

New Species of Parmeliaceae (lichenized Ascomycotina) from South America

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Abstract: The species *Flavoparmelia quichuaensis* Elix & T. H. Nash, *Hypotrachyna divaricatica* Elix & T. H. Nash, *Hypotrachyna goiasii* Elix & Nash, *Hypotrachyna hypoalectorialica* Elix & T. H. Nash and *Relicina xanthoparmeliformis* Elix & T. H. Nash are described as new to science.

As a result of further study on the lichen family Parmeliaceae in South America (Adler & Elix 1987, 1992; Elix & Adler 1987; Elix & Ferraro 1993; Elix & Nash 1992; Nash et al. 1987a, 1987b, 1994), we are describing five new species. Throughout the present work chemical constituents were identified by thin layer chromatography (Culberson 1972; Culberson, Culberson & Johnson 1981; Culberson & Johnson 1982; Elix & Ernst-Russell 1993; Elix, Johnston & Parker 1988), high performance liquid chromatography (Feige et al., 1993) and comparison with authentic samples.

Flavoparmelia quichuaensis Elix & T. H. Nash sp. nov. Fig. 1

Species cum thallo ut in *Flavoparmelia norfolkensi* sed ab hac specie medulla alba et acido lobarico, acido stenosporonico et acido colensoico continente differt.

Type. Peru. Dept. Cuzco, Prov. Quispicanchis, around Laguna Urpicanha near Huacarpay, ca. 3200 m, on soil on dry rocky hill with low spine shubbery, *H. Kashiwadani 21346*, 8 Sept. 1984; TNS-holotype, ASU-isotype

DESCRIPTION. *Thallus* foliose, terricolous or saxicolous, adnate, pale yellow-green, to 5 cm wide. *Lobes* irregular, 1.0-3.0(-5.0) mm wide, becoming laterally imbricate, ± contiguous, plane,

rotund at the apices. *Upper surface* plane to \pm undulating, dull to slightly shiny, with reticulate, white maculae towards the apices, isidiate; *isidia* laminal, cylindrical, rarely becoming coralloid, ultimately becoming inflated at the apices and erumpent-pustulate, hollow within (dactylate), very rarely with traces of granular soredia. *Medulla* white. *Lower surface* black with a very narrow, naked, brown rim, sparsely rhizinate; rhizines short, simple or tufted at the apices, concolorous with the lower surface. *Apothecia* and pycnidia not seen.

CHEMISTRY. Cortex K-; medulla K-, C-, P-; containing usnic acid, lobaric acid (major), stenoporonic acid (major), colensoic acid (major), atranorin (\pm trace).

NOTES. This species is characterised by the adnate, yellow to yellow-green thallus, the isidiate upper surface where the cylindrical isidia ultimately burst open at the apices but only rarely become sorediate and the medullary lobaric, colensoic and stenoporonic acids. Morphologically this new species resembles *F. norfolkensis* Elix & Streim. from Norfolk Island, as both have a similar vegetative propagules but they differ in medullary pigmentation and chemistry (Elix & Streimann, 1989). Thus the medulla of *F. norfolkensis* is pigmented yellow-orange (due to the anthraquinone euplectin) and contains additional protocetraric acid while the medulla of *F. quichuaensis* is white with chemistry as indicated above. Lobaric, colensoic and stenoporonic acids were not known previously from the genus *Flavoparmelia*. The epithet is derived from the fact that this species occurs in Peru, historically the land of the Incas, the Quichua speaking people.

Additional Specimens Examined

PERU. Dept. Cuzco, Prov. Quispicanchis, Luisanpampa near Oropesa, ca. 3150 m, on calcareous rock, rocky cliff along river, *H. Kashiwadani* 21193, 21216, 21218, 8 Sept. 1984 (TNS); Dept. Puno, Prov. Puno, around Laguna Umayo, Sillustani,

about 20 km NW of Puno, ca. 3900 m, on rock in open dry place with cacti, *H. Kashiwadani* 22180, 26 Sept. 1984 (TNS); Dept. Puno, Prov. Lampa, Cara Cara, near Pucará, 3900-4000 m, on rock in *Polylepis racemosa* forest, *H. Kashiwadani* 22289, 27 Sept. 1984 (TNS).

Hypotrachyna divaricata Elix & T. H. Nash, sp. nov. Fig. 2

Species cum thallo ut in *Hypotrachyna microblasta* sed ab hac specie lobis latioribus, rhizinis parce ramosis et acido divaricatico continente differt.

