

**THE SPECIES OF *CANOMACULINA*, *MYELOCHROA*, *PARMELINELLA*, AND
PARMELINOPSIS (PARMELIACEAE, LICHENIZED ASCOMYCOTINA) FROM THE
"SEGUNDO PLANALTO" IN THE STATE OF PARANÁ, BRAZIL**

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RESUMO – (Espécies de *Canomaculina*, *Myelochroa*, *Parmelinella* e *Parmelinopsis* (Parmeliaceae, Ascomycotina Liqueenizados) do Segundo Planalto do Estado do Paraná, Brasil). Este estudo descreve as espécies de *Canomaculina* Elix & Hale, *Myelochroa* (Asahina) Elix & Hale, *Parmelinella* Elix & Hale e *Parmelinopsis* Elix & Hale ocorrentes no Segundo Planalto do Estado do Paraná. São apresentadas chaves para a identificação das espécies. Seis espécies são citadas pela primeira vez para o Estado do Paraná. *Parmelinella wallichiana* é citada pela primeira vez para o Continente Americano.

Palavras-chave – Parmeliaceae, *Canomaculina*, *Myelochroa*, *Parmelinella*, *Parmelinopsis*

ABSTRACT – (The species of *Canomaculina*, *Myelochroa*, *Parmelinella* and *Parmelinopsis* (Parmeliaceae, Lichenized Ascomycotina) from the "Segundo Planalto" in the State of Paraná, Brazil). The present study describes the species of *Canomaculina* Elix & Hale, *Myelochroa* (Asahina) Elix & Hale, *Parmelinella* Elix & Hale and *Parmelinopsis* Elix & Hale occurring in the "Segundo Planalto" in the State of Paraná. Keys Identification are given. Six species are reported for the first time for Paraná. *Parmelinella wallichiana* is cited for the first time for the American continent.

Key words – Parmeliaceae, *Canomaculina*, *Myelochroa*, *Parmelinella*, *Parmelinopsis*

Introduction

The present work is part of an intensive survey of the Parmeliaceae *sensu stricto* of the "Segundo Planalto" of the state of Paraná, South Brazil. The studied area is delimited by the following latitudes and longitudes: 24°30'-26°06'S and 50°25'-49°49'W. Its climate is characterized as subtropical-temperate, with some nocturnal frosts in the winter, a mean

annual precipitation of 1423mm, and a mean annual temperature of 17.6°C (Maack 1981).

The lichen flora of Paraná has not yet been systematically surveyed so far the scanty extant information about the Parmeliaceae being scattered in different publications (Hale 1976a, 1976b; Kurokawa 1974, 1985; Osorio 1973, 1977a, 1977b; Fleig 1997; Eliasaro & Adler 1997, 1998; Eliasaro *et al.* 1998).

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The group of genera designated by Elix (1993) as *Parmelia sensu lato* are herein named *Parmeliaceae sensu stricto*. They are represented in most ecosystems and display a great variety of secondary metabolites produced by the fungal component (mostly aliphatic acids, depsides, depsidones, dibenzofurans, anthraquinones and xanthenes), which are commonly used in taxonomy and have potential pharmaceutical applications.

The genera *Canomaculina* Elix & Hale, *Myelochroa* Elix & Hale, *Parmelinella* Elix & Hale and *Parmelinopsis* Elix & Hale were segregated from *Parmelina* Hale (Elix & Hale 1987), and comprise a group of taxa with atranorin in the upper cortex and with relatively narrow, marginally ciliate, adnate lobes.

The species of *Canomaculina*, *Myelochroa*, *Parmelinella* and *Parmelinopsis*, which occur on the "Segundo Planalto" of the State of Paraná, are herein briefly described.

Material and methods

The specimens studied were mostly collected by the first author and are housed at UPCB (see Holmgren *et al.* 1990 for herbarium acronyms). Sampling was mainly done at the following selected localities: Jaguariaíva (Parque Estadual do Cerrado); Tibagi (Guartelá); Ponta Grossa (Parque Estadual de Vila Velha and Buraco do Padre); and Lapa (Parque Estadual Gruta do Monge and surroundings).

Type specimens studied are housed at G, TUR, and W. Reference material kept at both BAFC and US were also examined.

