Streams; Dilution in Large Lakes; Dilution in Oceans and Tidal Estuaries; Sewage Treatment Works; Screening; Plain Sedimentation; Septicization in Connection with Sedimentation; Chemical Precipitation in Conjunction with Sedimentation; Electrolytic Treatment; Strainers, Slate Beds and Colloidors; Broad Irrigation; Intermittent Sand Filtration; Contact Filters; Sprinkling Filters; Aeration; Hypochlorite Treatment; Ozonization; Institutional and Residential Plants; Comparative Summary.

It will be noticed that some of the newer processes, such as ozonization, the use of electrolytically prepared hypochlorite, etc., are also gone into, but with reservations as to their probable utility. In the description of processes, emphasis has been placed on the underlying principles and on the efficiencies obtained by their application, while structures have been described only to a limited extent and the illustrations are relatively meager, The subject of cost is also one that has not been elaborated.

GEORGE C. WHIPPLE

SCIENTIFIC JOURNALS AND ARTICLES

THE contents of the *American Journal of Science* for July are:

"Storm King Crossing of the Hudson River, by the New Catskill Aqueduct, of New York City," J. F. Kemp.

"Lake Parinacochas and the Composition of its Water," G. S. Jamieson and H. Bingham.

"Shell Heaps of Maine," F. B. Loomis and D. B. Young.

"Mixtures of Amorphous Sulphur and Selenium as Immersion Media for the Determination of High Refractive Indices with the Microscope," H. E. Merwin and E. S. Larsen.

"Asymmetry in the Distribution of Secondary Cathode Rays produced by X-rays; and its Dependence on the Penetrating Power of the Exciting Rays," C. D. Cooksey.

"Derivation of the Fundamental Relations of Electrodynamics from those of Electrostatics," L. Page.

"Hydrolysis of Esters of Substituted Aliphatic Acids," W. A. Drushell.

"Some Suggested New Physiographic Terms," DeL. D. Cairnes.

THE following articles are printed in the *Journal of Genetics* for June:

"Species Hybrids of *Digitalis*," W. Neilson Jones.

"Notes on Inheritance of Color and other Characters in Pigeons," L. Doncaster.

"On Heterochromia Iridis in Man and Animals from the Genetic Point of View," C. J. Bond.

"Second Report on the Inheritance of Color in Pigeons, together with an Account of some Experiments on the Crossing of certain Races of Doves, with special reference to Sex-limited Inheritance," Richard Staples-Browne.

"Gigantism in *Primula sinensis*," Frederick Keeble.

RECENT WORK IN SYSTEMATIC AGROSTOLOGY

Beiträge zur Gramineenflora von Misiones: E. L. EKMAN (*Arkiv f. Botanik*, 11: no. 4. 1912).

The author visited for three months in 1907–08, Misiones, that portion of Argentina lying between Uruguay and Paraguay. The above article is a critical account of the grasses collected at this time. The author enumerates 125 species and gives a table showing the relation of these to the surrounding regions. The larger genera are *Panicum* 27 species (23 species as the genus is limited by Hitchcock and Chase), *Paspalum* 19 species and *Andropogon* 14 species (including *Sorghum, Sorghastrum* and *Heteropogon*). There are four beautiful plates, taken from photographs, by the gelatin process, and illustrating the inflorescence, the details of which are excellently shown. The work inspires confidence from the incorporation of numerous critical notes. It is interesting to note that the anomalous *Leptochloa spicata* is transferred to the genus *Tripogon*, a disposition which is well supported by evidence. The descriptions of new species are in Latin, the notes in German.

The Grama Grasses: DAVID GRIFFITHS (*Contr. Nat. Herb.*, 14: 343–428, 1912).

This was reviewed recently by Dr. Bessey[1]

[1] SCIENCE, April 12, 1912, p. 590.

