17.

The Rediscovery of the Ether

H. C. DUDLEY

The growing interest in psychic phenomena became a topic of conversation for a colleague and me several years ago. We were at a conference where one symposium was given over to a discussion of ESP. My colleague asked if I believed in such approaches to science. I replied that I neither believed nor disbelieved because I knew little about the topic. "However," I said, "if psi phenomena were ever proven to be valid, I could write an equation which would define the medium by which the information might be transmitted."

I had in mind the ether—or, to put it in modern terms, an energy-rich subquantic medium composed of extremely small neutral particles called neutrinos, pervading all space and interpenetrating all matter. This concept, which has developed in the last 15 years, primarily in Europe, of a neutrino sea filling interstellar space is the modern revival of an ancient concept that began to go out of fashion after Einstein's special theory of relativity proposed that the ether did not exist. With all due respect to Einstein, it is now time for all scientists to say that Newton may well have been right after all.

This is indeed ironic, but not unprecedented. When new information enables one to penetrate deeper into old problems, then those theories—which after all are only interpretations of experimental results that have assumed the status of "self-evident truths"—have to be altered or abandoned. Science must readjust, even when concepts once branded "pseudoscience" reappear with renewed support. Failure to do so is

"The Rediscovery of the Ether" by H. C. Dudley is an original article written especially for this volume and is printed by permission of the author.

intellectual dishonesty, intellectual inertia. It turns true science itself into pseudoscience.

Pre-1930 science theorized that there must be some mechanism, tangible albeit extremely refined, present in all space through which heat, light, radio, x rays, etc., were transmitted. The source of this concept in science can be traced back to Newton, who received it from much earlier sources, including the Greeks. In 1704, Newton asked in his classic work *Opticks:*

> Is not the heat of a warm Room convey'd through the Vacuum by the Vibrations of a much *subtiler Medium than Air,* which after the Air was drawn out remained in the Vacuum? And is not this *Medium* the same with that *Medium* by which Light is refracted and reflected, and by whose Vibrations Light communicates Heat to Bodies? And is not this *Medium* exceedingly more rare and subtile than the Air, and exceedingly more elastick and active? And doth it not readily pervade all Bodies? And is it not (by its elastick force) expanded through all the Heavens?

In 1912 the following appeared in a prominent textbook of physics, and continued to appear in later editions until 1932:

> *The Ether.* To account for the transmission of waves through space containing no ordinary matter it seems necessary to assume the existence of a *universal medium* filling all space and even interpenetrating matter itself, as shown by the existence of transparent substances. That this *medium* can react on matter is shown by the fact that radiant energy is transmitted from ether to matter in the case of absorption, and from matter to ether in the case of emission of radiation by material sources.
>
> In recent years doubt as to the necessity for assuming the existence of an ether has been expressed by some who believe that it is sufficient to attribute the power of transmitting radiation to space itself. It may be doubted whether this is more than a dispute about terms. We cannot discuss the question here, but pending the settlement of the controversy it seems wise to continue the use of the word ether as at least denoting the power of space, vacant or *occupied by matter,* to transmit radiation. (Italics added)

The null results of the famed Michelson–Morley experiments (1881–1889), coupled with an assumption by Ein-

stein (1905), had by 1940 resulted in the abandonment of any concept of the ether as a medium necessary for the transmission of light or x rays. The notion of an "ether," "aether," or "luminiferous ether"—some type of medium existing in all space—disappeared from physics textbooks. Anyone who attempted to seriously discuss this subject was looked upon as ignorant, if not a pseudoscientist.

Why, then, is it necessary to reopen this seemingly esoteric question? What is the practical significance of such a return to the views of bygone days? I have proposed answers to these questions, showing how recent developments in physics suggest: (1) a new conceptual model of the atom is required, involving the entire atom as the basic unit system rather than reactions involving essentially mass/energy changes of only the nucleus; (2) the real possibility of a nuclear detonation leading to "the ultimate catastrophe" of planetary annihilation.[1–8] Perhaps this medium is also a physical mechanism for transmission of energy underlying certain psychic phenomena; its characteristics would seem to make it a likely candidate.

Recent astrophysical studies show that the orientation of the Michelson–Morley apparatus foreordained the null results. Yet their conclusions are now graphically used in all current physics texts to "prove" the lack of an ether or of the necessity of such a medium for the propagation of light. Ironically, Michelson, an experimenter *par excellence* and the first American to win a Nobel Prize in science (1907), could not bring himself to accept as final the results of his own work. He felt there must be something wrong, but didn't know what.

Michelson and Morley centered their attention on the Earth's orbital velocity (30 km/sec). They had no knowledge of the existence of galaxies, of galactic motions in relation to each other, or of the motion of our solar system in our galaxy. Orientation of their interferometers tangent to the Earth's surface insured that the angle of approach of an "ether drift" would be nearly perpendicular to the plane of the interferometer. Rotation of the instrument in this plane would only slightly alter the effective velocity of the ether at the two arms of the interferometers.[4] The null results are thus

explainable on the basis of pre-1900 classical mechanics. The limited information available to Michelson and Einstein is emphasized by the following:

(i) By referring to stars in this galaxy, the Earth's velocity, with respect to the galactic center, is in the range of 200–220 km/sec, as determined by several astronomic studies conducted since 1930.

(ii) Since 1960, the existence of a nearly isotropic 3.5-cm electromagnetic radiation flux has been demonstrated by several studies. This is postulated to result from the "big bang," a celestial primordial event. E. K. Conklin's experiments, conducted at Stanford University in 1968–1969, estimated the Earth's absolute motion, with this flux as the generalized frame of reference, at about 160 km/sec.[5]

This determination of the Earth's movement in our galaxy is of the greatest importance because these data disprove one of the basic portions of the theories of both Newton and Einstein. For both assumed that absolute motion could not be shown experimentally. But Conklin's experiments did just that. The direction of the Earth's motion and its speed around the galactic center were determined without reference to any other star or planet (which has put philosophers into a tizzy). All things considered, Michelson's hunch was right: there was much missing from his studies of the ether.

