equilibrium corresponding to complete random redistribution. This is represented schematically by the equation:

$$R_2R'_2M + R'C \rightleftharpoons [R_2R'_3]\ [MC] \rightleftharpoons R_3R'M + RC$$

in which R and R′ are the groups to be redistributed, M is the carrier, such as Pb in the case of alkyllead compounds, and R′C or RC is the catalyst.

The information obtained so far on the redistribution reaction is in accord with such a mechanism, but does not yet include data which confirm its correctness. Kinetic studies of the reaction and investigation of the physical and chemical characteristics of the catalyst are, however, expected to throw light on this point. It seems fair to expect that a closer scrutiny of the mechanism of the reaction will lead to a better understanding of the exact nature of the covalent bond and particularly of the exact mechanism whereby it is loosened and reformed in ordinary chemical reactions.

Beyond these positive studies one may well speculate whether this heretofore unsuspected reaction does not often take place spontaneously in natural systems containing several kinds of similar compounds. It may well be that the aging of alcoholic beverages is due at least in part to the redistribution of the esters to which they owe their flavor, while some of the little understood changes which take place in the living cell may correspond to the random interchange of the amino acid groups between the molecules of protein.

Practical applications should also not be overlooked. Two groups already suggest themselves at first sight. One is the preparation of mixed compounds such as mixed esters of polybasic acids, for instance: instead of preparing these by successive esterification, they can now be prepared directly by redistribution between the two corresponding symmetrical esters. A second and perhaps less obvious line would be the opening of new fields of use for materials heretofore considered too inert to be of practical value in chemical syntheses. For instance, organic bromides are not usually thought of as brominating agents because the bromine can not be removed by ordinary methods. As shown in Fig. 2, appropriate double decomposition between ethylene dibromide and an organic chloride will yield the corresponding bromide. Bearing in mind the availability and ease of handling ethylene dibromide, it seems probable that its use will prove advantageous in the preparation of some organic bromides, especially where the corresponding chloride is readily available.

The scientific reader who is not directly concerned with organic chemistry will be interested to note that this discovery carries a lesson which reaches well beyond the confines of its field. The concept of the absence of reaction between similar organic compounds has been accepted without challenge because of its usefulness in introducing order in our chemical knowledge. The experimental evidence reported above proves once more that we should ever bear in mind that the validity of any concept depends on how strictly we have been able to subject it to experimental verification and not on how long we have had it or how easily it fits our mental processes.[1]

OBITUARY

WITMER STONE[1]
(1866–1939)

WITMER STONE was born a naturalist, nurtured a naturalist, and a naturalist he lived to the end of his days. Most of the many activities that filled his busy life flowed from his profound interest in nature. An instinctive collector, he loved to gather about him the objects that excited his admiration and curiosity. In naming and classifying his specimens he became a systematist and a scientist. Inevitably as he made and mastered collections his keen perceptions discovered new kinds of animals and plants and new facts relating to kinds previously known. He wrote of his discoveries so wisely and so well that he became editor of the foremost ornithological journal of America. As a master editor and through his technical papers he became known throughout the world and added to his fame and that of the institution which was his scientific home.

Stone's association with the Academy of Natural Sciences of Philadelphia was practically life-long. It began in a boyish fascination following a visit to the museum when he was eight or nine years old and became closer year by year until 1888, when he assumed charge of the bird collections for the Ornithological Section. From this nominal official connection he succeeded step by step through curatorial positions from conservator to director of the museum. His life became so merged with that of the academy that for many years it was difficult to think of them apart. During the half-century of his official connection the collections of the academy grew greatly. The number of birds alone increased from 26,000 in 1888 to 143,000 in 1939.

Apart from his curatorial duties but more or less closely linked with them Witmer Stone's activities may be placed under four heads: namely, (1) scientific research, (2) nomenclatural, (3) editorial and histori-

[1] Based on a Minute of Appreciation presented to the council of the Academy of Natural Sciences of Philadelphia, October 3, 1939.

