mental growth. Professor Swift, if I understand him, accepts neither of these conclusions, but he does not clearly deny them. Nor does he make clear the very complicated states of affairs of which the data given are but one aspect.

Concerning some of the conclusions which Professor Swift does definitely accept (such as: "*Every young child must be regarded as a potential genius,*" "*It is doubtful whether in three fourths of the cases criminal tendencies are anything else than a convenient name with which to cover our social sins and failures in education,*" "*Progress* [in the course of practise] *is never steady, but always by leaps*"), it must be noted that other intelligent investigators possessed of the same facts as the author would still not proceed to his conclusions. The ambiguities of units of mental measurement and the complexities of selective influences play too large a rôle in almost all our studies of human nature to leave any one's work exempt from revision and amendment.

The book is interesting throughout, partly because of the selection of topics and partly because the author possesses the admirable quality of writing to produce reactions in others rather than to express his own thoughts. The lack of an index should be remedied, especially since the book is a collection of essays whose separate titles can not at all adequately describe their contents.

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BOTANICAL NOTES

RECENT SYSTEMATIC PUBLICATIONS

THE fourth part of Dr. A. J. Grout's "Mosses with Hand-lens and Microscope" appeared late in April of the present year. It covers pages 247 to 318, and includes the completion of the family *Leskeaceae* and about half of the *Hypnaceae*. Twenty full-page plates, mostly from the Bryologia Europaea and Sullivant's Icones Muscorum, and thirty-two cuts serve to illustrate the text. The announcement is made that the closing part (V.) will be issued some time next year (1909). This closing part will complete the family *Hypnaceae*, and include analytical keys to sterile mosses, a list of errata, and a complete index. When the whole work is finished it will be a most useful addition to American bryological literature, and an indispensable aid to the beginner in the study of mosses. The fine quality of paper and the clear type and good presswork add much to the pleasure one experiences in using the book.

The problem of introducing the student to the work of identifying the plants about him is one which has puzzled botanical teachers not a little, especially since the introduction of laboratory studies has left little time for the old-fashioned preparation by the study of some such text-book as the old Gray's "Lessons" of our boyhood days. When this was used the pupil had nothing to do but to get ready for field work and the "classification" of flowering plants. That was all there was in botany. We had to run over the book in order to know how to "classify" the spring flowers when they appeared. We had to know the meaning of such words as cordate, ovate, spatulate, serrate, dentate, crenate, sepal, petal, introrse, extrorse, hypogynous, epigynous, dehiscent, indehiscent, orthotropous, anatropous, albuminous, exalbuminous, etc., for these were in constant use in the keys to the families and genera, and the descriptions of all botanical groups from divisions and classes to species and varieties. Thus long ago; but now-a-days after a longer or shorter course in laboratory botany where he has learned something of the evolution of the higher plants from the lower, he is sent to the fields with no previous instruction in the terminology of plant structures. He is told to "dig out" the identifications of the plants he finds by the aid of some manual of systematic botany. And it must be confessed, it is often pretty hard digging. The keys and descriptions are so technical as to be difficult of understanding, while the number of species described in the manual is so great as to bewilder and confuse the would-be botanist. Hence has arisen the demand for simple, local floras. By the use of non-technical descriptions it has been found

possible to designate the plants of a limited region so that all of the species may be recognized. This is what has been done by Professor Dr. Clements and his colleagues in the University of Minnesota—Dr. C. O. Rosendahl and Dr. F. K. Butters—in their "Guide to the Spring Flowers of Minnesota." Here by the time limitation, added to the areal limitation, the authors make it possible to readily distinguish practically all of the higher plants their students will find. Keys are very freely used, in fact the booklet is little more than a collection of keys, first to the families, then to the genera, and last to the species. Etymologies are freely given, and every name has its accent correctly indicated. It must prove to be of the greatest use to the pupils in botany classes in all grades of Minnesota schools.

About a year and a half ago Roland M. Harper published an instructive paper in the Annals of the New York Academy of Sciences (Vol. XVII., part 1) entitled "A Phytogeographical Sketch of the Altamaha Grit Region of the Coastal Plain of Georgia." With the index which has now been added it constitutes a stout pamphlet of 436 pages, and 28 full-page plates of reproductions of photographs. A geological map of Georgia showing especially the coastal plain region, including the Altamaha Grit, and seventeen diagrams in the text serve to further illustrate the paper. From map and text we learn that the Altamaha Grit covers about 11,000 square miles in southern Georgia, stretching in a belt of irregular width from the Savannah River southwestwardly to the southwestern corner of the state. Originally the region was covered with open forests in which there was little shade, a condition favoring the growth of shrubby and herbaceous vegetation. The number of species of flowering plants and ferns is given as 739, of which 53 are trees and 107 shrubs and woody vines. The larger trees (with trunks one to three feet in diameter) are *Nyssa uniflora, Persea pubescens, Gordonia lasianthus, Liquidamber styraciflua, Liriodendron tulipifera, Magnolia grandiflora, M. glauca, Quercus alba, Q. michauxii, Q. lyrata, Q. phellos, Hicoria aquatica, Taxodium distichum, T. imbricarium, Pinus palustris, P. elliottii, P. taeda, P. serotina, P. glabra.* Among the genera of arborescent species that are notably absent from the region are *Tilia, Celtis, Populus, Catalpa, Sassafras, Negundo, Platanus* and *Fagus.* Other notable absentees are *Monarda, Rosa, Ranunculus, Polygonum, Trillium, Adiantum* and *Phegopteris.* The paper will repay careful reading and study.

