by the chemical route. Having made a specialty of photographic theory and having a keen appreciation of scientific work both fundamental and applied, we venture the prediction that no director of the company will contribute more to the success of the corporation than Dr. Mees.

The election of chemists to high places in industrial organizations should not be so infrequent as to need editorial comment. The valuable qualities which the Eastman Kodak Company has discovered in Dr. Mees may be found by other commercial organizations among their own scientific staff. We venture to suggest that such an inquiry would reveal many men qualified to take such increased responsibility in the management of the company's affairs. Such a man will, of course, have native ability, made more valuable by the special training which a thorough grounding in chemistry and allied subjects is sure to give. With a little encouragement he will be able to pass sound judgment in differentiating between essentials and non-essentials in business, just as he must do in the course of his chemical work.—*Journal of Industrial and Engineering Chemistry.*

COMMITTEE ON LUMINESCENCE

THE Committee on Luminescence of the National Research Council met at Ithaca, N. Y., on August 17th. Present were Messrs. C. D. Child, H. L. Howes, H. E. Ives, E. L. Nichols and Miss Frances G. Wick.

Mr. Child reported on the present status of our knowledge of the luminescence of mercury vapor and suggested that special attention be called to the following phenomena of mercury vapor which deserve further investigation: (1) The continuous spectrum which may be obtained under certain conditions of pressure and temperature, (2) the abnormal broadening of the absorption spectrum which occurs with increasing pressure of the vapor, (3) the fact that the luminosity of the continuous spectrum does not commence at the instant the vapor is excited and that it continues for an appreciable time after the excitation has ceased, (4) the increase in chemical activity occurring under the same conditions as those required for the continuous spectrum, and (5) the apparent decrease in the ionization potential occurring under the same conditions. The following explanations which have been suggested should be tested further: (1) That newly vaporized vapor is more active in giving the continuous spectrum than other vapor, and (2) that molecules are formed from excited atoms, that is, from atoms in which an electron has been removed to an outer orbit.

Mr. Howes gave a résumé of investigations of the luminescence of the rare earths and in particular of the extended researches of Urbain in this field.

Mr. Ives reported on the relations between the photo-electric effect and luminescence so far as the same have already been developed and urged that observers in these fields should keep in mind the importance of more definitely determining the nature of such interdependences as may exist.

Mr. Nichols discussed the structure of luminescence spectra. He announced that measurements made under his direction, and soon to be published, indicate that the apparently continuous luminescence spectra of solid solutions in general are made up of submerged, over-lapping bands having a constant frequency interval and that this interval is characteristic of the activating element; also that the spectrum of incandescent oxides, of flames containing burning metals such as magnesium, calcium, aluminum, etc., and probably of all incandescent solids, have the structure above described.

Miss Wick described studies of the luminescence spectra of certain natural fluorites previously heated to fusion. Instead of the relatively broad bands observed by Urbain and others in such fluorites, the modified spectrum consists of fine lines readily identified as those of samarium, europium, dysprosium, etc. The phosphorescence of these fluorites is greatly increased and prolonged by such heat treatment.

By invitation Messrs. D. T. Wilber and L. J. Boardman sat with the committee.

E. L. N.

SPECIAL ARTICLES

ULTRAMICROSCOPICALLY OBSERVABLE FLUORESCENCE

SINCE my last communication on the fluorescence of the blue-green algae, in which I expressed reserve regarding its visibility in chloroplasts, I have been able to demonstrate to others, observers of the highest competence, and thus to assure both them and myself that the chloroplasts of the leaves and of the green algae examined by me exhibit a marked degree of deep red fluorescence observable with the dark field condenser, when the optical conditions described (SCIENCE 58: 91–2. 3 Aug. 1923) are fulfilled. This observability gives new impulse to the study of the chloroplast.

Suspensions of living cells of a *Scenedesmus* and of a *Monostroma* are fluorescent to the eye when examined in a dark room in a narrow beam of strong light of w. l. approx. 530 and less, and their spectra in this light exhibit a strong band in the red, as K. Stern found for *Chlorella* (Ber bot. Ges. 38: 28. 1920). The same general statement may be made for suspensions of chloroplasts in water and in glycerine.

E. g. the filtrate from *Saponaria* leaves ground with water and sand behaved in this way. When observed ultramicroscopically, all these showed the deep red fluorescence.

