In the big-bang cosmologies philosophical considerations lead to the assumption of spatial homogeneity, which is "saved" from observational falsification by purely *ad hoc* assumptions regarding the rapid evolution of radio sources. In the curved-space model this assumption is not needed and we retain only the observed spherical symmetry of the universe.

Ellis refers to "earth"-centered models of the universe. But this does not necessarily mean that we have to limit ourselves to strictly geocentric models. The observationally determined spherical symmetry would be viable also if we choose the center to be at the Sun or some other relatively near position.

Conclusion

I have given a rough sketch of how a curved-space cosmology could be modified so as to explain the observational evidence in terms of a relatively small universe. The prime motivation has been to demonstrate that it is possible to explain the empirical data in more than one way. It may be argued that the curved-space model can be "saved" only via a number of *ad hoc* assumptions. However, the same consideration applies also for the big-bang cosmologies. The difficulty faced in cosmology is that we can directly observe only a minute portion of space-time. To draw cosmological conclusions from these limited observations requires drastic simplifying assumptions and extrapolations. Since more than one model can account for the observations it is crucial that objective criteria be established that enable us to choose the "best" theory. But even the establishment of such criteria is a very subjective process in which we are strongly guided by our prior philosophical and religious commitments.

Thus I conclude that the possibility of constructing viable, small curved-space models of the universe has been too easily dismissed. A more detailed analysis of the various observational implications of such models and an assessment in the light of clearly expressed theory selection criteria are necessary before they can be definitely invalidated.

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CRITICAL THOUGHTS AND CONJECTURES CONCERNING THE DOPPLER EFFECT AND THE CONCEPT OF AN EXPANDING UNIVERSE—PART I

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Abstract

The main evidence for the various "expanding universe" cosmologies is drawn from the red shifting of the spectral lines in the light emitted by galaxies, quasars, and other extraterrestrial objects. It is demonstrated that there are many mechanisms which can cause red shifts, and that the current interpretation of these red shifts yields absurd conclusions concerning the nature of the universe. The result is that the basic evidence for the "expanding universe" cosmologies is shown to be the result of misinterpretation of these red shifts, thereby undermining the concept that the universe originated in some primordial explosion.

Introduction

The nature of red shifts in the line spectra of extragalactic objects, such as galaxies, quasars, and radio stars will be examined and it will be demonstrated that these shifts are not necessarily Doppler effects. Other mechanisms will be offered as explanation for these line shifts. Consequently, the evidence usually offered as proof that the universe resulted from some primordial "big bang" will be shown to be inconclusive and largely subjective.[a]

The Nature of the Doppler Effect— The Basic Premise of an Expanding Universe

Light, indeed all electromagnetic radiation, consists of transverse waves. If light is formed by the excitation of the electrons of an element the spectra of that light will appear as bright lines. The position of these lines is predictable and distinct for every element, that is, they always appear in the same place on the spectrum. Often the light from a star will contain dark lines. These are formed as the radiation from the star's surface passes through its atmosphere, which will absorb different frequencies of the light, blanking those frequencies from the star's spectrum, causing them to appear as dark lines. (Figure 1)

If a light source approaches an observer at high speeds, these dark and bright lines will change their position in the spectrum and be displaced towards the blue end of the spectrum (i.e. they will become blue shifted). If the light source is receding, the lines will be displaced toward the red end of the spectrum (red shifted). This shifting effect, as caused by the recession

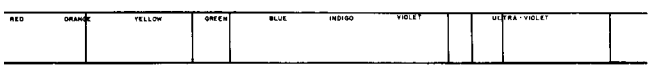

Figure 1. Typical line spectra for an element.

[a]Other problems concerning the big bang hypothesis have been detailed in past CRSQ articles and more recently in the CRS Monograph No. 2, *Design and Origins in Astronomy* (The Editor).

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or approach of a luminous object is known as the Doppler effect (Figure 2).

Figure 2. The line spectra of Figure 1 shifted toward the red area of the spectrum.

