

NOTES ON A NEW SYSTEM CLASSIFYING PLANTS OCCURRING IN ULTRAMAFIC ROCK AREAS

By Hideo TOYOKUNI*

I. Introduction

From June 19 to 22, 1991, the 1st "International Conference on Serpentine Ecology" was held at the University of California in Davis, U. S. A., and many important papers on serpentine ecology were read by participants assembled from different parts of the world. I attended at the conference and read a paper entitled "Japanese serpentinophytes: their classification and distribution". On that occasion, I proposed a new system classifying plants occurring in ultramafic rock areas. An abstract of my paper read at the conference will be published in the Proceedings of the Conference (in press). However, as the abstract will be too short to explain in detail my proposal for new categories of classification of the so-called serpentinicolous plants, I would like to introduce my system of classifying plants occurring in ultramafic rock areas in this paper.

Before going further, I would like to express my hearty thanks to Professor Arthur R. KRUCKEBERG, University of Washington, Seattle for his kind invitation to this memorable 1st International Conference on Serpentine Ecology, and to Professor Shiro NOSAKA, Aichi University of Education, Kariya, for his valuable data on Japanese serpentinicolous plants given to me. My sincere gratitude is also expressed to Dr. Naoharu MIZUNO, Experimental Farm, Tokyo University of Agriculture, Abashiri, with whom I attended at the International Conference, for his valuable advice. Last, but not least, I also thank Professor Toshihiko SATO of our Faculty of Liberal Arts for his kind information on the geology of ultramafic rocks.

II. Historical Survey on Systems of Classification

PANČIĆ was the first to describe peculiar vegetation of ultrabasic rock areas in his paper entitled "Flora der Serpentinebirge in Mittel-Serbien" (PANČIĆ 1859), but he didn't attempt to classify plants in ultrabasic rock areas into special categories. In 1928, NOVÁK attempted to classify peculiar plants occurring in ultrabasic rock areas as "les types serpentiniques" (*i. e.* serpentinophytes) (NOVÁK 1928). In his later paper, NOVÁK subdivided serpentinophytes into (1) obligate serpentinophytes, and (2) facultative ser-

* Biological Institute and Herbarium (SHIN), Faculty of Liberal Arts, Shinshu University, Matsumoto 390, Japan

serpentinophytes, the former category means “plants found only in ultrabasic rock areas”, while the latter one means “plants found preferentially in ultrabasic rock areas, but sometimes found in soils of another lithological origin” (NOVÁK 1937). PICHI-SERMOLLI in 1948, adopting the opinion of NOVÁK divided serpentinophytes into two subgroups: (1) serpentinofite tipiche (*i. e.* typical serpentinophytes), and (2) serpentinofite preferentiale (*i. e.* preferential serpentinophytes). He also introduced a new category “serpentinicolous relics”, denoting plants that have survived in ultrabasic rock areas owing to specific, edaphic conditions.

In 1953, RUNE attempted to classify all plants that occur in ultrabasic rock areas as follows:

- A. Serpentine-characteristic or serpentinicolous plants
 - a. Serpentinophytes
 - 1. Typical serpentinophytes
 - 2. Preferential serpentinophytes
 - b. Serpentinicolous relics
 - c. Serpentinicolous ubiquitous
- B. Serpentine-indifferent plants
- C. Serpentine-accidental plants

In virtue of this elaborate work (RUNE 1953), the classification of plants occurring in ultrabasic rock areas was almost stabilised and established.

However, from the ecological viewpoint, the meaning of the term serpentine has come to involve not only serpentinites but also other ultrabasic rocks, such as peridotites and soapstones (RUNE 1953). Accordingly, the terms “serpentinicolous plants” and “serpentinophytes” have historically long been used for *characteristic plants occurring in any ultrabasic rock areas* and *plants specialised there*, respectively. However from the geological viewpoint, serpentinites denote only a part of the ultrabasic rocks. In this connection, I proposed in 1955 to use the terms “ultrabasicosaxicolous plants” and “ultrabasicosaxophytes”, respectively, instead of “serpentinicolous plants” and “serpentinophytes” (TOYOKUNI 1955, 1982, INAGAKI *et al.* 1968).

My system was as follows:

- A. Ultrabasicosaxicolous plants (*i. e.* ultrabasic rock characteristic plants)
 - a. Typical ultrabasicosaxophytes
 - b. Preferential ultrabasicosaxophytes
 - c. Ultrabasicosaxicolous relics
- B. Ultrabasic rock ubiquitous
- C. Ultrabasic rock-indifferent plants
- D. Ultrabasic rock-accidental plants

But, recently geologists prefer to use the term “ultramafic rocks” rather than “ultrabasic rocks”, so I wish to propose here the following terms in describing plants

occurring in ultramafic rock areas. Other than nomenclature, I have mostly followed the system proposed by me in 1982.

A. Ultramaficolous plants

Plants that occur more frequently or abundantly in ultramafic rock areas than in the surrounding ones, either being of morphologically recognisable phases or being geographically isolated from their allies.

a. Ultramaficophytes

Morphologically recognisable taxa, appearing exclusively or preferentially in ultramafic rock areas, not being geographically isolated from related taxa.

1. Typical ultramaficophytes

Plants occurring exclusively in ultramafic rock areas.

2. Preferential ultramaficophytes

Plants occurring preferentially in ultramafic rock areas.

b. Ultramaficolous relics

Plants occurring disjunctively in ultramafic rock areas, and geographically isolated from the allied taxa.

c. Ultramaficolous ubiquitous

Plants in ultramafic rock areas not appearing as morphologically recognisable taxa, and not being geographically isolated from the allied taxa, namely the morphologically unchanged phases derived from the ubiquitous plants of the surrounding areas.

B. Ultramafic rock-indifferent plants

Plants occurring in ultramafic rock areas at about the same rate as in other areas in the vicinity.

C. Ultramafic rock-accidental plants

Plants occurring accidentally in ultramafic rock areas.

The followings are some examples of ultramaficolous plants in Japan: *Betula apoiensis*, *Viola yubariana*, *Primula yuparensis*, *Lagotis glauca* subsp. *takedana*, *Taraxacum yuparense*, *Hierochloe pluriflora*, etc. are typical ultramaficophytes, *Euphorbia sieboldiana* f. *montana*, *Angelica stenoloba*, etc. are preferential ultramaficophytes, and *Draba japonica*, *Crepis gymnopus*, *Saussurea chionophylla*, etc. are ultramaficolous relics. Ultramafic rock ubiquitous are *Stellaria nipponica* f. *yezoensis*, *Thlaspi japonicum*, *Aconitum yuparense*, etc. Ultramafic rock-indifferent plants are too many to mention, and ultramafic rock-accidental plants are very diverse in a manner of *cujus regio ejus religio*, so I don't quote their names here.

III. Summary

A new classification of plants occurring in ultramafic rock areas was introduced. The system of the classification is as follows:

A. Ultramaficolous plants

- a. Ultramaficophytes
 - 1. Typical ultramaficophytes
 - 2. Preferential ultramaficophytes
- b. Ultramaficolous relics
- c. Ultramafic rock ubiquests
- B. Ultramafic rock-indifferent plants
- C. Ultramafic rock-accidental plants

IV. References

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