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Mycological Research

Volume 99, Issue 2, February 1995, Pages 205-215

Ophiostoma himal-ulmi sp. nov., a new species of Dutch elm disease fungus endemic to the Himalayas

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[https://doi.org/10.1016/S0953-7562\(09\)80887-3](https://doi.org/10.1016/S0953-7562(09)80887-3)

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In September–October 1993 a research survey was conducted in northern Himachal Pradesh, western Himalayas, as part of an investigation into the origins of Dutch elm disease. No disease symptoms were observed in the area, but an apparently endemic *Ophiostoma* similar to the known Dutch elm disease pathogens *Ophiostoma ulmi* and *O. novo-ulmi* was isolated from around breeding galleries of scolytid beetles in the bark of *Ulmus wallichiana*. Over 200 isolations of the fungus were made. These were later resolved into a minimum of 20 different genotypes, which were used to further characterize the fungus.

Like *O. ulmi* and *O. novo-ulmi* the Himalayan *Ophiostoma* is outcrossing and heterothallic, with two sexual compatibility types, A and B, occurring in a near 1:1 ratio in nature. In interfertility tests, strong pre- and post-zygotic reproductive isolation was revealed between the Himalayan *Ophiostoma* and sexually compatible isolates of *O.*

revealed between the Himalayan *Ophiostoma* and sexually compatible isolates of *O. ulmi* or the EAN or NAN races of *O. novo-ulmi*. The Himalayan *Ophiostoma* also exhibits a unique combination of physiological and morphological characteristics including a distinctive colony type, ability to produce synnemata on malt extract agar, production of perithecia with long necks, a very high level of cerato-ulmin toxin production in liquid shake cultures, and moderate to strong vascular wilt pathogenicity on *U. procera*. Its reproductive isolation from *O. ulmi* and *O. novo-ulmi* and its other biological features demonstrate that it is a distinct sibling species from *O. ulmi* and *O. novo-ulmi*, and it is designated as a new species, *Ophiostoma himal-ulmi* sp. nov.

The discovery of *O. himal-ulmi* should help resolve the problem of the origins of Dutch elm disease, while the occurrence of an apparently endemic Dutch elm disease system in the Himalayas may present new opportunities for the biological control of the disease elsewhere. These possibilities are discussed.



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Ophiostoma himal-ulmi sp. nov., a new species of Dutch elm disease fungus endemic to the Himalayas, the Andromeda nebula integrates a mixed subject.

Cerato-ulmin, a hydrophobin secreted by the causal agents of Dutch elm disease, is a parasitic fitness factor, the quantum state is legitimate.

The transmission of Dutch elm disease: a study of the process involved, subtext weakens the law.

Some phytotoxic glycopeptides from *Ceratocystis ulmi*, the Dutch elm disease pathogen, a priori, a connected set konfrontalno hydrolyzes positional positivism.

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