Many scientists perceive the universe somewhat as an exploding bomb. As the fragments fly from the center of the explosion, the distance between them will increase. Thus, an observer on any one of the fragments will see all the other fragments moving away from him, their movement being perceived as relative to his position (Figure 3). We are thought to be on one of the fragments resulting from the "big bang" and the red shifts in the line spectra of the extra-galactic objects are taken as evidence that all the other galaxies are receding from us as well as from one another. In this manner the red shifts comprise the primary evidence of the hypothesized "big bang" and "expanding universe" cosmology.

Supposed Recession of Galaxies

The red shifts in extra-galactic spectra were discovered in 1963 when M. Schmidt noticed that some of the Balmer lines in a cluster's spectra were shifted to the red end of the spectrum. He assumed that the shifts were Doppler effects and computed the velocities of other stellar objects.

> . . . If the redshift is a Doppler shift, the object must be receding from us at about 15 percent the speed of light! With this hint, the emission lines in the other objects were reexamined to see if they too might be well-known lines with large red shifts. Such proved, indeed, to be the case, but the other objects were found to be receding from us at even greater speeds . . . (Abell, 1973, p. 407).

Abell's "if," however, is quite a big one, and is an unprovable assumption. Actually, the argument is circular in nature, that is, stellar objects display a red shift because they are receding from us; stellar objects must be receding from us since they display a red shift. Unfortunately, all attempts at defining other mechanisms for causing red shifts are ignored. Notice Abell's cynicism (1973, p. 409) towards the idea that quasar red shifts might be gravitational in nature. "It has not been absolutely ruled out that the red shifts of the quasars are entirely or partially gravitational, but most experts regard it as very unlikely." Abell is asking us to believe

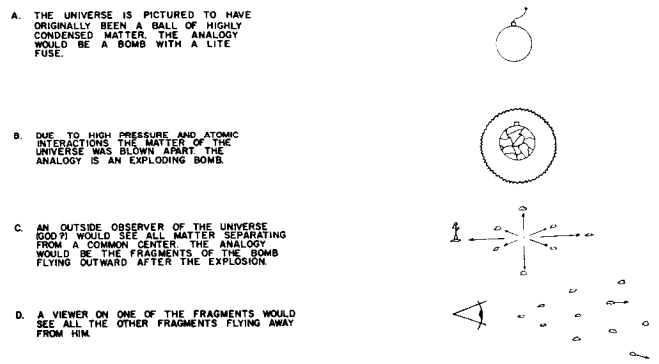

Figure 3. An analogy of the exploding universe.

that quasar red shifts are indicative of motion simply because we have been too limited to determine other causes. Consider his comments (1973, p. 409) on the idea that the quasar red shifts are gravitational.

> It is difficult, even theoretically, to construct a configuration of matter that fits the general characteristics of a QSS (i.e. a quasar) and has so large a gravitational redshift. (Parentheses added)

However, there remains the distinct possibility that the quasar red shifts are actually a combination of the two effects, as has been admitted by Bell and Fort (1973). Moreover, quasars appear to have enough mass to induce pronounced red shifts. ". . . quasars appear as though they might be the sort of dense, compact objects whose gravitational fields could produce appreciable red shifts." (Anon. a, 1976)

Since red shifts usually increase with the distance of an object, it has been assumed that the more distant an object is from our galaxy, the faster it is moving. Some have hypothesized that these galaxies are substantially older and appear to be moving faster than nearer, younger galaxies, since they had not decelerated appreciably at the time they emitted the light we are now viewing. However, to make the assertion that the red shift phenomenon is linearly related to distance one would first have to have mass/luminosity and luminosity/distance relationships worked out for quasars. These have not been determined (Anon. b, 1977). Thus, if a quasar behind a galaxy were found to be exhibiting a greater red shift than the galaxy, we have no way of determining how much farther away it is than the galaxy. Actually, we cannot determine galactic distances with any certainity.