The modern development of an ether concept began in 1951 when Nobel Laureate Paul Dirac, now professor of physics at Florida State University, asked "Is there an ether?" as the title of a paper.[6] He answered his own question in the affirmative and stated that the ether he thought existed was essentially an all-pervasive sea of electrons (e^-) in random motion. In 1959 another Nobelist, the French physicist Victor de Broglie, suggested that this ether is "a gas made up of leptons [a class of subatomic particles of small mass] and probably neutrinos [leptons with no charge and almost no mass]."

In addition to these speculations, astrophysics has extended its studies in the past thirty years to include the space *between* the planets and the stars, and as a result has discovered dust clouds, radio signals, x rays, and electric and magnetic fields in supposedly "empty" space.

Finally, our space program efforts since 1957 have made all textbooks on astronomy published before 1965 so dated that they may as well have been written in Sanskrit for all their present usefulness.

Out of all this information explosion has come the realization that there is as much mass between the stars as there is contained in them and in the planets as well. In short, empty space is in fact crowded with interlocking magnetic and electric fields, plus neutrinos.

In contrast with these discoveries, nuclear science assumes that empty space is inert, free of mass and energy. And it is this assumption that makes it diametrically opposed to the new astronomy. On this basis there is a real battle of ideas going on between astrophysics and nuclear physics. With the mass of new evidence of how much now fills outer space, the case for the astrophysicist becomes increasingly stronger.

During the past two decades there has been developing in astrophysics the concept of a generalized neutrino sea. This flux of uncharged particles arises from the nuclear fusion reactions taking place in the countless stars scattered throughout the universe. Because the stars are almost randomly distributed, neutrinos bombard us in nearly equal quantities from every direction. These minute bits of matter pass through our bodies at a rate estimated at one million to one billion per square inch per second.

This subquantic medium has been defined as an energy-rich substrate, the common denominator in all particle reactions. The neutrino, a very small particle of matter (perhaps smaller than a quantum of light—hence the term subquantic) having no electric charge, was experimentally proven in 1953. It had been invented as an imaginary particle about twenty-five years earlier by the Austrian physicist Wolfgang Pauli. In 1932 Enrico Fermi used it to explain certain radioactive decay systems. Three decades later, the nature of this particle began to be clarified. It was not a single particle, it seemed, but a pair of particles, with mass about 1/2500 that of the electron. By 1971 the two nearly equal particles had become two sets of particles: two electron neutrinos (ν_e) with mass about equal to 1/10,000 that of the electron, and two muon neutrinos (ν_μ), with mass about equal to the electron.

Muon neutrinos have a rest mass of about 0.6 MeV; electron neutrinos have a rest mass of about 60 eV. Their particle velocity ranges over a continuum from near zero to near the speed of light. Particle density appears to be about 10^{12} per cm^3 and their energy density has been estimated at 10^8–10^{19} eV/cm^3.[2] The subject is extensively reviewed in B. Kuchowicz' *Cosmic Neutrino*.[7]

When Einstein's famous equation $E = mc^2$ was first proposed, it was considered an interesting speculation, not a proven theory. Over the years, and especially since the first atomic bomb detonations of 1945, this equation has been accepted without question since there was no other explanation for the prodigious amounts of energy released by the atomic and hydrogen bombs. Official science now feels comfortable with this equation; it is an old friend.

Einstein himself said that Relativity must be accepted as a complete theory. If any part was proven false, he said, the whole theory is invalid. But Relativity *requires* an energy-free, mass-free space. It requires that there be no ether (particulate or otherwise), no neutrino sea, no subquantic medium. Likewise, quantum mechanics requires that the interactions of subnuclear particles and atoms take place in spaces which are free of energy and free of mass. The space in which these reactions occur *must not* contribute anything to the reaction—or else so much of modern physics is wrong.

Thus the two systems of theory which govern the thinking of modern nuclear physics—relativity and quantum mechanics—*require* the absence of the ether. Yet we are now finding this new framework and beginning to define it and characterize it with remarkable accuracy. It therefore seems imperative that we sweep away the cobwebs of time and look for a new explanation for the energy obtained from uranium and plutonium bombs and reactors. It is of no consequence to the generations of today that this requires the passing of an old friend, $E = mc^2$. Einstein developed this theorem more than a half a century ago. Such is the course of science and the challenge to this generation. We must move on.[8]

REFERENCES

1. H. C. Dudley, "Radioactivity Reexamined," *Chemical and Engineering News* (April 7, 1975).
2. H. C. Dudley, "Is There an Ether?," *Industrial Research* (November 15, 1974).
3. H. C. Dudley, "The Ultimate Catastrophe," *Bulletin of the Atomic Scientists* (November 1975).
4. H. C. Dudley, "Michelson's Hunch Was Right," *Bulletin of the Atomic Scientists* (January 1975); see also *Phys. Today*, 73 (February 1975).
5. E. K. Conklin, "Cosmic Radiation," *Nature* **222** (1969).
6. P. M. Dirac, "Is There an Ether?," *Nature* **168** (1951).
7. Br. Kuchowicz, *Cosmic Neutrino* (Poland: University of Warsaw, 1972—in English).
8. H. C. Dudley, *Morality of Nuclear Planning—??* (New Jersey: Kronos Press, 1976), available from RadSafety Associates, Box 452, Hinsdale, Ill. 60521.