J. Reinke (Bot. Zeit. 44: 166 ff. 1886) believed that rhodophyll is composed of two "atom groups," one similar to the green component of chlorophyll; the other, a water soluble substance set free on death and only then becoming fluorescent. It would be of interest to examine the Florideae for fluorescence by means of the dark field condenser. I hope that some one working with these forms in reach will find time and inclination to make the examination.

For bringing into view the fluorescence of chloroplasts the use of glycerine or cane sugar (or equivalent) is necessary. I may iterate that it is at the apex of the inverted cone of illumination, obtained by reflection from the cover glass, that fluorescence is observable. A thin (0.8 mm. or less) slide and a dry objective are required.

In the above media some chloroplasts maintain their fluorescence for a surprisingly long time, though in this they do not all behave alike. Those of *Chlorophytum* and of *Aspidistra* have remained fluorescent in concentrated cane sugar for over a month, the preparation lying on a table in diffused light. During that period, those mounted in glycerine have nearly all lost their fluorescence—a few only are still so at the present writing. In water the chloroplasts, as is well known, rapidly break down or become vacuolated, as they do, but more slowly, in weak glycerine, according to the amount of water present. Under these circumstances no fluorescence is observable, ultramicroscopically, though it may not be absent.

In the chloroplasts of *Vaucheria* the fluorescent pigment soon becomes segregated into one to several vacuoles which are individually fluorescent, and which suffer more or less extrusion. There is a presumption that these vacuoles are identical with the drops of "assimilatory substance" observed by A. Meyer (Ber. bot. Ges. 36: 674. 1918) and by G. Mangenot (C. R. soc. biol. 83: 892. 1920).

With regard to the *Cyanophyceae,* I now find that, irrespective of the genus, the species may be divided into two groups, distinguishable by their fluorescent colors, those which are red (but with difference of shade corresponding it may be with various forms of phycocyanin) and those which are orange. These two groups will probably be found to align themselves with those found by K. Boresch, using spectrum analysis, to contain on the one hand a blue pigment with carmine red fluorescence, and, on the other, a red pigment having an orange-yellow fluorescence, separable from each other also by capillary analysis (Biochem. Z. 119:167. 1921).

The importance of an adequate evaluation of the behavior of the fluorescent pigments is indicated by the recent important work of B. Moore, E. Whitley and T. A. Webster (36 Ann. Rep. Oceanog. Dept. L'pool. 1922) who advance evidence to show that the role of the red pigment in the Florideae is not simply that of a screen, but that it is actively catalytic, partaking in photosynthesis.

FRANCIS E. LLOYD
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NEW HAMPSHIRE ACADEMY OF SCIENCE

THE New Hampshire Academy of Science held its fourth annual meeting at Alton Bay and at Durham, New Hampshire, May 25, 26 and 27. The academy is bringing together men in scientific work in New Hampshire, including members of the staff of Dartmouth College and the University of New Hampshire, technicians from industrial organizations, teachers of science in secondary schools and some noteworthy amateurs.

A feature of the annual meeting is a field excursion. Last year this took the form of a trip afoot into King Ravine, of the White Mountain, a great glaciated area. This year a boat was chartered for a trip to points of interest in Lake Winnepesaukee.

The program of papers read was as follows:

A review of cellulose hydration theories as applied to beating: M. O. SCHUR.

Auxiliary problems in nitrogen fixation: GEORGE A. PERLEY.

Chlorination of state water supplies: C. L. POOL.

The Schick test for diphtheria: K. C. ATKINS.

The feeble-minded mother in New Hampshire: B. W. BAKER.

Some relations of metabolism to growth and reproduction in plants: H. R. KRAYBILL.

Lethal hereditary factors in butterflies: J. H. GEROULD.

Determination of stellar distances: J. M. POOR.

What of science? L. B. RICHARDSON.

Wild life in New Brunswick: LELAND GRIGGS.

The human side of science: EDWIN E. SLOSSON.

Symposium on "Curriculum of the high and the junior high schools of New Hampshire":

Some theoretical considerations or the what and why: J. W. TWENTE.

Economy in the social orientation of children: E. W. BUTTERFIELD.

The new alchemy: GORDON L. CAVE.

The social science core in secondary education—a study in curriculum making: A. N. FRENCH.

Place of home economics in high school training: HELEN F. MCLAUGHLIN.

W. C. O'KANE,
Secretary