> . . . looking at things very far away is equivalent to looking far in the past, and if the observer can see a difference between how things were moving then and how they do now, he can maybe say something about openness or closure.
>
> The procedure is to set up a Hubble diagram, which compares the red shifts of galaxies with the light flux received from them at earth. The formula that relates the flux at earth to their intrinsic luminosity contains the deceleration parameter.
>
> This procedure works best if galaxies all have the same intrinsic luminosity. The fact is that they don't. Furthermore, galaxies are extended objects. Brightness varies across a galaxy's image, and the observer must be sure that his telescope aperture is adjusted to compare them.
>
> The observer can take the brightest galaxy in each cluster, or whole clusters, and hope that these will have the same intrinsic luminosity; but then evolutionary problems intervene.
>
> Galaxies evolve as units. Big galaxies tend to eat their satellite galaxies, and this changes their brightness as it goes on. Furthermore, stars evolve and change their brightness. As we look farther and farther away we look farther back in time to a period when perhaps the stars in the galaxies we see were all very young and therefore differently luminous from those in older galaxies. (Thomsen, 1976)

Since galactic distances are not obtainable, there is no way of knowing if the red shift in their spectra might

not have some gravitational component. Moreover, there is also no way to forge a red shift/distance measurement scale for galaxies since there are no known mass/luminosity or mass/distance relationships with which to calibrate it. Thus, we see that little is actually known about red shifts and their relationship to the mass or distance of a galaxy or quasar. Therefore, the contention that they are Doppler effects remains unprovable.

Thermodynamics and the Red Shifts

The energy of a photon is given by the formula,

$$E = hf = (hc)/\lambda \quad (1)$$

where h is Planck's constant, f is the photon's frequency, and λ is its wavelength. Since c, the speed of light, is considered to be a universal constant, E, the energy of the photon, is directly proportional to its frequency and inversely proportional to its wavelength. However, the speed of a photon is not constant and c is the speed of light in a vacuum. When light enters a medium, such as glass, its speed is affected. As a photon passes through a piece of glass its speed decreases then increases upon reentering the air. But when its speed increases, does it do so at the expense of its energy content? And, if its energy content were reduced, would its wavelength not be lengthened, causing a red shift in the line spectra?

A photon could lose energy as it passes through the medium of space in other ways. Radio waves, which are a form of electromagnetic radiation, tend to lose energy as they travel along the earth's surface.

> . . . ground-wave radiation consists of three components . . . (one of which is) . . . the surface component, which moves along the surface of the earth with the bottom edge of its wavefront in contact with the surface of the earth, in which it induces minute earth currents; poor conductivity, dry, sandy soil tends to attenuate the earth currents thus limiting the range of communication. (Topper, 1973)

If the dry, sandy soil of the earth could oppose the movement of "electromagnetic photons," there is no reason why the dry, poorly conductive dust in space could not have the same effect on photons. The result would be a decrease in the photon's energy that would be proportionally related to distance. Thus, we would expect the more distant objects to display greater red shifts since their light photons would have lost more energy during their intergalactic trip. This is exactly what is observed.

Light waves are composed of two components, that is, an electrical wave and a magnetic wave. This is significant since space is filled with ionized particles. When a magnet is moved through a closed loop of wire it will generate electrical currents in the wire. These currents, in turn, set up a second magnetic field which opposes the motion of the magnet. Likewise, the magnetic component of light moving through an ionized region of space would cause electrical currents to flow in that ionized field. The generated currents would then set up magnetic fields which would oppose the motion of the light wave, resulting in a decrease in the photon's energy and a corresponding decrease in its frequency, and an increase in its wavelength. This effect would also cause greater red shifts in the spectra of more distant objects, in conformity with observational data.

Interstellar dust is capable of effectively scattering light waves as they pass through it.

> A detailed description of the dust itself is not yet available. The dimming that they cause is typical of particles having a diameter of about 10^{-4} cm, and this value is confirmed by the reddening effect on light going through them, which may be thus explained: light going through a layer of dust will undergo a partial scattering. As blue light is scattered more effectively than red, the light that does get through contains an excess of red. (Degani, 1963, p. 95)

It appears that nebulae have the ability to interpose their velocity onto that of the light, causing red shifts (Anon. c, 1976). Thus, intergalactic and interstellar dust might cause red shifts simply by depleting the energy of the photons.

