

be taken to discover if any marked difference exists between the social composition of these groups. While this method may give satisfactory results at a moderate expense, it is far inferior in value to the method of repeated measurements at stated intervals. In this case the same subdivisions must be made, and changes in the social status and in the health of individuals must be recorded and eliminated. In order to carry out such a plan, it would be necessary to organize a bureau with sufficient clerical help to carry on the work. The questions underlying physical and mental growth are of fundamental importance for hygiene and education, and we hope the time may not be far distant when a work of this character can be undertaken.

SOME ODDITIES IN BIRD-LIFE.

BY C. W. SWALLOW, WILLSBURGH, OREGON.

It is not my intention, in this article, to describe any new species that are unknown to ornithologists, but there are many nature-lovers that cannot identify the birds easily; with such, I hope these descriptions may help and create a stronger desire to know more of the birds.

I will try to describe a few birds that are not as well known to the general observer as the robin, and which, by their rarity or peculiar habits, make them especially interesting to study.

The first species I will notice is Townsend's Solitaire (*Myadestes townsendii*). This is a rare bird to me, as I have never secured but one specimen. It may almost be called a hybrid between the thrushes and flycatchers, yet, by its color and flight, it somewhat resembles the shrikes. These birds are not as large as the robin, being a more slim bird with longer tail. They measure in inches somewhat as follows: Length, 8.5; extent of wings, 13.5; wing, 4.5; tail, 4.25; tarsus, .75. Their bill is about one-half inch long and strongly resembles the flycatchers, being broad and flat and slightly toothed. Bill and feet are black; the back is brownish ash, or slaty; the breast is lighter, shading into light ash on the crissum; top of head brownish black, lighter at base of bill; throat light ash; a light ring about the eye; wings and tail brownish-black; primary wing-feathers slightly edged with white and the secondary wing-feathers and outer tail-feathers quite extensively white-edged, the primaries and secondaries with a spot of yellow or tawny, giving the wing the appearance of having a bold bar of this color at the point of primary coverts; tail forked and slightly double-rounded.

This seems to be the only species of the genus found in the United States. They are probably more common between the Rocky and the Cascade ranges; but stragglers may be found west of the Cascades, even to the Pacific Coast; as I am informed by Mr. R. H. Lawrence that the species has been taken at Astoria. They are reported from New Mexico by A. W. Anthony in the *Auk*. Dr. Coues gives their range as north to British Columbia, stating that they build on or near the ground, laying bluish-white eggs, spotted with brown.

The Bushtits (*Psaltiriparus*), although very small, dull-colored birds, are quite interesting and odd, as is also their nest, which is an ingeniously woven, pensile structure that may be found in bushes at the height of one's head, or twenty feet or more up in trees. One that I found last spring was near the end of a long hemlock limb, about twenty feet from the creek over which it hung. It was securely fastened to the small, slender twigs in three places. It was about nine inches long and four and one-half in diameter, outside. It was well and thickly woven, of moss and cottony substance, being strong enough to hold a number of pounds weight. The entrance was a small hole in one side near the top, and the bottom was well lined with feathers. They lay from six to nine small white eggs. These diminutive birds are only about four inches in length, with short, rounded wings less than two inches, and a narrow graduated tail somewhat longer than the wing. They are of a slate color above, shading into ashy on the under parts. They have no bright colors and are not crested. Bill and feet black. These lively little busybodies keep up a continuous twittering as they flit from twig to twig. There are but a few species found in the United States.

Psaltiriparus minimus has a brown crown patch, while *P. plumbeus* has a lead-colored crown like the back.

P. lloydi has an ashy crown and black bars on sides of head. This is a southern bird, while the other two may be found as far north as Oregon or Washington.

A DEFINITION OF "SOLUTIONS."¹

BY C. E. LINEBARGER, CHICAGO, ILL.

WITHIN recent years great progress has been made in our knowledge of solutions. This has been in main due to the application of the laws established for gases to solutions. Solutions are intermediate between liquids and gases. The theory of gases has been well developed, and the next problem is to devise a general theory of liquids. There are two ways of getting at the nature of liquids, — through the critical point and through solutions. Pellat² has recently shown the need of precision in the definition of the critical point, and has deduced from a consideration of the iso-thermal curves of carbon dioxide determined by Andrews³ a definition at once concise and precise. It is my intention in this paper to subject to examination the existing definitions of solutions, and, if they be found inadequate or inaccurate, to propose another. Definitions, the preliminaries of science, are but landmarks of classification. As scientific knowledge advances, the classifications and definitions change: they are provisional and progressive. Until within a few years, our notions of the nature of solutions were so vague that it was not possible to insist upon precise definitions; but now that we have a theory of solutions that rivals the theory of gases in simplicity and even surpasses it in the accuracy of its experimental results, it is time that a suitable definition be adopted.

Among the formal definitions of solutions (which are not very numerous) of acknowledged authorities, I will quote for the sake of comparison the following:—

(a) "Auflösung heisst, wenn sich ein fester Körper mit einer Flüssigkeit (einem tropfbar-flüssigen Körper) so verbindet, dass er in dieser Verbindung flüssig wird. . . . Die Flüssigkeit nennt man dann das *Lösungsmittel*, der vorher feste Körper heisst *aufgelöst*, und die neue Verbindung eine *Auflösung*" (Berzelius, *Lehrbuch der Chemie*, I., 424, fifth edition).

(b) "The liquefaction of a solid or gaseous body by contact with a liquid, the solid or gas being diffused uniformly through the liquid and not separating when left at rest" (Watts' *Dictionary of Chemistry*, article Solutions).

(c) "Lösungen sind homogene Gemenge, welche man durch mechanische Mittel nicht in ihre Bestandteile sondern kann" (Ostwald, *Lehrbuch der allgemeinen Chemie*, I., 606).

In these typical definitions there are three questions that require examination: (1) What is the state of aggregation of solutions? (2) Is homogeneity necessarily a characteristic of solutions alone? (3) What is to be understood by mechanical means, and is it true that solutions cannot be decomposed into their constituents by such means?

As to the first question, it is seen that the two first definitions regard a solution as liquid, which is, indeed, the common conception. Yet undoubtedly solids have the power of dissolving one another under certain conditions, so that a solution may be solid.⁴ The expressions "solutions of gases in gases," of "liquids in gases," and even of "solids in gases" are quite general and used by good authorities. Thus the state of aggregation of solutions may be gaseous, liquid, or solid. (See, however, the definition proposed below).

But are there not homogeneous mixtures that are not solutions, no regard being had, however, to mixtures of powders, etc.? Every one knows what solutions of crystalloids, such as sugar or

¹ By solution is understood in this paper the ready-made mixture, no reference being had to its mode of formation; for the action of the solvent upon the substance to be dissolved as well as the product of the action is commonly called a "solution."

² De la Définition et de la Détermination du Point Critique, *Jour. de Phys.* (3), I., 225.

³ *Phil. Trans.* II. 1869.

⁴ Van't Hoff. *Zeitschrift für physikalische Chemie*, 5., 322.