light. In his experiments he used a mercury arc surrounded with black glass, which transmitted mainly the 366 lines of mercury. When this radiation fell into the eye it caused fluorescence of the materials of the eye, with the result that the observer saw a violet haze, which, being in the eye, was not useful for seeing anything. The effect corresponds exactly with the last sentence above quoted from Beebe.

The color of the eye fluorescence is somewhat uncertain. Wood spoke of it as a "violet" haze. W. de Groot[1] arranged an experiment in which various people looked at ultra-violet lines, and presented the results thus: "For 3650, 3345 and 3261 the description which the persons gave of the color was remarkable. They described it as a clear blue whereas the Hg line 4047 and Zn line 4057 were described as violet. It seemed to them as if the succession in the spectrum was reversed. To myself the color appeared more greyish, although with a hue distinctly bluer than that of the recognized 'violet' lines."

It must be remembered that Dr. Beebe was observing the phenomenon on a grander scale than has been produced in the laboratory. The entire scene which he saw through the quartz window of the bathysphere was lighted with the shorter wave-lengths of the daylight spectrum.

To work out the effects quantitatively will require more exact data than are available at present on the absorption coefficients of sea water for visible and near-ultra-violet light and on the visibility curve of the eye extended into the ultra-violet region of the spectrum.

On the basis of the foregoing explanation one is led to wonder about the fluorescence of the eyes of fish. The fluorescence would be troublesome for undersea daylight vision at these depths, and its absence from the eyes of creatures in such an environment would appear to be a favorable adaptation.

E. O. HULBURT

NAVAL RESEARCH LABORATORY,
WASHINGTON, D. C.

UNUSUAL SKY APPEARANCE

A CORRESPONDENT from Vienna, Va., writes that on either January 22 or 23, about 8 o'clock in the evening, she saw a light flashing in the southwest something like lightning. It would flare up several times, then die down. As she watched it, it became very vivid till it seemed to come from a great blazing light, almost a ball of fire. All this time it was moving around the horizon from the southwest until it had almost reached the starting point. She thought it perhaps more vivid when in the north, and that it seemed to be dying away in the southeast. It appeared to be very low, just showing above the foothills.

I myself was driving along Wisconsin Avenue in Washington on the evening in question, with my wife, and we were startled by what was probably the same appearance. It resembled what is called "heat lightning," only that it seemed to be very near indeed and not associated with any noise. The night, as I recall it, was very cold and dry, and I believe on the turn between two contrasting types of weather.

I would appreciate it if any of your readers will suggest to me an explanation.

C. G. ABBOT

SMITHSONIAN INSTITUTION

BOOKS AND LITERATURE

THE MICROPHYSIOLOGY OF NERVE

The Microphysiology of Nerve. By GENICHI KATO. 139 pp., 1934. The Maruzen Company, Ltd., Tokyo, Japan.

IN this concisely written monograph, Professor Kato has presented the results of a series of experiments utilizing his technique for isolating single nerve or muscle fibers in the Japanese toad. Using preparations in which either a single nerve or muscle fiber or both have been dissected free, Kato and his co-workers have abundantly demonstrated that the nerve impulse completely recovers after passing through a narcotized region. The magnitude of the conducted response of a single muscle fiber stimulated through a single nerve fiber is always the same at any strength of stimulus above threshold. Graded, non-conducted muscle fiber contractions localized at the site of small stimulating electrodes are obtainable only with weak stimuli and are unaccompanied by action potentials. Kato compares these responses to peculiar localized contractions occurring as a result of stimulation of a completely narcotized region of a muscle. Both of these types of contraction are found only under restricted conditions as a result of artificial stimuli and are entirely different from the conducted contractions in which there is no deviation from the all-or-none principle.