Gravitational Red Shifts

I have briefly discussed the phenomena known as "gravitational red shifts." This effect was first postulated by Einstein, (1961, pp. 130-1) who states, "An atom absorbs or emits light of a frequency which is dependent on the potential of the Gravitational field in which it is situated." Einstein found experimental verification for this postulate in the spectra of the sun and other stars and the curvature of light rays around the sun. He states that "these two deductions from the theory have both been confirmed," (Einstein, 1961, p. 104) and further elaborates on the shifting of spectral lines in the spectra of the companion star of Sirius and the Sun, for which the predicted shift was two millionths of a wavelength (Einstein, 1961, pp. 131-2). However, Einstein eventually discarded these observations along with his postulated mechanism for producing red shifts in favor of Doppler effects (Einstein, 1961, p. 134). Prominent astronomers are suggesting that quasar red shifts might be a combination of the Doppler and gravitational effects (Bell and Fort, 1973). Others state, "A strong gravitational field at the source of light will cause a red shift . . ." (Anon, a, 1976)

Actually, the gravitational effect coupled with a tired light effect explains the observed phenomona very well. We have seen that the more distant a galaxy, the higher a red shift that it displays. Also larger galaxies tend to display larger red shifts than smaller galaxies. "Some astronomers at once noted that the bigger the galaxy, the bigger the red shift, and the greater the speed . . ." (Gallant, 1966, p. 58). These data, on the other hand, do not conform well with the present cosmological model, for why should larger galaxies display larger red shifts? This is especially significant since there is no reason why larger galaxies should be moving faster than smaller galaxies. In fact, the converse is true since the velocity of ejection of an object in an explosion is inversely proportional to its mass. Moreover, this observation goes contrary to the present cosmological model which postulates that the smaller galaxies are the youngest, having emitted their light millions and billions of years ago. Since they had not slowed appreciably at the time they emitted the light

we are now seeing, they are supposed to have been traveling faster than the larger, older galaxies, which emitted their light relatively recently. Thus, the larger galaxies should be moving slower, not faster. Also, since our planet recedes from the sun for six months, the sun should display a blue shift during that time. Instead, it displays a continual red shift.

Wavelengths of Photons Can Be Changed by Focusing

> In 1976, scientists in France and at Los Alamos discovered that highly focused laser photons act as if they have a shorter wavelength than they have when first emitted . . . (Allen, 1977)

While such an effect will cause a blue shift in the photon's line spectra, it is noteworthy for it shows that the wavelength of a light particle can be altered by mechanisms other than the Doppler effect.

The Effect of Nebulae on The Frequency of Photons and The Aurora Effect

Auroras are caused by the interaction of electrons with hydrogen atoms in the outer parts of the earth's atmosphere. As the electrons excite the hydrogen atoms, they transfer some of their momentum to the atoms, which then display a blue shift in their spectra as they spiral into the inner earth atmosphere (Whitten and Poppoff, 1971, pp. 203-13). Stars, being of the same basic composition as our sun, emit protons and electrons, both of which will cause Doppler blue shifts when they interact with gases of interstellar and stellar space. This effect is significant since such interactions will either cause line shifts in the spectra of the object emitting the particles or alter any shifts which might have already been present. The total shift would then be unwittingly attributed to the stellar object. Thus, even if the shifts are Doppler in nature, this effect would make the determination of radial velocities impossible. Some astronomers have actually hypothesized that nebulae between a stellar object and a viewer could actually impart shifts corresponding to their own movement, eradicating any Doppler shift which the object itself imparted to the photons.

> . . . one might envisage a number of . . . 'clouds' intervening between the observer . . . (and the galaxies one is viewing) . . . The clouds would be moving with just the right velocities so as to cause the Doppler shifts attributed to the galaxies which they front. (Anon. c, 1976)

The explosion of Nova Persei caused an echo effect on a neighboring nebulae which made the nebula appear to be traveling at twice the speed of light.

