of style and be just as well, if not better, understood. He will also be more agreeable to "quite a few" of SCIENCE's readers I have no doubt, among whom is

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SCIENTIFIC BOOKS

A Biological Survey of the Waters of Woods Hole and Vicinity. Section I., Physical and Zoological, by FRANCIS B. SUMNER, RAYMOND C. OSBURN and LEON J. COLE. Section II., Botanical, by BRADLEY M. DAVIS. Section III., A Catalogue of the Marine Fauna, by FRANCIS B. SUMNER, RAYMOND C. OSBURN and LEON J. COLE. Section IV., A Catalogue of the Marine Flora, by BRADLEY M. DAVIS. Department of Commerce and Labor. Bulletin of the Bureau of Fisheries, Vol. XXXI., 1911. Washington, Government Printing Office. 1913.

This bulletin is issued in two parts, each a separate volume; Part I., 544 pages, of which 54 contain introductory explanations and physical data, the remainder giving the results of the dredging operations carried on by the bureau, supplemented by some observations on conditions in shallower water, where dredging was not necessary. In this part 274 charts and maps are included. The second part contains 316 pages, numbered continuously with the first part. It consists of catalogues of the marine animals and plants, with localities, etc., bibliographies of works referring to the region in question, and ends with what appears to be a complete index. The present notes refer to the botanical parts, which occupy 147 pages, as against 620 pages for the zoological; but some reference is necessary to the introductory part.

The region under consideration includes Vineyard Sound and Buzzards Bay; the main body of the information on which this work is based was obtained by dredgings in the years 1903, 1904 and 1905, and a few in 1907, from the government steamers, *Fish Hawk, Phalarope* and *Blue Wing.* In all 458 stations were dredged, of which a list is given, showing date, location, depth and character of bottom. Charts 225 to 227 also show these data graphically. At each station a record was kept of the species brought up by the dredge, so that the data as to distribution may be considered as fairly complete. The result of this, as regards 38 species of algæ, is shown on charts, identical outline charts of the region, one for each species, with a star showing each station where the species was found. No verbal description can express as clearly as do these charts the area inhabited by a species, and their value is especially shown when one compares the eight similar charts in the zoological section, showing, not distribution of species, but temperature, density, etc. Compare, for instance, chart 228, *Chætomorpha melagonium,* a northern plant, occurring here only in the colder waters by Gay Head and Cuttyhunk; chart 237, *Laminaria digitata,* also northern, about Gay Head only; chart 241, *Griffithsia Bornetiana,* almost entirely in the warmer waters near shore; chart 242, *Griffithsia tenuis,* a common plant of the Mediterranean and Bermuda, here reaching its northern limit, and here recorded only in the extreme northern portion of the chart, where shallow water and distance from the open sea give a higher temperature than in the more southern part of the bay or in the sound.[1]

With these chart 261, *Grinnellia americana,* is in strong contrast, showing an almost universal distribution for this beautiful and characteristically American species.

The dredgings on which the charts were based were all made in the months of July, August and September; that different results would have been obtained by dredgings in other months is quite possible, especially as regards annuals, but probably the difference would be less than what is found between tide marks, or just below low-water mark; at such

[1] *G. tenuis* also occurs just east of the region represented in the charts, but only in such bodies of water as Waquoit Bay, which are very shallow, connected with the sea by a narrow channel, and in which in summer the temperature of the water is quite high.

stations in practically all temperate regions a large number of species appear, often abundantly, in late winter and early spring, only to disappear before the midsummer flora is established. This deficiency in data for other than the summer months is in part compensated for by a careful study which Dr. Davis has made of a very limited region, "Spindle Rocks," continuing over a period of fifteen months, after which the rocks were removed in connection with a widening of the ship channel. The eight charts given show zones of growth about each rock, and the appearance, maximum and disappearance of the various species of algæ.

Section IV., list of the marine algæ, is intended to include all species whose occurrence in the Woods Hole region is properly vouched for, including many forms not noted in Section II. Details of distribution, exact localities for rarer forms, dredging stations, seasonal occurrence, references to publications and to exsiccatæ, with synonyms, make this section very complete. The total number of species and the proportions of the different classes are as follows:

Cyanophyceæ	37
Chlorophyceæ	48
Phæophyceæ	66
Rhodophyceæ	89
Total	240

The Woods Hole region has had prominence in the marine algology of New England since the publication of Farlow's list of 1873.[2]

In addition to the investigations of the Fish Commission and its successors, of which the work now under consideration is the latest result, the Woods Hole Marine Biological Laboratory has maintained a summer school here for over thirty years, and the records and herbarium of the laboratory have been utilized in making up this list, which may be considered as approximating completeness nearly enough to justify drawing some general conclusions. Into these conclusions Dr. Davis has gone in some detail; and as to the general character of the flora of this region, the older hypothesis seems justified, that Cape Cod is a relatively sharp boundary line between a subarctic flora, inhabiting the shores north, and a warm-water flora extending south; but with isolated colonies of northern plants in the south, of southern plants in the north.[3]

Dr. Davis's comments on the influence of tides, currents, etc., seem to be well reasoned out and conservative.

