

PHYTOSOCIOLOGICAL PRECISIONS ON SOME VEGETATION TYPES OF THE PACIFIC NORTHWEST TERRITORIES

Precisiones fitosociológicas sobre algunos tipos de vegetación de los territorios del Pacífico Noroeste

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As a result of the workshop “Vegetation Classification and Phytogeography of Circumboreal Coniferous Forests” held in association with the 44th Symposium of the International Association for Vegetation Science (Freising-Weihenstephan, Germany, 29 July-4 August 2001) a special issue of *Folia Geobotanica* has been published [CHYTRÝ & SPRIBILLE (ed.). Vegetation of Circumboreal Coniferous Forests. *Folia Geobot.*, 37 (4). 2002]. This compilation includes two local contributions concerning typological and descriptive phytosociology on some coniferous forests of British Columbia (Canada) and Montana (US) territories [SPRIBILLE in *Folia Geobot.*, 37 (4): 475-508 and STACHURSKA-SWAKÓN & SPRIBILLE in *Folia Geobot.*, 37 (4): 509-540. 2002].

We present here several concepts, nomenclatural aspects, and characteristic species, in addition to establishing the correct synonymies giving a detailed list concerning the involved vegetation-types. We include below only the implicated phytosociological high units strictly following the current issue of the International

Code of Phytosociological Nomenclature published by WEBER, MORAVEC & THEURILLAT [in *J. Veg. Sci.*, 11: 739-768. 2000].

We follow the bioclimatical and biogeographical proposals published in our monograph [*Itinera Geobot.*, 12: 5-316. 1999]. For nomenclature we use the catalogues of BONAP/MIP [*Biota of North America Program of the North Carolina Botanical Garden. A synonymized checklist of the vascular flora of the United States, Canada and Greenland* (http://www.mip.berkeley.edu/query_forms/browse_checklist). Museum Informatic Project. Berkeley, CA. 2000] which basically follow the classic checklist of KARSTZ [A *synonymized checklist of the vascular flora of the United States, Canada and Greenland.*, vol. 1, 2nd ed. Timber Press. Portland, OR. 1994]. The published volumes of "Flora of North America" [MORIN (ed.), *Flora of North America, North of Mexico*. Oxford University Press. New York, NY. 1993-2003] were also considered.

TSUGETEA MERTENSIANO-HETEROPHYLLAE Rivas-Martínez, Sánchez-Mata & Costa 1999 [in *Itinera Geobot.*, 13: 350].

Typus: *Tsugetalia mertensiano-heterophyllae* Rivas-Martínez, Sánchez-Mata & Costa 1999 [in *Itinera Geobot.*, 12: 78. 1999].

North American climactical and permanent edaphophilous coniferous forests of the North-Western Pacific biogeographical subregion (Rocky Mountain Region), spreading mainly into Oceanic Temperate bioclimate territories (including the Submediterranean bioclimatical variant), but also in certain areas with other bioclimates such as Hyperoceanic Temperate, Pluviseasonal Oceanic Mediterranean and Oceanic Boreal. According to the ombrothermic conditions, their timberlands should be macro- and megaforests but in very cold territories or poor soils, they may also be micro- and mesoforests.

These forests are distributed throughout the mesotemperate to orotemperate or hemiboreal areas with subhumid to ultrahyperhumid ombrotypes, and in meso- or supraboreal territories with humid to ultrahyperhumid ombrotypes. Locally these forest communities can also develop in meso- and supramediterranean areas with subhumid to humid ombrotypes. This kind of forest vegetation grows in all kinds of substrata, but frequently on cambisols, luvisols, andosols, regosols and podzols. Although their major diversity occurs throughout the territories of the Cascade biogeographical province, these forests are also common in the Boreal Oceanic Alaskan Province areas (with the exception of the Aleutian Islands and Alaska Peninsula Subsectors where coniferous forests are absent). Finally, the wooded vegetation covering dry coastal slopes and sand dunes (*Pinion contortae*) from Haines (Alaska) to Mendocino (California) could be recognized as micro- or mesoforest permanent communities.

We only recognize one order (*Tsugetalia mertensiano-heterophyllae*) and three alliances framed in this class: *Tsugion heterophyllae*, *Tsugion mertensianae*, and *Pinion contortae*.

