

## Further studies on lichens from Venezuela with new and interesting records

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**Abstract:** NEUWIRTH, G. 2008. Further studies on lichens from Venezuela with new and interesting records. – *Herzogia* 21: 147–156.

Descriptions and images of 60 corticolous, terricolous and saxicolous lichen species collected on nine localities in different elevations spread over the whole area of Venezuela between the Caribbean coast, montane regions in the Andes and rainforest regions in the South are presented. 24 lichen species are new to Venezuela.

**Zusammenfassung:** NEUWIRTH, G. 2008. Weitere Studien über Flechtenarten aus Venezuela mit neuen und interessanten Funden. – *Herzogia* 21: 147–156.

Beschreibungen und Fotos von 60 rinden-, boden- und gesteinsbewohnenden Flechtenarten, gesammelt an neun verschiedenen Orten in unterschiedlichen Höhenlagen verteilt über das gesamte Gebiet von Venezuela zwischen der Karibischen Küste, den montanen Regionen der Anden und den Regenwaldgebieten im Süden, werden vorgestellt. 24 Arten sind neu für Venezuela.

**Key words:** Lichenized Ascomycetes, biodiversity, South America.

### Introduction

In addition to the paper on foliicolous lichen species based on the results of five field trips in Venezuela in 2005 (NEUWIRTH 2007), twenty four further species are reported from Venezuela for the first time. The current publication describes corticolous, terricolous and saxicolous species in nine different areas and elevations from sea level up to 4300 m, collected within the same Venezuelan tour.

The variety of landscapes in this South American region is reflected in many specimens treated in this paper. In contrast to foliicolous lichens mostly found in rainforests, the following lichen species are distributed from dry coastal areas up to the montane regions in the Andes.

Many studies on lichens from South American regions are cited in literature (MÜLLER 1880, SATO 1968, HERTEL 1971, 1974, RAMÍREZ REYES & SKOREPA 1974, HALE 1975, 1976, LÓPEZ-FIGUEIRAS 1977, 1979, 1981a, 1981b, 1982, 1983, 1985, 1986, LÓPEZ-FIGUEIRAS & MORALES MENDEZ 1989, KALB 1982, KALB & VĚZDA 1988, APTROOT 1991, MARCANO et al. 1996, VARESCHI 1973, 2001, KOMPOSCH & HAFELLNER 1999, 2000, 2002, 2003, KOMPOSCH et al. 2002, SIPMAN 1992, 1994, NEUWIRTH 2007), but in general lichen species seem to be collected poorly in Venezuela, the most recent checklist (FEUERER 2008) presents 1319 taxa.

Several selected lichen species are cited from adjacent countries or from regions of Central America to render the possibility of comparison to the distribution in the neotropics. It is impossible to present a complete list of records in South America within this paper, because the extreme ecological differences between the Caribbean coast up to the Andes demonstrate an enormous biodiversity in the lichen flora of this country.

## Material and methods

Morphological aspects were examined by using a stereomicroscope Euromex Mic 1642 ZHT. Anatomical features have been studied by a light microscope Reichert Neovar on hand-cut sections or squash preparations of lichen material mounted in water or 20 % KOH.

The species *Diploschistes cinereocaesius* and *Hypotrachyna caraccensis* required additional investigations with thin-layer chromatography (TLC) to obtain correct results.

For determination of the species monographic treatments (AHTI 2000, AWASTHI 1975, HALE 1975, 1976, KALB 1987, KALB et al. 2004, MARBACH 2000, REDINGER 1935, STAIGER 2002, SPARRIUS 2004, WIRTH & HALE 1978), internet keys (SIPMAN 1998, 2005, 2006) and several smaller taxonomic papers were used.

All lichen species are cited with the abbreviation Gn (Gerhard Neuwirth) and a number of the authors personal herbarium (unless otherwise stated leg. et det. G. Neuwirth). Images are numbered and described to establish connections with the text. Some lichen specimens were left unidentified, especially species of the genera *Arthonia*, *Opegrapha*, *Platygramme* (Gn 8520, 8555, 8579), also two species on rocks of Lajas (*Pyrenopsis* sp., *Pyrenocollema* sp.; Gn 8030b, 8030c). Samples are deposited in the private herbarium of G. Neuwirth (Gn) and some duplicates in the herbarium of Berlin (B 600158719, 600158720, 600158721, 600158722).