Herbarium specimens were examined with a dissecting microscope for morphological characterization; ascospores and conidia were measured after mounting in 10% KOH plus 1% phloxine.

Spot tests on the upper cortex and medulla were carried out with reagents K (10% KOH), C (30% Potassium hypochlorite) and K, followed by C (KC).

Lichen substances were identified by thin

layer chromatography (Culberson & Ammann 1979; Elix *et al.* 1988), and by comparison with authentic samples.

Results and discussion

Canomaculina Elix & Hale, Mycotaxon 29: 239. 1987.

This genus is characterized by tapered (simple to furcate) cilia, effigurate-maculate upper surface of the lobes, filiform conidia, and simple to furcately branched rhizines (Elix 1993). Recently, Elix (1997) extended the concept of *Canomaculina*, including all species formerly belonging to *Rimeliella* Kurok. Nevertheless, we prefer to treat both genera separately until the criteria of delimitation are settled. Therefore, only two species of *Canomaculina s. str.* are described for the studied area.

Key to the species of *Canomaculina*

1. Thallus lacking vegetative propagules, medulla K- *C. consors*
1. Thallus sorediate-pustulate, medulla K+ yellow, turning orange *C. muelleri*

Canomaculina consors (Nyl.) Elix & Hale, Mycotaxon 29: 239. 1987.

Parmelia consors Nyl., Flora, Jena 68: 613. 1885.

Thallus corticolous, adnate, greenish-grey, 4-13cm across. Lobes subirregular, apically rounded, margins crenate, densely ciliate; cilia robust, up to 1mm long, simple or commonly furcate. Upper surface with white, effigurate macules, sometimes pruinose at the apices, lacking vegetative propagules. Medulla white. Lower surface black, rhizinate to towards the margin or with a bare brown marginal zone, moderately rhizinate; rhizines of two types, either thick and up to 5mm long, or thin, less than 1mm long, intermixed, simple, furcate or rarely squarrosely branched. Apothecia substipitate, 2-10mm diam., disc brown,

imperforate or perforate. Ascospores ellipsoid to subglobose, 14-16 x 8-10µm. Pycnidia not found.

Chemistry: Upper cortex K+ yellow (atranorin, major). Medulla K-, C-, KC- (unidentified aliphatic acids, minor).

Specimens examined: **BRAZIL. Paraná:** Tibagi, Guartelar, 17/IV/1994, *Eliasaro 1305* (UPCB); Lapa, near Parque Estadual Gruta do Monge, 9/X/1996, *Eliasaro 1929* (UPCB).

This South American and Australian species (Hale 1976a; Elix 1994) is characterized by the absence of vegetative propagules and the negative results for medullary tests (presence of aliphatic acids or no substances demonstrated). Rare at the "Segundo Planalto", it occurs on trees in the cerrado or along roads. It was formerly reported by Hale (1976a) from the Brazilian states of Mato Grosso, Minas Gerais, Rio de Janeiro, Rio Grande do Sul, Santa Catarina, São Paulo, and recorded further by Osorio (1977b) from Paraná.

Canomaculina muelleri (Vain.) Elix & Hale, Mycotaxon 29: 240. 1987.

Parmelia muelleri Vain., Acta Soc. Fauna Fl. Fenn. 7: 49. 1890.

Thallus corticolous, adnate, greenish-grey, 5-10cm across. Lobes subirregular, apically rounded, 5-10mm wide, densely ciliate, cilia commonly robust, tapered, up to 1mm long, simple or commonly furcate. Upper surface white, effigurate-maculate, sometimes pruinose at the apices, submarginally sorediate; soralia at first punctiform, then orbicular, sometimes confluent at maturity. Medulla white. Lower surface black, moderate to densely rhizinate to towards the margins, or with a brown, bare or papillate marginal zone under the lobe apices; rhizines black, of two types, either thick and up to 5mm long or thin and less than 1mm long, simple, furcate or rarely squarrosely branched. Apothecia sessile, 1-2mm diam.; amphithecium sorediate, disc brown, imperforate. Ascospores hyaline, ellipsoid to subglobose, 12-13 x 8µm.

Pycnidia not seen.

Chemistry: Upper cortex K+ yellow (atranorin, major). Medulla K+ yellow, C-, KC- (stictic acid, major).

