Toledo Medical College. He was chief of staff at the time of his death at the age of seventy-seven years on January 16, 1939.

THE Fourth South American Chemical Congress, sponsored by the Chilean Government, will be held at Santiago in January. At that time the University of Santiago will celebrate its founding in 1504.

THE forty-third annual meeting, the two hundred and forty-sixth regular meeting, of the American Physical Society will be held at Princeton University on December 29, 30 and 31. The preliminary arrangements for the program include a joint session with the American Association of Physics Teachers for Tuesday afternoon. At this session it is hoped that President G. W. Stewart, of the State University of Iowa, will deliver his retiring presidential address, that Professor W. F. Magie, of Princeton University, will speak on the life work of Joseph Henry, and that Professor Arthur H. Compton, of the University of Chicago, will deliver the first Richtmyer Memorial Lecture of the American Association of Physics Teachers on "Wartime Problems of the Physics Teacher."

THE sixth annual meeting of the Florida Academy of Sciences and the Florida Junior Academy of Sciences was held at Florida Southern College, Lakeland, on November 20, 21 and 22. In addition to the general sessions the academy met in three sections—Biological, Physical and Social Sciences. Sixty-one papers were presented. The program of the Junior Academy was held in the Lakeland High School building. Frank Brigham, superintendent of public instruction of Polk County, gave the address of welcome. There was a message from the Academy of Sciences, papers and demonstrations by members of the Junior Academy and a motion picture on vitamins in human nutrition by Professor L. L. Rusoff, of the university. Field trips, a football game and banquets for both academies were held.

PLANS for the construction by the General Electric Company of a plant to be built at a cost of $1,000,000 for the manufacture of synthetic phenol have been announced by William H. Milton, Jr., the newly appointed manager of the plastics department. The action was taken to counteract a shortage of phenol, used by the government for production of plastic parts. The new plant is expected to be in operation in 1942.

DISCUSSION

THE POLARIZATION OF ATMOSPHERIC HAZE

THE article by George M. Byram in SCIENCE for August 22, pp. 192–193, seems to require some amendments in view of research I have conducted in the field of atmospheric polarization.[1] The statement, that "when viewed through a combination polarizing screen and red filter, the visual range of distant objects may be considerably increased, because under favorable conditions this filter combination removes a large part of the atmospheric haze," must allude to the presence of a light-colored object in front of a dark background.

The visual range is a function of the contrast between the sighted object and its background. Disregarding the influence of color and form contrast and other physiological factors, there is still the contrast between the apparent brightness of the object and its background to be considered. The apparent brightness of the object consists of the light reflected by the object and the light scattered by the air and its suspensions between the observer and the object, the so-called air-light. With regard to the apparent brightness of the background, two possibilities are encountered: If the background consists of a solid object, as, *e.g.*, a mountain range, its apparent brightness is a function of light reflected on it and the air-light. In case wooded mountains (albedo 0.07) form the background to a light object, such as a light-colored smoke column, an improvement can be obtained by viewing through a red filter and polarizing screen, since the short-wave air-light which is partially polarized is absorbed and thus the contrast between the light object and its dark background is increased. The same holds true for white clouds which have blue sky for a background, as the combination filter greatly reduces the short-wave, partially polarized, sky-light and thus allows the white cloud to stand out much better in front of the dark appearing sky. In these cases the improvement is in visibility rather than in visual range.

The other possibility under consideration is a dark object with the light from the clear sky near the horizon, the so-called horizon-light, as a background. In this case the resulting conditions are entirely different. The apparent brightness of the dark object is mainly a function of the air-light. The horizon-light consists of the light scattered by the air column from the observer to the boundary of the optically effective atmosphere, tangent to the earth's surface at the point of observation.

The air column involved in the production of the horizon-light is necessarily longer than that producing

[1] *Arch. d. Deutsch. Seewarte*, 56: 6, 1–53, 1936.

the air-light in front of the dark object. Moreover, light scattered in higher layers of the atmosphere contributes a large part to the horizon-light, whereas the air-light in front of the dark object is produced in surface-near layers where relatively greater quantities of large depolarizing particles are present. Therefore the degree of polarization of the horizon-light must be greater than that of the air-light. This statement is implied in results obtained by C. Dorno,[2] who found that the difference between the polarization of the horizon-light and air-light increases with increase in distance from observer to object. Thus the combination of red filter and polarizing screen absorbs more of the horizon-light than of the air-light, lowering the contrast and decreasing the visual range.

