Notes on epiphytic communities in forests of North Korea

Poznámky k epifytickým společenstvům v lesích Severní Koreje

Jiří Kolbek

Institute of Botany, Academy of Sciences of the Czech Republic, CZ–252 43 Průhonice, Czech Republic

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Forest epiphytic vegetation with fern *Neoniphopsis linearifolia* is reported from the Kumgangsan Mts., Korean Peninsula.

K e y w o r d s : Epiphyte, forest vegetation, Korean Peninsula

Compared with European forest vegetation, epiphytic plant species are not rare in forests of the northern part of Korean Peninsula. Due to favourable climatic conditions and high humidity during the summer months (monsoon), pteridophytes, in particular, establish on trees as epiphytes. Nine species of 5 families were observed in 1986, 1988 and 1990 in forests of North Korea (nomenclature of plant taxa follows the list of plant species names, Ri et Hwang 1984):

Aspidiaceae	*Camptosorus sibiricus,*
	Dryopteris crassirhizoma,
	Dryopteris saxifraga,
Davalliaceae	*Davallia mariesii,*
Hypolepidaceae	*Microlepia pilosella,*
Polypodiaceae	*Lepisorus ussuriensis,*
	Neoniphopsis linearifolia,
Selaginellaceae	*Selaginella involvens,*
	Selaginella rossii.

Twenty species of 16 families of seed plants were also observed as epiphytes. Their occurrence, however, is more rare or even only accidental:

Amitostigma gracile	*Orchidaceae*
Artemisia japonica, A. keiskeana	*Asteraceae*
Carex lanceolata, C. siderosticta	*Cyperaceae*
Chelidonium majus	*Papaveraceae*
Deutzia sp.	*Hydrangeaceae*
Diarrhena japonica, Tripogon chinensis var. *coreensis*	*Poaceae*
Hosta sp. div.	*Liliaceae*
Kalopanax pictus	*Araliaceae*
Lespedeza maximowiczii, Lespedeza sp.	*Fabaceae*
Pilea peploides	*Urticaceae*

Prunus leveilleana	*Amygdalaceae*
Saxifraga fortunei	*Saxifragaceae*
Sedum spectabile	*Crassulaceae*
Styrax obassia	*Styracaceae*
Tripterygium regelii	*Celastraceae*
Viola keiskei	*Violaceae*

Practically no epiphytes (except the lichen genus *Usnea*) were recorded in the coniferous woods (taiga) along the northern boundary with China, in the wider surroundings of the volcano Paektusan (study area: 1230–2000 m a. s. l.). *Larix olgensis* predominates in the tree layer, accompanied by *Abies nephrolepis*, *Picea jesoensis* and *P. koraensis*. In the deciduous forest districts of Myohyangsan, Taesongsan and Sujangsan of central part of North Korea, some species already appear as epiphytes.

The occurrence of epiphytes was most intensive in the mountain range Kumgangsan, on the coast of the Sea of Japan near the South Korean frontier. The climate is fairly warm there, with high totals of precipitation (Fig. 1), especially in summer. A forest community with epiphytes as a permanent and significant component was found there. Among the epiphytic species, the fern *Neoniphopsis linearifolia* is absolutely predominant, occurring regularly on old individuals of forest woody plants. Scree and boulder forests with old trees, whose habitus resembles the Central European scree communities of the alliance *Tilio-Acerion*, occur at altitudes of 300–560 m below the hill Samsonam, on the northeastern slopes of the Kumgangsan Mts. The species composition of the tree and shrub layer is evident from Table 1. The herb layer is dominated by *Dryopteris* and *Athyrium* species. Among the most constant taxa are *Ainsliaea acerifolia, Dryopteris*

