

There have been three significant periods in cycling history, each covered in more detail below. Despite the myths of supposed earlier two-wheelers, the first bicycle (a "running machine" that the rider straddled and propelled with his feet on the ground) was invented in Germany in 1817, and this is when the history of the bicycle and the motorcycle begins. It led to a promising acceptance in several countries but was suppressed by the authorities in several places, so that by 1821 it had virtually died out. (Others, including Pinkerton [see below] believed that it was simply a fad of the rich and that fashions come and go in such a period.) It was not until the early 1860s that someone in France added cranks and pedals to the front wheel of a running machine, and another international rush developed. If we define a modern bicycle as a vehicle having two wheels in line connected by a frame on which a rider can sit, pedal, and steer so as to maintain balance, then this is the start of its history. This rush lasted much longer than that of 1817–1821. The front wheel was made progressively larger, and the high bicycle or "ordinary" was born. It was fun but it was dangerous,<sup>1</sup> and designers and inventors tried for many years to arrive at a safer machine. Success came with the so-called safety, first in 1878 with the Xtraordinary and the Facile, and reaching significant commercial success with John Kemp Starley's safeties of 1885 which, with Dunlop's pneumatic tires reinvented in 1888, became by 1890 very similar to the safety bicycle of today.

These, then, are the three principal developments that we shall discuss below in this short history. We shall also mention the tricycle period, the repeated enthusiasm for recumbent bicycles, and the enormous popularity of the modern all-terrain (or mountain) bicycle (the ATB).

### Early history

It was through the use of tools that human beings raised themselves above the animals. In the broadest sense of the term, a tool might be something as simple as a stone used as a hammer or as complex as a computer controlling a spacecraft. We are concerned with the historical and mechanical range of tools that led to the bicycle, which—almost alone among major human-powered machines—came to use human muscles in a near-optimum way. A short review of the misuse of human muscle power throughout history (Wilson 1977) shows the bicycle to be a brilliant culmination of the efforts of many people to end such drudgery.

Many boats, even large ones, were muscle-powered until the seventeenth century. Roman galleys had hundreds of "sweeps" in up to three banks. Figure 1.1 shows a large seventeenth-century galley having fifty-four sweeps, with five men on each. The men were likely to be criminals, chained to their benches. A central gangway was patrolled by overseers

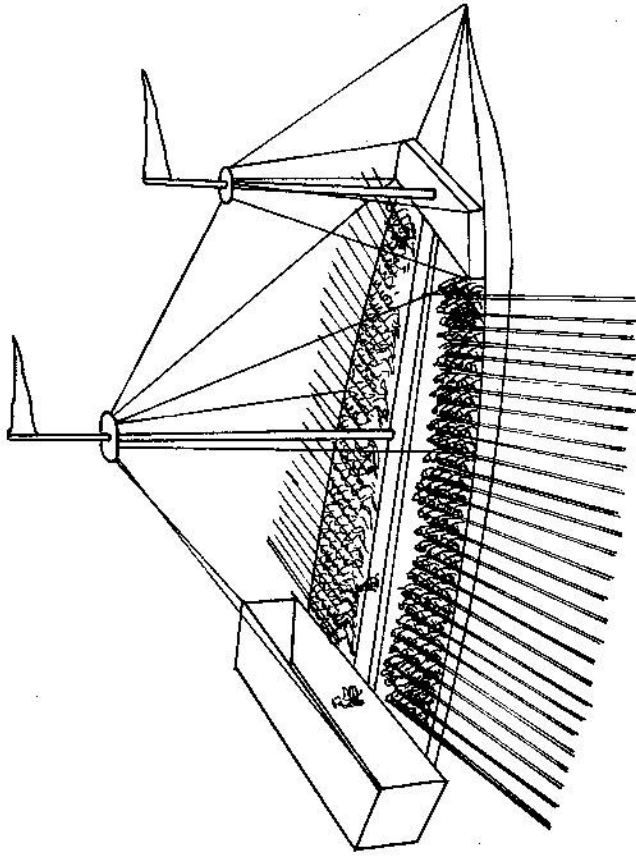


Figure 1.1

Early-seventeenth-century galley, with drummer in the stern and a whip-bearing overseer on the central gangway. (From a drawing in the British Museum reproduced in the *Encyclopaedia Britannica*, sketched by Dave Wilson.)

equipped with whips to provide persuasion for anyone considered to be taking life too easily. The muscle actions used by these unfortunate oarsmen were typical of those considered appropriate in the ancient world. The hand, arm, and back muscles were used the most, while the largest muscles in the body—those in the legs—were used merely to provide props or reaction forces. (They didn't have the sliding seat of today's competitive rowers.) The motion was generally one of straining mightily against a slowly yielding resistance. With five men on the inboard end of a sweep, the one at the extreme end would have a more rapid motion than the one nearest to the pivot, but even the end man would probably be working at well below his optimum speed. Most farm work and forestry fell into the same general category. Hoeing, digging, sawing, chopping, pitchforking, and shoveling all used predominantly the arm and back muscles, with little useful output from the leg muscles. In many cases, the muscles had to strain against stiff resistances; it is now known that muscles develop maximum power when they are contracting quickly against a small resistance,