59) are Crompton Oorang and his son, Rockley Oorang.

Practically all show dogs are placed at public stud, and any champion, thanks to the advertising his winnings give him, will be popular. The 53 champions who never sired a champion can not therefore be excused on the plea of lack of opportunity. They would certainly receive more bitches than a non-champion, unless this dog had made a great reputation as a sire.

The full table, showing the ancestry and get of all Airedale champions, and a similar one for Scottish terriers will be published in my forthcoming book on dog breeding.

WILLIAMS HAYNES

MITOSIS IN THE ADULT NERVE CELLS OF THE COLORADO BEETLE

IN a recent study of the development of the nerve cells through larval, pupal and adult stages in the honey bee, we had ample opportunity to note the method of division and growth. After the very early larval stages there is formed a regular mitotic figure in each multiplying nerve cell. These division figures are not equally abundant in all our material, which may account for the assumption that there is a rhythm in the normal growth of nerve cells. Mitosis does not stop at the end of the larval period, but continues for a time in the pupal stage. We have observed perfect mitotic figures in bees in the early pupal stages of metamorphosis. These figures are exactly like those occurring in the larval stages.

The larval life of the honey bee is relatively inactive, which affords an interesting contrast with the active existence of the common potato beetle. The results of this comparison will appear in a separate paper. While making the comparative study of the larval as well as pupal and adult stages in the growth of the nerve cells we noted in some of the adult material unmistakable evidence of nerve cell division. Close examination showed that there were many nerve cells in one animal dividing in the normal mitotic manner. Centrosomes, spindle fibers and astral rays were all complete. The chromosomes were too compactly massed to be counted. In one field of the 2 mm. oil immersion objective we found six cells undergoing division. Others appeared in other parts of the ganglionic mass.

Our study upon the growth of the nerve cells in the honey bee and the potato beetle indicate that we may expect to find nerve cells regularly dividing by mitosis through the pupal and into adult life.

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SCIENTIFIC BOOKS

Sigma Xi Quarter Century Record and History 1886–1911. Compiled by HENRY BALDWIN WARD, Secretary of the Society of the Sigma Xi, with the assistance of the Chapter secretaries. University of Illinois. Urbana-Champaign. Pp. xii + 542.

A brief statement of the society whose achievements for a quarter of a century are given in the octavo volume which has just been published under the above title will perhaps best describe its importance.

In the early spring of 1886 the feeling that students of science who were not eligible to election in the well-known honor college fraternity, Phi Beta Kappa,[1] should organize a similar honor society to which those worthy followers of Agassiz, Darwin and Haeckel should be admitted was clearly recognized at more than one college, and especially at those universities where science was made an important feature of the curriculum.[2]

Accordingly, at Cornell University in November, 1886, the society of the Sigma Xi was

[1] Organized in 1776 at William and Mary College in Virginia.

[2] Let me call attention at this point to the fact that very early in the history of the School of Mines of Columbia University in New York those students who were able to enter the senior class without conditions were given the privilege of wearing the badge of crossed hammers in the course of mining engineering, and of the Liebig's potash bulbs in the chemical course.

organized. It takes its name from the initial letters of two Greek words signifying "Companions in Zealous Research." The object of the organization, as given in its constitution, is to encourage original investigation in science, pure and applied, by meeting for the discussion of scientific subjects; by the publication of such scientific matter as may be desirable; by establishing fraternal relations among investigators in the scientific centers; and by granting the privilege of membership to such students as during their college course have given special promise of future achievement.

Membership in this society is of three kinds: active, alumni and honorary. Naturally the first class is the most important and includes, as a rule, professors, instructors, graduates and such undergraduates as may be found worthy. The undergraduates are usually chosen in the senior year, following in this respect the custom of Phi Beta Kappa, although in some institutions, as, for instance, the University of Chicago, it has been the policy to admit only graduate students to membership. The alumni members are chosen from graduates of at least five years' standing, who have demonstrated their right of membership by investigation, while honorary members may be selected from those who have achieved eminence as scientific workers, although as yet none such have been elected.

From the beginning it was evident that the society would succeed. Chapters were organized at Rensselaer and Union in 1887, at Kansas in 1890, and at Yale in 1895. In addition to the foregoing there are now chapters at Minnesota (1896), Nebraska (1897), Ohio (1898), Pennsylvania (1899), Brown (1900), Iowa (1900), Stanford (1901), California (1902), Columbia (1902), Chicago (1903), Michigan (1903), Illinois (1903), Case (1904), Indiana (1904), Missouri (1905), Colorado (1905), Northwestern (1906), Syracuse (1906), Wisconsin (1907), Washington (1907), Worcester (1908), Purdue (1909) and Washington, St. Louis (1910).

The membership in 1886 was but 14, but it has grown steadily and persistently ever since; for in 1891 it was 267, in 1901, 1,559, and in 1911, 7,498, which number is annually increased by between 600 and 700 (659 in 1911) new members, of which in 1911 324 were undergraduates.