Main characteristic species (class and order): *Acer glabrum* var. *douglasii*, *Adenocaulon bicolor*, *Alnus viridis* subsp. *sinuata*, *Aquilegia formosa*, *Arnica diversifolia*, *Aruncus dioicus* var. *pubescens*, *Aster subspicatus*, *Bromus sitchensis* var. *sitchensis*, *Carex concinnoides*, *Carex inops*, *Coptis aspleniifolia*, *Corallorbiza mertensiana*, *Clintonia andrewsiana*, *Clintonia uniflora*, *Cypripedium montanum*, *Disporum bookeri* var. *bookeri*, *Disporum smithii*, *Equisetum variegatum* subsp. *alaskanum*, *Heuchera glabra*, *Holodiscus discolor*, *Lactuca biennis*, *Lilium columbianum*, *Listera caurina*, *Lonicera ciliosa*, *Luzula divaricata*, *Menziesia ferruginea*, *Oemleria cerasiformis*, *Oplopanax horridus*, *Osmorbiza purpurea*, *Pedicularis racemosa* subsp. *racemosa*, *Pityopus californica*, *Polystichum andersonii*, *Polystichum dudleyi*, *Polystichum munitum*, *Rosa gymnocarpa*, *Rubus pedatus*, *Saxifraga odontoloma*, *Stachys ciliata*, *Stellaria crispa*, *Streptopus roseus* var. *curvipes*, *Tellima grandiflora*, *Thelypteris quelpaertensis*, *Tiarella trifoliata* var. *trifoliata*, *Tiarella trifoliata* var. *unifoliata*, *Tolmiea menziesii*, *Vancouveria planipetala*, *Viola glabella*, *Viola orbiculata*.

Tsugetalia mertensiano-heterophyllae Rivas-Martínez, Sánchez-Mata & Costa 1999 [in *Itinera Geobot.*, 12: 78].

Typus: *Tsugion heterophyllae* Rivas-Martínez, Sánchez-Mata & Costa 1999 [in *Itinera Geobot.*, 12: 83].

Syn.: *Thujetalia plicatae* Brooke, Peterson & Krajina in Sribille 2002 [in *Folia Geobot.*, 37 (4): 486] (syntax. syn., typus: *Lysichito americani-Chamaecyparidion nootkatensis* Brooke, Peterson & Krajina in Sribille 2002 [in *Folia Geobot.*, 37 (4): 500]), *Thujetalia plicatae* Brooke, Peterson & Krajina 1970 [in *Ecol. W. N. Amer.*, 2 (2): 271] (art. 8), (*Piceo engelmannii*) *Tsugo (mertensianae)-Vaccinietalia membranacei* Brooke, Peterson & Krajina 1970 [in *Ecol. W. N. Amer.*, 2 (2): 261] (art. 34c).

Tsugion mertensianae Rivas-Martínez, Sánchez-Mata & Costa 1999 [in *Itinera Geobot.*, 12: 104].

Typus: *Abieti amabilis-Tsugetum mertensianae* Brooke, Peterson & Krajina 1970 [in *Ecol. W. N. Amer.*, 2 (2): 263].

Syn.: *Lysichito americani-Chamaecyparidion nootkatensis* Brooke, Peterson & Krajina in Sribille 2002 [in *Folia Geobot.*, 37 (4): 500] (syntax. syn.), *Lysichition americani* Brooke, Peterson & Krajina 1970 [in *Ecol. W. N. Amer.*, 2 (2): 273] (art. 29b).

Oceanic Temperate (euoceanic and semicontinental) and barely subcontinental (Continental Temperate), and Oceanic Boreal (euoceanic and semicontinental) or barely subcontinental (Continental Boreal); orotemperate and supraboreal; perhumid and ultraperhumid; climactical coniferous micro-, meso- and macroforests, and also chionophilous or chionophobic permanent woodlands widespread throughout the territories of the Cascade and Boreal Pacific biogeographical provinces.

Main characteristic species: *Abies lasiocarpa*, *Abies lasiocarpa* x *amabilis*, *Abies procera*, *Abies procera* x *lasiocarpa*, *Aconitum delphiniifolium* subsp. *chamissonianum*, *Bromus sitchensis* var. *aleutensis*, *Chamaecyparis nootkatensis*, *Elliottia pyroliflorus*, *Erythronium montanum*, *Gaultheria humifusa*, *Larix lyallii*, *Ligusticum grayi*, *Luzula glabrata* var. *hitchcockii*, *Luzula piperi*, *Mertensia paniculata* var. *borealis*, *Mitella breweri*, *Picea* x *lutzii* (*Picea sitchensis* x *glauca*), *Pleuricospora fimbriolata*, *Pulsatilla occidentalis*, *Ranunculus suksdorfii*, *Rhododendron albiflorum*, *Ribes acerifolium*, *Rubus arcticus* subsp. *stellatus*, *Rubus lasiococcus*, *Rubus nivalis*, *Saussurea americana*, *Sorbus sitchensis* var. *grayi*, *Sorbus sitchensis* var. *sitchensis*, *Streptopus streptopoides* var. *brevipes*, *Tsuga mertensiana*, *Vaccinium membranaceum*, *Viola ocellata*.