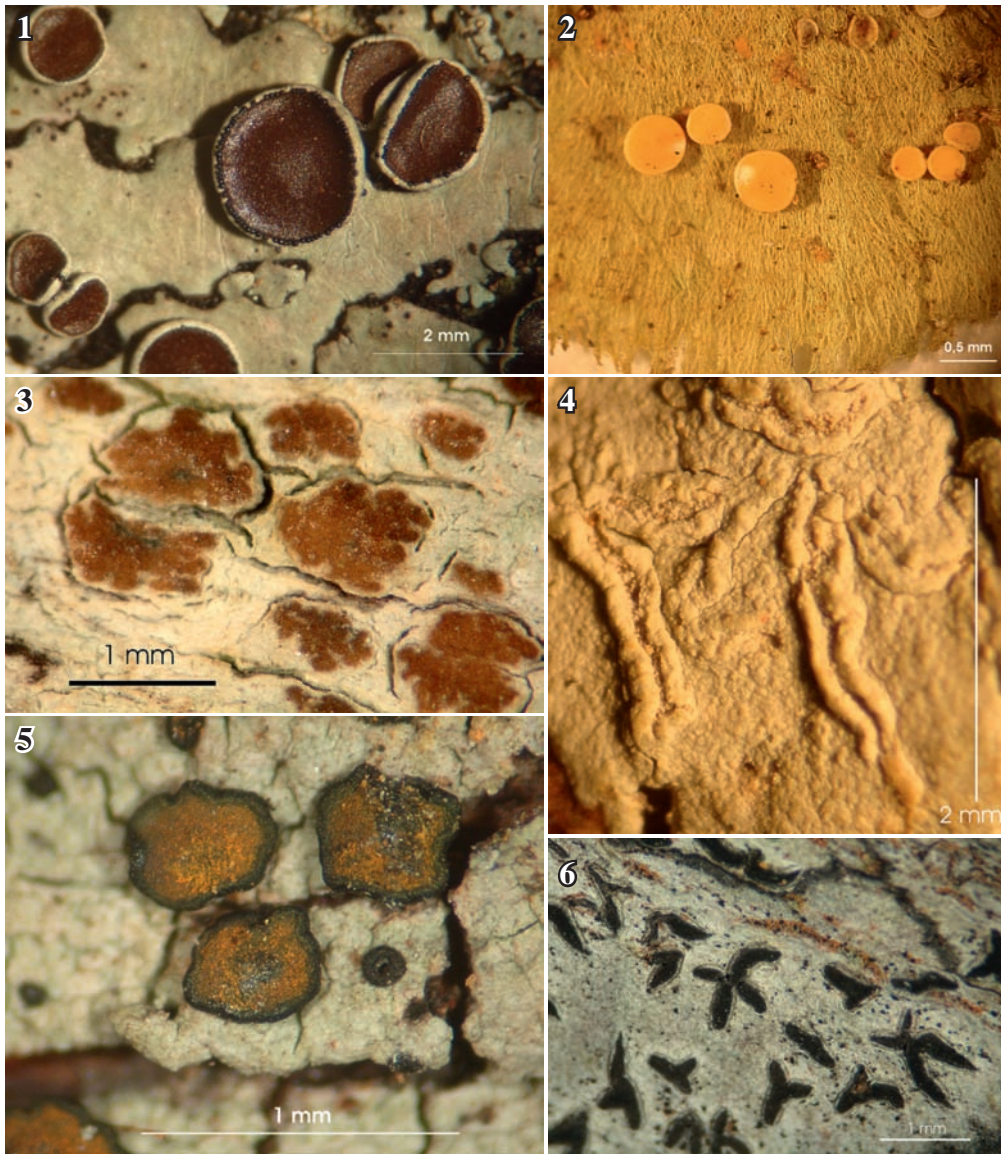
## Localities

All specimens were collected during a four-week trip through ecological different parts of Venezuela in 2005. On the assumption that most localities are well-known from the first part (NEUWIRTH 2007), the creation of a second map of Venezuela was omitted, new localities will be presented in the lines below.