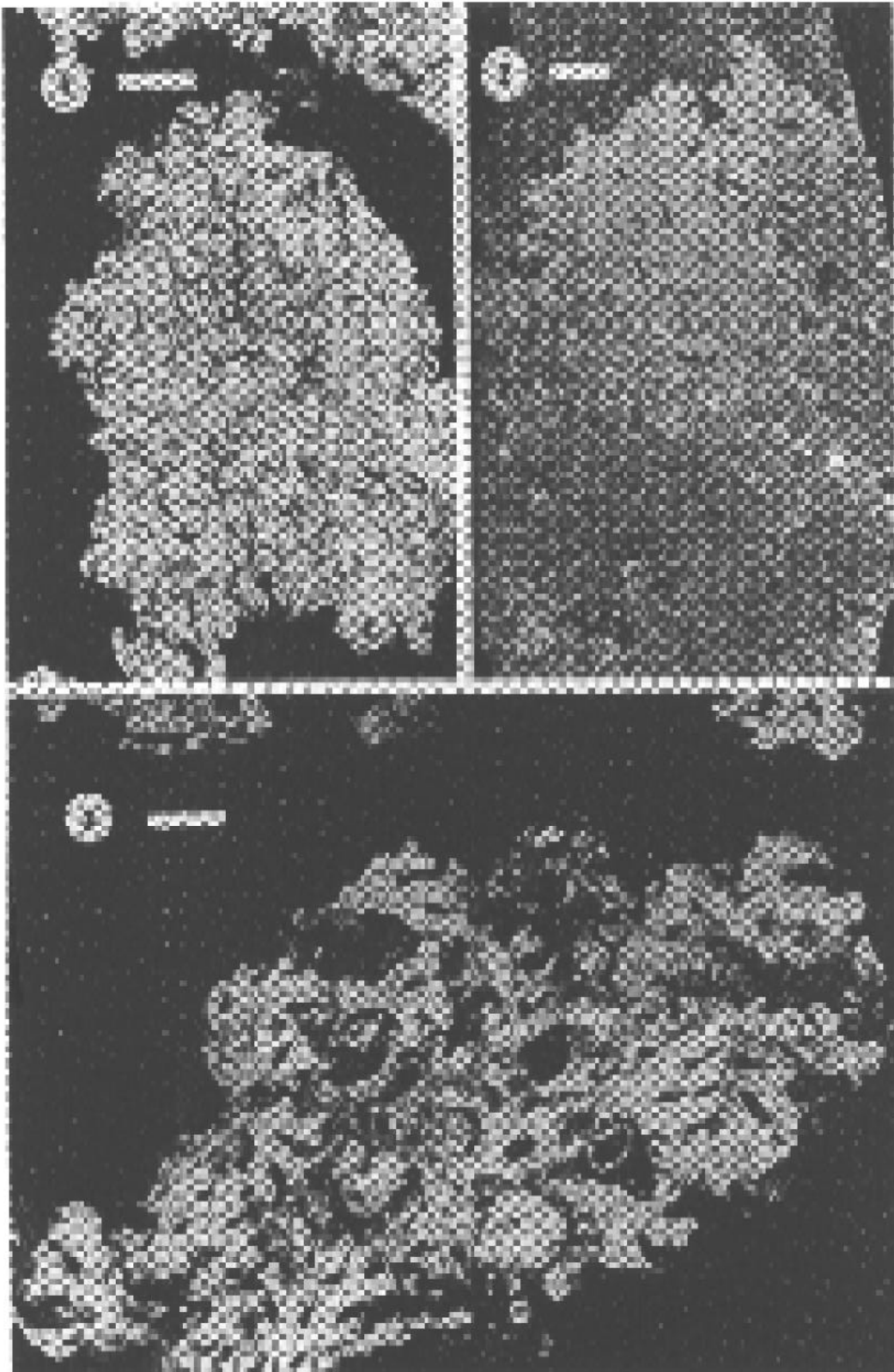
Type. Brazil. Goiás, Serra Dourada, along route 70, 119 km north-west of Goiânia, 49°55'W, 16°01'S, ca. 730 m, on sandstone, *T. H. Nash* 29323, 6 June 1990; ASU-holotype, ANUC, SP, US-isotypes.

