The Laws of Curvilinear Motion in the Iliad

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Abstract. In Book 18 of the Iliad, Achilles, after the completion of the funerary rites for his deceased friend Patroclus, organizes games in his honor with precious prizes for the winners, among others, a chariot race, to which Antilochus, son of Nestor, King of Pylos, participates. Antilochus’ horses appear to be inferior to those of his competitors, and Nestor instructs him how to win by knowledge rather than by the capacity of his horses. Nestor’s words provide an excellent formulation of the laws governing the motion of a rigid body on a curved course. Antilochus follows his father’s instructions and eventually wins the race.

1 The Mycenaean Chariot

A light chariot with spoked wheels was evidently developed in Syria or Northern Mesopotamia at about the beginning of the 2nd millennium BC and quickly propagated all over Middle East because of its usefulness at war. Such chariots appear in tombstones of the Mycenaean arched graves, as well as in Cretan seal rings in about 1450 BC. Besides war they were useful for hunting, even for traveling. No other form of chariots, developed for military purposes, appears in the Iliad. At around the end of the Bronze Era, roads for wheeled vehicles were constructed, especially connected to bridges of streams and rivers, some remnants of which can still be found in the area of Mycenae.

Chariots of Mycenaean and Archaic Greece used to have very light and flexible wheels, made by bending of very thin wood – of willow, elm or cypress – usually with only four spokes (Figure 1). So structured, wheel is very elastic and acts as the spring suspension of modern vehicles, allowing these chariots to trot on the rough ground of the Greek hillside, where heavier and more rigid vehicles would be useless. In fact, the wheel’s hub was bending as a bow under the chariot’s weight. Four-wheel chariots of similar design were a later development (Figure 2).
Fig. 1 Reconstruction of a Mycenaean chariot (1499–1200 BC): The Homeric chariot was constructed by bending very thin wood, therefore, very flexible.

2 Nestor’s Instructions to Antilochos

In the Iliad, 18.306-348, Nestor, King of Pylos, gives his son Antilochos, the following instructions, in order to win the chariot race, organized by Achilles to honour his friend Patroclus, who died in a duel with Hector, the Trojan Prince:

Antilochos, said Nestor, you are young, but Jove and Neptune have loved you well, and have made you an excellent horseman. I need not therefore say much by way of instruction. You are skilful at wheeling your horses round the post, but the horses themselves are very slow, and it is this that will, I fear, mar your chances. The other drivers know less than you do, but their horses are fleeter; therefore, my dear son, see if you cannot hit upon some artifice whereby you may insure that the prize shall not slip through your fingers. The woodman does more by skill than by brute force; by skill the pilot guides his storm-tossed barque over the sea, and so by skill one driver can beat another. If a man go wide in rounding this way and that, whereas a man who knows what he is doing may have worse horses, but he will keep them well in hand when he sees the doubling-post; he knows the precise moment at which to pull the rein, and keeps his eye well on the man in front of him. I will give you this certain token which cannot escape your notice. There is a stump of a dead tree – oak or pine as it may be – some six feet above the ground, and not yet rotted away by rain; it stands at the fork of the road; it has two white stones set one on each side, and there is a clear course all round it. It may have been a monument to some one long since dead, or it may have been used as a doubling-post in days gone by; now, however, it has been fixed on by Achilles as the mark round which the chariots shall turn; hug it as close as you can, but