- L 1: El Ávila;** North of Caracas; part of Cordillera de la Costa. Montane rainforest; trees along the trail between Hotel Humboldt and cable railway station (990–1100 m); 30.10.2005.
- L 2: Colonia Tovar;** Cordillera de la Costa, 80 km west of the capital, between Caracas and Maracay; 31.10.2005.
- L 3: San Felipe;** La Mission. North coast region between Morón and Barquisemeto. *Eucalyptus* trees; 250 m; 2.11.2005.
- L 4: Timotes;** Western Venezuela, Andes. Slopes along the mountain road from Valera to Mérida; c. 2500 m; 3.11.2005.
- L 5: Aguila Pass;** Western Venezuela, Andes. Highest elevation of the road, 4200 m. Collected in Páramos in the surrounding area of Pico El Aguila. *Espeletia* vegetation between 4200 m and 4300 m, also silicate blocks and soil on exposed places within a region called “Tierra helada”.
- L 6: Laguna de Mucobaji;** Andes; road from Mérida to Barinas. Walking tour from Laguna Mucobaji to Laguna Negra in elevations between 3500 m and 3600 m; 4.11.2005.
- L 7: Camp Orinoquia;** 20 km south of Puerto Ayacucho (Prov. Amazonas). Eastern banks of Rio Orinoco. Shrubland on granite blocks of Lajas in adjacent areas of the camp between 100 m and 150 m; 10.11.2005.
- L 8: Rio Caura;** south of Las Trincheras on western banks of the river; primary lowland rainforest, c. 100–150 m; 13.11.2005.
- L 9: Laguna de Tacarigua;** North Venezuela, Caribbean coast, Tortuga Lodge. Habitats c. 1 km from coast in mangrove forest on shrubs; 19.11.2005.

