attitudes of mind. . . .Scientists are valuable but untrustworthy. . . .There is a widespread tendency in the public mind to identify science with destruction. . . .Science must not be permitted to go on a rampage. . . .Science is respected for its power; not for its spirit. . . .Moral incompetency of science. . . .A revulsion against science is said to be in the making. . . .Disappointment and suspicion enshroud science. . . .Hovering over science are storm clouds of suspicion, recrimination and fear. . . .There is abundant evidence to indicate a serious decline in the popularity of science and scientists during the past few years. . . .Scientists have been more pushed about by U.S. security regulations than any other group in our society. . . .Touting for their precious freedom, scientists are really speaking of permissive freedom—exemption from legal restraint in pursuit of knowledge. . . .Let's demand a moratorium on science."

This is only a small sample of expressions which I believe reflect attitudes now in ascendance. The trend may be insignificant, transitory, or even imaginary; or it may be very real and serious. Irreparable damage may be done before it is apparent. Of course, critics of science have always been with us and science from its beginning has contended with these attitudes. The contemporary criticism, however, while exhibiting the same ignorance and lack of understanding, is arising in new and powerful quarters, is aimed at our basic philosophy, and appears to be building up to the point where the "sins of science" is a popular topic of conversation.

Some of the causes of the adverse developments appear to be:

1. The concept that science and religion are in opposing camps—suspicion that science is largely responsible for whatever degree of abandonment there has been of moral principles and ethical standards.
2. The internationalistic outlook of scientists—misunderstanding of the scientific philosophy of free exchange of information.
3. Social neutrality of science—the detachment—the indifference of scientists to public attitudes—the practice that some scientists have of setting themselves apart, above, and beyond the rest of society.
4. The ridicule of areas of knowledge not subject to precise measurement, the disagreement among scientists themselves as to what can legitimately be considered "scientific."
5. The time lag between the views held by scientists and public awareness of such views.
6. Fear and resentment of the "destructive" power of science.
7. Disappointment in the wake of the exaggerated hopes penned by newspaper and magazine writers.
8. The extraordinary scientific illiteracy in America even among intelligent, educated people—ignorance of the basic precepts without which there would be no science at all.

The situation demands further study of causes and solutions. Science needs no special pleaders, but respect is a necessity and can come only with understanding. Scientists are dependent upon society for their privileges and it behooves them, no matter how many years it may take, to communicate a more accurate conception of science to as many people as possible. Naïve as it may sound, I am urging a deliberate effort to disseminate widely the story of science and the habits of thinking which underlie it.

Government scientists, particularly those dealing with administration and policy matters, are in a unique position to contribute to this effort. It seems to me that we not only represent science and scientists to our Government, but we also represent our Government to the scientific community. It is our responsibility to promote understanding and to resolve problems threatening their mutual interest. For example, if the structure upon which science has grossed its achievements is threatened by Government-sponsored intimidation and hysterical security regulations, or if our Government is threatened by dangerous views and affiliations of politically naïve scientists, we must in either case, or both, do more than observe the phenomenon. We must assume the freedom and take the risk, if necessary, of promoting a satisfactory general policy as well as safe and fair decisions in the individual cases.

When any misunderstanding, disappointment, or unjustified criticism arises, it must be met with an adequate, honest, and intelligent response. Some appropriate and respected organization should make a business of this. Of the three existing agencies—the National Academy of Sciences, the American Association for the Advancement of Science, and the National Science Foundation—which by charter have broad responsibilities for the welfare of science in the United States, can we hope that at least one of these will take the immediate initiative?

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[1] The opinions expressed herein are those of the author and do not in any way represent official statements from or reflect the policies of the Office of Naval Research, Department of the Navy.

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Nomenclature of the Amines Derived by Decarboxylation of Cysteine and Cystine

THERE exists some confusion in the biological literature about the chemical significance of the name cystamine. The importance of β-mercaptoethylamine in the chemistry of coenzyme A and in protection against ionizing radiations suggests the necessity of a trivial name, for the specific purposes of biological discussions, which shows its relation to cysteine and avoids confusion with the corresponding disulfide.

We agree to accept *cysteamine* for β-mercaptoethylamine ($HS—CH_2—CH_2—NH_2$) and *cystamine* for β,β′-diaminodiethyldisulfide

$$S—CH_2—CH_2—NH_2$$
$$S—CH_2—CH_2—NH_2$$

It is pointed out that cystamine is given with the suggested meaning in *Beilstein Handb. org. Chem.* (1942), but that in the Merck Index, cystamin is given as a trade name for hexamethylenetetramine.

