Lamarck -
First believed that organisms remain unchanged, as did almost everyone.

Then in 1799 he changed his mind - believed that organisms evolve and that spontaneous generation of life from inorganic matter constantly provided new organisms for evolution to work on.

In 1793 - became professor of insects, worms and microscopic animals at the Museum of Natural History in Paris.

Started thinking about the evolution in response to the "new" question of the time - Do species ever go extinct?

Had two answers:
Yes - for simple organisms as they were so fragile. They were continuously replaced by spontaneous generation.
No - for more complex organisms - they simply evolved into another form of life.
He believed in a "Chain of being" - scaled from the most primitive to the most complex. To Lamarck, this scale of life is dynamic, not static - i.e., he believed that one organism could evolve into another.

Organisms went up the chain of being for two reasons:
1 - Natural tendency or life force - even in a uniform, demand free environment, they would change to become more complex
2 - "Besoins" (a french word) meaning needs - a changing environment would produce the need to change and subtle bodily fluids (i.e., something akin to electricity or calories, not blood) would create the needed organs or other changes. In other words, the organism would acquire what was needed. Also, these changes would be passed on to offspring - hence the phrase "inheritance of acquired characteristics."

His theory was about the origin of organisms, not the origin of species. Since the flow up the chain of being was a continuous one, there should be no discrete forms such as species. Hence, species were an embarrassment to him.
Lamarck on acquired characters and their inheritance (neither idea was original):

"First law: In every animal..., the more frequent and sustained use of any organ will strengthen this organ little by little, develop it, enlarge it, and give to it a power proportionate to the duration of this use; while the constant disuse of such an organ will insensibly weaken it, deteriorate it, progressively diminish its faculties, and finally cause it to disappear."

"Second law: All that nature has caused individuals to gain or lose by the influence of circumstances..., is conserved through generations in the new individuals descending from them, provided that these acquired characteristics are common to the two sexes or to those which have have produced these new individuals."
Argument from design:
still going strong in the 1830's
"Bridgewater Treatises" - aimed at
demonstrating the "Power, Wisdom, and
Goodness of God, as manifested in the
creation"

Whewell's argument-
the world runs according to laws and the
effects of these laws are instances of apparent
design

eexample: organic adaptations
by law-earth year lasts exactly 12 mths
by law-"plant" year lasts exactly 12 mths

dthis is essential for the well-being of plants
if plant cycles were 11 mths - soon have
flowering in January
"Why should the vegetable cycle be exactly of
the same length as the earth's cycle?"
No chance could produce such a result
-intentional adjustment of these two
things to one another
"God matched the lengths of the years"
therefore-God looks out for the interest of
plants
Chambers vs. Darwin
on the Galápagos fauna

Chambers (Vestiges) -

finches - the different varieties and species represent separate lines that evolved independently (in a parallel way) from different ancestors that crawled up from the sea

absence of mammals - not enough time for them to evolve from the present inhabitants

Darwin (Origin) -

finches - evolved from a common stock of mainland founders, molded on the various islands by different selective forces

absence of mammals - caused by their difficulty in reaching the islands
From the Origin:
"A struggle for existence inevitably follows from the high rate at which all organic beings tend to increase" - got this idea from Malthus

"How will the struggle for existence...act in regard to variation?"

"...those under nature, vary; and how strong the heredity tendency is..."

Darwin's statement re natural selection:
"Can it, then, be thought improbable, ... that...variations useful in some way to each being in the great and complex battle of life, should sometimes occur in the course of thousands of generations? If such do occur, can we doubt (remembering that many more individuals are born than can possibly survive) that individuals having any advantage, however slight, over others, would have the best chance of surviving and of procreating their kind? On the other hand, we may feel sure that any variation in the lest degree injurious would be rigidly destroyed. This preservation of favourable variations and the rejection of injurious variations, I call Natural Selection."
Blending vs. non-blending inheritance

Roughly, people at the time believed in two kinds of inheritance
1) blending - e.g., black and white rabbits breed and give rise to grey rabbits
2) particulate - e.g., a male and female breed and sexual characteristics are pass on undiluted - no half-male/half-female offspring created

People differed in their beliefs of which was the norm and which was the exception?

Darwin believed in blending inheritance

Darwin's hypothesis of heredity (never put it in the Origin):
Pangenesis
"gemmules" given off by various cells of the body - these gemmules "circulate" around and find their way to the sex organs and eventually the sex cells

"explained" many facts of heredity

1- acquired characteristics can be inherited
e.g., strength of a blacksmiths arms - affects the gemmules given off and thus can be passed to the next generation

3- blending of characteristics such as skin color occurs because the gemmules from each parent mingle

4- Skipping of generations (avatism) could be explained if the gemmules are not blended out of existence each generation (mingle rather than fuse)

Criticisms of pangenesis

Darwin never accorded it the importance or certainty of natural selection - called it a provisional hypothesis

Mivart (anatomist) 1870 - said, in essence, that if the effects of conditions impinging on the body can be transmitted through the sex cells to future generations, then why is it that the Jews, who have been circumcising their sons for many generations, must continue to do so? Examples like this showed that something was wrong with pangenesis.
Francis Galton - Darwin's cousin did an empirical test of the pangenesis hypothesis using rabbits of two colors and blood transfusions

found no effect - the rabbits did not change in subsequent generations in response to the transfusions

Darwin's reply - "I have not said one word about the blood or about any fluid proper to any circulating system."
(then how were the gemmules circulated?)
Darwin's view on the ancestry of humans

"Light will be thrown on the origin of man and his history"

Question at issue: Are humans in any essential way different from other animals? Led to clashes between the Darwinians and their opponents in 1860

Owen (comparative anatomist) - the brain of humans "present an acsensive step in development" (said that the hippocampus minor was unique to humans) - shown later not to be true by Huxley

Wilberforce (Bishop at Oxford) asked Huxley at a meeting at Oxford - was it through his grandmother or his grandfather that he claimed descent from monkeys?

Rumor - Huxley replied that he would rather be descended from a monkey than from a bishop of the Church of England!

Actually said -
“would I rather have a miserable ape for a grandfather, or a man highly endowed by nature and possessed of great means and influence, and yet who employs these faculties and that influence for the mere purpose of introducing ridicule into a grave scientific discussion – I unhesitatingly affirm my preference for the ape.”
So why call it the "Darwinian REVOLUTION"?

-caused the overthrow of some of the most basic beliefs of his age

-refuted the belief in the individual creation of each species, establishing in its place the concept that all of life descended from a common ancestor

-argued that humans were not special products of creation

-upset current notions of a perfectly designed, benign natural world and substituted the concept of a struggle for existence

-undermined the Victorian notions of progress and perfectibility by his demonstration that evolution brings about change and adaptation, but it does not necessarily lead to progress, and it never leads to perfection

-introduced the concepts of probability, chance, and uniqueness into scientific discourse