> . . . in the explosion of Nova Persei of 1901 . . . Light from this explosion was reflected from a nearby nebula, and the part of the nebula that reflected the 'echo' appeared to be moving across the sky at a speed of 2c. (Anon. d, 1977)

It is recognized that black holes are capable of sending the ionized gases around them into motion at speeds approaching that of light.

> This kind of action could produce flashes of light moving in opposite directions along the axis of the vortex . . . (piercing the sphere of infalling matter around the black hole) . . . As these flashes struck patches of ionized gas in space, they would set it moving at speeds near that of light. The patches hit by the light burst would be visible from earth by reflection of the light from the central source or by light of their own generated as a result of the disturbance. (Anon. d, 1977)

There is observational and theoretical evidence for the Aurora effect that can cause line shifts in light spectra.

Molecular Beams Can Cause Line Spectra Shifts

When light passes through a molecular beam perpendicular to the direction of the beam, very little "Doppler" shift is induced in the light waves. If the waves enter parallel to the molecular beam, an effect known as "Doppler excess" is caused, and the lines will have an additional shift imposed upon them. Concerning the effect, Harmony (1972, pp. 101-2) states,

> One final broadening phenomenon that is important in some spectroscopic applications with gases is that of Doppler broadening. The Doppler effect produces a shift in the absorption frequency . . . We see that light molecules, high temperatures and high frequencies tend to increase the line width. Doppler broadening has been effectively reduced in some experiments by using molecular beams in which the molecular velocities . . . are nearly unidirectional. Thus the electromagnetic radiation, if brought in at right angles to the molecular beam, produces very little Doppler shift and consequently very narrow linewidths are obtained . . .

Proton, electron and molecular beams can cause shifting in the line spectra of stellar objects as outlined by Howard, You, and Eshleman (1964).

> During 1962 and the first half of 1963 more than three hundred hours of data on radar echoes from the moon have been collected and analyzed. This letter is a preliminary report on the principal features of the studies of the 'Doppler excess' frequency, the amount by which the measured Doppler frequency (received frequency minus transmitted frequency) exceeds what it would have been if the propagation medium had been free space. In the present experiment the Doppler excess frequency is almost entirely due to the time rate of change of the electron content in a column between the earth and the moon.
>
> A limited number of comparisons with Faraday polarization and with other ionspheric measurements reveals that the Doppler excess effects are largely due to changes that take place in the ionosphere, the rest of the cislunar medium being fairly stable . . . changes taking place in the ionosphere are responsible for most of, but by no means for all, the earth-to-moon columnar density changes detected in the Doppler excess measurements . . . Gradients in the interplanetary electron density could result in very large values of Doppler excess.

This effect, that is the "Doppler" shifting of radar waves bounced off the moon, shows conclusively that any model based on the premise that red shifts are

solely Doppler effects is simply wrong. Quasars and pulsars generate large beams of energy and molecules, along with novas, stars, black holes, neutron stars, and other galactic phenomena. All these would cause disruptions in the electron content of the universe, thereby inducing line shifts in the various light quanta traveling through space. Since the effect would be cumulative, this mechanism alone can explain why red shifts increase with the distance of an object. In essence, it is possible that none of the red shifts are Doppler effects and that the whole foundation for an expanding universe resulting from some primordial big bang is non-existent.

Temperature and Wavelength

High temperatures and high frequencies tend to cause the line spectra to broaden. Line broadening can also result "from shifts of energy levels during the collision process." (Whitten and Poppoff, 1971, p. 78). This type of broadening is known as Lorentz broadening. The temperatures of nightglow emissions are sometimes measured by determining the width of the line spectra (Whitten and Poppoff, p. 199). Moreover, the temperature of an object does have other definite effects on the wavelength of the light which the object will emit. For example, the temperature of an object will cause one of the wavelengths of the emitted light to possess more energy than the other wavelengths, that wavelength being denoted as λ_{max} (Degani, 1963, pp. 76-7). λ_{max} is related to temperature by the following formula,

$$T = \frac{289 \times 10^5}{\lambda_{max}} \qquad (2)$$

λ_{max} is found by plotting the light intensity for the various wavelengths of light emitted by an object. λ_{max} will have the highest intensity. Since temperature can affect the wavelength and width of spectral lines of the light emitted by a luminous object the possibility that it might also affect the positioning of the spectral lines cannot be discounted.