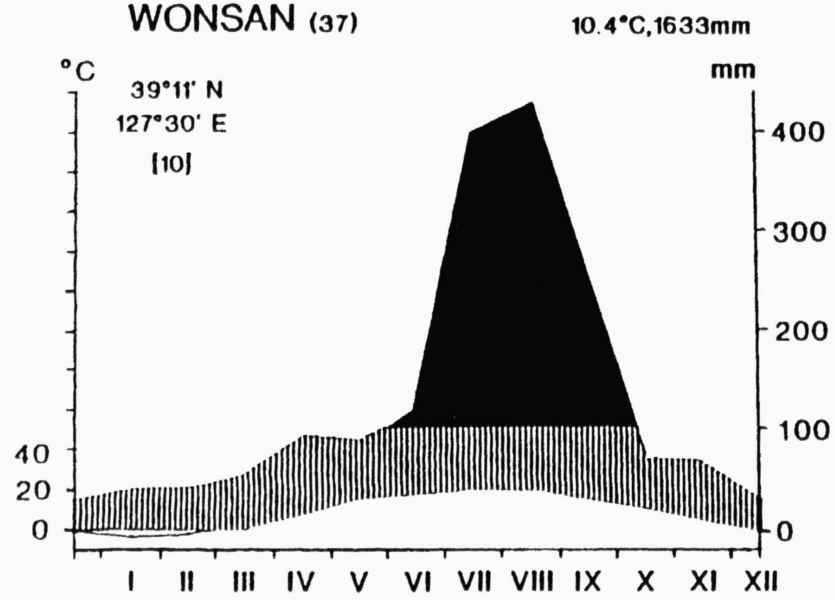

Fig. 1. – Climatic characteristics of Wonsan situated ca. 80 km NW from Kumgangsan Mts. (according to Krebs et al. 1984, modified).

Table 1. – Mean constancy values (based on 3 relevés) of tree and shrub layer in forests of the Kumgangsan Mts., North Korea, infested by vascular epiphytes. The range of dominance/abundance estimated by Braun-Blanquet 7-grade scale (Braun-Blanquet 1964) is given in parentheses.

Tree layer		
Quercus mongolica	100	(1–4)
Acer mono	100	(1–2)
Betula schmidtii	100	(1–2)
Carpinus cordata	100	(1–2)
Fraxinus rhynchophylla	100	(1–2)
Magnolia sieboldii	100	(1)
Acer pseudosieboldianum	67	(1–2)
Cornus controversa	67	(1–2)
Styrax obassia	67	(1–2)
Tilia amurensis	67	(+–1)
Juglans mandshurica	33	(2)
Tilia mandshurica	33	(2)
Kalopanax pictus	33	(1)
Prunus leveilleana	33	(1)
Actinidia polygama	33	(+)
Shrub layer		
Benzoin obtusilobum	100	(2–3)
Acer pseudosieboldianum	100	(1–2)
Actinidia polygama	100	(1–2)
Magnolia sieboldii	100	(1–2)
Styrax obassia	100	(1–2)
Carpinus laxiflora	100	(+–3)
Euonymus oxyphylla	100	(+–2)
Corylus heterophylla	100	(+–1)
Tilia amurensis	67	(1–2)
Carpinus cordata	67	(+–2)
Tripterygium regelii	67	(+–2)
Acer mono	67	(+–1)
Rhododendron schlippenbachii	67	(+–1)
Vitis amurensis	67	(+–1)
Actinidia kolomicta	67	(+)
Lespedeza maximowiczii	67	(+)
Rhus trichocarpa	67	(r–+)
Tilia mandshurica	33	(2)
Fraxinus rhynchophylla	33	(1)
Maackia amurensis	33	(1)
Philadelphus schrenckii	33	(1)
Prunus leveilleana	33	(1)
Quercus mongolica	33	(1)
Acer tschonoskii	33	(+)
Betula chinensis	33	(+)
Corylus mandshurica	33	(+)
Forsythia ovata	33	(+)
Lonicera praeflorens	33	(+)
Marlea macrophylla	33	(+)
Palura paniculata	33	(+)
Prunus sp.	33	(+)
Quercus serrata	33	(+)
Rubus crataegifolius	33	(+)
Spiraea sp.	33	(+)
Stephanandra incisa	33	(+)
Weigela florida	33	(+)
Aralia elata	33	(r)
Callicarpa dichotoma	33	(r)
Deutzia sp.	33	(r)
Kalopanax pictus	33	(r)