Specimens examined: **BRAZIL. Paraná:** Ponta Grossa, Parque Estadual de Vila Velha, 8/IV/1996, *Eliasaro 1856, 1859* (UPCB); Tibagi, Guartelá, 17/IV/1994, *Eliasaro 1306* (UPCB).

This species is characterized by the sorediate upper cortex and stictic acid as the major component in the medulla. It is morphologically similar to *C. pilosa* Stizenb., a common species in Curitiba, and differs only in the medullary chemistry (aliphatic acids in *C. pilosa*). *C. muelleri* was reported by Hale (1976a) from Mexico, Venezuela, Peru, Argentina, and Brazil (Minas Gerais), and further recorded for Paraná State (Osorio 1977a) and Uruguay (Osorio 1980).

Myelochroa (Asahina) Elix & Hale, Mycotaxon 29: 240. 1987.

This genus is mainly characterized by thalli with narrow, grey lobes, simple cilia, simple to squarrosely branched rhizines, and a yellow to orange medulla, containing secalonic acid derivatives and hopane triterpenes (Elix 1993). It is represented by one species in the studied area.

Myelochroa lindmanii (Lyngé) Elix & Hale, Mycotaxon 29: 241. 1987.

Parmelia lindmanii Lyngé, Arkiv Bot. 13: 74. 1914.

Thallus corticolous, adnate, greenish-grey, 4-10cm across. Lobes subirregular, apically rounded to subtruncate, 5-8mm wide, cilia restricted to the lobe axils, simple, less than 0.5mm. Upper surface flat, shiny, moderately to densely isidiate; isidia simple, cylindrical. Medulla sulfur-yellow. Lower surface black, with a brown marginal zone, moderately rhizinate; rhizines black, simple. Apothecia sessile, 2-6mm diam.; amphithecium isidiate, disc brown, imperforate. Ascospores hyaline, 8-12x6-8µm. Pycnidia immersed. Conidia

bifusiform 6-7µm.

Chemistry: Upper cortex K+ yellow (atranorin, major). Medulla K-, C-, KC- (secalonic acids, major).

Specimens examined: **BRAZIL. Paraná:** Jaguariaíva, Parque Estadual do Cerrado, 16/IV/1994, *Eliasaro 1264c* (UPCB); 19/IV/1995, *Eliasaro 1369* (UPCB); Tibagi, Guartelara, 22/II/1996, *Eliasaro 1492* (UPCB); Ponta Grossa, Parque Estadual de Vila Velha, 27/III/1996, *Eliasaro 1783* (UPCB).

This species was reported by Hale (1976a) from Mexico and South America (Colombia, Venezuela, Paraguay, Uruguay, Argentina and Brazil: Rio Grande do Sul). It was also cited for Paraná, Mato Grosso do Sul (Osorio 1977a), and Minas Gerais (Ribeiro 1998).

Parmelinella Elix & Hale, Mycotaxon 29: 241. 1987.

Elix (1993) characterized this genus mainly by the thalli with moderately broad grey lobes, simple cilia and rhizines, a yellow-grey upper cortex, containing traces of secalonic acids and atranorin, ascospores 15-18x8-10µm, and cylindrical conidia being 5-9µm long. Our measurements of spore dimensions are more or less coincident with the above range for *P. wallichiana* but not for *P. versiformis*, which has larger spores, commonly with thick episporium. Our observations on collected specimens and type material of *P. versiformis* and *P. wallichiana* show that both have bifusiform to sublageniform conidia being (5-) 6.5-7µm long. Therefore it is necessary to redefine both ascospore dimensions and the type of conidia found in the genus *Parmelinella*.

In addition, traces of secalonic acids in the upper cortex are probably not an important taxonomic character of the genus, as indicated by the results of the HPLC analysis of two samples of *Parmelinella* from Curitiba, which are commented on below.

This genus is represented by two species in

the studied area.

Key to the species of *Parmelinella*

1. Thallus lacking vegetative propagules.....
..... *P. versiformis*
1. Thallus isidiate *P. wallichiana*

Parmelinella versiformis (Kremp.) Marcelli, Acta bot. bras. 7: 56. 1993.

Parmelia versiformis Kremp., Flora 61: 464. 1878. Type collection: Argentina, Lorentz & Hieronymus (lectotype by Hale, G!).

