced by Pregl, but the older methods, for example, the long and tedious process for the estimation of halogens by the method of Carius, are still in vogue in many of our laboratories and are taught to the students. In any case the usual operation entailed by the estimation of carbon and hydrogen, nitrogen, sulphur and the halogen requires considerable time, which has not been materially shortened by the introduction of the less cumbersome methods due to Dennstedt. Pregl's methods, in which a very small quantity of material is used requiring the provision of a special type of balance, have been tried in many laboratories, and have found favor, it is understood, in several of them, more particularly abroad. But the general experience has been that the technical skill required to obtain good results is acquired only after long practice, and that whereas the methods are useful for gaining an indication of structure when the quantities of material at hand are so small as to necessitate their use, yet when a sufficient quantity of substance is available the older methods are more reliable and more easily carried out. It is interesting to note that the new methods which have been introduced by Professor ter Meulen, of Delft, are going to be described to us by Professor ter Meulen himself, who is fortunately with us at this meeting. Professor ter Meulen will give an account of his methods on Tuesday morning, and they will be shown in actual operation during the soirée on Tuesday evening. Chemists will then see that a great saving of time can be effected by methods which can not only be used to analyze the small quantities employed by Pregl, but also quantities of 0.1 gm., such as organic chemists have been accustomed to use in the past, and which have been shown to produce the most accurate results.

THE UTILIZATION OF FOREST PRODUCTS

The immense number of organic compounds distributed among the plants, trees and grasses which form the forests and jungles of the world, offer a wide field for research which has still much to yield. Our knowledge of the medicinal properties of organic substances and the various uses to which they could be put in the service of mankind did not come to us through any effort of the chemist, but as the outcome of a process of trial and error which is as old as the human race itself. These products were obtained from vegetable materials present in the forests, and as time went on they were extracted in a form possessing some degree of purity, and the plants containing those with specially valuable properties were cultivated for their production. As soon as a theory of organic structure was evolved upon which prediction could be based, these useful products were subjected to close investigation, and in several cases they were prepared by laboratory means. As an outcome several of them, such as indigo and alizarine, were found to be capable of production more economically by the chemical method than by the processes of life, and the natural substances were rapidly replaced by the artificial products. Others still resist all efforts to unravel their structures and remain still unsynthesized. Nevertheless it has been by a study of the chemical structure of natural products that much has been learned regarding the relation between chemical composition and physiological action, and although it may not have been found possible economically to prepare the natural substance itself, the clue revealed by the determination of structure has led to the production of other substances which have not only shown the properties of the natural compound in an enhanced form, but have also exhibited other valuable physiological effects. The determination of structure has, therefore, two objects—to prepare the natural substance and to ascertain the particular arrangement of the atoms in the molecule which confers on it the properties which determine its value. The determination of the structure of indigo led not only to the production of the blue natural indigo, but enabled indigoes of every shade of the spectrum to be prepared as commercial products. The determination of the structure of cocaine revealed the molecular complex which conferred on this substance its power to act as a local anesthetic, and has led to the production of a number of other substances possessing this valuable property, but without the special disadvantages attaching to the use of the natural substance. Examples of this kind are numerous and should be increased. A systematic examination of our forest products would undoubtedly lead to the discovery of many others and would provide opportunity for the investigation of many other important problems, such as, for example, the utilization of forest grasses as a source of power alcohol.

Systematic team-work research by organic chemists in close association with botanists is required, and now that the Forest Production Research Board of the Department of Scientific and Industrial Research is in active operation, no doubt this branch of its work will receive attention.

(To be concluded) J. F. THORPE

AGE: THE PIPER[1]

I HAVE chosen as my title "Age: the Piper," for I propose to show how we, the younger partners in this dance of life, must foot the measure piped by our

[1] Address delivered at the Alumni Banquet of the Medical School, Western Reserve University, June 15, 1926.

seniors. Take it as you will, the inspiration and the judgment alike lie at the charge of our elders. They have set the pace and to them we must answer: it is a serious business.

