sure of the average potential for growth of the society as a whole, and is also the absolute measure of per-capita productivity of labor in that society. Recognizing that "energy-intensity" and "capital-intensity," include even the simplest kinds of useful improvement of land and maintenance of such improvements, and that increase of the productivity of average labor requires technological progress in some sense, we have the general picture. The most general facts from the history of mankind, are, first, that the upper limit of primitive mankind's potential population is approximately 10 million individuals, second, that the population today is approaching 5 billion, and, third, that most of this increase has occurred since modern science was set into motion in Italy, during the fifteenth century. The rough "model" of increase of potential relative population-density, accounts for that process of increase of population, through technological progress.

"Ideal" economies, like healthy living organisms, are negentropic processes. The healthy economy has the same congruence with the Golden Section, which Pacioli and Leonardo discovered to be the case for living organisms. The difference between living organisms and societies, is that the scientific and technological progress, which causes the increase of potential relative population-density, is itself a product of the developed creative-scientific potentials of the individual human mind; in this respect, the negentropy of the economic process is supplied in a different form than biological processes generally. Yet, at the same time, this negentropic mental activity, which is the proper name for "human intelligence," is the activity of living organisms, persons, whose capacity to generate and employ the fruits of human intelligence is biologically delimited.

For reasons elaborated in published locations, the varieties of negentropic processes so indicated, can be comprehended mathematically, only along the lines of further, if uncompleted, development of Gaussian physics accomplished by Bernhard Riemann.

The geometry of life

Pictured are anatomical studies by Leonardo da Vinci (1452-1519), dating from the 1480s-90s, the time of his collaboration with the mathematician Luca Pacioli in creating a new scientific academy in the city of Milan. This collaboration produced the book *Divina Proportione*, which elaborated the conception that the harmonic patterns of growth and morphology of function of living processes are congruent with the Golden Section (called by Pacioli "divine proportion," or proportion of self-similar growth). It is noteworthy that during this same period, Leonardo was designing new cities which would be "plague proof" because of advanced sanitation and fresh water-supply systems.

Leonardo da Vinci's attitude toward his studies of anatomy is expressed in the statement inscribed on this drawing: "And you, O Man, who will discern in this work of mine the wonderful works of Nature, if you think it would be a criminal thing to destroy it, reflect how much more criminal it is to take the life of a man; and if this, his external form, appears to thee marvelously constructed, remember that is nothing as compared with the soul that dwells in that structure; for that indeed, be it way it may, is a thing divine. Leave it then to dwell in His work at His good will and pleasure, and let not your rage or malice destroy a life—for indeed, he who does not value it, does not himself deserve it."

The model of the dodecahedron (inset), made up of 12 faces, each of which is a pentagon, was drawn by Leonardo da Vinci for Pacioli's book. The pentagons can only be constructed by use of the "golden" self-similar ratio.