Introduction

Nematodes originated during the Precambrian or Cambrian explosion over 500 million years ago (Wray et al., 1996; Ayala & Rzhetsky, 1998; Rodriguez-Trelles et al., 2002). The phylogenetic position of the Nematoda relative to other metazoans has historically been one of contention. Originally circumscribed within the Vermes Linnaeus, 1758 and later the Aschelminthes Grobben, 1910 (Claus & Grobben, 1910), the Nematoda are now believed to belong to a clade of moulting animals, the Ecdysozoa (Aguinaldo et al., 1997), and share a most recent common ancestor with arthropods, kinorhynchs, nematomorphs, onychophorans, priapulids and tardigrades.

Origins of entomopathogenic nematodes (EPN)

Entomopathogenic nematodes of the Steinernematidae and Heterorhabditidae are not monophyletic, but likely began independently to explore biotic relationships with arthropods and Gram-negative enteric bacteria (Enterobacteriaceae) by the mid-Palaeozoic (approximately 350 million years ago) (Poinar, 1993). Their origins were probably not synchronous and the ages of their respective lineages appear to be significantly different. Evidence for the disparate origins and relative age of these Families is illustrated in Figure 240. Assuming even a somewhat sloppy molecular clock, the long branch lengths of Steinernema, both within the genus and relative to its most recent common ancestor, imply that it has been evolving independently of other nematode lineages for a longer period of time than Heterorhabditis. This could explain, in part,
Fig. 240. Phylogenetic tree of 434 representative taxa from the Rhabditida, Plectida and Monhysterida. The tree was generated from 18S rDNA sequences by the neighbour joining BioNJ algorithm using log determinant transformed distances in order to account for rate and nucleotide usage heterogeneity among lineages. EPN branches are in bold.