**New records to Venezuela:**

- Arthonia complanata* Fée: Cortic.; on shrubs. L 8 (Gn 8475, det. O. Breuss). Reported from Costa Rica only (BREUSS 2000).
- Arthonia conferta* (Fée) Nyl.: Fig. 3; Cortic.; on branches of shrubs. L 9 (Gn 8552, 8554, 8555, det. H. Sipman; B 600158720).
- Bulbothrix coronata* (Fée) Hale. Syn.: *Parmelia relicina* var. *coronata* (Fée) Müll.Arg.; Fig. 1; Cortic.; on shrubs; L 7 (Gn 8416, 8419, 8432, 8436, 8438, 8443, 8447, 8450). This rare lichen species shows distinct bulbate cilia, plane to rugulose lobes and coronate apothecia with pycnidia, sometimes faintly maculate (HALE 1976). Found in communities with *Stigmatochroma gerontoides* and *Pyrrhospora russula* on bark of shrubs. Reported in South America from Brazil (KALB 1982; HALE 1976) and Paraguay (HALE 1976).
- Coenogonium lepreurii* (Mont.) Nyl.: Fig 2; Cortic.; L 8 (Gn 8484). Growing on bark of shrubs in primary lowland rainforest. The species has been reported as foliicolous by LÜCKING & KALB (2000) from Brazil, LÜCKING (1999) and BREUSS & NEUWIRTH (2007) from Costa Rica.
- Diplolabia afzelii* (Ach.) A.Massal.: Cortic.; L 7 (Gn 8483b). A frequent species in Central America already reported from Costa Rica (BREUSS & NEUWIRTH 2007) and also from Guyana (SIPMAN & APTROOT 1992, as *Graphis afzelii*).
- Diorygma junghuhnii* (Mont. & Bosch) Kalb, Staiger & Elix: Fig. 4; Cortic.; L 7 (Gn 8470). Reported from Brazil, Costa Rica, Guatemala and Guyana (KALB et al. 2004).
- Diorygma monophorum* (Nyl.) Kalb, Staiger & Elix: Cortic.; L 7 (Gn 8469). The lichen differs in its one-spored asci and large ascospores from other representatives of the genus *Diorygma*. Reported from Brazil, Colombia and El Salvador (KALB et al. 2004).
- Durietzia pallida* (Hook.) Yoshim.: Cortic.; L 6 (Gn 8536, det. O. Breuss).
- Enterographa anguinella* (Nyl.) Redinger: Cortic.; on shrubs in community with *Arthonia* sp. and *Opegrapha* sp.; L 9 (Gn 8558, det. H. Sipman). A pantropical species that reaches its northern-most distribution in Japan and the U.S.A., the southern-most in Uruguay and Australia (SPARRIUS 2004).
- Everniastrum limaeforme* (Taylor) Hale: Cortic.; on bark of *Eucalyptus* trees; L 3 (Gn 8038, det. O. Breuss).
- Gassicurtia coccinea* Fée: Cortic.; L 7 (Gn 8982). The genus *Gassicurtia* is part of the tropical *Buellia*-group with 2-celled ascospores, lacking algae in margin (MARBACH 2000).
- Gassicurtia ferruginascens* (Malme) Marbach & Kalb: Fig. 5; Cortic.; L 7 (Gn 8485). Reported from Brazil and Hawaii (MARBACH 2000).
- Graphis dissipens* Nyl.: Cortic.; L 7 (Gn 8515). Reported from Costa Rica by BREUSS & NEUWIRTH (2007) based on collections from the Bosque Esquinas rainforest. Cited by STAIGER (2002) from western South America.
- Graphis furcata* Fée: Cortic.; L 7 (Gn 8521, det. H. Sipman).
- Graphis librata* C.Knight: Cortic.; L 7 (Gn 8472, 8514; B 600158722). Closely related to *Graphis leptocarpa*, but with norstictic acid (WIRTH & HALE 1978).
- Graphis plurispora* (Redinger) Lücking & Chaves: Syn.: *Graphina pseudosophistica* var. *plurispora* Redinger. Cortic.; L 7 (Gn 8510, 8512, 8595). Reported from Brazil (REDINGER 1935) and Dominica (WIRTH & HALE 1978 as *Graphina plurispora*).
- Graphis ruiziana* (Fée) A.Massal.: Fig. 7; Cortic.; L 4 (Gn 8057). Mentioned by STAIGER (2002) from Costa Rica and Brazil.
- Graphis* cf. *virescens* Müll.Arg.: Cortic.; L 7 (Gn 8449).
- Opegrapha* cf. *bonplandiae* Fée: Fig. 8; Cortic.; L 9 (Gn 8549, det. H. Sipman).
- Phaeographis* cf. *adinconspicua* Sipman: Cortic.; L 7 (Gn 8421, 8424, 8426, 8429, 8451); L 8 (Gn 8481).
- Phaeographis brevinigra* Sipman: Fig. 6; Cortic.; L 8 (Gn 8448).
- Polymeridium albocinereum* (Kremp.) R.C.Harris: Cortic.; L 7 (Gn 8498).
- Pseudopyrenula diluta* (Fée) Müll.Arg. var. *diluta*: Cortic.; L 7 (Gn 8509, 8513).
- Stigmatochroma gerontoides* (Stirt.) Marbach: Cortic.; L 7 (Gn 8442, 8446, 8499, 8504, 8507).



