ment. One plat will be devoted to experimental work in plant genetics under the direction of Professor R. W. Wood.

REALIZATION of the rapidity with which the last remaining stands of virgin deciduous forest in Kentucky are being cut down has led to the organization of a league whose objective is the acquisition of the last remaining forests to be maintained as inviolate preserves. The "Save-Kentucky's-Primeval-Forest" League hopes to do for the deciduous forest what the "Save-the-Redwoods" League has done for California's redwood groves. The organization meeting was held in Lexington at the call of Miss Daisy Hume, a representative on the National Conservation Committee of the Garden Club of America. A further meeting was held in Lexington on January 4. Mrs. Bailey P. Wootton, of Frankfort, is secretary-treasurer of the league.

A CORRESPONDENT of the *Journal* of the American Medical Association reports that a new Microbiologic Research Institute has been established in connection with Osaka Imperial University for which it is planned to erect a large building. There has been only one institute in Japan of this kind, the Infectious Disease Research Institute in Tokyo, which is chiefly devoted to studies of microbiology and to the manufacturing of preventive vaccines. Osaka is often called the gateway of infectious diseases from abroad, and so it will be more convenient for this kind of work than Tokyo. The new institute will study chiefly leprosy, tuberculosis, bacteriology and the prevention of epidemics. It will deal with infectious diseases that are closely connected with the surgical, internal and dermatologic departments. The first chief is Professor Dr. Yashiro Furutake, of the medical department of the university. Drs. Taniguchi, Satani, Imamura, Hosokawa and Sakurai, who are professors and assistant professors of the university, are on the staff. It will be completed in 1939 and the annual expenditure is expected to amount to over 330,000 yen.

THE American Medical Association plans to modernize its building in Chicago at a cost of $400,000. It is announced that approximately $200,000 will be spent on the two-story top addition. The balance will be used for modernizing the entire building and making many changes in departments. The entire new top floor will be used for enlarged editorial and library space. The executive, secretarial and business offices will be moved to the new seventh floor. Various special bureaus will occupy the present sixth floor. The printing departments and others will use the remaining lower stories. Founded in 1847 the American Medical Association now has a membership of 100,000 out of the 130,000 practicing physicians in the United States. It publishes many medical magazines and booklets on its own presses. It employs 550 men and women on a day and night shift. Dr. Olin West is secretary and manager. Dr. Austin A. Hayden is secretary of the board of trustees.

DISCUSSION

COMPUTING PROGRESS IN CHEMISTRY

MEN attempting to measure the progress of science and the progress of civilization have failed to find an acceptable yardstick on which they may mark those numbers which are needed to satisfy their scientific minds, and, moreover, they have not been able to compute the numbers to give a scientific answer to the question in their minds.

The American Chemical Society, without knowing what it was doing, has built the yardstick and computed the numbers for marking the yardstick of progress by publishing its twice-a-month journal, *Chemical Abstracts.*

The American Chemical Society, faced by the unwieldy chaotic mass of rapidly accumulating chemical facts and chemical theories, early this century selected editors and set them to work devising a plan for bringing order out of the chaos, asking them to seek a key to the constantly growing mass of chemical literature throughout the world.

These editors began the magazine *Chemical Abstracts* in January, 1907, endeavoring to collect, condense and then publish in it an abstract of every worthwhile article on chemicals or chemistry appearing in the current scientific magazines.

The first year they condensed and published 7,975 such abstracts, the next year 10,835, and so on, increasing an average of about two thousand a year, until they published 19,025 in 1913.

The great war set back the number until they published only 9,283 in 1918, but immediately after the war the old pace of increase at about two thousand a year reasserted itself. In 1923 they published 19,507 abstracts, which brought them back to where they were in 1913, and the annual increase of two thousand a year marched on to the end of 1935 unaffected by the economic depression so that it is estimated that they published 42,468 abstracts in this last year.

The slight variations of the "curve" shown in the accompanying chart are explained by the editors.

For example, the drop in the curve for the year 1931 was caused by many abstracts due for publication in 1929 which were held over to 1930 for budgetary reasons, thus heaping up additional abstracts in 1930. Others due for publication in 1931 were held over (about 2,500 of them) until 1932, thus also explaining the apparent drop in 1933.

