Abstract of Doctoral Dissertation

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Title of Doctoral Dissertation

A morphological and phylogenetic study of the genus *Chondria* (Rhodomelaceae, Rhodophyta)
【紅藻ヤナギノリ属（フジマツモ科）の形態学的および系統学的研究】

The red algal tribe Chondrieae F. Schmitz & Falkenberg (Rhodomelaceae, Rhodophyta) currently contains seven free-living genera and two parasitic genera. The type genus is *Chondria* C. Agardh which currently includes more than 80 certain species. The tribe Chondrieae is superficially similar to the tribe Laurencieae F. Schmitz, but differs in the number of pericentral cells, origin of tetrasporangia and shape of spermatangial branches. Since the introduction of molecular tools for macroalgal systematics, some taxa of the Rhodomelaceae have been studied in attempts to clarify relationships among genera and species, especially in the tribe Laurencieae. In contrast, the Chondrieae almost has not been drawn attention, especially in terms of molecular and phylogenetic studies. Therefore, the current classification of the Chondrieae is still based almost entirely on morphological characters. This study was carried out to produce the comprehensive molecular phylogeny of *Chondria* as the type genus of the Chondrieae and to verify the current classification of *Chondria* by morphological analyses, using specimens mainly from Japan.

The molecular phylogenetic analyses were conducted based on RuBisCO large subunit (*rbc*L), small subunit of nuclear ribosomal rRNA (SSU rRNA) and mitochondrial cytochrome oxidase subunit 1 (*cox*1) gene sequences; new sequences were generated for 12 species. While the Chondrieae was moderately supported and sister to the Laurencieae, the genus *Chondria* did not form a clade, being intermingled with the genera *Acanthophora* J.V. Lamouroux and *Acrocystis* Zanardini (*rbc*L and SSU rRNA trees). Morphological characters which have been adopted to identify *Chondria* species in previous works (e.g. shape of branchlets and apices, male or female reproductive morphologies) were evaluated whether these characters reflect their molecular phylogeny or not. These taxonomic characters did not correspond to the phylogenetic trees. The phylogenetic trees were shown to be not support the subgenera *Euchondria*, *Coelochondria* and *Platychondria* in the genus *Chondria.*

Two species previously identified as a member of the genus *Chondria*, the Japanese '*Chondria capillaris*' and '*Chondria nidifica*', were segregated from *Chondria* and clustered in the same clade isolated from other species of the tribe Chondrieae in *rbc*L and SSU rRNA trees. The clade of the two species was sister to the clade of the Laurencieae and other species of the Chondrieae with moderate supports. The new genus *Neochondria* was proposed to accommodate these two species: *Neochondria ammophila* S. Sutti, M. Tani, Y. Yamagishi, T. Abe & K. Kogame sp. nov. (= Japanese *C. capillaris*) and *Neochondria nidifica* (Harvey) S. Sutti, T. Abe, K.A. Miller & K. Kogame comb. nov. (= *C. nidifica*). *Neochondria* strikingly resembles *Chondria* in gross morphology and shares several characters, but it can be distinguished from the latter by the presence of adventitious elongate cells that form densely compact layers between the pericentral cells and surround the axial strand even in ultimate branchlets.

Specimens formerly identified as *Chondria dasyphylla* (Woodward) C. Agardh in Japan were reexamined using morphological and molecular phylogenetic analyses. It was revealed that the specimens consisted of multiple species: *Chondria acuminata* sp. nov., *Chondria* cf. *curdieana* (Harvey ex J.Agardh) De Toni and an unidentified species (*Chondria* sp. 1). *Chondria acuminata* sp. nov. is characterized by its distinctively acuminate branchlets. *Chondria* cf. *curdieana*, which was firstly reported from Japan, shares most morphological characters with the Australian *Chondria curdieana.* The last taxon, *Chondria* sp. 1 did not resemble any described *Chondria* species from Japan. Morphological and molecular data (*rbc*L, SSU and *cox*1) demonstrated the identity of these three species, suggesting that they are members of the genus *Chondria* and are distinct from the authentic *C. dasyphylla.*