Dynamic Chiropractic

PHILOSOPHY

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PHYSICS XII: "LIGHT -- THE FIRST BORN OF HEAVEN" (MILTON)

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The wavelengths of light waves can be measured in angstrom units. (an angstrom is equivalent to 10^{-8} centimeters.) The frequency of light is the number of wavelengths (crests of) passing a given place in one second. Light, therefore, has a frequency of several hundred trillion waves per second; light is an electromagnetic wave with a frequency between 430 and 750 million cycles per second. A wavelength is the separation of successive wave crests, while the amplitude of a wave is the maximum displacement of the material from the undisturbed position. Light may be defined as that portion of the electromagnetic spectrum to which the normal human eye is sensitive, i.e., that portion lying between the wavelengths 400 nm and 770 nm(nanometers) (or between 0.000039 cm and 0.000075 cm). The frequency of x-rays and gamma rays which are higher in the electromagnetic spectrum than light rays, i.e., more energetic, exceed the several hundred trillion waves per second and therefore have the effect on solid matter of being particulate in their behavior.

Most light sources generate radiation emitted from bodies which have become hot or have been otherwise energetically excited. White light is a mixture of radiations from all parts of the visible spectrum range, typified by the blackbody radiation reaching the earth from the sun. Blackbody radiation is the electromagnetic radiation emitted from a blackbody in virtue of its thermal energy. The energy emitted from a blackbody is proportional to the 4th power of its absolute temperature (the Stefan-Boltzmann Law). The other blackbody radiation laws are: (1) Wien's Displacement Law, (2) Wien's Second, and (3) Third Laws, and (4) Planck's Radiation Formula. In practical terms, the Stefan-Boltzmann Law means that the color of hot bodies progresses from straw through red, to white, to blue as the source temperature increases and greater proportions of their thermal radiation are emitted in the blue region of the visible spectrum. Theoretically, a blackbody is an object which absorbs all the electromagnetic radiation which falls upon it. However, in practice no object acts as a perfect blackbody, i.e., absorbs all electromagnetic radiation which strikes it. Blackbodies are also ideal thermal radiators. The hotter the objects, the shorter the wavelengths of light emitted.

Objects which do not, themselves, emit light are seen by the light they reflect or transmit. In passing through a body or on reflection from its surface, particular wavelengths may be abstracted from white light (which is a wavelength mixture), the body thus displaying the colors which remain unabsorbed. Objects which reflect no visible light at all appear black.

Today optical phenomena are explained in terms of either waves (reflection, refraction, diffraction, interference, polarization, and scattering) or quanta (particle-like segments) (blackbody radiation, photoelectric emission and the interaction of light energy with substantial matter, as with the phenomenon of photophoresis). Substantial matter is a material substance which has extension in time and space, i.e., dimensionality and inherent inertia (mass).

The Tyndall Effect: British physicist John Tyndall, in 1869, showed that light rays scatter into different colors when directed through minute particles of matter of uniform size. The frequencies produced (colors) depend on the size of the particle as well as the position of the observer. The smaller the particles in the medium (colloid), the shorter (hence bluer) the wavelengths of visible light it is, and this permits light to behave in wave fashion, while larger objects absorb, reflect or cast clear-cut shadows, resulting in a particle-like effect. Thus, it is the size of the intervening "particle" or "obstacle" which results in either a particle-effect or a wave-effect of light.

When light "falls" on the surface of an object, countless billions of particles of quantal waves batter against the surface at a tremendous speed. Theoretically, these particles should exert some kind of force or pressure on the object by their great numbers or momentum, and they do: it is called photophoresis. The Russian physicist, Peter Lebedev, more than 70 years ago, using tiny paddle wheels in a vacuum against which a beam of light was directed, discovered that a reflecting aluminum surface was "pushed back" with almost twice the pressure force of a light-absorbing surface coated with "platinum black." Later, two American scientists confirmed Lebedev's findings and found that the pressure light exerts is the same for all colors of light frequency. In fact, light exerts about 30 pounds of pressure on each square mile of the earth's sunward side.

J. W. Beams used small rotors held in space and spun by magnetic forces. These suspended, bearingless rotors could be spun so fast that they actually exploded under the colossal centrifugal force developed.

Photophoresis, as such, was discovered in the 1920's by a Viennese physicist, Felix Ehrenhaft. He placed finely powdered graphite particles in an evacuated globe of glass, shook the globe to randomly distribute the minute particles of graphite dust, and then he directed a beam of light through the center of the globe. The particles in the beam orbited around the "circumference" of the light beam. If the direction of the beam through the globe was altered, the orbits of the particles changed to remain in perpendicular orbits in relation to the long axis of the beam. If the light beam is made less intense, the little orbiting particles move toward the beam's source. If the light beam's intensity is increased, they move away from the beam's source as they continue to orbit. If the light beam's intensity is gradually reduced, the orbiting particles spiral toward the source. At a certain specific weakness of the beam the particles stop moving. Moreover, the particles spin very fast on their miniature axes at a rate up to 4,000 rotations a second. The force that induces these movements in these particles was calculated to be more than 50 times the force of gravity.

So, here is the puzzle: How is it possible for a weightless, massless, high-speed "nothing" like light to exert a measurable, observable pressure effect on material objects? Additionally: How can a "something" with no rest mass (light) have effects that appear as waves or as discrete little "corpuscles" (Newton's word) of matter in its interactions with matter? If something has a sheer "energy of motion," what is it that is moving? Waves of radiational energy? What's that? Very small bits of matter just at the edge of "material reality" capable of moving at the fantastic speed of light, which therefore appear to be essentially non-material in their behaviors?

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