Parmelia mutata Vain., Acta Soc. Fauna Fl. Fenn. 7(7): 39. Type collection: Brazil, Minas Gerais, Sítio (Antonio Carlos), *Vainio: Lichenes Brasilienses Exsiccati. 1891* (lectotype by Hale, TUR!).

Parmelia catharinensis Müll. Arg., Flora 74: 239. 1891. Type collection: Brazil, near Santa Catarina, *Ule 73* (isolectotype by Hale, W!).

Parmelia wettsteinii Zahlbr. Denkschr. Akad. Wiss. Wien., Math.-Naturwiss. Klasse 83: 173. 1909. Type collection: Brazil, São Paulo, near Taipas, *Schiffner & Wettstein* (lectotype by Hale, W!).

Thallus corticolous, adnate, pale buff to greenish-grey, 3-5cm across. Lobes subirregular, apically roundish, crenate, 5-8mm wide; cilia sparse, mostly in lobe axil, simple, less than 0.5mm. Upper surface flat, soredia and isidia lacking. Medulla white. Lower surface dark brown to blackening, with a brown bare or papillate marginal zone, or medium to pale brown or beige (paler marginally), moderately rhizinate; rhizines simple, concolorous or whitish when young, sometimes dark brown contrasting with a pale lower surface. Apothecia frequent, sessile, 2-5mm diam., disc brown, imperforate. Ascospores (16-)21-26(-29) x (10-)12-15µm, commonly with episporium (1.5-)2-3(-4)µm thick. Pycnidia frequent, laminal, immersed. Conidia bifusiform to sublageniform, 6-7µm long.

Chemistry: Upper cortex K+ yellow

(atranorin, major). Medulla K+ yellow turning red (salazinic acid, major).

Selected specimens examined: **BRAZIL.**

Paraná: Lapa, 6/II/1996, trees along road, on thin branches, *Eliasaro 1753* (UPCB); Curitiba: Centro Politécnico, 15/IX/1993, *Eliasaro 1084* (UPCB, BAFC, CANB), 13/IV/1998, *Eliasaro* (UPCB).

This South American species has been reported by Hale (1976a) from Argentina and Brazil: Minas Gerais, São Paulo, Santa Catarina and Rio de Janeiro. These are the first records for the State of Paraná.

The specimens of *P. versiformis* collected in the studied area grow mostly on small branches and are commonly small, with a dark (brown to blackening) lower surface, while the specimens collected in Curitiba are quite well developed and may be assigned to two types: a) those with a darker lower surface (medium brown to black, particularly at the centre), mostly collected on tree branches, and b) those with a paler lower surface (medium to pale brown), collected mostly on tree trunks. The type collection of *Parmelia versiformis* Kremp. corresponds to the second type (b), whereas the other three type specimens (of *P. mutata* Vain., *P. catharinensis* Müll. Arg. and *P. wettsteinii* Zahlbr.) have a black lower surface like those of type (a).

Parmelinella wallichiana (Taylor) Elix & Hale, Mycotaxon 29: 242. 1987.

Parmelia wallichiana Taylor, Hooker J. Bot. 6: 176. 1847.

Parmelia nimandairana Zahlbr., Fedde Rept. 33: 55. 1934. Type collection: Taiwan, Nimandaira, Mt. Arisan, 24/XII/1925, *Asahina 63* (lectotype by Hale, W!).

Thallus corticolous, adnate, 3-5cm across. Lobes subirregular, apically rounded, crenate, 5-8mm wide, cilia in lobe axils, simple, less than 0.5mm. Upper surface plane, moderately to densely isidiate; isidia simple, cylindrical, rarely branched. Medulla white. Lower surface

black to medium brown or medium brown to pale brown, with a brown, papillate marginal zone, moderately rhizinate; rhizines simple, concolorous or whitish, sometimes dark brown in contrast with the pale brown lower surface. Apothecia sessile, rare, 2-3mm diam., amphithecium isidiate, disc brown, imperforate. Ascospores 14-18(23)x(8-)10-11(-16) μ m. Pycnidia very rare. Conidia bifusiform to sublageniform, 5-7 μ m long.

