

## A Good Wormhole Is Hard To Find

By Nancy Mann

In the Middle Ages, European transportation had a land-locked character and the coasts' transportation networks were subordinate to the interior; this was true from China to England, until the Western nations became great naval powers in the 17<sup>th</sup> century. Specifically, the 14<sup>th</sup> century has been called The Age of Immobility as conditions in the undeveloped interior are analyzed. Advances in transportation occurred in shift, not gradually, from the economic arteries of the Silk Road, to the canals of the Low Countries.

The near-death of the economy ended the first technological advances in transportation; the near-death of plague, in 1347. Six more plagues, before 1400, slowed movement of the main goods: grain, salt, wine and oil.

People carried goods on foot, traveling about three miles per hour, and sometimes used wheelbarrows; the wheelbarrow, surprisingly, being invented as late as 220 A.D. Large walking groups were banned by several Popes, as these groups "spread the Black Death." So, goods were carried on human shoulders – pilgrims' and Crusaders', and royal messenger carried the news. Carts and wagons were utilized.

Towns developed as a natural network – thirty miles apart – the normative one day's journey. The rich traveled farther despite the risk of highway robbers.

Roman roads had deteriorated. Thus, noblemen built roads, complete with spikes or pikes at the entrances, hence the term "turnpikes." Local lords seized goods "legally." Peasants worked on mire-filled roads, annually.

In 1300, there were thirty toll-ways near the Rhine River. River transportation gave way to inland travel, when better bridges were built. Roman boats, *cortia*, were re-discovered, and built. River-boats had no rudders, but skilled oarsmen.

With the advent of the compass, and three masts, transportation grew exponentially. Carracks transported thousands of tons of goods and armies. (Two famous carracks were the *Niña* and the *Pinta*). Products from land and forests were brought to coasts, and the Venetian Empire began.

Transporting horses on carracks was critical. William brought 2,000 horses when he invaded England. Horse trading was an economic pillar. Poor and rich could rent equines, known as palfreys. Their gait was the "amble." London's population in 1348, was 60,000 people, about 40,000 horses – over 620,000 pounds of grain to feed horses poured into the city. New "draft" horses wore the new technology, the harnesses. They could pull for more hours daily (50% more foot pounds per second than oxen) and their use helped end the feudal system.

So, for the future, we will spin down wormholes, dismantling the molecules of our goods, and combining them in another, linking galaxy. Back then, you would decide whether to transport

by land or by sea; you would load humans and pack-horses, hire drivers, rely on untrustworthy maps, plan defenses against highway robbers; if by sea, you fought pirates. Shrewdly, you had an “insurance” plan: two caravans, two routes, two sets of jewels (for bribes) and (for lurking bandits, hostile noble retinues, crazed religious fighters, and army infantries), many incantations against the unwelcome breezes of Bubonic Plague.