The inquisitive mind that looks at this yardstick of *Chemical Abstracts,* covering five war years, seven pre-war years and seventeen post-war years, says to itself, "How far have we a right to look into the future through these years as a telescope?"

In answer to such question a well-informed scientist will say: "Those seven peace years plus seventeen peace years are twenty-four peace years, of almost uniform progress. It is fairly safe to count on the same progress continuing twice as much longer, say to the year 1985."

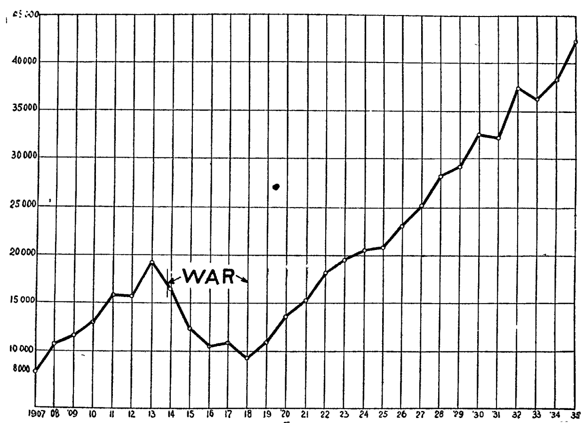

FIG. 1

The accompanying curve is approximately a straight line drawn through the years 1918, 1924, 1928. That line, prolonged to show the probable course of chemical progress in the next fifty years, indicates that, in the year 1985, if no serious war interrupts progress, there will be published 135,000 magazine articles on chemistry—about three times as many as in the year 1935. In other words, chemical knowledge and the library of chemical facts will be growing three times as fast in 1985 as in 1935.

The curve in the chart misleads a person who looks into the past instead of into the future, for its slope backward from 1913 to 1907 seems to indicate that chemical progress first came to life a few years before 1907, perhaps about 1901.

Other abstract chemical journals are found on the shelves of many libraries, going back to 1880 in England, and still further back in Germany, and stand on those shelves as monuments to prove that chemists and chemistry were very much alive long before 1901. The truth seems to be that chemistry was marching steadily along the road of progress for a hundred years before 1901 with chemists publishing a few score or a few hundred magazine articles on chemicals each year, increasing the number very slowly until about the year 1900, when the newly discovered argon, helium on the earth, neon, radium and x-rays began to revolutionize chemistry.

The editors of those British and German abstract chemical journals made no serious attempt to cover the wide field covered by the editors of *Chemical Abstracts,* so no safe estimates can be based on those abstract journals. All that can be said is that they prove chemistry was alive and growing before 1907, but growing for the most part much more slowly than in recent years. The library of chemical facts increased very slowly in the days of forty or more years ago.

To this should be added an estimate that progress has been growing at a faster rate than the curve indicates, because to-day, more than in the past, a magazine article on new chemicals is likely to describe several or even many new chemicals. Modern chemists make one new chemical, and from it make numerous derivatives to complete an investigation planned along lines utterly unknown to chemists of the past.

It hardly seems possible that the progress in chemistry in all the century before the year 1900 could have produced much more than the 42,468 abstracts published in 1935. In other words, the march of chemical progress each year carries the world almost as far forward as did the march of progress in the whole century between 1800 and 1899.

This forward march each year seems to be in the neighborhood of one per cent. per year of all prior progress added together—or only a fraction of the growth of wealth as estimated by economists. It has been reported that the economists consulted as advisers, when asked by the makers of the Treaty of Versailles what Germany could pay, said, "In normal times national wealth in a civilized nation grows between three per cent. and five per cent. each year."

How about mechanical progress? Can we produce a similar or a different curve for mechanical progress? To this it is possible to answer: "This curve represents the speed of chemical progress. No similar data have been found for drawing a separate curve of mechanical progress, but data have been found which indicate that the curve for mechanical progress must follow closely along the curve of chemical progress."

