in the forests of the northern Rocky Mountains that all national forest regions have been instructed to develop similar methods of measuring fire danger.

LEO SHAMES

FILMY FERNS IN THE CAROLINAS

No species of the interesting and peculiar group of ferns known as the filmy ferns (Hymenophyllaceae) has ever been found in the Atlantic States north of Georgia. We can now report the occurrence of three of them in the Carolinas, one new to the North American continent. They are: *Hymenophyllum tunbridgense* (L.) J. E. Smith and *Trichomanes Petersii* A. Gray from Pickens County, northwestern South Carolina, and *Trichomanes Boschianum* Sturm from Macon County, southwestern North Carolina. The former is new to North America. The station for *T. Boschianum* near Highlands, N. C., was discovered by Dr. Herbert Hechenbleikner, who was working at the Highlands Laboratory with W. C. Coker. The two South Carolina plants were found by Mrs. Bayard Taylor several years ago. With her and Dr. Taylor, W. C. Coker visited the stations on October 9 of this year and found populous colonies of both of them. All three species were found on granitic gneiss, not on sandstone, as was to be expected.

MARY S. TAYLOR
W. C. COKER

UNIVERSITY OF NORTH CAROLINA

THE WOODS HOLE MARINE BIOLOGICAL LABORATORY

BIOLOGISTS are reminded that one of the sources of income upon which the Marine Biological Laboratory depends for its maintenance is the sale of biological materials by its supply department to educational and scientific institutions.

In spite of the extensive damage to laboratory property caused by the recent storm, the supply department is prepared to fill orders promptly. It will appreciate at this time the opportunity of serving the members of the corporation and other biologists.

By placing your orders for material with the supply department you will, in a substantial way, help the laboratory to repair its very considerable losses.

The damage to the buildings of the Marine Biological Laboratory, caused by the storm of September 21, was almost wholly due to water. The tide in Buzzards Bay rose about 10 feet above the normal high water mark, overflowed the Eel Pond, poured into the supply department building through the windows and doors, and filled the basement of the brick building to a depth of 4 feet. Before the flood abated it had put out of commission the great storage battery and the switchboard, covered microscopes and other apparatus with mud, leaked into many stocks of chemicals, and had ruined cabinets and drawers where much small scientific material was stored. The loss to the supply department was fortunately not large.

Due to the unremitting efforts of those in charge of the various departments, the damage was kept at a minimum. But extensive repairs and replacements will be necessary. This work is already under way. It is confidently expected that the laboratory will soon be completely restored, and that research and instruction will be carried on as usual during the summer of 1939.

CHARLES PACKARD,
Associate Director

SCIENTIFIC BOOKS

LIGHT

Light. Principles and Experiments. By GEORGE S. MONK. Pp. xi + 477, figs. 265. McGraw-Hill Book Company, New York, 1937. Price, $5.00.

THIS text-book gives a combined treatment of three branches of optics which are too frequently separated, namely, geometrical optics, physical optics and laboratory work in both these fields. The first quarter contains a very good summary of geometrical optics: thick lenses, optical instruments, apertures, photometric principles and prism instruments. The principal section on physical optics contains chapters dealing with spectra, optical properties of media, effects of electric and magnetic fields, as well as the usual topics of interference, diffraction and polarization.

It is a pleasure to see that some spectroscopy is included, as this is one of the most important parts of applied optics. Additional experiments might have been outlined, such as those dealing with some of the uses of the quartz spectrograph and infra-red spectrometer. Such work would give valuable experience to the student, especially to one who is majoring in physics or chemistry. In order to provide a better background for such work, it would be advisable to give even more material on spectroscopic theory and nomenclature. In passing, it might be noted that the author makes the mistake of saying that Rydberg's constant varies as the square of the atomic number of the element, whereas perhaps the most important contribution by Rydberg to spectroscopy is the demonstration that this constant is nearly the same for the arc spectra of all elements.

The diffraction grating could have been discussed more fully. The author considers that the theory is so involved that it obscures the final results. However, in this case the vibration polygon method, in which one

adds the squares of the sums of the components of the amplitudes, is simple and applicable to many other diffraction problems as well. The diffraction pattern of a double slit and of a circular opening could have been simplified by the use of this method.

