The variability of this species has been noted repeatedly by observers, and there has been much discussion as to its ability to form gas in carbohydrates. Miss Hefferan,[2] who has done the most comprehensive work on this group, found in eight strains of *S. marcescens* (*B. prodigiosus*) gas formation in dextrose in seven, in sucrose in four and in lactose in one. Her *B. prodigiosus* VIII formed no gas in any of the three sugars used. In this respect our form agrees with VIII and differs from all the rest of her series and from the type described by Bergey.

Miss Hefferan also found among the eight strains variations in viscosity, in the amount of color in broth, and in the presence of a pellicle on broth cultures. *B. prodigiosus* I, II, III, IV, VI and VII produced slight color in liquids and a red surface ring; V produced a heavy orange-red membrane and VIII only a pink, or violet, surface ring. Our strain colored bouillon a brilliant rose red throughout, with a thin pellicle, thus differing from any strain previously described. This excessive pigment formation is the most striking characteristic of this form. In a few days agar streaks become a most brilliant red, varying from scarlet to crimson, while the upper layer of agar becomes deeply stained with pigment. In the solubility of this pigment in water this form differs from all descriptions of *Serratia* species which have come under our notice. Pigment formation takes place at high temperatures—30° C. to 37° C.—which is also a variation from *S. marcescens,* but is characteristic for related species.

The suggestion that the excessive pigment formation might be due to contamination with some other form was tested by repeated platings and a study of many slides. The white colonies, which were considered as possible contaminations, invariably, upon being streaked on agar, produced red growths, and the slides showed apparently pure cultures with Gram's stain and carbol fuchsin. Single-cell isolation would have made this point certain, but time has not been available for this work.

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THE CLEARNESS OF THE OHIO RIVER

IN the body of the interesting address by Dr. Alexander Findlay on "The twilight zone of matter"[1] is a statement which seems too indefinite to be taken broadly, in view of the nature and importance of the matter under discussion. The comparative clearness of sundry river waters as affected by the presence or absence of colloids is under discussion, and the statement is made:

"The water of the Ohio River, on the other hand, is at all times clear, owing to the absence of protective colloids and the presence of lime and other salts which act as precipitating agents."

The Mississippi and Nile are the rivers included in the reference to "on the other hand" in the above quotation. Taking the statement as made we would first of all point out that the analysis of no great river such as any of those mentioned can safely be taken at any point as truly representing the colloidal or any other condition of the whole stream; certainly not in the case of the Ohio. As the writer can testify from personal observations of his own, and as might be inferred by an inspection of the geological nature of the regions drained by the Ohio, such a statement as the one made above becomes meaningless unless restricted to a particular stage of the river. The two separate rivers forming the Ohio at Pittsburgh, *viz.,* the Allegheny and the Monongahela, are not in themselves at all times clear nor does the resulting river, the Ohio, become so or remain so during its entire course. As a matter of fact, one of the muddiest rivers I have ever seen is this river at Cincinnati, even after it has received the limestone waters of the several streams, Miami, etc., from its course along the southern boundary of the state of Ohio, and after it has been the recipient of all sorts of factory and industrial refuse matter, mine waters, sewage, etc. In short, the Ohio, like its sister, the Mississippi, is not a hydrographic unit, nor are sweeping assertions as to its colloidal behavior to be accepted as at all times, or at all stages correct; there are other factors involved in the discussion besides the relation of lime to colloids. Very probably the quotation as used did not originate with Dr. Findlay, but is to be taken rather as typical of certain general assertions, lacking carefully coordinated data. The statements have been going the rounds for many years that limestone drainage acts as a clarifying agent in natural waters; it may be true that it does up to a certain point. But there are streams in southern Ohio so saturated with lime salts that freshwater mussels flourish in them; the pebbles become in time coated by lime, as do also submerged tree trunks, but at the same time the waters are seldom clear; clays, "muds" in general, all the usual inwash of a cultivated and populated region. Probably most scientific persons who have given any time and ob-

[2] Hefferan, Mary, "A comparative and experimental study of bacilli producing red pigment." *Centrbl. f. Bakt.* Abt. II., Bd. XI, p. 311–540, 1904.

