

5 WATERSHEDS . . .

In Colorado, the Great Divide assumes dramatic configurations. As a boy, I was always impressed when standing on a summit of the divide with the idea that the melting ice on one side would flow into the Atlantic Ocean and that but a few inches away would end up thousands of miles from the other in the Pacific Ocean. Divides or watersheds, which may be razor thin but result in inexorable separations, play an important role in the structure of the world. Five watersheds (whose razor thinness may not always be perceptible) are given here.

- **The Sonic Barrier.** An alteration in the equations of aerodynamics occurs at the speed of sound, requiring totally different design approaches to wings and fuselages of aircraft.
- **The Point of Economic Takeoff.** The level of income at which not everything produced is consumed and at which savings become possible separates those who may acquire and create wealth from those who must only subsist.
- **The Inflection Point of a Growth Curve.** Prior to this point, growth is accelerating, suffusing a feeling of optimism, security and an unlimited future; after this point is passed, growth is decelerating, giving a feeling of pessimism, uncertainty and the necessity for a zero-growth future.
- **The Point of Optimum Size.** The larger an organization, the more efficient, the more effective, the more savings possible—up to a point. Beyond this point, an increase in size results in a decrease in efficiency, effectiveness, and savings. No one seems to know how to locate this point.
- **The Optimum Level of Knowledge (A Special Case of Optimum Size).** Richard Feynman once said that the reason productivity in theoretical physics falls off after a certain age may be because the physicist knows too much. His imagination has been displaced by facts. This could happen to a culture as well as to an individual.

In reply to the question, “What was God doing before he created the Heavens and the Earth?” St. Augustine said, “He was creating Hell for those who asked this question.”

AND 5 LIMITS

Limits are watersheds having only one drainage—probably because we have not yet discovered the other one. Until recently, Absolute Zero has been regarded as a limit. Now virtual temperatures below zero are seen not only to be consistent with thermodynamic theory but essential to describe the state of some systems. Perhaps in time we shall discover the ‘other drainage’ to the following limits.

- **The Velocity of Light.** According to the theory of relativity, the maximum possible velocity for any physical entity is $c = 2.9979250 \times 10^{10}$ cm/sec.
- **The Schwarzschild Limit.** Another relativistic limit states that the ratio of mass to radius for all gravitating bodies (i.e., all material bodies) is bounded.
- **The Instant of the Cosmic Big Bang.** The first moment in the evolution of the universe constitutes an informational barrier. We have no way of penetrating to what happened before that time.
- **The Black Hole.** Another informational barrier penetrable only by mathematical surmises.
- **Death.** The most familiar of all information barriers.