One record of mechanical and chemical progress is the patents issued by the United States Patent Office and by other patent offices. This record of patents issued is very defective as an index of progress, for several reasons. First, each patent issued represents an invention a year old or several years old. Second, the issue of patents drops greatly during and following an economic depression, such as that following the year 1929. Third, changing policies in the Patent Office produce unmeasurable changes in the number of patents allowed to issue.

In a normal year about one patent issues for every two patent applications filed, but in the year 1935, about one patent issued for every one and one-third patent application filed, most patents being based on patent applications two, three or more years old.

On the other hand, the number of patents issued varied little during the ten years from 1870 to 1880, although those years saw the invention of the electric motor, the telephone, the incandescent electric lamp and other important inventions shown in the Centennial Exhibition of 1876.

The number of patents issued each year by some other nations varies much more widely and more rapidly than in the United States. England, for example, issued about 12,000 patents in 1931, about 24,000 in 1930 and about 35,000 in 1933. It is obvious that the number of patents issued is an unsafe guide by which to measure progress.

The proportion of chemical patents issued each week in the United States has, in contrast, remained singularly constant for thirty years at about one in every fourteen of all patents issued. In other words, the curve of progress in mechanics must be nearly identical with the progress in chemistry if statistics of issued patents mean anything.

One further observation must be made pointing to the years 1914 to 1918, and that is to point the lesson of the cost of war. The asserted stimulus to chemistry due to war does not appear either in those years or in any showing of heaped-up and buried progress released to show itself at the end of the war. On the contrary, each year of war apparently set back progress more than the progress gained in a year of peace, and each year of war apparently added its set-back to the set-back of the previous year of war. It is evident that the much-boasted chemical progress whipped-up to meet war needs is trivial compared to the work-a-day progress in times of peace.

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POLYGONBODEN ON MT. DESERT ISLAND, MAINE

ANTEVS[1] has described both fossil and modern stone nets and stone stripes from the Presidential Range, New Hampshire, and from Mt. Katahdin, Maine, at elevations of 4,000 feet and higher. The authors have found modern stone nets and stone stripes on Cadillac Mountain and on Jordan Mountain, and Professor Edward H. Perkins, of Colby College, has found them on Sargent Mountain, Mount Desert Island, Maine. On Cadillac Mountain they were observed as low as 1,300 feet and on Jordan Mountain as low as 1,100 feet, which makes these the lowest described Polygonboden in the United States. The nets and stripes on Jordan Mountain are embryonic and vague but rather numerous. Those on Cadillac Mountain are in many cases well formed, as well formed as any the authors have seen on Mount Washington, besides being much more numerous. These structures are found in the small barren patches of more or less modified glacial till, sometimes admixed with disintegrated granite, which is still preserved in places. The average diameter of the nets is one to two feet and the stripes are from four to five feet long. These are undoubtedly being formed at the present time and are similar to the modern stone nets and stone stripes which Antevs has described. These structures are undoubtedly present on other peaks of Mt. Desert Island, and it is the intention of the authors to return and go over the ground more thoroughly with the hope of finding these features at lower levels, perhaps even at sea-level.

It is generally agreed that the conditions necessary for the formation of these structures are: (1) freezing temperatures; (2) correct soil conditions; (3) flat areas with slight slope and (4) barren areas. It may well be that the first three of these conditions obtain at sea-level in the Mount Desert area. However, barren areas are not common unless made by man. An examination of old sand and gravel pits might furnish some interesting data, and along this line it would be interesting to prepare some earth at sea-level to see if the Polygonboden would form. The authors spaded up one area which contained especially well-developed structures with the idea of returning to collect data on their rate of formation. The material in which the Polygonboden are formed often rests in rock basins, which condition makes for a high water table. This condition, together with the high precipitation on the Mount Desert mountains and the great number of barren areas, is probably responsible for the low elevation of the Mount Desert Polygonboden.

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1 Ernst Antevs, "Alpine Zone of Mt. Washington Range," Merrill and Webber Company, Auburn, Me., 1932.

"PETRIFIED WALNUTS" VS. CONCRETIONS

SEVERAL years ago Mrs. George W. Rust, who was then Miss Alce Ann Clark, student of the University