and here may be added only a few agrostological notes. The pen-and-ink drawings by Agnes Chase, illustrating the details of the spikelet, are accurate and particularly helpful in a group having so complicated a floral structure. The half-tones from photographs by the author illustrating the habit are unusually good. The genus *Cathestecum,* placed in the tribe Zoysiæ by Bentham & Hooker and in Festuceæ by Hackel (Engl. & Prantl, Pflanzenfam.) is here considered to be a close ally of *Bouteloua,* a conclusion well supported by the structure of the spikelets, as shown by the illustrations. The name *Bouteloua* is used rather than the older spelling *Botelua.* This suggests the desirability of adopting a definite rule to govern such cases. Lagasca deliberately adopted *Botelua* in 1805, using this spelling throughout his article, but in 1816 changed this to *Bouteloua,* which spelling has been used by all later authors. Lagasca states that the genus was named for the brothers Boutelou. I have used Lagasca's corrected spelling myself, but there is a tendency at present to subject even the spelling of generic and specific names to the law of priority. There are several changes in the names of familiar species. *Bouteloua procumbens* (Durand) Griffiths, for *B. prostrata* Lag.; *B. gracilis* (H. B. K.) Lag., for *B. oligostachya* Torr.; *B. barbata* Lag., for *B. polystachya* (Benth.) Torr.; *B. trinii* (Fourn.) Griffiths, for *B. trifida* Thurb. and *B. burkii* Scribn. On technical grounds, the name *Bouteloua bromoides* disappears altogether. In place of this we have *B. filiformis* (Fourn.) Griffiths, and two allied species, *B. radicosa* (Fourn.) Griffiths and *B. repens* (H. B. K.) Scribn. & Merr. Dr. Griffiths accepts 1881 as the date of publication of Fournier's work on "Mexican Grasses." The title-page date is 1886, but at least two copies of press-proofs were distributed in 1881 and used by Bentham and by Hackel as if published. By admitting the earlier date the author is obliged to take up *Chondrosium trinii* Fourn. which antedates both *Bouteloua trifida* Thurb. (1883) and *B. burkii* Scribn. (1883).

Plants of Southern New Jersey: WITMER STONE (*Ann. Rep. N. J. State Mus.,* 1910).

The title page date of issue is 1911, but the volume did not reach us until February, 1912. Reference will be made here only to the portion relating to the Gramineæ (pp. 174–246, pls. 5–15). As to form, the work is a model for its class. Though no descriptions are given, there are excellent keys to genera and to species. There are also important notes upon habit and local distribution. The half-tone plates illustrating the inflorescence are unusually good. In the recent revision of *Panicum* by Hitchcock and Chase many interesting northern extensions of the range of species to New Jersey are based upon Mr. Stone's collections, such as that of *P. wrightianum.* This species has since been collected on Cape Cod by E. W. Sinnott, and by Clarence Knowlton. I wish to criticize a method in technique adopted by the author. In this I do not wish to criticize Mr. Stone, because he has ample precedent for the method used. It is the citation of names in synonymy in such a manner that the reference appears to be the original publication when in reality it is to a later work or to a work in which the name has been misapplied. For example, "*Panicum sphagnicola* Nash, Brit. Man. Ed. I. 85." is given under *Panicum lucidum* Ashe. The original publication of *P. sphagnicola* was several years earlier (*Bull. Torrey Club,* 22: 422. 1895). The author means by his reference that *P. lucidum* was described under the name *P. sphagnicola* in Britton's Manual. Apparently Mr. Stone has intended to distinguish the original place of publication by giving the citation in full with date. But under *Tripsacum* we see as the second name in the list of synonyms, "*Tripsacum dactyloides* Nuttall Gen. I. 85. 1818," although the name was first published by Linnæus ("Syst. Nat.," ed. 10: 1261. 1759). This is not an error on Mr. Stone's part, as is shown by the accepted name at the heading where "L." is given as the authority. Mr. Stone probably inserted the Nuttall reference because of a note there on the local flora.

Erianthus alopecuroides "Gray Man. Ed. I. 616. 1848," appears as a synonym under *E. saccharoides,* though the original author of the former was Elliot in 1816. This method of citation lacks precision. On seeing the above citation one might justly infer that Gray's Manual is the original place of publication of *Erianthus alopecuroides.* This, however, is not the idea the author wished to convey. What he does mean is that in Gray's Manual the name *E. alopecuroides* Ell. was erroneously applied to *E. saccharoides.* Authors have recognized this lack of definiteness and have attempted in various ways to avoid it. Some would write the reference *E. alopecuroides* "Ell.," Gray Man. 616. 1848. Others, *E. alopecuroides* Ell. err. det. Gray (cf. Piper, "Flora of Washington," Contr. Nat. Herb., Vol. 11). I have used this, *E. alopecuroides* [Ell. misapplied by] Gray, Man. Some would place original references in one category and misapplications and secondary references in another, or make a statement in a note that Gray (Man. 616) described this species under *E. alopecuroides* Ell. I do not wish here to recommend especially any of the above methods, but only to insist on the necessity of distinguishing between the two categories of citations, publication and misapplication.