Sir James Barrie, speaking the other day at a banquet for the Australian cricketers in England, spoke whimsically of one of those who, having set out upon the long journey of the dead, paused to lean his elbows on the village gate and watch the cricket match on the green. "What a terrible thing if he had to rejoin his fellows feeling that we, his successors, were not playing the game." Try as we will, we may not, as Dr. Stewart assured us at the alumni banquet a few years ago, evade the responsibility we owe to those who have passed along this way ahead of us.

How early in our consciousness this responsibility becomes fixed I, an exponent of the science of the sepulcher, must leave to the psychologists. Almost a thousand years ago Saint Hildegarde of Bingen wrote her vision. "And I saw the likeness of a woman having a complete human form within her womb. And then, by a secret disposition of the Most High Craftsman, a fiery sphere, having none of the lineaments of a human body, possessed the heart of the form, and reached the brain, and transfused itself through all the members. And I saw that many circling eddies possessed the sphere and brought it earthward, but ever with renewed force, it returned upward and with wailing asked 'I, wanderer that I am, where am I?' 'In Death's shadow.' 'And where go I?' 'In the way of sinners.' 'And what is my hope?' 'That of all wanderers.'" But when we have come to this earth, when in the process of years we have learned patience and persistence, when we have at last found that the mists about the goal are shifting and transient, what has age to contribute to our philosophy?

Seventy-five years have passed since Wordsworth died and the Prelude was published: one hundred and twenty since it was in its first form, finished but only at this date so long afterwards are we able to study the textual changes made during those forty-five years.

> The mind of man is framed even like the Breath
> Of harmony in music.

was the original script.

> Dust as we are, the immortal spirit grows
> Like harmony in music.

is the text as Wordsworth the elder finally left it.

How long has this subtle influence been at work in mankind? How long has it been possible to leaven thus our common heritage?

All of you have seen the wonderful palace of medical research and training put at our disposal by the inspiring generosity of Mr. Samuel Mather, and many of you, passing by the tremendous collection of human material in the museum named in honor of our beloved dean, must have wondered why this feverish haste to gather such quantities of the evidence of our mortality. Some of you know that now, in consequence, for the first time it is possible to study quantitatively the life history of mankind, not merely of the population lately stirring restlessly along the southern shore of these great lakes, but also, through this sample, the life history of all mankind. Secrets hitherto hidden from our knowledge are breaking upon us with startling vividness and we may now more accurately adjudge our inheritance. It seems a simple thing to state that owing to the opportunity provided in the vision of Dr. Hamann's life, it is now possible to discern with fair accuracy the precise age of any human skeleton. The bare fact smacks of the dry bones which gave it birth, but what possibilities it has opened up!

Away in that dusty corner of the earth called Pecos, in New Mexico, have lived a people undisturbed even by the violent travail of the New World in the sixteenth century. And there between 850 and 1800 A. D. there lived and died 560 persons who have bequeathed to us their records in their bones. Many died in childhood, others in early adolescence, most in the two decades between thirty-five and fifty-five years. During all these thousand years there has been no perceptible change in the actual duration of life at Pecos. But when we come to deal with the higher European civilization there is a different tale to tell.

Up in the English Lake District there is a shaggy moor overlooking the vast expanse of silted sand covered at high tide alone by a shallow sea: it is called the Birkrigg from the birches which dot its irregular rocky surface. There in the Bronze Age was a settlement—a lookout for the hinterland. Last summer I had the privilege of examining the sixteen burials in the adjacent disc barrow or Bronze Age cemetery. It came upon me with shock of surprise to find the sixteen bodies ranging in age from seventeen to thirty years. Yet the collateral evidence does not seem to indicate, as one might otherwise suppose, a military encampment of young people only. Why did these people die so young: that was the disquieting thought with which I left the district.

Hard upon the heels of this investigation I was called across the country to the town of Scarborough, situated on the edge of the naked cliff overlooking the North Sea like a sentinel watching Europe. Here time after time incursions of marauders landed from the wilder districts of Jutland and Scandinavia. In Bronze, Roman, Saxon and Norman times alike Scarborough was a fortified village. Under the chancel of the Norman church were recovered last year one

hundred and forty-six skeletons of folk who lived in the eleventh and twelfth centuries. Here as at Pecos the majority of the people died between thirty-five and fifty-five, the peak of mortality occurring at about forty years. Of the entire number only eight lived to see their sixtieth summer.