**Fig. 1:** *Bulbothrix coronata*.

**Fig. 3:** *Arthonia conferta*.

**Fig. 5:** *Gassicurtia ferruginascens*.

**Fig. 2:** *Coenogonium lepreurii*.

**Fig. 4:** *Diorygma junghuhnii*.

**Fig. 6:** *Phaeographis brevinigra*.

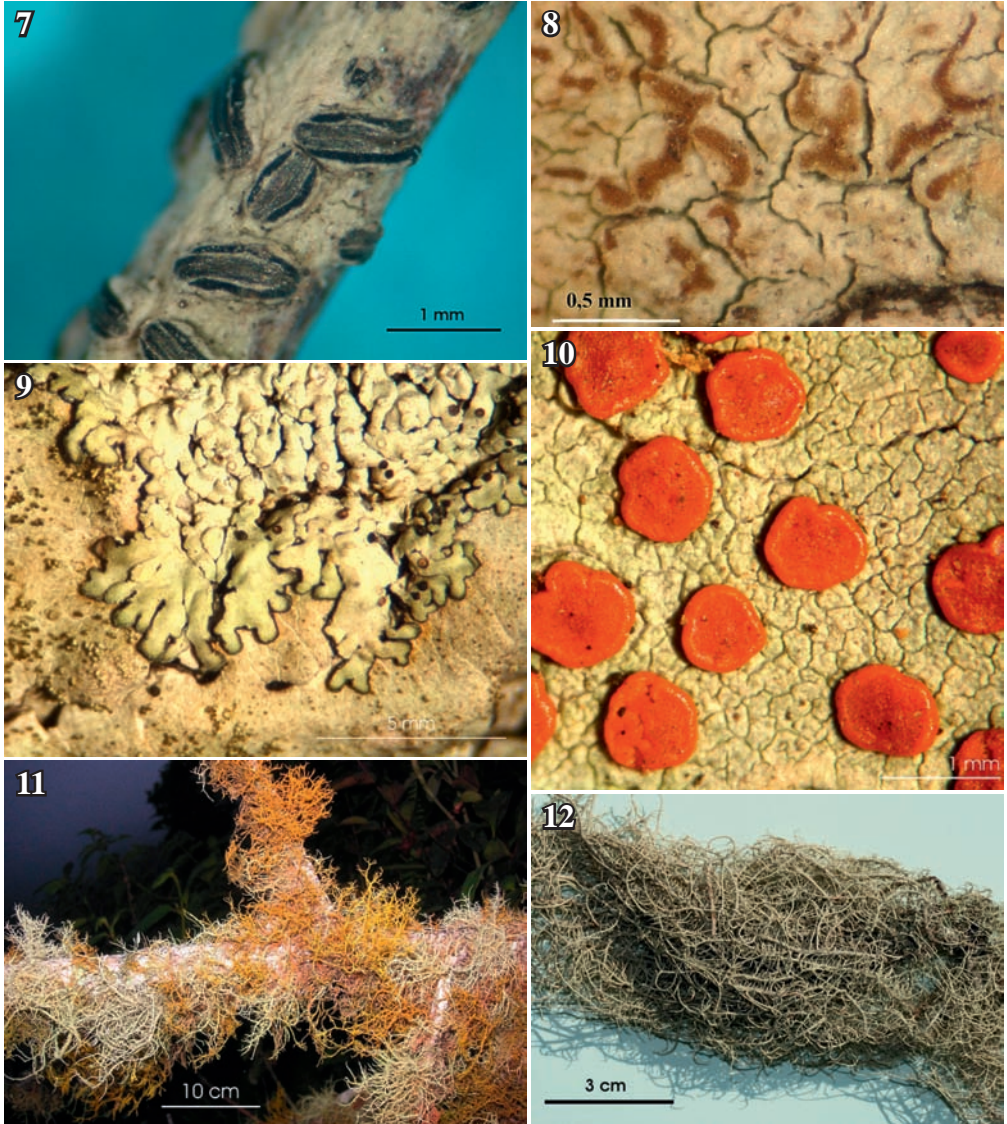
### Further lichen species:

*Bulbothrix apophysata* (Hale & Kurok.) Hale: Cortic.; on shrubs and dead wood; L 8 (Gn 8486); HALE (1976), LÓPEZ-FIGUEIRAS (1986); MARCANO et al. (1996).

*Canoparmelia amazonica* (Nyl.) Elix & Hale: Cortic.; typical adnate thallus on shrubs; L 7 (Gn 8422); VARESCHI (1973, as *Parmelia amazonica*).