Mr. Stone has used for the citation of authors the method rather generally adopted by zoologists, in which only one author is given and that one the author of the specific name. The great majority of botanists cite at least the author of the accepted combination of genus and species, and often also the author of the specific name if published originally under a different genus. Under *Uniola* we find *Uniola laxa* (L.), showing that Linnæus gave the specific name *laxa* under a different genus. In the list of synonyms given by Mr. Stone we see that Linnæus described the species as *Holcus laxus.* In the list of synonyms also appears *Uniola laxa* Britton 294, but this is only a reference to localities given in Britton's "Catalogue of Plants of New Jersey" (I had some difficulty in determining the meaning of this reference), and not to the original publication of the combination (B. S. P. Prel. Cat. N. Y. 69. 1888). It happens that Mr. Stone has made certain combinations for the first time and hence will be cited by most botanical writers as the author of these combinations. But there is no means of determining which of the combinations are new, except by the laborious comparison of each case, since the combination may not appear in the list of synonyms, or if it does the reference may be misleading in this respect. Of course this omission is of no consequence to those who use the zoological method of citation. Mr. Stone probably did not realize the additional difficulties he was placing in the way of the indexer when he decided to omit all indications by which the new combinations could be distinguished. Among the grasses the following new combinations are made: *Paspalum læve circulare* (Nash) Stone, *Panicum commonsianum addisonii* (Nash) Stone, *Chætochloa imberbis versicolor* (Bicknell) Stone.

It is to be noted that Mr. Stone gives the original place of publication of *Panicum stipitatum* Nash, as Britton's Manual 83. The name was first used by Scribner (U. S. Dept. Agr. Div. Agrost. Bull. 17 (ed. 2): 56. May, 1901) where it is credited to "Nash, in Britt. Manual, 83, 1901." This must have been taken from proof sheets, as Britton's Manual did not appear till after August 24, 1901 (the date of the preface). This is mentioned only in reference to the question of the standing of proof sheets as publication.

As previously stated, these remarks are not intended as a criticism of Mr. Stone or of the excellent flora which he has published. The work suggested the remarks and this opportunity was taken to record certain protests.

Notes on Genera of Paniceæ: Agnes Chase (*Proc. Biol. Soc. Washington,* 19: 183–192, 21: 1–10, 21: 175–188, 24: 103–160).

It has long been recognized by agrostologists that the classification of the genera of grasses is still very artificial and greatly needs revision. Botanists who have turned their attention to this family have been kept

busy with the classification of the species and very little has been done with the genera since the exposition by Bentham and Hooker (Gen. Pl. 3^2. 1883) and by Hackel (Engl. & Prantl, Pflanzenfam. 2^2. 1887). It is true that authors have attempted revisions of genera in local floras, recognizing the necessity of rearranging groups to accord with additional facts. But too often such rearrangement has been based solely upon species growing within the region covered by the flora. Nature knows no such limitations. Groups that are perfectly distinct in one area may in another area be connected by transition forms. Mrs. Chase has begun the revision of the genera of the entire family throughout the world. The four papers mentioned deal with the tribe Paniceæ, which will be completed in one more paper. The genera still to be discussed belong to the subdivision of the tribe in which the spikelets are surrounded by bristles. Under each genus is given a full discussion of the synonymy, a description of the genus as limited by the author, and, in American genera, an excellent text figure of the spikelet drawn from the type species. The author has been consistent in recognizing genera, basing validity upon characters of the same kind and degree. Such classification is necessarily the result of her botanical judgment, but this judgment is based upon a careful comparison of characters of the group as represented throughout the world, and unbiased by tradition or authority. Those who have given only superficial attention to grasses, and to whom certain names have become familiar, will "view with alarm" the splitting up of such genera as the heterogeneous *Panicum*. But a close study must convince the most conservative that the great genera *Panicum* (in the restricted sense) and *Paspalum*, recognized as distinct since their separation by Linnæus, are more closely allied than any of the segregates from *Panicum* recognized by Mrs. Chase, such as *Syntherisma* (*Digitaria*). In fact in the excellent synoptical key to genera, appearing in Part IV., *Valota* (*Panicum leucophæum*), *Syntherisma* and *Leptoloma* (*Panicum cognatum*) are numbered 3, 4 and 5, while *Panicum* and *Paspalum* are numbered 16 and 17. The author quite properly revises the nomenclature of the species in each genus in so far as this can be done without a further study of type specimens. Much just criticism has been directed against what some have been pleased to call "name-juggling," a sort of pop-gun revision, in which the primary purpose has been to change names or create new combinations. The nomenclature of a group of plants should be revised by the person who revises the taxonomy. And nomenclature in its applications should not be considered apart from the study of the plants involved. Mrs. Chase, however, has given the taxonomy careful study and is in position to adjust the nomenclature. It is hoped that the other tribes of grasses may be revised by her in the same manner.

North American Flora. Poaceæ: G. V. NASH (*N. A. Fl.* 17: 77–98. 1909).