THE DEVELOPMENT OF A GREAT JOURNAL

The few living botanists who saw the beginnings of the *Botanical Gazette* in 1875 have watched its later development with increasing interest and gratification. Appearing as a thin four-page, rather badly printed sheet, of poor paper, and bearing the name of *The Botanical Bulletin,* its beginnings were anything but promising. Yet there was something in it that won it friends from the beginning, in spite of the fact that it was issued by a practically unknown young man, in a little town in the Mississippi Valley, nearly a thousand miles from any considerable botanical library or collection of plants. It was not profound, and no important discoveries were announced in its pages. It was, however, an honest effort to tell truthfully and simply some things that the editor and his friends had seen in the vegetation about them. It made no pretense to being anything more than a little journal of little notes. And it fulfilled this mission so well that it made a distinct place for itself, and as the years went on it enlarged its field, grew in size, and finally came to be the one indispensable journal for every American botanist. It is not necessary to relate the varying fortunes of this journal, nor to tell of its repeated enlargements; most of these are more or less familiar to the present generation of botanists. Within the last few months the *Gazette* has had to take another step in its evolution. In its growth year by year it has added more pages of matter, more text figures and more full-page plates, each of which has added not only to its value to the reader, but very materially to the expense of its publication. On com-

paring it with the average of five of the leading foreign botanical journals it appears that during the past two years the *Gazette* has been giving 945 pages to their 648, 45 plates to their 12; and 182 text figures to their 122, while the average subscription price of the foreign journals is thirty per cent. higher. Accordingly after consulting with many botanists as to what changes should be made to equalize the *Gazette* with other journals of its rank, the editors announce that since "the pressure for publication is increasing rather than diminishing" they will maintain the 80-page size for each number, however gaining additional space by "a more rigid selection of original papers, a greater compression of these papers in text and illustrations, a franker expression of opinion in reviews, and the abandonment of the department of 'News.'" With these changes the publishers advance the subscription price to seven dollars per year, a step which is amply justified by the fact that the *Gazette* will still cost far less per page and plate than any of the foreign journals of its rank. Botanists everywhere will be glad to know of the growth and development of this American journal, and will wish it the continued success which it has earned so well.

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SPECIAL ARTICLES

AN EXAMINATION OF THE THEOREM OF ALLEN HAZEN THAT FOR EVERY DEATH FROM TYPHOID FEVER AVOIDED BY THE PURIFICATION OF PUBLIC WATER SUPPLIES TWO OR THREE DEATHS ARE AVOIDED FROM OTHER CAUSES[1]

IF Hazen's theorem is true, the purification of polluted water supplies has sanitary and economic consequences much more far reaching than has hitherto been supposed. If, for example, in the city of Pittsburg, purification of the public water supplies by the new municipal filters should, as may reasonably be expected, effect a saving of at least one hundred deaths a year from typhoid fever and, according to the theorem, in addition two or three hundred deaths from other causes, such saving of human life means also the avoidance of a present economic waste of two millions of dollars annually instead of half a million from typhoid fever alone.

Hazen's theorem rests upon the discovery by Hiram F. Mills and others that in several cities purification of the public water supply has been immediately followed by a marked decline in the total death rate, such decline being far greater than that which would have been effected by the decline in typhoid fever mortality alone. It appears to have been first definitely formulated and published by Mr. Hazen in a paper on "The Purification of Water in America," presented to the International Engineering Congress at St. Louis, in 1904. The theorem has not hitherto attracted the attention or consideration which it deserves, and we have therefore critically examined the evidence upon which it rests and, having found the theorem not only correct but conservative, have gone further and undertaken to discover precisely what are those "other causes" of death in which the extraordinary decline referred to takes place.

For these purposes we have made an elaborate statistical study of the influence of the purification of polluted public water supplies in Lowell and Lawrence, Mass., upon the total death rates of those cities, and also upon their death rates from various diseases; comparing the data for each city with those of the other, and of both with similar data for Manchester, N. H., a city of the same class which from various points of view, such as location and population, is remarkably well adapted to serve as a norm. As a result of our studies we have found that the theorem is true not only for the cities mentioned, but also for certain other cities, including Hamburg, Germany, when this city substituted a pure for a polluted water supply in 1893. We find, furthermore, that the decline in total mortality is accounted for to a large extent by the diminished number of typhoid fever deaths, but to a much greater extent by a decline in deaths from other causes; that about eighty per cent. of the decline in general mortality

[1] Preliminary communication.