[1] SCIENCE, LXII, 1600, p. 195.

servation to the behavior of river waters and natural drainage will be willing to admit the great importance of colloidal action in natural river waters, but this truth will not be abetted in any way by the circulation of statements which lack coordination with the other equally important factors in the case.

So far as lime salts are concerned it would seem to be true of fresh waters as it is of sea waters that organic life and organic "matter" tends to remove them, and that in so doing will pull down an appreciable quantity of other suspended matter. The clarity or non-clarity of the resulting stream will then depend, will it not, upon another adjustment of factors such as the relative amounts of "clay matter" suspended in it, the intake of other streams along its course, and the degree of removal of the original lime and organic matter. It has always seemed to the present observer that the condition of the lower portions of such streams as the greater rivers, the Nile, Mississippi, Ohio, etc., is a sort of survival from a series of natural "experiments" rather than due to the action of one set of factors; and that assertions to the effect that a certain river always does this or that are true only when, as is not always the case, a definite series of like reactions are set up. The apparent preponderance of the "lime salts" over organic matter in the final stages of the Mississippi, and indeed the relative abundance of any of the usual "salts" commonly recorded in water analyses are still in too chaotic a state of coordination with modern ideas of ionization, etc., to be taken too weightily. That colloidal action plays an important part in the reactions constantly in process in river waters may presumably be taken as correct; that such actions play the all-important or even the most important part in such reactions is another matter and is by no means to be given the preeminence ascribed to it in the quotation as given.

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SCIENTIFIC BOOKS

The Osteology of the Reptiles. By SAMUEL WENDELL WILLISTON. Arranged and edited by William King Gregory. Cambridge, 1925. The Harvard University Press. Price $4.00.

A THING that has been lacking hitherto in the literature of vertebrate palaeontology is a comprehensive and adequate treatise on the osteology of reptiles. There have been many excellent discussions of the osteological characters of special groups and a certain amount of high-grade text-book treatment of the skeleton of the Reptilia. None of these could fill the need of a comprehensive reference book on reptilian osteology.

This need Williston's "The Osteology of the Reptiles" has filled in an admirable manner. The book is divided into two sections; the first, comprising two thirds of the volume, deals with the reptilian skeleton from a strictly morphologic viewpoint; the second, comprising the remaining third, consists of a brief classification of the Reptilia, with definitions of the major groups and many of them minor ones.

The section on the primitive skeleton of reptiles, in the introduction, is a discussion of particular value. Professor Williston's specialty, in his later years at least, was the morphology of the Permian amphibians and reptiles, and his account of the primitive reptilian skeleton forms a very adequate groundwork for the discussion of the skeleton in the later and more specialized groups. The tabular key of the bones of the primitive skeleton sums up for the student the names of the bones of the reptile skeleton and their location in a very clear and compact way.

Following the introduction is a chapter on the skull of reptiles, occupying nearly a third of the book. Horns, processes, fenestrae, etc., are given a general discussion and their more striking modifications in the various groups are noted. Then the bones of the skull are considered one by one, their primitive positions and contacts noted and their special characters and modifications in the later and more highly specialized reptilian groups discussed. A table of synonyms of names of skull bones adds to the usefulness of this section.

Following the discussion of the separate skull elements is a series of sections dealing with the skull in the various orders of reptiles, noting general form, elements present, degree and kind of fenestration, dentition and adaptive modifications.

After the chapter on the reptilian skull is one on the vertebral column, in which the vertebra are discussed and their elements, developments and modifications, both as individual vertebra and as regions of the vertebral column.

Similar chapters follow on ribs and sternum, pectoral and pelvic girdles and limbs. In each of these the primitive characters of the Permian reptiles are discussed adequately and the modification from the primitive conditions considered as such.

This part of the volume is complete in itself and might be used independently of Part II, which deals with the classification and systematic treatment of the reptilian orders.

Part II begins with a brief chapter on the principle or problem of classification, which points out clearly the difficulties in the way of arriving at a