In this number only a beginning is made, including a key to the thirteen tribes, and descriptions of the first 18 genera, up to and including *Elionurus*. The form of treatment is fixed by the general style of the work, for which reason certain criticisms must be shared by the editors. But the style adopted by the editors is the result of definite consideration and any criticism of this must take the form of a protest or regret. Probably the omission that the student will most often regret is the lack of cited specimens. To the student of grasses the mention of a few selected specimens might well take the place of the plates listed. It is also to be regretted that room could not be found for critical notes on synonymy. It is a good idea to give the type species of each genus, but there will be many cases where selection must be made and it would be helpful if the reasons for a certain choice were given. In *Hemarthria* the first of two species was chosen. In *Miscanthus* the second species is chosen. The reason for rejecting the first species is a good one, namely, because Andersson, the author of the genus, remarks that the first species, *M. capensis*, shows a transition to other genera, but it would be more satisfactory to the student if

this reason were given. It will be interesting to note the manner in which Mr. Nash in the future parts of the work solves the various difficulties which will beset him in fixing the types of the genera.

The name *Tripsacum acutiflorum* Fourn. (*Bull. Soc. Bot. Belg.* 15: 466. 1876) is accepted in place of *T. lanceolatum* Rupr. (Fourn. Mex. Pl. 2: 68. 1881). This is based upon the statement made by Fournier, in a discussion of grasses with separated sexes, that in *Tripsacum* the peduncle of the male spikelet, ordinarily free, "est soudé avec le rachis de l'épi dans le *T. acutiflorum* n. sp." This statement certainly does not distinguish *T. lanceolatum* from the other species and can scarcely, therefore, be considered as sufficient to constitute publication. It is rather to be taken as incidental mention within the meaning of the American Code of Botanical Nomenclature (Canon 12. A name is not published by its citation in synonymy, or by incidental mention). The allies of *Rottbœllia cylindrica* have difficulty in keeping their names. When Otto Kuntze showed that the type species of *Manisuris* was a *Rottbœllia,* the names of these species were changed from *Rottbœllia* to *Manisuris.* Now Mr. Nash decides that this group is not congeneric with the type of *Manisuris,* but belongs to the genus *Stegosia* and the species are all transferred to the new allegiance. At the same time that Kuntze made the disconcerting discovery mentioned above he found it necessary to change the name of the grass generally called *Manisuris granularis,* since it obviously was not a true *Manisuris.* He called it *Hackelochloa granularis,* and is followed in this by Mr. Nash (and also by the present writer. See "Grasses of Cuba"). However, it appears necessary to take up for this genus the name *Rytilix* Raf. (*Bull. Bot. Seringe,* 1: 219. 1830).

While Mr. Nash's contribution is not, and could not be expected to be, monographic, it will be, when completed, of great service to agrostologists.

A. S. Hitchcock

SPECIAL ARTICLES

RHYTHMICAL ACTIVITY OF ISOLATED HEART MUSCLE CELLS IN VITRO

In previous communications[1,2] I pointed out that the heart muscle of chick embryos will beat rhythmically for many days when suspended in the media of a tissue culture and from such transplanted tissue there is an active growth of cells into the surrounding media. Braus[3] has repeated these experiments, using the hearts of embryo frogs and toads and he has found that these isolated beating hearts react to electrical and chemical stimuli similar to the intact heart. Braus also noted that the cells which grew from the hearts of cold-blooded animals were living at the end of three months. Very recently, Carrel[4] by the use of the method of repeated transplantation of the tissue from a culture to a fresh medium (Carrel and Burrows) has attempted to prolong the life and function of heart muscle *in vitro.* His experiments show that the rhythm which I noted in fragments of embryonic chick hearts can be prolonged, although intermittently, for a period of 85 days. The results of these experiments substantiate, therefore, the former well-known fact, namely, that strips of heart muscle, both of cold and warm blooded animals (Erlanger), will beat for some time when placed in the proper media. In none of these cases could one rule out, however, the possibility of the existence of nerve ganglia or some possible precursor in the young embryonic hearts, which might initiate rhythmical contractions.

During the present year experiments have been made to determine the conditions which would prolong the life and allow the development of functional activity in the cells which had grown and differentiated in the culture.

[1] Burrows, M. T., 1911, *Jour. Exp. Zool.,* Vol. 10, 63.

[2] Burrows, M. T., 1912, *Anat. Record,* Vol. 6, 141.

[3] Braus, H., 1912, *Weiner Med. Wochschr.,* No. 44.

[4] Carrel, A., 1912, *Jour. Exp. Med.,* Vol. XV., 516.