*Cladonia corniculata* Ahti & Kashiwadani: Terric.; on soil over siliceous rocks; L 6 (Gn 8541); AHTI (2000). **Aragua:** Colonia Tovar, Pico Codazzi, 2200–2300 m, 1979, Ahti & Vareschi 37497 (H).





**Fig. 7:** *Graphis ruiziana*.

**Fig. 9:** *Dirinaria confluens*.

**Fig. 11:** *Teloschistes flavicans* & *Usnea* sp.

**Fig. 8:** *Opegrapha* cf. *bonplandiae*.

**Fig. 10:** *Pyrrhospora russula*.

**Fig. 12:** *Usnea baileyi*.

**Mérida:** El Cánaveral, 3100 m, 1976, López-Figueiras 12237b (H, MERF); Las Piedras–Cuenca del Aracay, 2600 m, 1975, López-Figueiras 9813 (H, MERF). **Miranda:** Los Guayabitos, 1350–1450 m, 1979, Ahti et al. 37449 (H). **Táchira:** Páramo de El Batallon, 3500 m, 1975, López-Figueiras & Keogh 9296 (MERF, US); Páramo de El Zumbador, 3600 m, 1975, López-Figueiras 9422 (MERF, US). **Trujillo:** Páramo de Guaramacal, 2750 m, 1975, López-Figueiras 10379 (H, MERF); Páramo de Guirigay, 3250 m, 1975, López-Figueiras & Ruiz-Terán 10803 (H, MERF).

***Cladonia cryptochlorophaea*** Asahina: L 6; (Gn 8530); AHTI (2000). **Aragua:** Tovar, Pico Codazzi, 2400 m, 1979; Ahti & Vareschi 37510 (H). **Distrito Federal:** El Ávila, 2000 m, 1958, Dennis 1507