In observing spinal reflexes, Kato has shown that ipsilateral afferent stimuli are inhibitory to a crossed-extensor reflex (frog) at certain moderate current strengths, while with greatly increased strength of stimulation of the same nerve trunk the effect is summation with the crossed stimulation. This summation is a function of fibers which originate from free nerve endings in the epidermis, whereas the inhibitory effects

[1] *Nature*, September 29, 1934.

result from stimulation of nerves arising in muscles. He suggests that there are two types of afferent nerve fibers: (a) inhibitory fibers, easily narcotized and having a low threshold of stimulation and (b) excitatory fibers which are less susceptible to narcotization and have a high threshold. Kato has isolated these two types of fibers and has demonstrated that the central effect of the inhibitory fibers, which are about 9.5μ in diameter, is only inhibition with stimuli of any strength or frequency even after the application of strychnine. Stimulation of the excitatory afferent fibers, whose diameter is 6 to 7μ, results only in summation with crossed excitation. Kato has also localized an inhibitory center at the level of the *lamina terminalis* from which fibers are projected into the cord decussating slightly caudal to the crossing of the motor tract.

Kato does not offer experiments that would refute the view, now generally prevalent, that the nerve impulses which give rise to inhibition do not differ fundamentally from those whose central effect is excitatory. Evidence is accumulating from many sources tending to show that not only are impulses in nerve fibers non-specific but also in intra-central terminals as well. Therefore, whether a discharge into the cord gives rise to excitation or inhibition depends upon the nature of the reactions set up at the particular point on the neurone at which the discharging nerve terminal forms a synapse. The significance of Kato's experiments lies in the fact that they lend support to the hypothesis that a particular synapse when discharged by its nerve fiber always produces the same non-reversible effect; one synapse when activated always develops excitatory state, and another always inhibitory state. However, a single afferent fiber may end not only in nerve terminals (boutons terminaux) which contribute to the development of an excitatory state in one neurone, but it may also send collateral branches to another nerve cell or cells on the same side of the cord, which end in boutons whose discharge results in inhibition.

EBBE HOFF

LABORATORY OF PHYSIOLOGY
YALE UNIVERSITY

THE GRASSES OF THE UNITED STATES

Manual of the Grasses of the United States. By A. S. HITCHCOCK. U. S. Dept. Agr. Miscel. Publ. 200: 1–1044. figs. 1–1696. 1935. Superintendent of Documents, Government Printing Office, Washington, D. C., $1.75.

No family of plants is of such outstandingly great importance to man as is the grass family, including as it does all our cultivated cereals, the basic foods of the majority of mankind, most of the wild and cultivated species on which the grazing and dairy industries are based, and numerous species otherwise of great economic importance. It is thus fitting that the first comprehensive treatment of the entire family, as represented in the continental United States, should appear under government auspices. It is a botanical contribution of first magnitude and one of great economic and scientific moment. In the introductory pages the uses, distribution, morphology, classification and nomenclature of grasses are considered, followed by a key to the tribes and genera, while under each genus is a key to the species. There are 159 numbered genera and 1,100 numbered species, with additional data appertaining to casually introduced and cultivated forms. Each species is illustrated, while the accompanying maps graphically indicate the geographic distribution in each case. The descriptive text is not encumbered with synonyms, but for those who must consider synonymy, a full list of synonyms, by accepted species in alphabetic sequence, is given at the end of the work, pages 771–982. Here and there in the synonymy critical notes are given and for all originally published species, as contrasted to transfers, the type locality is indicated. How complex synonymy has become may be evidenced from the fact that for a number of species more than 20 synonyms are listed, and for at least one species more than 70 synonyms are given. This list of synonyms provides the basis of selection of the accepted name in each case, the nomenclature following the International Rules. The compilation of this list, a major task, shows evidence of most careful and critical bibliographic and herbarium work, and there seems little chance that few if any "earlier" names will be detected by future workers that would replace those accepted in this important work.

The work is planned to meet the needs of the botanist, the agronomist, the forester and the agriculturist, hence the inclusion of supplementary economic notes under the various genera. Common names of cultivated species follow "Standardized Plant Names," while those for native and naturalized species have apparently been arbitrarily selected, as were many of those in that work; for these the author is not responsible (p. 14). Thus under *Muhlenbergia* one notes the most unusual and apparently new common name "muhly," while fox tail, which is widely used for *Setaria,* is replaced by bristle grass and the name for fox tail is associated with *Alopecurus.* These arbitrary changes can not conceivably effect accepted usage, and unquestionably it would have been better to apply common names, as does the man on the land, rather than to have invoked arbitrary selection.

This is a major contribution to our knowledge of the grasses of North America, marks the culmination of more than thirty years of intensive work on the part of the author, and will be found to be of great