knowledge of the subject gives authority to his estimate of the value of the future air-ship in warfare.

The remainder of the book is mainly devoted to dynamical aeronautics. Professor Müllenhoff analyzes briefly the principles of animal flight in Chapter X., and in the first part of the next one, Major Moedebeck gives the history of man's attempts at flight. In the same chapter a paper by the late Otto Lilienthal on artificial flight is followed by Mr. Chanute's account of the modern experiments where one looks in vain for any mention of the remarkable machines of the late Professor Langley. In Chapter XII. Major Moedebeck describes the air-ship or motor-balloon, in the list of whose performances, by some error, the drifting race of spherical balloons in 1906 for the Gordon-Bennett cup has been included, with the name of the winner strangely distorted. The next three chapters, on flying-machines, their motors and screws, are by the well-known Austrian expert, Major Hoernes. Chapter XVI., the last one, contains a convenient list of the aeronautical societies of the world and an appendix has a useful collection of tables and formulæ. The index is inadequate to so much material, but, in spite of this and some minor defects, the work can be highly recommended to the increasing number of persons interested in the investigation or navigation of the air, as the best existing treatise on this rapidly-developing subject.

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SOCIETIES AND ACADEMIES

THE AMERICAN CHEMICAL SOCIETY. NORTH-EASTERN SECTION

THE seventy-seventh regular meeting of the section was held at the State Mutual Restaurant, Worcester, Mass., on May 18, at seven o'clock P.M. The paper of the evening was upon 'Ceramics,' by Dr. Frederic Bonnet, Jr. The speaker first referred to the importance of the clay-making industry, it being the third in magnitude and only surpassed by those of coal and iron. The value of clay products in 1905 reached the immense sum of $145,697,-188. Of this, brick represent nearly one half. Clay consists of naturally occurring earthy materials having more or less plasticity when wet, and which, when heated to redness or higher, becomes hard and rocklike. Clays are of secondary origin, and are the product of the decomposition of feldspathic or serpentine rocks. Brongniart, and also Dr. Cushman, of the U. S. Department of Agriculture, testing laboratory for road materials, have made researches which indicate that the decomposition of the feldspar is a kind of electrolysis, in which the alkali constituent passes into solution, leaving the alumina and silica. The noted deposits of Cornwall, England, Zettlitz in Bohemia and certain deposits in Germany, however, appear to have resulted from the action of acid vapors on feldspar. Deposits formed by weathering are usually shallow and the original feldspar is found beneath. True kaolin is formed from feldspar and is essentially a basic hydrated aluminum silicate. If the clay has been transported by water and again deposited, it usually contains some impurities; if little iron is present and the clay is tough and plastic, it is called ball clay. The cause of plasticity is not fully understood and no entirely satisfactory theory has been advanced. One of the most recent, the colloid theory, fails to meet the case and does not explain the cohesiveness of a ball clay. The history of pottery is, to some extent, the history of man; from the crude pots of primitive races to the decorative ware and porcelain of advanced civilization. Clay is often used just as it is found for brick, tile and common pottery, but for all better ware it needs selection and preparation. In the finest ware and for some special purposes, it is subjected to very fine grinding and mixing, or long tempering and ageing. The effect of silica on the fusion point of clay is very important; pure kaolin fuses at temperatures about 1,800° C., or higher, but free silica lowers this, and hence should not be present in too great an amount in fire-clays. But metallic oxides are the most noticeable fluxes in clays; the fusion point decreases as the percentage of bases rises. But the bases exert this depressing effect on the fusion point in proportion to their chemical equivalence; thus 40 MgO has the same lowering effect as 56 CaO, or 62 Na_2O. This is called the Law of Richter, but it does not apply to glazes where the amount of fluxes is large. Fusibility of clay is determined by test pieces (Seger cones), or by pyrometry. The Seger cones are made of pure clay, mixed with fluxes in such graded proportions that the fusion temperature of the consecutive numbers are about 20° C. apart. The No. I. cone fuses at the same temperature as an alloy of one part platinum and nine parts gold, *i. e.*, at 1,150° C. Since this temperature is rather high, Cramer and Hecht prepared cones containing B_2O_3 and PbO, fusing at definite temperatures down to 590° C. These cones give the true measure of the heat effect, but not necessarily the exact temperature, and hence are more useful to the potter than is the pyrometer, since they show the effect which will be produced on the ware. But cones do not show the temperature below 590° C., *e. g.*, at 200° to 400° C., when the water is given off from the clay, nor can they indicate anything as to the rate of cooling of a kiln, which is often important in reference to producing, or preventing crystallization of the glaze. The main difference between the glaze and the body of the ware is one of fusion temperature; the former fuses completely and is essentially a glass. A good glaze must have proper expansibility, to neither chip off nor crack (craze) upon the surface of the ware; and not be attacked by water or ordinary acids, especially for culinary ware, and must be hard to resist wear. The ordinary salt glaze on stoneware and the hard glaze on true porcelain meet all these conditions, but all other glazes fail in some degree. Four types of glaze are in common use: alkaline or salt glaze, feldspathic, lead, and stanniferous (enamels). The general formula for glaze is $xRO, yR_2O_3 \cdot zSiO_2$, where $RO =$ sum of metallic fluxes (CaO, MgO, K_2O, etc.); R_2O_2 is usually Al_2O_3 or the sum of Al_2O_3, Fe_2O_3, and Cr_2O_3; some of the SiO_2 may be replaced by TiO_2, SnO_2, etc. In the raw glaze, insoluble substances are finely ground and suspended in water, into which the ware is dipped. A fritted glaze has its materials partially fused and combined before grinding for the dipping. Thus a fritted glaze is made from soluble substances, or those of high specific gravity which would tend to segregate when the ware is dipped. The fusion of silicates results in the formation of igneous solutions holding the ingredients dissolved, and the temperature of fusion is lowest when several silicates are thus mixed. The more complex glazes and slags are the most fusible.