Annual conventions are held on the Tuesday evening of the week of the meeting of the American Association for the Advancement of Science, at which time the policy of the society comes up for discussion and such other public business as may be desired. Delegates from the chapters, together with the general officers, are members of the Council.

It is not easy to review the achievements of Sigma Xi during its existence of a little more than a quarter of a century. This difficulty lies in knowing just what to say. There is no danger of saying too much, but there is decided danger in saying too little. Its mission is to encourage science and to foster original investigation.

Science has been distinctly advanced by the popular public lectures and addresses made before many of the chapters by such eminent authorities as Charles F. Chandler, R. H. Chittenden, George W. Goethals, G. E. Hale, L. O. Howard, David Starr Jordan, A. A. Michelson, C. S. Minot, E. W. Morley, E. L. Nichols, C. R. Van Hise, Arthur G. Webster, Harvey W. Wiley and many others.

In the celebrations of the centenary of Darwin's birth, it took an active part, and important commemorative meetings with appropriate addresses were held when the bicentenary of Franklin's birth occurred.

Of far-reaching importance was the investigation by the California chapter of the condition actually existing in the region about San Francisco concerning the bubonic plague and the results of the report were most potent at a time when the existence of that frightful disease on the Pacific coast was disputed.

Not the least of its valuable contributions is the fact that it has brought about an increased interest in Phi Beta Kappa. It affiliates agreeably with its older rival at Columbia, Kansas, Minnesota and Pennsylvania, alternating addresses at commencement at certain of these universities, and holding joint meetings at others. The existence of Tau Beta Pi, the honor fraternity in institu-

tions of applied science, is, I am sure, very largely due to the success of Sigma Xi.

Sigma Xi stands "for intellectual energy rather than sordid ambition," and the volume so ably compiled by Professor Ward richly demonstrates the fact that it "has become a prominent factor in most of our universities." In the words of one of its founders in consequence of its influence:

> Men have come to know that knowledge of the present is far more important than tradition—that individual discernment, power of initiative, and honesty, surpass all authority in the equipment of a scholar of the new sort.

MARCUS BENJAMIN

An Introduction to the Chemistry of Plant Products. By PAUL HAAS and T. G. HILL. Published by Longmans, Green and Co., London, New York, Bombay and Calcutta. 1913. Pp. xii + 401.

The progress of chemistry, perhaps more than of any other science, may be divided into great epochs, in each of which one branch of the science is found to be far more productive of permanent results than are the other divisions.

The centuries-long period of alchemy gradually merged into the period when chemical researches were conducted with the view of enlarging the number of compounds which could be utilized in medicine.

Following the discovery of the nature of combustion, we begin to find the first organized chemical research, devoted in the main to inorganic chemistry, which rewarded us with a gradually increasing number of elements, with the atomic hypothesis, and the gas laws.

Thus until 1828 nearly all of the chemical investigations were confined to inorganic chemistry, for the compounds of carbon were supposed to be formed only by the action of life. When, however, Wöhler made his famous synthesis of urea, a new field was opened and the immense number of organic compounds listed in "Beilstein" are in a large measure the result of the studies of the period of organic chemistry.

For a time organic chemistry overshadowed inorganic chemistry until, under the leadership of men like Arrhenius, Ostwald, Nernst and Van't Hoff, a new chemistry was created which we know as physical chemistry. And even in our own time we have seen the science of radioactivity follow the discovery of radium by Mme. Curie.

During all of these advances the chemistry of the life processes has been more or less neglected. To be sure, a great many of our universities list courses in "physiological chemistry," but until very recently these have been devoted almost entirely to the study of nutrition and the chemistry of pathology, and even to-day the study of the chemistry of the life processes is only at a beginning. This is perhaps necessary, for it would be a useless task to undertake to determine and measure the life processes without the exact knowledge furnished by the organic and physical chemists.

We are thus, probably, near the beginning of a period of biological chemistry, not only the chemistry of animal life, but the chemistry of plant processes as well, not only from the standpoint of the physician and utilitarian, but from the broader standpoint of the study of life itself, its chemical products and the laws by which it is governed.

We have many admirable text-books dealing with physiological chemistry, but text-books which are suitable for a course in plant chemistry are rare. This may perhaps in part explain the absence of such courses from the curricula of our universities. It is, therefore, a pleasure to find such a book as "An Introduction to the Chemistry of Plant Products."

Modeled somewhat after Hoppe-Seiler's "Handbuch der physiologisch- und pathologisch-chemischen Analyse," but dealing only with plant products, there is a wealth of information in the 400 pages. Each group of plant constituents is discussed, first under the general group, then under the group subdivisions, and lastly each compound is given, its structural formula (when known), its properties, its chemical reactions, its micro-chemical reactions in many cases, the qualitative tests