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The Brocken Spectre of the Desert View Watch Tower, Grand Canyon, Arizona

THE Watch Tower spectre is beautiful and is rarely seen. It forms only when the Grand Canyon at Desert View (southeast portion of the Canyon area) is filled to a proper depth with clouds that can act as a horizontal screen for the projected shadow of the tower. Charles Farmer, tower supervisor, stated that during his twenty years of duty at Grand Canyon he had never seen the spectre before 1952. During this year, it formed once in the spring (date unknown) and again during the afternoon of December 1. It was during this last appearance that I was able to make a brief study of the phenomenon.

The spectre consists of a series of colors which arc or bow around the shadow of the tower (Fig. 1). Yellow was innermost, with reds and purples forming the intermediate and outer bands. Cloud particles diffused the colors along their adjacent edges and formed many interesting blends. Later the same day, the spectre shifted and was centered over the shorter shadow of the kiva section of the tower.

When the tower and bow of colors were first noticed during the spring occurrence, it was about 9:00 A.M. The erect shadow of the tower, and the spectre were then projected on the clouds 200 feet below the north rim, which is about nine miles northwest of the tower. Elevation at the tower is 7452 feet and at the north rim it is about 8300 feet at the Canyon edge. According to Mrs. Farmer, who was on duty at the tower that day, the spectre stayed with the shadow as it was shortened by the rising sun and moved from the west toward the east. As late as 4:00 P.M., the spectre was still visible in a small side canyon lying about ENE of the tower; the shadow was then about 400 feet in length. The bows of color subtended angles (measured from the tower) of less than one degree near the north rim, to approximately ten degrees late in the afternoon of the same day. When the phenomenon was observed on December 1, it was about 3:00 P.M. The shadow at this time extended for about 500 feet NE of the 70-foot tower.

Colored photographs have been taken of the phenomenon by Virgil Gipson, local Fred Harvey photographer, and Charles Farmer of Desert View. However, diffusion by the cloud particles usually causes the pictures to have indistinct lines and fuzziness. Unlike true rainbows, the outer band of color is reddish violet instead of red. To further complicate matters and defy explanation, the innermost color is yellow, hence it is neither a true rainbow nor an inverted one.

According to Louis Shellbach, park naturalist at Grand Canyon National Park, a bow of colors formed around the projected shadow of Yaki Point during late January or early February, 1940 (time of day unknown). He had ridden a pony to the point and thought that he could even see his shadow in the middle of the display of colors. E. T. Christensen, assistant park naturalist, reports that he has seen bows of color form around the projected shadows of Yavapai Observation Station (two miles northeast of Yaki Point and about 17 miles west of Desert View) on several different occasions when the Grand Canyon was filled with clouds.

Similar displays of bows of color were reported by Frank Sylvester, headquarters district ranger at Grand Canyon, during plane flights over the South Pacific during World War II. Frequently such displays of color entirely circumscribed the shadow of his plane, when flying between the sun and a cloud. No data were available concerning the distribution of colors around the shadows of the airplane, Yaki Point, or the Yavapai Observation Station.

Some observers of the phenomenon at Desert View have advanced the theory that it is caused by the refraction of sunlight through the windows at the top of the tower. This is rather doubtful because these windows are only a few feet square and probably would not pass sufficient light to project the nine miles to the north rim. Another theory involves multiple diffraction of the sun's rays as they pass between the tower and Canyon clouds. This principle is

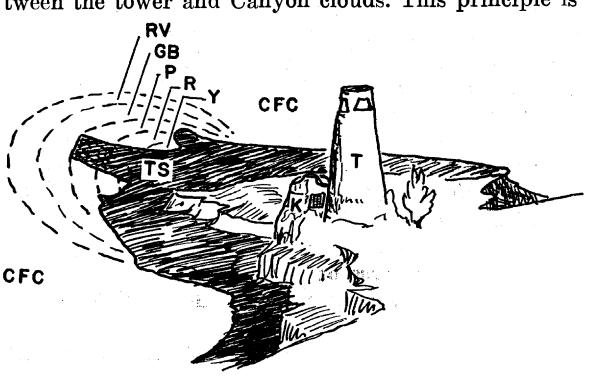

FIG. 1. Diagram of the brocken spectre, Desert View Watch Tower, and its shadow; not to scale. Symbols: CFC, cloud-filled canyon; GB, Greenish blue; K, kiva; P, purple; R, red; RV, reddish violet; T, tower; TS, tower shadow; and Y, yellow.