PHYSICS

Mysterious "Phosphors" Give Cold Light for Television

Finding That Crystals of Luminescent Materials Can Change Electrons Into Light, Experts Make Tele-Eyes

See Front Cover

THE WOODS are spooky when decayed tree branches become phosphorescent and glow in the dark. In much the same way, faces of clocks shine in the night if the hands and figures of the hours are phosphorescent. And everyone is familiar with the uncanny gleam of the cat's eyes as they "shine" in the darkness. Now, science, emulating the human eye in television, goes the cat one better. While the cat's eye merely reflects light, the "eye" or screen of the tele-receiver actually produces "cold light."

The trick is based on luminescence—"light emission not directly attributable to heat." Jostling old traditions, customs and devices as it electrified and modernized them, radio now takes up the age-old art of luminescence, applying it to man's conquest to "see at a distance." For the art of luminescence, optics and lenses, radio research promises much that is new. They are keys to the future of television.

Having caught the clue that tiny crystals of specially synthesized luminescent materials have the unique property of transforming electron energy into light, the research experts now fashioning kinescopes or "tele-eyes," are delving deeply into the historical, theoretical and practical features of the effect.

Revealing hitherto unpublished data, Humboldt W. Leverenz, of the RCA Laboratories, discloses that the art of luminescence is having a rebirth, although synthetic luminescent materials have been known for 337 years. He explains that the term "cold light" is concisely descriptive of these "glow materials." And he goes on to point out that in television a scientific word—"cathodo-luminescence"—comes into prominence. The name is derived from the fact that light emission is occasioned by cathode rays or electrons, which are electricity in buckshot form, that impinge on luminescent matter.

Alchemists were a long, long way from television when, in 1603, they synthesized phosphors by crude methods, such as by heating oyster shells with sulphur to produce a feeble violet-phosphorescence. Now, along comes television to accelerate the old oyster shell technique. The intense search of literature on the subject of luminescence has disclosed, according to Mr. Leverenz, "a plethora of phosphor recipes," but, to complicate the problem, few work successfully.

First of all, to serve on the eyelike screen of radio, a luminescent ingredient must be Simon pure; in fact, it must possess a degree better than "spectroscopic purity," as Mr. Leverenz describes it. To the visitor the laboratory looks like a hospital operating room. And, incidentally, the air is kept so pure that a burning gas flame is invisible; there are no impurities to burn.

To reveal the complexity of the trick, Mr. Leverenz calls attention to the fact that there is no theory of luminescence adequate to explain quantitatively all the properties of known phosphors, or to predict the properties of new ones. But he does know that in regard to luminescence, so vital in television, all efficient phosphors are definitely crystalline. But those intended for the kinescopic "eye," must give off light of a color that the eye can easily see, if maximum efficiency is required. Therefore, all phosphors are not suitable for television.

Many factors must be taken into consideration in fashioning retinas for television. Evidence that eleven years of intensive television-luminescence research in the RCA Laboratories have been capped with success is found in the statement by Mr. Leverenz that the kinescope now can provide high enough levels of flicker-free picture brilliancy to be adequate, not only for the normal eye, but also for the defective eye. He quotes statistics to report that approximately two-fifths of the population, comprising millions of people, have defective visual functions which must be considered in establishing a public service such as television.

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PHYSIOLOGY

Colchicine Experimenters Warned of Possible Danger

COLCHICINE, the "magic drug" that speeds up evolutionary processes in plants by doubling chromosome numbers, may be dangerous if not handled with proper precautions, Dr. Haig Dermen of the U. S. Department of Agriculture warns the hundreds of enthusiastic amateur experimenters now engaged in trying to produce strange and possibly valuable new varieties.

Animal tissue is much more sensitive than plant, to the effects of colchicine, states Dr. Dermen. A minute quantity of the solution, of the concentrations used on plants, might cause blindness if it got into a person's eye, or might produce skin irritation if carried to the face.

Up to the present at least, colchicine has had no scientifically valuable effects when used in attempts at producing new varieties of animals. Most of the experiments on animal cells simply resulted in the death of the cells. There have recently been some reports of modifications of the colchicine treatment, using much weaker solutions that may have induced chromosome doubling in animals without killing the cells. However, to date the outcome of these experiments has been so equivocal that for persons desiring dependable and practical results work with plants continues to be much more promising.

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