The present notes give of course a very incomplete idea of the fullness of the work, which is noteworthy also as the first American attempt to represent the distribution of algæ graphically, rather than by description; indeed the writer can not recall any European work of the same character. Rosenvinge[4] in the first part of his treatise on the algæ of Denmark has given a long list of dredgings, with data of depth, bottom, etc., but there is no indication that any graphic representation is planned. Something resembling this has occasionally been attempted in regard to flowering plants, as for instance by Fernald,[5] Stone,[6] but in these the shading or dotting indicates an area, not a station. The charts for Spindle Rocks are practically unique by their exactness

[2] W. G. Farlow, "List of the Seaweeds or Marine Algæ of the South Coast of New England," Report of U. S. Commission of Fish and Fisheries for 1871–72 (1873), pp. 281–294.

[3] The distinction of an arctic flora on one side of Cape Cod and a warmer flora on the other requires some modification if exactness is wanted. The writer's observations have shown that at Eastham and Welfleet, 25 miles north of Woods Hole, the Massachusetts Bay shore of the cape has a summer flora practically the same as that of the shore of Buzzards Bay. More observations are needed, but it is probable that the flora on both shores of the cape is much the same.

[4] L. Kolderup Rosenvinge, "The Marine Algæ of Denmark, Contributions to their Natural History," *Kgl. Dansk. Vidensk. Selsk. Skrifter*, 7 Raekke, Vol. VII., No. 1. Kobehavn, 1909.

[5] M. L. Fernald, "An Expedition to Newfoundland and Labrador," *Rhodora*, Vol. XIII., p. 109, 1911.

[6] Witmer Stone, "The Plants of Southern New Jersey," Annual Report of the New Jersey State Museum, 1910 (1911).

and their completeness through the year. Considerable attention is given to the matter of "formations" and "associations," as is the custom nowadays in works treating of distribution; it may be a question how far subdivision should be carried in this matter, and whether it is wise to refer to the "*Nemalion* association," "*Dasya* association" and the like, to indicate that a single species grows plentifully in certain localities, without, as far as stated by the author, admixture of any other plant. While much attention is paid to the habitats of the different species, favorable and unfavorable conditions, epiphytes, etc., the word "ecology" is generally conspicuous by its absence; this is to the writer a good sign, as authors who most enjoy using it seem often to be persons with a distaste or contempt for systematic botany, and the systematic botanist has learned to be somewhat cautious in accepting the names used for the plants making up their "associations," etc. The case is stated very compactly in a footnote to a recent paper by Tidestrom.[7]

While there will always be differences of opinion as to the limitations of species, etc., the writer, who is fairly familiar with the New England marine flora, has not found anything to indicate an error in determination in Dr. Davis's list.

While this work is by far the most complete study of the marine flora of any limited region of this continent, it leaves plenty of questions for further study. Among them the writer would suggest as specially interesting the matter of the different range in latitude on the two sides of the Atlantic, of a species occurring on both sides. The occurrence in the Woods Hole region of many Mediterranean species, but the absence of others associated with them in Europe, was long ago pointed out. While this is not taken up by Dr. Davis, it would seem to the writer that it may be due to the much greater range of temperature at Woods Hole, as indicated by the charts, etc.; a Mediterranean annual demanding a high summer temperature, but passing the winter in the spore state, would find no difficulty in living here; while it would be impossible to acclimate an alga requiring a temperature of at least 40° Fahr. throughout the year. But some other cause must be found in the case of a species like *Hypnea musciformis,* abundant and luxuriant at Woods Hole, but not reaching to the English Channel; while *Dictyota dichotoma,* at its best on the English coast, has not been found with us north of North Carolina.

Botanists who desire uniformity of nomenclature will be glad to see that the international rules, as adopted at the Vienna Congress of 1905, are here followed,[8] and it is a matter for congratulation that so careful and thorough a work as Dr. Davis's has been brought out in so good shape as a government publication.

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A Bibliography of the Tunicata, 1469–1910. By JOHN HOPKINS, F.L.S., F.G.S., F.Z.S., etc., Secretary of the Ray Society. Printed for the Ray Society and sold by Dulau & Co., Ltd., 37 Soho Square, London, West, dated 1913.

The author prepared a portion of this bibliography, dealing with titles up to the year 1870, in connection with his preparation for

[7] "Much argument ecological falls of its own weight when the entities considered are not known to the observers." Ivar Tidestrom, "Notes on Vol. XV., p. 104, 1913.

[8] The results of the Brussels Congress of 1910 were not published at the time Dr. Davis's manuscript was accepted by the government; under the rule that the names of Nostocaceæ heterocysteæ and Nostocaceæ homocysteæ date, respectively, from the "Revision" of Bornet & Flahault, and the "Monographie" of Gomont, a few names of authors, given in parenthesis by Dr. Davis, would be omitted, but no generic or specific names would be changed. It is possible that under a strict construction of the Vienna rules the name of *Griffithsia Bornetiana* may have to be given up; but as the few writers who have proposed a substitute use a name certainly unjustified by the same rules, Dr. Davis has done well to retain, in company with all other American algologists, the specific name given by Farlow.