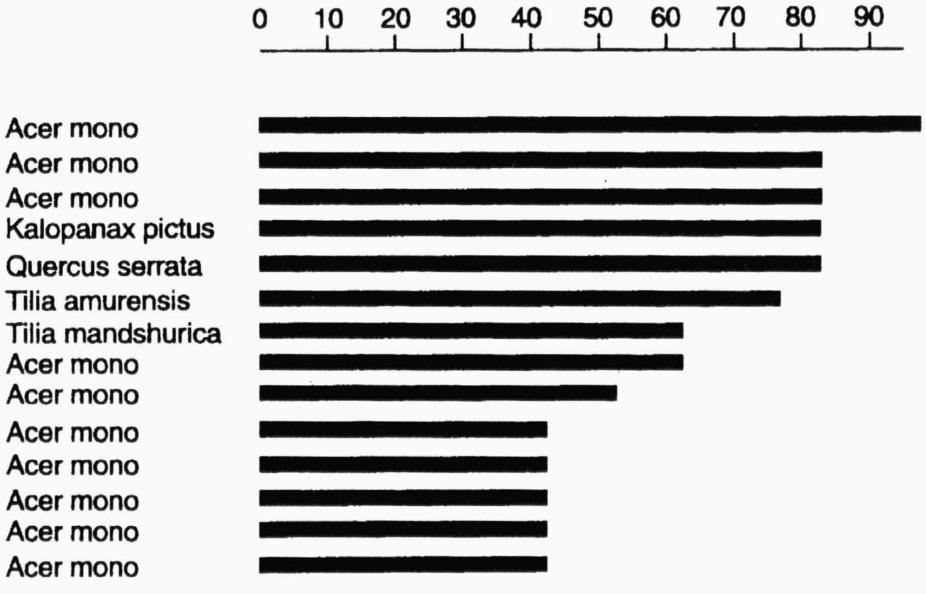

Fig. 2. – Cover (%) of *Neoniphopsis linearifolia* on the limbs of selected trees of different species in the Kumgangsan Mts., North Korea.

crassirhizoma, Polystichum tripteron, Asarum heterotropoides var. *mandshuricum, Rubia chinensis, Viola albida, V. selkerkii, Synurus pungens, Astilbe chinensis, Syneilesis palmata*, etc. The total number of species in the herb layer was 80.

The occurrence of epiphytes and their relation to particular forest woody plants was investigated in a sample plot 500 m^2 in size, situated at the altitude of 340 m. The dominant species *Neoniphopsis linearifolia* overgrows the surface of thicker limbs irrespective of geotropism, but with varying degree of cover. *Acer mono* was its most frequent host plant (Fig. 2). On the contrary, the epiphyte was absent from *Quercus mongolica* or trees with "smooth" bark (species belonging to the genera *Betula*, *Carpinus*, *Cornus*, *Fraxinus*, *Juglans*, *Magnolia*, *Prunus*, *Styrax* and species *Acer pseudosieboldianum*). The surface area of thicker and older limbs continuously covered by this epiphyte can be estimated from 2 to 7 m^2, with cover density between 40 and 95 %. As an accompanying phenomenon, frequent occurrence of various mosses and lichens was observed; however, it was impossible to determine particular species.

With some exceptions, the forest vegetation of the northern part of the Korean Peninsula has not been sufficiently known so far (Li et Li 1986, Dostálek et al. 1988, Neuhäusl et Neuhäuslová 1994) and the East Asian forest epiphytic communities have not been classified either. I do not know any literature describing a vegetation type similar to that encountered on the territory under study or in its neighbourhood, e.g. (1) Northeastern Asia (Song 1992), (2) Korean Peninsula (Yim et Kira 1975–1977), (3) China (Danert, Geier et Hanelt 1961, Wang 1961, Hou 1983), (4) South Korea (Kim J.-W. 1990, Kim J.-W. et Kim J.-H. 1988, Kim J.-U. etYim 1988, Song 1988, 1991, Song et Nakanishi 1985, Song, Nakanishi et Itow 1990, Takeda, Nakanishi et Choe 1994), and (5) Japan (Miyawaki 1980–1989, Ohno 1983, Kim J.-W. 1989).

Vascular epiphytic vegetation is a very common phenomenon on trees in the tropics (occurring less commonly in the subtropics) but its occurrence in continuous forest stands of the temperate zone of the Korean Peninsula is a remarkable, previously not reported feature. It should be taken into consideration that vascular epiphytes occur only on old trees in natural plant communities and that they could be irreversibly destroyed by some unsuitable, ill-considered action.

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Souhrn

Během tří expedic do KLDR v létech 1986, 1988 a 1990 byl sledován výskyt cévnatých epifytů v lesní vegetaci. Ze semenných rostlin bylo zjištěno 20 taxonů 16 čeledí, z kapraďorostů 9 druhů 5 čeledí, které se častěji chovaly jako epifyty. Ve střední části Korejského poloostrova v horách Kumgangsanu byly nalezeny staré, druhově bohaté lesní porosty (tab. 1), v jejichž stromovém patře dominuje kapradina *Neoniphopsis linearifolia* (*Polypodiaceae*), která selektivně porůstá větve některých dřevin (obr. 2). Podobný typ epifytické vegetace mi není znám z dostupné literatury z Korejského poloostrova ani sousedních území (Japonsko, Čína).

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