Why did it take so long for someone to theorize about organic evolution, and then why did acceptance of these theories go so slowly?

Mayr (1991) cites seven reasons, four religious and three philosophical secular beliefs:

{Four Religious concepts :}

A belief in a constant world unchanged since relatively recent creation;
A belief in a created world, populated by created organisms;
The wise and benign and omnipotent Creator, who at least did the best he could with the possibilities, to form a “nearly perfect” world;
A belief in the unique position of man in the creation. Man had a soul that animals lack, and there was no possible transition from animal to man.

{Three Secular philosophical concepts :}

The philosophy of essentialism;
A belief in the causal interpretations for phenomena in nature as elaborated by the physicists and chemists (Physicalism or “Physics envy”);
A belief in “final causes” or teleology (purposes for everything).

Mayr (1991) also lays out some reasons for why Darwin would have had to labor long and hard under the best of circumstances to fashion a persuasive series of arguments to support his new paradigm.
Mayr's summary of Darwin's theory (from Wikipedia)

Darwin's theory of evolution is based on key facts and the inferences drawn from them, which Mayr summarised as follows:

- Every species is fertile enough that if all offspring survived to reproduce, the population would grow (fact).
- Despite periodic fluctuations, populations remain roughly the same size (fact).
- Resources such as food are limited and are relatively stable over time (fact).
- A struggle for survival ensues (inference).
- Individuals in a population vary significantly from one another (fact).
- Much of this variation is heritable (fact).
- Individuals less suited to the environment are less likely to survive and less likely to reproduce; individuals more suited to the environment are more likely to survive and more likely to reproduce and leave their heritable traits to future generations, which produces the process of natural selection (fact).
- This slowly effected process results in populations changing to adapt to their environments, and ultimately, these variations accumulate over time to form new species (inference).

Continuing on, not to belabor the breadth of Darwin’s thinking, here is how Mayr is interpreted as putting all the major pieces of fact and inference together in Darwin’s mind.
Here are two especially thoughtful books on Darwin. Janet Browne’s (2006) work styles itself as a “biography” of the core concepts of Darwinism. Thus, it is far wider in the scope of time than a biography of Charles Darwin (1809-1882).

By contrast, Burkhardt’s (editor, 1996) selection of Darwin’s letters is wonderfully penetrating of most detailed thinking in relation to his contemporaries and colleagues. It is a sort of snapshot, or series of samples of fossil evidence of minds, of both sender and recipient, in daily interactions, from the 19th century. We must ask ourselves whether the same fossil evidence of our own and succeeding generations’ thinking will be available, and in what form.
One of the most compelling analyses of Darwin’s thinking that I have found is this graphically enhanced way of keeping track of the five “philosophical bridges” crossed by Darwin. It is inspired by Bill Bryson’s (ed. 2010) book on the history of the Royal Society of London.

Bryson is one of my non-specialist heroes in the art of making scientific concepts understandable and discuss-able by non-scientists. His book, *Seeing Further*, celebrates articulate scientists, non-scientific interpreters of science, and just plain good solid scholarship in many fields. Richard Dawkins is another of such heroes, alongside Neil deGrasse Tyson, Carl Sagan, Victoriya Forsythe, and most recently Kate Everson.
When Mark, Marvin and I do get fully into the wondrous contributions of the second voyage of HMS *Beagle*, I hope that we will be effective at persuading you that the effects of that voyage have remained very much with us in the 20th and 21st centuries. My training as a biologist began with people like Ernst Mayr, a widely published Darwin scholar, Edward O. Wilson, another leading disciple of neo-Darwin scholarship and refinement of natural selection theories. In fact, about 52 years ago, some hosts in southern Ecuador took pictures of me and birds that I was helping to study in 1965, testing the idea that island biogeography was not restricted to oceanic islands, but could be followed in mountainous regions of the Andes of South America, in which reproductively isolated populations of seed-eating finches could develop into separate species, just as Darwin had shown for Galapagos Island finches 130 years earlier.
Darwin, of course aged, but never seemed to grow old, given the rich heritage of ideas that he bequeathed to so many scientists.
The Dunlin, *Calidris alpina*, is a cosmopolitan species, with 5-7 subspecies recognized worldwide. One subspecies breeds in southern Beringia, and winters along the Pacific coast of North America. Another breeds in Eurasia and northern Beringia, but winters entirely in southern coastal Eurasia. The subspecies that breeds in Arctic and subarctic Canada winters on the Gulf of Mexico and Atlantic coasts of North America. So, we have now looked at several populations of one species all characterized by one type of social system: males and females form permanent bonds. They tend to return to their same breeding territories year after year (site fidelity) and birds that hatch and grow in particular parts of the species’ breeding range tend to return there (philopatry) to breed as adults.
The story gets interesting, even racy—the rest of the members of the subfamily have experimented with alternative lifestyles. The opposite of the conservative strategy is opportunistic. Opportunism takes one or more of three forms, according to Pitelka et al. (1974). The world’s most cosmopolitan species, the Sanderling, winters in mid-latitudes of Atlantic coasts, Pacific coasts and Polynesia, and throughout coastal areas of the Indian Ocean. The Sanderling is a long-distance migrant that prefers breeding at especially high latitudes of Greenland, Arctic Canada, and western Eurasia. Oddly one of the few regions not favored by breeding Sanderlings is Beringia. The particular form of opportunism in Sanderlings is serial polygamy: a female will lay one clutch of eggs that is incubated by the male, and another that she incubates. The pair bond lasts either a short time, or is virtually non-existent. Thus, the behavior might be a choice between serial polyandry or serial polygyny, hence for uncertainty it is called serial polygamy. Two other species specialize in this form of opportunism. Notice that the Sanderling, unlike the Dunlin, is monotypic, worldwide. That means that subspecific distinctions do not arise through any type of reproductive isolation. Put another way, gene flow through the world’s population of Sanderlings is free-flowing: the population is considered pan-mictic.
My best guess about Baird’s Sandpipers is that the pair bond is weak. Divorce appears to be common, not universal. Divorce leaves one member of the pair behind to incubate the eggs, while the other member departs for distant breeding grounds where habitats may become snow-free at progressively later dates each breeding season. This species’ ability to nest in high alpine as well as Canadian Archipelago habitats that verge on polar desert favors this sort of facultative opportunism. This social system results in double, maybe triple clutching for some females, and for participation in initiating nesting twice or more for some males within a single breeding season.

Pitelka et al. considered the Baird’s Sandpiper to be monogamous, thoroughly conservative, in its social system. I venture to state that the species’ facultative annulments of pair bonds place the species at least at the threshold of opportunism. Further, this strategy seems to qualify as a probable ‘missing link’ in the adaptive radiation of social and breeding systems.
My little unpublished story about the Baird’s Sandpiper’s plasticity in social systems meshes well with what I imagine to be its (relict?) migration and breeding schedules.

Looking back on this stage of scientific endeavor, the few insights that I contributed were just a small part of a torrent of insights generated by a cohesive team of ecological investigators.

One tasty irony in the story of these arctic sandpipers’ breeding systems:

- Notice that 1) the **conservative** social systems lead to reproductive isolation, which in turn promotes accelerated genetic differentiation leading to proliferation of species;

- and 2) the **opportunistic** social systems assure wide gene flow, and lead to conservation of traits throughout a species’ range.

(I hope to revisit this irony in a different context a little later)