- (BM, REN-Abbayes, VEN), 1900 m, 1981, López-Figueiras 25229 (H, MERF). **Táchira**: Páramo de Tamá, 2750–3100 m, 1980, López-Figueiras 24559 (H, MERF). **Trujillo**: At base of Páramo de la Christalina, 2400 m, 1975, López-Figueiras 10432 (H, MERF).
- Cladonia portentosa* (Dufour) Coem.: Terric.; L 6 (Gn 8534).
- Cryptothecia rubrocincta* (Ehrenb.: Fr.) Thor: Cortic.; L 1 (Gn 8043). Sample poorly developed. This suspicious species has been analysed as Christmas wreath lichen on samples from Brazil by EDWARDS et al. (2005). Mentioned in scrubs on exposed ridge and in mossy forest along streamlet, c. 1250–1500 m. Sipman 26775, camp 2 (1992); Sipman 27185, camp 5 (SIPMAN 1992). Also reported from Guyana (SIPMAN & APTROOT 1992) and Costa Rica (BREUSS 2001, 2004).
- Dictyonema glabratum* (Spreng.) D.Hawksw.: Syn.: *Cora pavonia* (Sw.) Fr.: Terricolous on siliceous rocks. L 5 (Gn 8022). VARESCHI (1973, as *Cora pavonia*); OBERWINKLER (1984, as *Cora pavonia*); AHTI (1992, as *Dictyonema pavonia*); BREUSS (2001, as *Cora pavonia*) from Costa Rica.
- Diploschistes cinereoceus* (Sw.) Vain.: Terric.; on soil in high elevation, gyrophoric acid absent (TLC: Leo Spier); L 5 (Gn 8025).
- Dirinaria confluens* (Fr.) D.Awasthi: Fig. 9; Cortic.; L 7 (Gn 8435, 8441, 8445).
- Graphis caesiella* Vain.: Cortic.; L 7 (Gn 8468); LÓPEZ-FIGUEIRAS (1986).
- Graphis dublicata* Ach.: Cortic.; L 7 (Gn 8501); DENNIS (1965).
- Hypotrachyna caraccensis* (Taylor) Hale: Terric.; L 5 (Gn 8016). With salicinic and stictic acids, no galbinic acid (TLC: Leo Spier). DENNIS (1965, as *Parmelia caraccensis*); VARESCHI (1973, as *Parmelia caraccensis*); LÓPEZ-FIGUEIRAS (1986); MARCANO (1991).
- Hypotrachyna densirhizinata* (Kurok.) Hale: Terric.; L 5 (Gn 8012). VARESCHI (1973, as *Parmelia densirhizinata*); HALE (1975); LÓPEZ-FIGUEIRAS (1986).
- Hypotrachyna paramensis* W.L.Culb. & C.F.Culb.: Cortic.; L 6 (Gn 8538). CULBERSON & CULBERSON (1981); LÓPEZ-FIGUEIRAS (1986).
- Ocellularia cavata* (Ach.) Müll.Arg.: Cortic.; L 7 (Gn 8984, det. O. Breuss).
- Parmotrema conformatum* (Vain.) Hale: Cortic.; L 7 (Gn 8522). VARESCHI (1973, as *Parmelia conformata*); LÓPEZ-FIGUEIRAS (1986).
- Parmotrema fasciculatum* (Vain.) Hale: Cortic.; L 7 (Gn 8497). LÓPEZ-FIGUEIRAS (1986).
- Parmotrema latissimum* (Fée) Hale: Cortic.; L 8 (Gn 8476). VARESCHI (1973, as *Parmelia latissima*); LÓPEZ-FIGUEIRAS (1986).
- Parmotrema peralbidum* (Hale) Hale: Cortic.; L 7 (Gn 8440). LÓPEZ-FIGUEIRAS (1986).
- Peltula tortuosa* (Nees) Wetmore: Terric.; L 8 (Gn 8473, det. O. Breuss). Species of this genus occur worldwide on exposed rock surface. Sample collected on surface of Lajas in South Venezuela. With the unicellular cyanobacterium *Chroococidiopsis* most of them possess the same cyanobiont (BÜDEL 2007; LANGE et al. 1993).
- Punctelia stictica* (Delise ex Duby) Krog: Terric.; L 5 (Gn 8029, det. O. Breuss). LÓPEZ-FIGUEIRAS (1986). Widespread but scattered in North and South America.
- Pyrenopsis* cf. *antillarum* Vain.: Saxic.; L 7 (Gn 8030, det. M. Schultz). On surface of Lajas in community with *Pyrenopsis* sp. and *Pyrenocollema* sp.
- Pyrrhospora russula* (Ach.) Hafellner: Fig. 10; Cortic.; L 7 (Gn 8414, 8431, 8437, 8441, 8500, 8507); LÓPEZ-FIGUEIRAS & MORALES (1989b, as *Biatora russula*).
- Pyxine pungens* Zahlbr.: Cortic.; L 7 (Gn 8478, det. O. Breuss).
- Ramalina subcalicaris* Nyl.: Saxic.; L 5 (Gn 8030, det. O. Breuss). VARESCHI (1973).
- Stereocaulon obesum* Th.Fr.: Terric.; L 5 (Gn 8024, det. O. Breuss). VARESCHI (1973); LÓPEZ-FIGUEIRAS (1986).
- Stereocaulon ramulosum* (Sw.) Räsch.: Terric.; L 6 (Gn 8533). DENNIS (1965); VARESCHI (1973); LÓPEZ-FIGUEIRAS (1986).
- Stereocaulon tomentosum* Fr.: Terric.; L 6 (Gn 8528). LÓPEZ-FIGUEIRAS (1986).
- Teloschistes flavicans* (Sw.) Norman: Fig. 11; L 4 (Gn 8050). VARESCHI (1953, 1973); DENNIS (1965); LÓPEZ-FIGUEIRAS (1986); MARCANO et al. (1995).

*Thamnolia andicola* Nyl.: Terric.; L 5 (Gn 8011). VARESCHI (1973).

*Trypethelium aeneum* (Eschw.) Zahlbr.: Cortic.; L 7 (Gn 8433, 8439, 8503), LÓPEZ -FIGUEIRAS (1986).  
A common and widespread crustose species on bark of many trees.

