limit for the amount of petroleum in the earth. One simply asserts that the volume of petroleum in the earth can not be greater than the volume of the earth 6.8×10^{21} barrels. At the 1970 rate of production of 1.67×10^{10} barrels per year held constant with no growth this amount of oil would last 4.1×10^{11} years.

In the eighty years from 1890 to 1970 world production of petroleum grew 7 percent per year. If this historic rate of growth of consumption were to continue, all of the oil in a tank the size of the earth would be used in 344 years!

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The final frame—*eppur si muove*

An Elegy Written In A Non-Inertial Frame of Reference
(With Apologies to Thomas Gray, Author Of "Elegy Written In A Country Church Yard" 1751)

The Theory tolls the knell of parting rays,
  Light bending in the influence of G;
The Old One homeward plots his world-like ways,
  and leaves our frame in constancy of c.

Now fade fictitious forces on the light,
  And every frame equivalency holds,
Nor gravitation wheels the planets' flight,
  Space curvature inertial pathways mold.

Beneath Newtonian trees still apples fall,
  Provided we the proper axes keep;
But other choices will their motion stall,
  Consigning them to relatively sleep.

Let 'Humanists' not mock the Physicists' toil,
  Their abstract joys in animate devotion;
Nor 'Jet-Set' hear with a disdainful smile,
  The convoluted annalen of motion.

The force of gravity, inertia's power,
  And mass responding, particle and wave,
They fall alike from Galileo's tower,
  Paths of Newton—can appearances be saved?

Full many a gem of purest ray serene,
  The dark unfathomed caves of space-time bend;
Full many a λ blue-born have we seen,
  Red-shifted at their journey's end.

Far from the gravitating mass's pull,
  Their Doppler-shifted courses do they stay;
Along a field line stretched taut full,
  They keep the constant fastness of their way.

Though at rest with the distant stars,
  Fixed in ertial frames we prove,
Gravity's strength defies all bars;
  Eppur si muove! And still it moves!

For who to dumb forgetfullness a prey,
  To the old philosophers' demise resigned,
Embraces new philosophy today,
  Nor casts one longing, lingering look behind?

Here rest their heads upon the lap of earth;
  Giants to both the cultures not unknown;
Fair Science frowned not on their humble birth,
  Let Humanists regard them as their own.

While still we seek their merits to disclose,
  Their final frame is in that dread abode,
Where all alike in trembling h repose,
  Perchance engaged in games of dice with God.

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Cosmology in the dark

The article about cosmology by Beatrice Tinsley (June, page 32) is a delightful exercise of the intellect. I have a simpler, down-to-earth explanation based on the Hubble variable.

According to modern mysticism,[1] the radius of universe is 10.4×10^{22} kilometers, corresponding to a symbolic time of 1.1×10^{10} years. The radius of Earth is 6.38×10^{3} kilometers. The ratio of former to latter is 1.63×10^{19}.

When the Hubble variable was discovered[2] in 1926 it had a value of 500 kilometers per second per megaparsec. During a past half century this variable has gradually declined[3] to 50.3 kilometers per second per megaparsec. The radius of universe is inversely proportional to the magnitude of this variable. Accordingly, the universe is expanding by a factor of 100 per century. Dividing this factor into above ratio discloses that the expansion began here on Earth 961 years ago; or 1015 AD during the Dark Ages. Obviously, western cosmology was born in the dark and has been there ever since.

References

1. H. Arp, "Extragalactic Astronomy," Science