Chemistry: Upper cortex K+ yellow (atranorin, major). Medulla K+ yellow turning red, C-, KC- (salazinic acid, major).

Selected specimens examined: **BRAZIL.**

Paraná: Lapa, 6/II/1996, trees along road, *Eliasaro 1688, 1705* (UPCB); 9/X/96, *Eliasaro 1874, 1921* (UPCB); Curitiba, Parque Bacacheri, 8/IX/1998, *Eliasaro 2102* (UPCB); Parque Iguazu, Jardim Zoológico, 16/XII/1998, *Eliasaro & Donha 278, 280* (UPCB); Centro Politécnico, 15/III/1993, *Eliasaro 1085* (UPCB); 1/II/1994, *Eliasaro 1165, 1166* (UPCB); 20/V/1994, *Morales 62* (UPCB); 2/X/1995, *Bündchen 122* (UPCB); 25/VI/1998, *Eliasaro 1997* (UPCB); Centro Cívico, 15/XI/1998, *Donha 174, 182b* (UPCB).

This species was reported for eastern Africa, India, Southeastern Asia, Japan, and Australia (Hale 1976a; Elix 1994). The present is the first report for the American continent.

This species was collected in the "Segundo Planalto" and in the city of Curitiba. The specimens can also be assigned to two types (particularly as regards the colour of the lower side) as in *P. versiformis*, and are also better developed in Curitiba.

The pattern of colour variation of the lower surface follows the same as described for *P. versiformis*: dark lower surface in the "Segundo Planalto" specimens (similar to those collected on tree branches in Curitiba), and pale lower surface in the specimens collected on tree trunks in Curitiba. *P. wallichiana* is very probably the isidiate counterpart of *P. versiformis*, and as expected for the presence of vegetative

propagules, is a very widespread species.

The chemical analysis by HPLC of one sample from *P. versiformis* of Curitiba (duplicate of *S. Eliasaro 1084*) and one sample of *P. wallichiana* (duplicate of *S. Eliasaro 1085*), by Dr. Isao Yoshimura, revealed the absence of traces of secalonic acids. This suggests that the presence of traces of secalonic acids is not a determinant taxonomic character for the genus *Parmelinella*.

Parmelinopsis Elix & Hale, Mycotaxon 29: 242. 1987.

This genus is mainly characterized by thalli with narrow, apically truncate, grey lobes, relatively large spores, cylindrical conidia, simple cilia and simple to sparsely branched rhizines (Elix 1993).

It is represented by five species in the "Segundo Planalto".

Key to the species of *Parmelinopsis*

1. Thallus lacking vegetative propagules.....
..... *P. damaziana*
1. Thallus with vegetative propagules
 2. Thallus with nonsorediate pustules
..... *P. spumosa*
 2. Thallus isidiate or lobulate
 3. Thallus densely lobulate
..... *P. schindleri*
 3. Thallus isidiate
 4. Isidia ciliate *P. horrescens*
 4. Isidia eciliate *P. minarum*

Parmelinopsis damaziana (Zahlbr.) Elix & Hale, Mycotaxon 29: 242. 1987.

Parmelia damaziana Zahlbr., Bull. Herb. Boiss. 5: 541. 1905. Type collection: Brazil, Minas Gerais: Monte Itacolomi (Ouro Preto), *Damazio 1375* (lectotype by Hale, W!).

Parmelia brachyconidia Zahlbr. Bull. l'Herbier Boissier, ser. 2, 5: 465. 1908. Type collection: Brazil, Minas Gerais: Serra de Ouro Preto, *Damazio 1741* (lectotype by Hale, W!).

Thallus corticolous or saxicolous, adnate,

whitish grey, 3-6cm across. Lobes sublinear to subirregular, 0.8-3mm wide, ciliate; cilia scattered, mainly simple, rarely furcate. Medulla white. Lower surface black, moderately rhizinate; rhizines black, mainly simple, sometimes furcate or squarrose. Apothecia common, sessile, 8-12mm diam., amphithecium smooth. Ascospores (13-)16-18x(6.5-)8-12µm. Pycnidia common. Conidia bifusiform, 4-5µm long.