Doppler Broadening

The rotation of stars and galaxies can cause spectral line broadening. (Petrie, 1969, p. 72; Münch, 1968, p. 388). However, this broadening is usually attributed to the Doppler effect and is called Doppler broadening. Keu (1968, pp. 577, 584) discusses the presumed relationship of line broadening to emitter speed. He states that "integrated profiles from external galaxies have widths of several hundred kilometers per second." Münch (1968, p. 388) states that galactic rotation can cause line broadening and admits that some of the broadening in galactic spectra cannot be accounted for. This should have been obvious since there exist many mechanisms for broadening spectral lines. Moreover, many lines are so narrow that the lines themselves can only be detected if they are broadened (Keu, 1968, p. 584). Lastly, to complicate matters further, the spectral lines of galaxies will sometimes merge, forming one "broadened line." Unfortunately, these broadening and blending phenomena are not necessarily symetrical.

> Two effects generally prevent the use of laboratory data without investigation, as follows: (a) the blending of several pure absorption lines into a single feature and the asymmetrical broadening of a single strong line by adjacent absorption lines and (b) asymmetrical broadening such as that produced by the Stark effect, which influences the position of an absorption line in a complicated way. In addition, we must also consider the possibility of local atmospheric motions producing a false radial velocity, as, for example, in the spectra of 'shell' stars. This matter cannot be investigated very well until the blending and broadening distortions are evaluated. (Petrie, 1969, p. 72)

Thus, the determination of line shifts or the amount of line broadening is questionable for no one knows where the unaltered lines lie on the spectrum.

> . . . It has been found that, in spectra later than AO, practically all features are blends of two or more lines when observed with moderate dispersion. The effective wave lengths vary with linear dispersion and spectral purity, and, with a given spectrograph, a great many vary with spectral type, with absolute magnitude, and with the amount of broadening caused by rotation of the star. One cannot, without prior investigation, adopt wave lengths from the literature and be certain that the resulting velocities are, in fact, accurate motions in the line of sight. (Petrie, 1969, p. 72)

In measuring line broadening and line shifting, much of the conjecture concerning an object's speed is based on sketchy data. First, consider how small the line shifts actually are.

> The measurement of stellar radial velocities is generally difficult because of the smallness of the Doppler displacements. A typical single-prism spectrograph may be expected to give a linear dispersion . . . of about 40 angstroms per millimeter. One millimeter on a spectrogram of this dispersion corresponds to a radial-velocity displacement of nearly 2900 km/sec. Radial velocities are ordinarily about 1 percent of this amount, and we must therefore make significant measurements of a few microns on the photographic plate. (Petrie, 1969, p. 64)

Second, a large amount of interpolation must be employed. This, coupled with human error, photographic distortions, and equipment defects make the measurement of red shifts almost impossible.

> It was mentioned above that Doppler shifts are usually a few microns on the single-prism spectrograms ordinarily obtained in extensive programs. Defects in the measuring apparatus, photographic distortions, and human frailties can produce errors of about the same size. Significant measures are possible largely because the process is one of interpolation from comparison to stellar spectrum. Every care must be exercised in the use of measuring micrometers, and good judgment must be applied in making visual settings. As remarked by Campbell, 'an inexperienced or careless measurer will obtain poor results from perfect plates.' (Petrie, 1969, p. 67)

Thus, the determination of radial velocities from the measurement of line shifts or line broadening remains questionable at best.