During the afternoon, before the meeting, parties were formed to visit the following manufacturing plants in Worcester: American Steel and Wire Company; Graton and Knight, Tannery and Leather-belting Company; the Worcester Sewage Plant; and the Polytechnic Institute Laboratories and Electrical Engineering Building. Later, the members of the Section were entertained at afternoon tea by Professor and Mrs. Leonard P. Kinnicutt at their home on Elm Street.

Specimens of various kinds of pottery were shown, among which were some from the Art Students' Club of Worcester, and examples of crystalline glazes from the New York State School of Ceramics, at Alfred.

FRANK H. THORP,
Secretary

THE TORREY BOTANICAL CLUB

THE meeting of April 24, 1907, was called to order at the museum building of the New York Botanical Garden, at 3:40 P.M., with Dr. M. A. Howe in the chair. Twenty persons were present.

The following scientific program was presented:

Ecological Distribution of the Beach and Dune Flora about Chicago, Ill.: Miss MARY PERLE ANDERSON.

Miss Anderson gave a brief account of the geological history of the ancient Lake Chicago and its succession of beaches, the Glenwood, the Calumet and the Toleston. These ancient beaches were formed by changes in the lake-level, and at the present time are indicated by ridges of wooded land more or less parallel to the present coastal beach of Lake

Michigan. The ridges are separated by the low level prairie land which makes up the Chicago Plain.

The formation of the dunes along the present shore of the head of Lake Michigan was considered, and also the changes in the flora that may be noted as one passes from the naked shifting dunes and extremely xerophytic conditions of those recently fixed, to the dunes farthest inland where mesophytic conditions prevail. Certain grasses, species of *Calamagrostis, Andropogon, Ammophila, Elymus,* do much to bind the dunes. The first trees to appear are the cottonwood and certain willows which are also of value in fixing the dunes. The scrub-oak and black-oak soon appear and are followed by the bur-oak, the white-oak, and the red-oak. *Pinus Banksiana* is followed by the white pine; the pig-nut hickory is succeeded by the shag-bark; other trees, such as the basswood, ash, cherry and black walnut, come in, and on the most mesophytic slopes of the oldest dunes and beaches one finds the sugar maple and, more rarely, the beech, hemlock, and southern tulip-tree. Corresponding changes in the shrubby and herbaceous vegetation occur, and at Stevensville and Porter, one may pass, in a short time, from extreme desert conditions through successive stages of the open forest of low trees and shrubs to the oak-hickory type and finally to the beech-maple-hemlock combination, which indicates the culmination of the forest in this region.

The usual ecological factors, heat, light, water, soil, wind, and direction of slope all have their influence in the floral distribution. Conditions in the dunes are extreme. Thus, for example, the trailing-arbutus and the bearberry, both northern types, may appear on the north-facing slope of a dune, while just over the crest, on the south-facing slope, the cactus may flourish.

Emphasis was laid on the fact that species vary with environment, often losing more or less of their xerophytic adaptations under mesophytic conditions; that a plant-society is only a stage in the development of a region; that the apparent tendency is for all to approach the mesophytic condition.

The paper was discussed by Dr. Grout and Dr. Rydberg.

Some Relations between Habitat and Structure in Mosses: Dr. A. J. GROUT.

Xerophytic mosses apparently tend to develop short, thick-walled cells, often with papillæ over the lumen. Nearly all mosses with papillæ over the lumen of the cell are xerophytic, or belong in groups that are largely xerophytic. Presumably the papillæ tend to retard transpiration.

Pleurocarpous mosses growing on trees tend to develop short thick-walled cells, especially at the basal angles, and a similarity of leaf structure in tree-growing mosses due to this fact has produced much of the confusion and uncertainty in classifying such mosses, *e. g., Alsia, Dendroalsia, Bestia, Groutia* and their relatives.

Tree-growing mosses also tend to develop erect capsules, and the correlated imperfect peristomes. To some extent this seems to apply to other xerophytic mosses.

Aquatic or subaquatic pleurocarpous mosses have an apparent tendency to develop enlarged and inflated alar cells.

Cleistocarpous and gymnostomous mosses appear, for the most part, to be mosses of various relationships adapted to damp soil, not closely covered with other vegetation, and best suited to support a rather short-lived annual moss.

The speaker recognized numerous exceptions to the above relationships, if stated as general principles, but, stated as tendencies, he believes they are worthy of serious consideration by the systematist, the morphologist, and the ecologist.

A brief discussion followed.

C. STUART GAGER,
Secretary

DISCUSSION AND CORRESPONDENCE

ELIMINATION OR FIRST SPECIES

HAVING followed the discussion of the proposed new rules of zoological nomenclature in the pages of SCIENCE, I feel that I voice the opinion of many zoologists when I say 'a plague o' both your houses.' For thirty years