Realism and Materialism

If the Romantics presented a world of possibilities through the imagination, then the realists refocused their attention on the world as it really was, warts and all. For writers and artists of the second half of the 19th century, industry and technology dominated the lives of Europeans.

Art and Literature

After 1850, writers turned from Romantic themes to the lives of those directly affected by a changing material reality. Characters in realist novels struggled to understand and cope with the impersonal forces of economic and social change. British author Charles Dickens (1812-1870) filled his novels with compelling characters thrown into. a World of sooty ,cities, cruel orphanages, and Corrupt business practices. Stories such as Hard Times and Oliver Twist revealed the underside of Britain's rapid industrialization and the crushing inequality attending material progress. Realist writers abandoned the conventions of Romantic rhetoric in favor of an unsentimental, precise style, as in Gustave Flaubert's (1821-1880) *Madame Bovary*. The title character becomes disillusioned with her mundane middle-class life and marriage, engages in several adulterous affairs, and ultimately Commits suicide.

Realist artists turned their canvases into. windows on the lives of the downtrodden. French painters led the way in revealing the difficult circumstances of landless peasants and exhausted factory workers. Jean-François Millet (1814-1875) highlighted in paintings such as *The Sower* and *The Gleaners* the backbreaking labor of culling enough from the earth to. eke out survival. His paintings were echoed by those of Gustave Courbet (1819-1877), whose Stonebreakers eloquently captured the brutal work of two manual laborers crushing stones for gravel. We focus on the physical posture of the workers rather than their faces. which are covered in shadows. As photography developed throughout the century, an additional medium became available to depict difficult Social problems.

Positivism

• THEME MUSIC

Positivism marks the culmination of the authority of science and belief in objective knowledge (OS). representing a continuity with the Scientific Revolution and Enlightenment. However. positivism goes beyond a particular epistemology (method of knowledge) to take up a philosophical or cosmologlcal position-that only objects verifiable by the senses can exist.

AP ACHIEVER

As the influence of organized religion declined in Europe, many substituted it with belief in the potential of science. The power of scientific thought seemed validated by its production of immense material benefits through industry and technology. French philosopher August Comte (1798-1857) captured this faith with the theory of positivism. Comte believed that history had progressed through three stages-the theological, metaphysical (or philosophical), and the scientific. The great revolutions of 1789-1848 faltered, according to Comte, because of their adherence to overly abstract principles. Progress must rely on a hard-nosed and empirical investigation of reality, avoiding wishful thinking and unsupported generalizations. Comte categorized all the sciences and argued for a science of society (sociology), which would become a new secular religion.

Modern Ideas

As an intellectual framework, modernism was born in the period 1850-1914. In philosophy, the sciences, and the social sciences, thinkers fulfilled the Enlightenment project of using reason to discover the laws of nature in various fields. However, many cherished Enlightenment notions were called into question by the emerging trends of irrationality, subjectivity, randomness, and struggle.

New Ideas in Science

Darwinian Evolution

Theories of evolution predated the 19th century. Previous versions explained evolution by the inheritance of acquired characteristics. After studying the diversity of finches on the Galapagos Islands (off the coast of Ecuador), Charles Darwin (1809-1882) concluded that the species he observed descended from a common ancestor. Knowing his theory would be controversial, Darwin Waited 25 years to work out the details before publishing *On the Origin of Species (*1859), one of the most influential scientific works ever written. Darwin borrowed from Malthus's population theories to argue that species are locked in a constant struggle for resources and survival. Through random variations (what we would call mutations, but Darwin did not understand the mechanism that produced them), some organisms gained a survival advantage in a local environment. If an evolutionary change was adaptive, the mutation would spread within a species population through reproduction, eventually producing new species. What Darwin called natural selection, and others later termed "survival of the

fittest," suggested that biological development occurred randomly, not through design or purpose. All of nature seemed in chaotic flux, with no role for the permanent and the good, as defined in theological terms.

Darwin's theory caused an immediate uproar and was condemned by religious figures, particularly those committed to biblical literalism. Not only did Darwin reject the hand of God in creation, his theory suggested that the earth was millions, not thousands, of years in age. Geological developments in the 19th century lent credence to Darwin's rejection of a young earth. Many scientists and intellectuals, such as T.H. Huxley (1825-9184), known as Darwin's Bulldog,. rushed to Darwin's defense. Austrian monk Gregor Mendel (1822-1884) later provided additional support for natural selection by articulating the gene theory of reproduction. With The Descent of Man (1871), Darwin applied his theory to the evolution of the human race from earlier primate species, once again undermining humanity's special place in the universe. Though some counseled dialogue between religion and science, partisans on both sides drew the cultural lines sharply between "atheistic science" and "superstitious religion."

The New Physics

Newtonian physics ruled science for two centuries. In addition to providing accurate explanations of natural phenomena, Newtonian mechanics offered an appealing vision of the cosmos as orderly and predictable. Quantum mechanics and relativity theory undermined this confidence. Accepted theory held that the atom was the simplest particle and indestructible, the fundamental building block of reality. Accumulating scientific evidence proved this atomic theory incorrect. Marie Curie (1867-1934) demonstrated how atoms emitted radioactive energy as they disintegrated" British scientists J,J. Thomson and Ernest Rutherford elaborated a more complex view of the atom as made up mostly of empty space and comprising subatomic particles. Such discoveries provided practical applications, as with William Rontgen's (1845-1923) discovery of the X-ray and its ability to see within the human body.

German physicist Max Planck (1858-1947) in 1900 articulated the quantum theory. According to Planck, particles did not emit or absorb energy in constant streams but in packets of energy. Further, experiments demonstrated how light acted sometimes as a particle and sometimes as a wave, depending on the circumstances of observation. More jarring to the

Newtonian view, it was demonstrated that the behavior of many particles could only be expressed by probability, not with objective certainty.

It took the great physicist Albert Einstein (1879-1955) to transform our co~oI1sense assumptions regarding time and space. Through a series of scholarly articles, Einstein argued that absolute time and space do not exist, but rather are relative to the observer and their status of motion. for example, Einstein showed how for objects that traveled at or near the speed of light, time slows down relative to a stationary observer. To our three-dimensional universe, Einstein's relativity theory thus added another dimension-space-time. In the presence of a massive object, such as the sun, space and time both curve, as was confirmed from observations of a solar eclipse in 1919. In addition, Einstein expressed how matter and energy were interconvertible in the famous formula, $e = mc^2$. This discovery suggested how the destruction of an atom might potentially liberate massive amounts of energy and/or destruction.