Chemistry: Cortex K+ yellow (atranorin, major); medula K-, C- or C+ pink, KC+ pink (3-methoxy-2,4-di-O-methylgyrophoric acid (= horrescens unknown), major; gyrophoric acid, major to minor; 5-O-methylgyrophoric acid, major; hiassic acid, minor to absent; 4-5-di-O-methylhiassic, minor).

Specimens examined: **BRAZIL. Paraná:** Ponta Grossa, Parque Estadual de Vila Velha, 27/II/1996, *Eliasaro 1584* (UPCB); Lapa, Parque Estadual Gruta do Monge, 6/II/1996, *Eliasaro 1718, 1720, 1757* (UPCB); 9/X/1996, *Eliasaro 1876* (UPCB).

This quite rare species has been reported by Hale (1976a) from Brazil: Minas Gerais and Rio de Janeiro, and from São Paulo (Ribeiro 1998). It was also recorded for East Africa by Krog and Swinscow (1979), and Swinscow and Krog (1988). It is here cited for the first time for the state of Paraná and constitutes the southernmost record for this species.

Parmelinopsis horrescens (Taylor) Elix & Hale, Mycotaxon 29: 242. 1987.

Parmelia horrescens Taylor, Flora Hibern.: 144. 1836.

Thallus adnate, corticolous, whitish grey, up to 7cm across. Lobes sublinear to subirregular, subdichotomously branched, 0.8-1.5mm wide, moderately to densely ciliate; cilia simple, rarely furcate; densely isidiate. Isidia cylindrical, simple or branched, frequently with apical cilia. Medulla white. Lower surface black, moderately rhizinate; rhizines black, mainly simple, sometimes furcate or squarrose.

Apothecia and pycnidia not found. (Ascospores 16-18x10-12µm according to Krog & Swinscow 1988).

Chemistry: Cortex K+ yellow (atranorin); medula C+ pink, KC+ pink (3-methoxy-2,4-di-O-methylgyrophoric acid (= horrescens unknown), major; 5-O-methylhiassic acid, minor; gyrophoric acid, major; umbilicic acid, major; 3-methoxyhiassic acid, minor to absent).

Specimens examined: **BRAZIL. Paraná:** Jaguariaíva, Parque Estadual do Cerrado, 19/IV/1995, *Eliasaro 1363* (UPCB); Ponta Grossa, Parque Estadual de Vila Velha, 27/IX/1995, *Eliasaro* (UPCB).

This species is distributed worldwide in temperate regions and at higher altitudes in the tropics (Swinscow & Krog 1988). It was reported for East Africa by Swinscow & Krog (1988). Hale (1976a) also cited it for South Africa, Asia (India, Java, Philippines, Taiwan, Japan), Europe (Ireland, Spain and France), USA, Mexico, Central America and the Antillas, South America (Venezuela and Uruguay), Australia and New Zealand.

In Brazil it was formerly reported for the states of São Paulo (Pereira & Marcelli 1989), Goiás and Minas Gerais (Marcelli 1993).

Parmelinopsis minarum (Vainio) Elix & Hale, Mycotaxon 29: 243. 1987.

Parmelia minarum Vainio, Acta Soc. Fauna Flora fenn. 7: 48. 1890. Type collection: Brazil, Minas Gerais, Sítio, 1885, Vainio, Lich. Brasil. Exs.

Thallus corticolous or saxicolous, adnate, greenish grey, 3-4mm wide. Lobes sublinear, subdichotomously branched, often imbricate, 0.5-2mm; cilia evenly dispersed, simple, densely isidiate; isidia cylindrical, simple to branched, commonly darkening at the apex, eciliate. Lower surface black, moderately rhizinate; rhizines black, mainly simple, sometimes furcate or squarrose. Apothecia rare, 2-3mm diam., sessile, amphithecium isidiate, disc brown. Ascospores 14-16x7-8µm. Pycnidia not found.

Chemistry: Cortex K+ yellow (atranorin, major); medulla C+, KC+ pink (3-methoxy-2,4-di-O-methyl-gyrophoric acid (horrescens unknown), minor to absent; 5-O-methylhiassic, major; gyrophoric acid, major; hiassic acid, major).