Numerous visual and instrumental (Wigand's visual range meter) observations made by the author through combinations of colored filters and Nicol's prism under all possible weather conditions did not reveal any improvement of the visual range when the horizon-light formed the background to the sighted object. In no instance, not even under the most favorable conditions, could a dark object with the horizon-light as background be made visible by any combination of filters if the object was not visible to the unaided eye on account of haze (in the meteorological sense), fog or dust. F. Löhle[3] showed on a theoretical basis that the effectiveness of filters is bound to certain limits of the ratio (λ/r) of the wave-length (λ) to the prevailing radius (r) of the air particles. These limits within which an improvement of the visibility by means of filters can be expected are $1.03 < \lambda/r < 5$.

In the cases cited by Mr. Byram and those mentioned above where an improvement of the visibility is possible, the visual range is originally good. Therefore, the value of filters and polarizing screens for improvement of the visual range is negligible for all practical purposes.

If, however, the color contrast is of importance as, *e.g.*, in spotting certain objects on the ground from airplanes, the use of suitable filters may greatly facilitate the identification of these objects.

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SOME EFFECTS OF BINOCULAR VISION

FOR some years I have amused myself from time to time with experiments in the stereoscopic effects obtained by viewing objects and the landscape from different positions—that is, from upright and recumbent positions of the head. I am not a student of optics and I feel fairly sure that I have made no observations that are not well known to specialists, but conversations with friends have led me to believe that some of these effects are not very generally known, and I have thought it might be worth while to call attention to them.

We are so used to viewing things in the round by means of our binocular vision that we seldom stop to wonder at the really wonderful fact that so short a distance as that between the pupils makes it possible to judge the distance of an object even when its size is unknown and to see distant objects in their spatial relations with one another. A change in the position of the head, however, may open our eyes, so to speak. If we look at things, not in the usual way, but with the eyes in a vertical line, one above the other, we get a very different view. Now the trunk of a tree, for instance, is perceptibly flattened in appearance, but the individual branches are seen in the round, and this has the effect of emphasizing their horizontal lines, so that we feel that we have never really seen them before. A very good tree to try this experiment with is the white pine (*Pinus Strobus*) because of its habit of growth. Lying on my side in some pasture and looking at the pines along its border, I see the beauty of their horizontal branches as I never can when standing. The beauty of a mountain landscape, too, can best be appreciated from the recumbent position. As all mountain-lovers know, the wide-stretching views owe much of their charm to the successive shades of green and blue that rise one above another to the horizon. Probably only an experiment for himself will convince any one that these horizontal zones of color take on an added beauty when seen from a horizontal position, but seeing is believing, and it is an experience that I have often had. This emphasis of the horizontal lines, however, involves a corresponding suppression of the vertical lines, so that, as might be expected, the landscape thus viewed is noticeably flattened, and the summits appear to be considerably lower. Nothing is added to the grandeur of a towering peak, therefore, by taking the recumbent view of it. Indeed, quite the contrary is the case. But the beauty of wide-spread views of ranges and valleys is strikingly enhanced by this change in the position of the head.

Another experiment may be tried on a nearby ridge or a pasture slope across a dip. When one lies down, the slope appears to be rounded vertically, and, if it is a compound slope, every change in the pitch is accentuated. On the other hand, when one sits up or stands, the conformation of the ascent opposite is unnoticed, but every change in the horizontal contour is accentuated. Thus, if there should be a little brook or brook-bed running down that opposite slope, its course and the form of its banks would show much more clearly than they did when the observer was

[2] C. Dorno, *Veröff. Preuss. Met. Inst.*, No. 303, p. 253. Berlin, 1919.
[3] F. Löhle, *Meteorol. Zeit.*, 55: 54–61, 1938.