



## Comparison of the cryptic nematode species *Caenorhabditis brenneri* sp. n. and *C. remanei* (Nematoda: Rhabditidae) with the stem species pattern of the *Caenorhabditis Elegans* group

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### Abstract

The new gonochoristic member of the *Caenorhabditis Elegans* group, *C. brenneri* sp. n., is described. This species is reproductively isolated at the postmating level from its sibling species, *C. remanei*. Between these species, only minute morphological differences are found, but there are substantial genetic differences. The stem species pattern of the *Elegans* group is reconstructed. *C. brenneri* sp. n. deviates from this character pattern only in small diagnostic characters. In mating tests of *C. brenneri* sp. n. females with *C. remanei* males, fertilization takes place and juveniles occasionally hatch. In the reverse combination, no offspring were observed. Individuals from widely separated populations of each species can be crossed successfully (e.g. *C. brenneri* sp. n. populations from Guadeloupe and Sumatra, or *C. remanei* populations from Japan and Germany). Both species have been isolated only from anthropogenic habitats, rich in decomposing organic material. *C. brenneri* sp. n. is distributed circumtropically, *C. remanei* is only found in northern temperate regions. To date, no overlap of the ranges was found. Hypotheses to explain the allopatric distribution of the two species are discussed. One suggests that the speciation center for the *Elegans* group was in East Asia, and globally distributed members dispersed from there.

**Key words:** *Caenorhabditis*, biogeography, biological species concept, circumtropical, mating tests, Nematoda, *remanei*, stem species pattern

### Introduction

Starting with the investigations by Nigon & Dougherty (1949, 1950) and the exceptionally successful studies by Brenner (1974), *Caenorhabditis elegans* (Maupas, 1899) and *C. briggsae* (Dougherty & Nigon, 1949) have become important model systems for basic biological studies. In the last 10 years, the interest of the scientific community has broadened to include comparative research, aimed at understanding the evolution of developmental processes. Therefore, other *Caenorhabditis* species have come into focus, in particular those most closely related to *C. elegans* which are members of the *Elegans* group (Sudhaus & Kiontke 1996, Kiontke et al. 2002). The *Elegans* group is a complex of sibling and complementary species that are difficult to differentiate except by the mode of reproduction (gonochoristic versus self-fertilizing hermaphroditic). At present, this group comprises eight species. Five of them are studied in different laboratories, even though two of them are not yet described and named. The three other members of the *Elegans* group are dubious and were never isolated after the initial description. The six named species are (well known species marked with \*): \**Caenorhabditis briggsae* (Dougherty & Nigon, 1949), *C. clavopapillata* (Kreis & Faust, 1933), \**C. elegans* (Maupas, 1899), *C. formosana* (Yokoo & Okabe, 1968), *C. oncomelaniae* (Yokoo & Okabe, 1968), and \**C.*