[1] A complete technical report on the subject will appear in the *Journal* of the American Chemical Society beginning in October, 1939.

cal and (4) educational. To a remarkable degree he possessed the diverse attributes that made him successful in each. That these successes were somewhat notable is perhaps best indicated by the opinions of competent contemporaries, who so often designated the field of their own specialty as that in which Stone had excelled. There is a wide-spread agreement among ornithologists concerning the importance of his contributions under 2 and 3. His book reviews in the *Auk,* of which he wrote about 1,500, are famous and widely read. Except for his "Bird Studies at Old Cape May," his papers on moult, plumages and migration and his "Plants of Southern New Jersey," his research publication seems to be less read, but its good quality is unquestioned. Concerning the value of his informal but effective educational influence, there is almost universal agreement. It was effected chiefly through direct personal contact. One prominent ornithologist writes, "I have never heard him open his mouth, either in private conversation or public speech without saying something significant and worthy of attention."

In each of his several activities Dr. Stone became by sheer ability and industry a recognized leader. He was a founder or a constructive member of several important biological societies. He became president or vice-president or both of the American Ornithologists' Union, the Delaware Valley Ornithological Club, the American Society of Mammalogists, the Philadelphia Botanical Club and the Pennsylvania Audubon Society. He was a vice-president of the Academy of Natural Sciences of Philadelphia and could have become president, following the death of Dr. Samuel G. Dixon, had he not declined. He was secretary of the Ludwick Institute since 1920 and a manager of the Philadelphia Zoological Society. Of the famous University of Pennsylvania Class of '87 he was secretary from undergraduate days to the time of his death. Many other unsought honors came to him. The University of Pennsylvania conferred upon him the Sc.D. and the Alumni Award of Merit. The National Committee of Audubon Societies established the Witmer Stone Wild Life Sanctuary at Cape May. The Hungarian Ornithological Society awarded him its Otto Hermann Medal and the American Ornithologists' Union its Brewster Medal posthumously. No other person received so many honors from the latter society as did he. Dr. Stone was elected to honorary or equivalent membership in many important foreign ornithological societies. After twenty years as editor of the *Auk* some 130 fellows and members of the American Ornithologists' Union presented him with a volume of testimonial letters, and on his seventieth birthday he was presented with a similar tribute from friends. The letters express the esteem in which he is widely held. When our front-rank ornithologists apply to him such terms as "dean of American ornithologists," "master workman in ornithology" and the like, it means that we have lived in the presence of a man of exceptional merit.

It may be permissible to venture a description of the historical niche in American ornithology which Witmer Stone occupies. Briefly, North American ornithology may be divided roughly into four periods. First was the pioneer period when the birds of the eastern United States were discovered and described. Second was the period of exploration and government surveys of the West, extending our knowledge of birds to the Pacific. Third was a period of consolidation and systematization, of organized effort, largely through the American Ornithologists' Union, to eliminate confusion by the adoption of exact concepts of species and subspecies and the attainment of a stable nomenclature. Dr. Stone was a dominant figure during much of this period, and its close may be placed in 1931 with the publication of the fourth edition of the A. O. U. Check List. One ornithologist has designated it as the "Stone Age" of American ornithology. Due to the arduous labors of Stone and his contemporaries it forms a solid foundation for the precise studies of the fourth or present period.

Of Dr. Stone it may be said that the seed within him on fertile soil grew into a sturdy tree of many branches, bearing fragrant flowers and nourishing fruit. Naturalist, scientist, faithful custodian of collections, biographer and historian of scientists and their science, interpreter of the rules of zoological nomenclature, protector of birds, writer of exceptional beauty and vigor, sometimes poetical, lecturer and teacher, helpful adviser, delightful companion and valued friend, Witmer Stone gave the best of his life and labor to this historic academy and of the riches of his personality to colleagues and associates.

His works and our memories are a fitting memorial, and may his spirit long abide in the lives of those on whom he spent it.

RECENT DEATHS

DR. FLOYD KARKER RICHTMYER, professor of physics and dean of the graduate school of Cornell University, died on November 7 at the age of fifty-eight years.

DR. WALDEMAR LINDGREN, from 1912 until his retirement with the title emeritus in 1933 Rogers professor of economic geology at the Massachusetts Institute of Technology, died on November 4 at the age of seventy-nine years.

DR. FRANK ANGELL, emeritus professor of psychology at Stanford University, died on November 2 at the age of eighty-two years.

DR. ROBERT MACDOUGALL, emeritus professor of analytical psychology at New York University, died on October 31 at the age of seventy-three years.