"To die of age," said Montaigne in the sixteenth century, "is a rare, singular and extraordinarie death, and so much lesse naturall than others. . . . It is an exemption, which through some particular favour Nature bestoweth on some one man, in the space of two or three ages." On attaining his thirty-ninth birthday the same philosopher wrote in soliloquy, "Thou hast alreadie over past the ordinary tearmes of common life."

Twenty years ago Karl Pearson analyzed the curve of modern deaths obtained from English vital statistics. He found that the peak of death occurs at seventy-two years but that there are lesser peaks in childhood, in adolescence and in middle age at forty-two. All these peaks except that of old age I have found in various ancient populations of which I have mentioned merely three. Again the peak of old age death does not occur among the unfortunates who, having failed to cope successfully with the conditions of life to-day, find their last resting place in what has become the permanent morgue of our city of Cleveland, namely, the anatomical laboratory.

It is this last peak of our mortality, occurring only in quite modern days and presenting itself at seventy-two, full thirty years after the peak of middle age death, which is the most suggestive and intriguing fact emerging from our study. There have been old men in all periods of the history of mankind, but they have been rare and marked men. "And the Lord commanded Moses, concerning the Levites, saying. . . . And from the age of fifty they shall cease waiting upon the service, and shall serve no more."

Precisely when this tremendous increase in the average actual duration of life first appeared as a result of greater safety and improved social conditions, we do not yet know: it can hardly have been much more than two centuries ago. But consider the effect. When the normal age of death was the early forties a man's experience died with him and had little or no opportunity of leavening the population at large. During the last two centuries, through the warding off of the Reaper for thirty years more, the younger members of civilized communities have enjoyed all the benefits of the experience of their elders. We seek for the cause of the enormous strides in discovery and invention during the past century. May not the chief contributing factor be precisely that our fathers and uncles abide to guide us out of the stores of their accumulated wisdom? May not the rapidly increasing sensitiveness of the civilized conscience with its resultant effect upon slavery, child labor, the rights of womanhood, be due in the main to the influence of our mothers who bloom as evening primroses in the twilight of life?

There is evidence indeed that the pace we have attained is too great for us. During the past twenty-five years we have been dying, on the whole, earlier than statistics of the expectation of life would lead us to anticipate: that is an issue for the future with its frantic haste. At the moment and for the last thought I would leave with you this evening may we not concentrate upon this theme that the major factor concerned in the betterment of living conditions to-day is the abiding with us of our elders, men and women alike? My closing emphasis rests upon the influence among us of the wisdom of our fathers and the grace of our mothers.

In Wordsworth's Prelude there is a phrase picturing that wonderful countryside of English lake and mountain. This phrase, so apposite for the beauty of age, is my final figure in the contemplation of these, our elders, "Clothed in the sunshine of the withering fern."

T. WINGATE TODD
WESTERN RESERVE UNIVERSITY

SCIENTIFIC EVENTS

THE LAENNEC ANNIVERSARY[1]

ONE hundred years ago there died in the village of Quimper, Brittany, one whose contribution to medicine in general, and to our knowledge of tuberculosis in particular, was of great magnitude. René Theophile Hyacinthe Laennec was his name. He invented the stethoscope, wrote a masterful treatise on its use, "Traité de L'auscultation Mediate," organized and augmented the then current knowledge on the pathology and the symptomatology of tuberculosis and coined a descriptive terminology which is still in use for the designation of sounds elicited upon auscultation.

Withal he was a clinician of the first rank. "Perhaps the greatest that ever lived" (Krause). His studies were not confined to the lungs and to tuberculosis. The cardiac sounds, normal and pathologic, were included in the domain of his researches. He described the first and second cardiac sounds and the various types of pathologic murmurs. He understood their significance, as well as the pathology and symptomatology of pericarditis.

Laennec studied medicine in Paris under Corvisart, physician to Napoleon Bonaparte. Laennec was a

[1] From the *Weekly Bulletin* of the City of New York Department of Health.