Specimens examined: **BRAZIL. Paraná:** Tibagi, Guartelá, 20/IX/1993, *Eliasaro 1105* (UPCB); 22/II/1996, *Eliasaro 1516* (UPCB); Ponta Grossa, Parque Estadual de Vila Velha, 8/IV/1996, *Eliasaro 1768, 1781, 1793* (UPCB); Lapa, beira de estrada, 6/II/1996, *Eliasaro 1709, 1712* (UPCB), Parque Estadual Gruta do Monge, 9/IX/1996, *Eliasaro 1942b* (UPCB).

This cosmopolitan species is known from all continents except Antarctica (Elix 1994). Hale (1976a) treated *Parmelia minarum* Vain. as a taxonomic synonym of *Parmelia dissecta* Nyl. (= *Parmelina dissecta* (Nyl.) Hale) recording Brazilian localities for *P. dissecta* (States of Paraná and Minas Gerais). This latter name regarded is a synonym of *Parmelinopsis horrescens* (Elix 1994c), who considers that "*Parmelia dissecta* has been misapplied for many years and most reports refer to *Parmelinopsis minarum*". Therefore, careful revision is necessary to apply the correct Brazilian distribution of *P. minarum*. The species has also been reported by Osorio *et al.* (1980) from Rio Grande do Sul, and by Marcelli (1993) from São Paulo.

Parmelinopsis schindleri (Hale) Elix & Hale, Mycotaxon 29: 243. 1987.

Parmelina schindleri Hale, Smithsonian Contrib. Bot. 33: 44. 1976.

Thallus adnate, corticolous, 3-8cm wide. Lobes sublinear, 0.3-0.5mm wide; cilia mostly at the lobe axils, simple, densely lobulate; lobules at margin lobes or at the upper surface, suberect or procumbent, ciliate. Lower surface black, moderately rhizinate; rhizines black, mainly simple to furcate or squarrose. Apothecia rare, disc brown, 2-5mm diam., sessile, margin crenate to lobulate. Ascospores

15-18 x 8-10µm. Pycnidia not found.

Chemistry: Cortex K+ yellow (atranorin, minor); medula C-, KC+ rose (3-methoxy-2,4-di-O-methylglyphoric acid (= horrescens unknown), minor; 5-O-methylhiassic acid, minor; glyphoric acid, minor; umbilicic acid, minor).

Specimens examined: **BRAZIL. Paraná:** Ponta Grossa, Parque Estadual de Vila Velha, 27/IX/1995, *Bündchen 86* (UPCB), *Eliasaro 1450* (UPCB); 8/X/1996, *Eliasaro 1808, 1825, 1830, 1854* (UPCB); Lapa, Parque Estadual Gruta do Monge, 9/X/1996, *Eliasaro 1883* (UPCB). **Rio de Janeiro:** Rio de Janeiro, *Schindler 5347* (US).

This species is only known from Brazil and was reported for the states of Minas Gerais, Rio de Janeiro (Hale 1976a) and São Paulo (Ribeiro 1998). This is the first report for the state of Paraná.

Parmelinopsis spumosa (Asahina) Elix & Hale, *Mycotaxon* 29: 243. 1987.

Parmelia spumosa Asahina, *J. Jap. Bot.* 26: 259. 1951.

Thallus corticolous, adnate, greenish grey, 2-3cm wide. Lobes sublinear, 0.5-2mm; cilia evenly dispersed; simple; with closed pustules or bursting open, but not sorediate. Medulla pale yellow at pustules. Lower surface black, moderately rhizinate; rhizines black, mainly simple. Apothecia and pycnidia not seen.

Chemistry: Cortex K+ yellow (atranorin, major); medula K-, C+pink, KC+ pink (2-4,5-tri-O-methylhiassic acid, major to minor; glyphoric acid, major; and an unidentified pigment).

Specimens examined: **BRAZIL. Paraná:** Tibagi, Guartelá, 22/II/1996, *Eliasaro 1488* (UPCB); Lapa, Parque Estadual Gruta do Monge, 9/X/1996, *Eliasaro 1890, 1930b* (UPCB); on trees along roads, 6/II/1996, *Eliasaro 1703* (UPCB).

In Brazil this taxon was formerly reported for São Paulo (Hale 1976a), Santa Catarina, Rio de Janeiro (Marcelli 1987), Mato Grosso (Marcelli 1993), and Minas Gerais (Ribeiro

1998). These are the first reports for Paraná State.

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