Description, molecular characteristics and *Wolbachia* endosymbionts of *Onchocerca borneensis* Uni, Mat Udin & Takaoka n. sp. (Nematoda: Filarioidea) from the Bornean bearded pig *Sus barbatus* Müller (Cetartiodactyla: Suidae) of Sarawak, Malaysia

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Abstract

**Background:** The genus *Onchocerca* Diesing, 1841 includes species of medical importance, such as *O. volvulus* (Leuckart, 1893), which causes river blindness in the tropics. Recently, zoonotic onchocercosis has been reported in humans worldwide. In Japan, *O. dewittei japonica* Uni, Bain & Takaoka, 2001 from wild boars is a causative agent for this zoonosis. Many filarioïd nematodes are infected with *Wolbachia* endosymbionts which exhibit various evolutionary relationships with their hosts. While investigating the filarial fauna of Borneo, we discovered an undescribed *Onchocerca* species in the bearded pig *Sus barbatus* Müller (Cetartiodactyla: Suidae).

**Methods:** We isolated *Onchocerca* specimens from bearded pigs and examined their morphology. For comparative material, we collected fresh specimens of *O. d. dewittei* Bain, Ramachandran, Petter & Mak, 1977 from banded pigs (*S. scrofa vittatus* Boie) in Peninsular Malaysia. Partial sequences of three different genes (two mitochondrial genes, *coxA* and *12S*rRNA, and one nuclear ITS region) of these filarioïds were analysed. By multi-locus sequence analyses based on six genes (*16S*rDNA, *ftsZ*, *dnaA*, *coxA*, *fbpA* and *gatB*) of *Wolbachia*, we determined the supergroups in the specimens from bearded pigs and those of *O. d. dewittei*.

**Results:** *Onchocerca borneensis* Uni, Mat Udin & Takaoka n. sp. is described on the basis of morphological characteristics and its genetic divergence from congeners. Molecular characteristics of the new species revealed its close evolutionary relationship with *O. d. dewittei*. Calculated p-distance for the *coxA* gene sequences between *O. borneensis* n. sp. and *O. d. dewittei* was 5.9%, while that between *O. d. dewittei* and *O. d. japonica* was 7.6%. No intraspecific genetic...