Too much is made of the fact that unpolarized light is not *actually* composed of the superposition of many linear component vibrations. Of course this is no more true than that the components of any force are really present in the force. It seems fruitless to discuss what is actually true in physical concepts. It is better to consider the extent to which the concept is useful, for example, that of rays in geometrical optics, waves in physical optics, wavelets in diffraction theory and photons in the quantum theory of light.

The introduction of an impossible cylindrical wave in the treatment of diffraction by a slit is certainly inconsistent with reality. As a matter of fact, one encounters here a two-dimensional integration over a plane or any other surface that one may choose. The integration in the direction of the length of the slit is carried out first and gives only a constant factor, while the integration across the slit leads to the characteristic result which is conveniently discussed with the aid of Fresnel integrals or Cornu's spiral.

In the chapter on double refraction it is stated that the double refraction of Cellophane is due to strains introduced in its manufacture. It should be more widely known that non-crystalline, strain-free materials are doubly refracting if they have a sub-microscopic structure, for example, fibrous or lamellar. Because of this fact, the polarizing microscope finds a useful application in the grading of cotton fibers, as well as in the study of the structures of various other plant and animal fibers and membranes.

The material in the chapter on color is not consistent with the best of modern practice in colorimetry, apparently because too much of it was taken from the older literature. The idea of desaturation by the addition of black is of no value in the measurement of color. The author makes reference to Hardy's excellent Handbook on Colorimetry, but does not use it to the fullest advantage.

The reviewer considers this to be the best book in its class, one for which there is a great need. In the intermediate optics laboratory it is desirable to include experiments in geometrical and physical optics and in spectroscopy without entirely losing sight of the underlying theory. This makes the field so broad that one has to select the subject-matter carefully, and it is not easy to satisfy a large number of teachers. Professor Monk has done very well indeed in this respect and has made a valuable contribution to optical literature.

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STATISTICAL AND MATHEMATICAL PHYSICS

Statistical Physics. By L. LANDAU and E. LIFSHITZ; translated from the Russian by D. SHOENBERG. Pp. viii + 234, Oxford University Press, 1938.

THIS book presents the results of thermodynamics obtained by consideration of statistical methods. Instead of taking the first and second laws of thermodynamics as fundamental first principles, the thermodynamic relations are derived from the atomic properties of the systems concerned. Thus we have presented in a uniform manner two subjects which, although their intimate relationship has long been recognized, are usually divorced, and treated in separate text-books.

The authors confine themselves to those phenomena not connected with quantum effects. After a discussion of the fundamentals of statistics, they proceed to derive the usual thermodynamic functions and the gas laws. Then there are chapters devoted to chemical potentials and chemical reactions, phase equilibria and the properties of solutions. These are followed by a chapter on anisotropic bodies, which is based largely on original work of Landau. The book is completed by a discussion of surface phenomena, the whole forming a well-ordered and well-presented exposition.

No doubt the authors will be criticized for the statement in the preface, "no attempt has been made at mathematical rigor, since this is anyhow illusory in theoretical physics, but we have instead tried to make clear the fundamental physical assumptions on which the results are based." Nevertheless, the statement furnishes an excuse for such matters as the definition of probability as the limit of a ratio which approaches no limit in the rigorous mathematical sense and the omission of any discussion of the ergodic hypothesis. The clarity of the exposition as a whole, however, should largely condone such imperfections.

A more serious objection can be made to the complete lack of any numerical magnitudes of the quantities under discussion. Although there are examples interspersed throughout the text, they consist largely in the derivation of less important consequences of the theory. The comfortable feeling that one gets from knowing that the heat of vaporization at the boiling point is 539 calories per gram for water, but only 2.7 calories per gram for methyl alcohol is completely lacking. This, to be sure, is purely a matter of opinion, and the text could certainly be supplemented in such a way as to correct this, if it were desired. Altogether, the book is excellently done and would represent a valuable addition to any one's library.

Methoden der Mathematischen Physik. By R. COURANT and D. HILBERT, Vol. II, pp. xvi + 549, Julius Springer, Berlin, 1937.

PHYSICISTS will welcome the second part of this most