Tsugion heterophyllae Rivas-Martínez, Sánchez-Mata & Costa 1999 [in *Itinera Geobot.*, 12: 83].

Typus: *Vaccinio ovati-Piceetum sitchensis* Rivas-Martínez, Sánchez-Mata & Costa 1999 [in *Itinera Geobot.*, 12: 85].

Syn.: *Abieti lasiocarpae-Tsugion heterophyllae* Spribille 2002 [in *Folia Geobot.*, 37 (4): 492] (syntax. syn., typus: *Pleurozio schreberi-Tsugetum heterophyllae* Bell in Spribille 2002 [in *Folia Geobot.*, 37 (4): 495 (*)]; incl. *Gymnocarpo dryopteridis-Abietion lasiocarpae* Wali & Krajina in Peinado, Aguirre & Cruz 1998 [in *Plant Ecol.*, 137: 192] (art. 8, 38), typus: *Gymnocarpo dryopteridis-Abietetum lasiocarpae* Wali & Krajina in Peinado, Aguirre & Cruz 1998, *loc. cit.* (nomen dubium et ambiguum, art. 37, 36) [RIVAS-MARTÍNEZ, SÁNCHEZ-MATA & COSTA 1999 [in *Itinera Geobot.*, 12: 56 et *Stud. bot.*, 18: 162]].

North American climactical coniferous meso-, macro- and megaforests widespread throughout the territories of the North-Western Pacific biogeographical subregion (Rocky Mountain Region), reaching the Cascade and Boreal Oceanic Alaskan biogeographical provinces. They are distributed throughout the mesoboreal, hemiboreal, meso-, supra- and lower orotemperate and meso- and supramediterranean areas, with ombrotypes ranging from subhumid to ultrahyperhumid. These conifer forests grow on andosols, cambisols, luvisols and podzols, with eutric, dystric, humic, umbric, gleyic or stagnic properties.

Main characteristic species: *Abies amabilis* x *procera*, *Abies grandis*, *Abies procera*, *Achlys triphylla*, *Allotropa virgata*, *Anemone deltoidea*, *Arceuthobium abietinum*, *Arceuthobium tsugense*, *Asarum caudatum*, *Campanula scouleri*, *Chamaecyparis lawsoniana*, *Chrysolepis crbysophylla* var. *minor*, *Corydalis scouleri*, *Dicentra formosa* subsp. *formosa*, *Dicentra formosa* subsp. *oregona*, *Disporum bookeri* var. *oreganum*, *Frangula purshiana*, *Gaultheria ovatifolia*, *Gaultheria sballon*, *Lonicera conjugialis*, *Mahonia nervosa*, *Maianthemum dilatatum*, *Marah oreganus*, *Mitella caulescens*, *Mitella diversifolia*, *Oxalis trilliifolia*, *Polystichum setigerum*, *Rhododendron macrophyllum*, *Sequoia sempervirens*, *Trillium ovatum*, *Vaccinium ovatum*, *Vaccinium parvifolium*, *Vancouveria hexandra*, *Viola sempervirens*.

Remarks: (*) The interpretation of this association from British Columbia (Canada) made by SPRIBILLE [*op. cit.*, 2002: 480, tb. 1: r.n. 29-33] and based on unpublished material by BELL [*Phytocoenoses in the dry subzone of the interior western hemlock zone of British Columbia*. Ph. D. thesis, University of British Columbia. Vancouver. 1964] with some frequent trees in the canopy of the forest layer such as *Larix occidentalis* and *Pinus contorta* subsp. *latifolia* is not according to Bell's community-type [in SPRIBILLE, *op. cit.*, 2002: 507]. However, the community from Erie Creek (southeastern British Columbia) could easily be identified with the earlier published association *Piceo engelmannii-Tsugetum heterophyllae* Rivas-Martínez, Sánchez-Mata & Costa 1999 [in *Itinera Geobot.*, 12: 102].