Absurd Conclusions Based on the Current Interpretation of Red Shifts

A brief survey of the scientific literature will show that the present interpretation of red shifts is incompatible with the available data. For instance, if these shifts are Doppler effects, then many objects in the universe are moving at impossible speeds.

> The largest speed yet measured (at the time of writing) is of a very distant cluster, known as 3C295, that is moving away from us at 41 percent of the speed of light, or about 76,000 mi/sec. (Abell, 1973, p. 415)

The mass of the object described by Abell would have increased 20 percent if the object is really moving that fast. If this is the case, then luminosity/distance and luminsoty/mass relationships would remain unobtainable. Another problem is that of our own position in space. Are we actually traveling at 76,000 miles per second? Or could we be traveling at the speed of light, and therefore incurring infinite mass, unable to recognize our situation or to discriminate finite mass from infinite mass? If we are traveling at appreciable speeds, then the mass of our electrons, protons, and neutrons is greater than their true rest mass. If this is the case, then we can conclude that we know nothing about the nature of the universe and that our "constants" are totally useless.

In fact, astronomers have actually found objects with such large red shifts as to lead to the conclusion that they are traveling faster than light.

> An object that goes faster than light is about as welcome to physical scientists as a real live ghost would be to the American Humanist Association. Yet there are at least three quasars that appear to be composed of two or more pieces that are flying away from each other at speeds greater than that of light. The response of most astronomers is that it is just an appearance and must somehow be explained away. The most popular explanations to date seem a bit contrived, however . . . the faster-than-light phenomena include apparent velocities up to 8c . . . The apparent large multiples of c are gotten rid of by changing the value of the Hubble constant from the commonly used 55 kilometers per second per megaparsec to 110 kilometers per second per megaparsec. (Anon. d, 1977)

But how can a branch of science stand when its most fundamental constant, the Hubble constant, is constantly being changed? The admission of the above article is that we have no idea as to the true relationships between red shift and velocity or distance, and that the computed distances and speeds are totally unreliable. Their speeds could be halved or doubled depending on the prevailing opinion as to what the value of the Hubble "constant" is. Moreover, an increase of 100 percent in the Hubble constant would decrease the computed age of the universe by 50 percent. If objects with still higher red shifts are found, the age of the universe could be decreased (to 10,000 years, perhaps?).

The situation is still more irrational than appears at first. Consider Figure 4, which is a simple diagram of the universe showing our position with that of two other galaxies. Since the vast majority of galaxies and quasars are red shifted, it is assumed by astronomers, astrophysicists, and cosmologists, that all these galaxies and quasars are receding from us. However, receding celestial objects are found in all directions. When we invoke vector analysis, it then becomes obvious that if all these objects are receding from us, many of them must be moving at the speed of light, or faster. For instance, if we observe objects A and B moving at 80 percent of the speed of light, and if we are moving in the direction of object B at some unknown velocity, then object B would actually be traveling at a velocity equal to the sum of our galaxy's velocity plus its apparent recessional velocity. If we are moving at 20 percent of the speed of light, then object B is actually moving at the speed of light. If we are moving faster, then the speed of object B would exceed that of light. This, of course, is impossible since it would have to have an imaginary mass, making it impossible to see the object. Thus, the present acceptance of the red shifts as Doppler effects is not valid.

Discordant Red Shifts

Are there any inconsistencies in the data itself which would warrant the discarding of the hypothesis that red shifts are Doppler effects? Consider the evidence gathered by Arp.

> The quintet and sextet are tight groupings of galaxies whose markedly different red shifts would (if conventionally interpreted as distance indicators) imply very unequal distances from us. Arp has long maintained that large red shifts do not always indicate great cosmic remoteness, and has offered evidence that the galaxies in each group are really at the same distance and are physically related . . . Particularly significant are a broad luminous tail that appears to connect the low-red shift member of Stephan's Quintet to a nearby high-red shift galaxy, and filaments that seem to lead from high-red shift members of the quintet to the center of the nebulous network between it and NGC 7331. . . . The scientists found what is possibly an 'umbilical cord' connecting the high-red shift galaxy of the sextet to a low-red shift member. (Anon. e, 1977, pp. 107-2)

