General Electric Lighting

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For as long as there has been electric light, there has been both concern about and interest in the effects of that light upon human health and activity. From the "magic rays" of the 19th. century to the ends of the electromagnetic spectrum that are being explored today, we want to know about the potential benefits and the potential hazards.

Dr. Veitch, her colleagues, the contributors and The American Psychological Association are to be commended for their efforts and particularly the work that went into the compilation of this summary report. It should certainly help answer a myriad of questions as well as focus attention on those areas where little is known.

As the report indicates, there is no shortage of questionable research. Unfortunately, the good work which has been done tends to be published in technical journals which have limited and specialized readership while dubious studies - especially those which report sensational results - are distributed in Sunday supplements for all to see.

It is time to agree on a definition of the main subject of this report - "full-spectrum lighting" and the definition provided by Boyce and echoed, in part, by Karpen is a good place to start. It is also time to figure out the role of UV in interior lighting. Fortunately, there is progress in that direction too. A proposed UV standard developed by the Photobiology Committee of the Illuminating Engineering Society of North America entitled, "Photobiological Safety for Lamps and Lamp Systems" (RP-27) is now out for public comment.

Lamp manufacturers have for some years provided daylight-simulating lamps (most have been fluorescent) which meet the imprecise definition of "full spectrum". As pointed out in this report, these lamps are relatively inefficient (lumens/watt) and so have had limited use in general lighting applications. Rather, they have been used more for task lighting - e.x. color inspection, color matching and similar color-critical tasks and, to some extent, in medical facilities and laboratories. Now, however, more efficient triphosphor versions of such lamps are commercially available. These match the efficacy of the newer types of general lighting fluorescent lamps. Some example comparison performance data are as follows:

Table 1
Lamp Performance Data

Initial Designation	Initial Efficacy Lumens	Lumens/ watt	Correlated Color Temperature (Kelvin)	Color Rendering (R_a)
1. F40T12	2250	56.3	5000	90
2. F40T12	950	48.7	7500	92
3. F40T12 (Triphosphor)	3200	80.0	5000	80
4. F32T8 (Triphosphor)	2400	75.0	5000	90
5. F40T12 (Triphosphor)	3050	76.2	6500	75

Which lamps should be considered "broad spectrum"? Numbers 1, 2 and 4 according to the proposed definition in the report. But what about the others considering that R_a differences of 1-3 points are not generally considered visually significant? Does it make any difference that lamps 3, 4 and 5 have rather "peaky" spectral distributions - characteristic of triphosphors versus the smooth and evenly distributed spectra of the older designs (lamps 1 and 2)? Seen side-by-side, some people can see clear visual differences between lamps 2 and 4 even though chromaticity and color rendering values (including the "x" and "y" chromaticity coordinates) match fairly well.

The questions are far from answered. What has changed is that now the new lamps can be economically and efficiently used for general lighting and there is an opportunity to separate preference and opinion from physical responses without substantial cost and efficiency penalties. It is a good time to get some better answers.