*Usnea baileyi* (Stirt.) Zahlbr.: Fig. 12; Cortic.; L 7 (Gn 8493, det. O. Breuss). **Estado Bolivar:** Cerro Guaiquinima, near NE edge of upper plateau, near camp 2, rocky sandstone area with shrub on exposed ridge; C 554??. 1250 m, H. Sipman 26768 c (B).

*Usnea bogotensis* Vain.: Fig. 13; Saxic.; L 6 (Gn 8531, det. O. Breuss); VARESCHI (1973); LÓPEZ-FIGUEIRAS (1986).

*Usnea rubicunda* Stirt.: Fig. 14; Cort.; L 4 (Gn 8049). DENNIS (1965); VARESCHI (1973).

*Xanthoparmelia cumberlandia* (Gyeln.) Hale: Terric.; L 5 (Gn 8027, det. O. Breuss). LÓPEZ-FIGUEIRAS (1986); HALE (1990). Common species.

*Xanthoria elegans* (Link) Th.Fr.: Saxic.; (Gn 8033). VARESCHI (1973, as *Caloplaca elegans*); LÓPEZ-FIGUEIRAS (1986).

## Discussion

To draw conclusions on the lichen flora of Venezuela in this publication is problematic, because collections concern biotops in extremely different climate areas, in addition, quantity of material is limited. But some conspicuous observations during the field excursions should be stated:

Lichen species on soil surfaces are significant to montane regions all over the world. The investigated habitats in the Andes of Venezuela (sector of Pico El Aguila) on soil and siliceous rocks were investigated in high elevations between 4200 m and 4300 m according to the typical ecological system, the Páramos with *Espeletia* vegetation. Terricolous species of Cladoniaceae, also *Thamnolia andicola* and *Xanthoparmelia cumberlandia*, found on compacted earth with poor metabolism, are locally abundant: *Cladonia cryptochlorophaea*, *C. portentosa*, *C. corniculata* and *Stereocaulon* species (*S. obesum*, *S. ramulosum*, *S. tomentosum*). The occurrence of saxicolous species like *Xanthoria elegans* with large, red-orange thalli on siliceous rocks seems to extend on W-exposed parts of rocks mostly. *Peltula tortuosa* was found in habitats on Lajas, covered with a thin soil layer on granite. Further samples on Lajas could not be determined exactly (*Pyrenopsis* sp. and *Pyrenocollema* sp.). The rich distribution of corticolous lichen specimens in all regions of Venezuela was observed on the banks of Rio Caura and Rio Orinoco, mainly in shrubland but also in primary lowland rainforests. As far as I could see, frequent species concerning corticolous lichens prefer dead wood and thin branches of shrubs at the Caribbean coast near the sea shore (*Arthonia conferta*, *Enterographa anguinella* and some unidentified species of the family Graphidaceae).

Rare specimens seem to be *Bulbothrix coronata* and *Diorygma monophorum*. Other lichen species like *Graphis disserpens*, *Graphis plurispora* and *Graphis ruiziana* remind of habitats in adjacent countries and biotops in Central America (Costa Rica). Also *Graphis librata* resembles *Graphis leptocarpa* which differs in containing norstictic acid.

The lichen genus *Usnea* could be investigated in confined habitats, for example *U. bogotensis* saxicolous with erect thalli, in the Páramos of high elevations up to 3500 m. This lichen species frequently colonizes the surface of siliceous rocks in Laguna Mucobaji. In contrast *U. baileyi* needs the bark of trees as substratum, similar to *U. rubicunda*.

Crustose thalli of *Trypethelium aeneum* are widespread in the south of Venezuela and have been found as yellow conspicuous patches on bark of trees frequently.





Fig.13: *Usnea bogotensis*.



Fig. 14: *Usnea rubicunda*.



**Ascospores:**

Fig. 15: *Arthonia complanata* (21–24 × 9–10 μm).

Fig. 17: *Graphis disserpens* (21–33 × 12–15 μm).

Fig. 16: *Arthonia conferta* (18–21 × 5–6 μm).

Fig. 18: *Graphis ruiziana* (33–39 × 12–15 μm).



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