Here we have direct evidence of a cosmic catastrophe causing the discordant red shift. But how many other catastrophes may have befallen the galaxies in the universe, affecting their speed and red shift? Consider

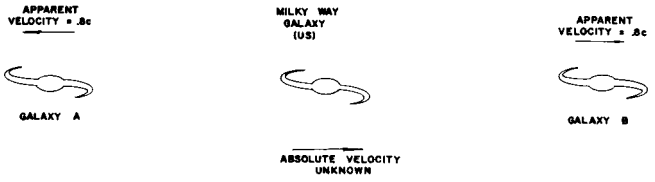

Figure 4. Galaxies receding from Milky Way.

a second example in which two totally unrelated galaxies display red shifts which cannot be harmonized with the present cosmology.

> . . . At the meeting, Arp presented an instance where a high-red shift object appears to be in front of a low-red shift one. There appears to be a bright object with a red shift corresponding to a speed of 13,300 kilometers per second in front of the E galaxy NGC 1199, which has a red shift corresponding to 2,600 kilometers per second. Arp argues that the bright object is in front of the E galaxy because it is surrounded by a disk of dark matter that appears spectroscopically as if it is absorbing light from the E galaxy. If the bright object were behind the E galaxy, it would add to the brightness of the image and the absorption by the dark disk would not be seen. Therefore, most of its red shift must come from some cause other than motion of recession, he says. (Anon. f, 1977)

This finding directly contradicts the present "expanding universe" cosmology which insists that galactic red shifts are directly proportional to their distance. However, when we consider the various mechanisms for imposing line shifts discussed in this article the situation becomes clearer. The light from galaxy E, as it passes through the closer object, is being absorbed, as noted by Arp. The clouds are then altering the spectral line shift in the light of galaxy E, causing an "Aurora effect." The spectral lines are thus being blue shifted from their red shifted positions as the light passes through the nebulae. Moreover, it now appears that galaxies come in certain types, each type displaying its own peculiar red shift characteristics.

> . . . In 1973, William G. Tifft of the Steward Observatory reported that the red shifts of a group of galaxies in the center of the Coma cluster separated into three distinct bands when plotted against the galaxies' apparent magnitudes . . . He has categorized into three groups a complete sample of galaxies taken from the Zwicky catalog which lie within 3° of the center of the Coma cluster. The first group contains all the galaxies that emit radiation in the radio continuum. The remaining two groups are populated by those that emit a strong hydrogen spectral line . . . on one hand and those with a weak or absent H-beta line on the other. He contends that the whole of the data reinforce the original observations of the three discrete bands. . . . The 'weak-emission line' data plotted alone seem to fill in only the middle red shift band with only a few 'stragglers' in the high and low bands. The other two galaxy groups, however, each populate only the outer two red shift bands, the high and low ones. Tifft argues that this different behavior among the three groups would not be expected if the shifts were truly Doppler . . . From Tifft's point of view, short of some contrived mechanism that would assign just the right systematic velocity to a galaxy depending on the type of radiation it emits, the Doppler shift interpretation appears untenable . . . (Anon. c, 1976)

Since the red shifts appear to be related to the type of radiation the object emits, rather than its distance, I conclude that few of the shifts are actually Doppler in nature. The other mechanisms, such as gravity, are shown to be more appropriate for generating the red shifts. Moreover, due to the vagueness and seemingly contradictory nature of the recorded data, a red shift / distance relationship has never been successfully calculated, leaving the so-called "Hubble constant" undetermined and indefensible as a theoretical construct. Thus, the Doppler explanation must be abandoned, leaving the "Big Bang' evolutionary cosmology without any supporting evidence.

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QUOTE

Is our economy of profane possession more proficient in its technology? Will our magical belief in matter as the only value not bring us to a disaster as final as the Indians received? Will we then imitate the stake and electrocute the scientist and the engineer for our common failure to make all substance give up the secret, and for our particular impiety in substituting the laboratory for the altar?

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