DESCRIPTION. *Thallus* foliose, saxicolous, adnate, to 7 cm wide. *Lobes* contiguous, imbricate, sublinear, dichotomously or subdichotomously branched, 2.0-5.0 mm wide, truncate, elobulate; the margins eciliate, black-margined at the apices. *Upper surface* pale yellow-green to yellow-brown, darkening towards the centre, flat, dull, white maculate, becoming extensively cracked, isidiate; *isidia* moderately to dense, cylindrical, mainly simple or sparingly branched, \pm brown or black-tipped. *Medulla* white. *Lower surface* black, rugulose; rhizines moderately dense, simple or fasciculate at first, becoming sparingly dichotomously branched, pale near the apices but black towards the centre. *Apothecia* not seen. *Pycnidia* common, appearing as black dots on the surface, immersed; conidia bacilliform, 6-8 x 1 μ m.

CHEMISTRY. Cortex K-; medulla K-, C-, KC-, P-; containing usnic acid, \pm atranorin (trace), divaricatic acid (major), nordivaricatic acid (trace).

NOTES. This species is distinguished by the simple, cylindrical isidia, the black lower surface and characteristic medullary chemistry. It is the first species of *Hypotrachyna* known to contain divaricatic acid, although this compound is quite common in other genera of the Parmeliaceae (e.g. *Canoparmelia*). Morphologically this new species

Figures 1-3. New species of Parmeliaceae. 1, *Flavoparmelia quichuaensis* (holotype in TNS); 2, *Hypotrachyna divaricata* (holotype in ASU); 3, *H. goiasii* (holotype in ASU). Scale bar = 5 mm.



resembles *Hypotrachyna microblasta* (Vainio) Hale (Hale 1975a), but the latter species has narrower lobes (1-4 mm wide), densely, dichotomously branched rhizines and contains medullary norstictic acid, galbinic acid and salazinic acid.

Additional Specimen Examined

BRAZIL. Goiás, Serra Dourada, 120 km north-west of Goiânia, 50°10'W, 16°04'S, ca. 850 m, on sandstone, *T. H. Nash 29352*, 6 June 1990 (ASU).

Hypotrachyna goiasii Elix & T. H. Nash, sp. nov. Fig. 3

Species cum thallo ut in *Hypotrachyna flavida* sed ab hac specie sporis brevioribus et acido alectoronico et acido α -collatolico continente differt.

Type. Brazil. Goiás, Serra Dourada, 120 km north-west of Goiânia, 50°10'W, 16°04'S, ca. 850 m, on mosses, *T. H. Nash 29338*, 6 June 1990; ASU-holotype, ANUC, SP, US-isotypes.

DESCRIPTION. *Thallus* foliose, adnate to loosely adnate, coriaceous, pale yellowish green, 5-8 cm wide. *Lobes* short-sublinear, 1-4 mm wide, dichotomously branched, imbricate. *Upper surface* continuous, shiny, emaculate, black marginate near the apices, lacking soredia and isidia. *Medulla* white. *Lower surface* black except for a narrow dark brown rim at the tips, plane, moderately rhizinate; rhizines black, 0.2-0.8 mm long, rather coarse, dichotomously branched. *Apothecia* numerous, adnate, 2-6 mm wide, disc flat to concave, deep brown; thalline exciple thin, continuous, crenate; spores ellipsoid, 9-11 x 5-7 μ m. *Pycnidia* common, appearing as black dots on the surface, immersed; conidia bifusiform, 4.5-6.5 x 1 μ m.

CHEMISTRY. Cortex K-; medulla K-, C-, KC+red, P-; containing usnic acid, alectoronic acid and α -collatolic acid.

NOTES. *Hypotrachyna goiasii* is unusual in being the first reported fertile, esorediate, nonisidiate species with usnic acid to contain the orcinol depsidones alectoronic acid and α -collatolic acid (Hale 1975a). Morphologically it is close to the sympatric species *H. flavida* (Zahlbr.) Hale and *H.*

hypoalectorialica (see below), and although *H. goiasii* has somewhat shorter spores than *H. flavida*, these taxa are most reliably distinguished by their distinctive medullary chemistries.

Additional Specimen Examined

BRAZIL. Goiás, along route 70, 119 km north-west of Goiânia, 49°55'W, 16°01'S, ca. 730 m, on sandstone, *T. H. Nash 29313*, 6 June 1990 (ASU).

Hypotrachyna hypoalectorialica Elix & T. H. Nash, sp. nov. Fig. 4

Species cum thallo ut in *Hypotrachyna flavida* sed ab hac specie sed sporis brevioribus et acido alectorialico et acido hypoalectorialico continente differt.

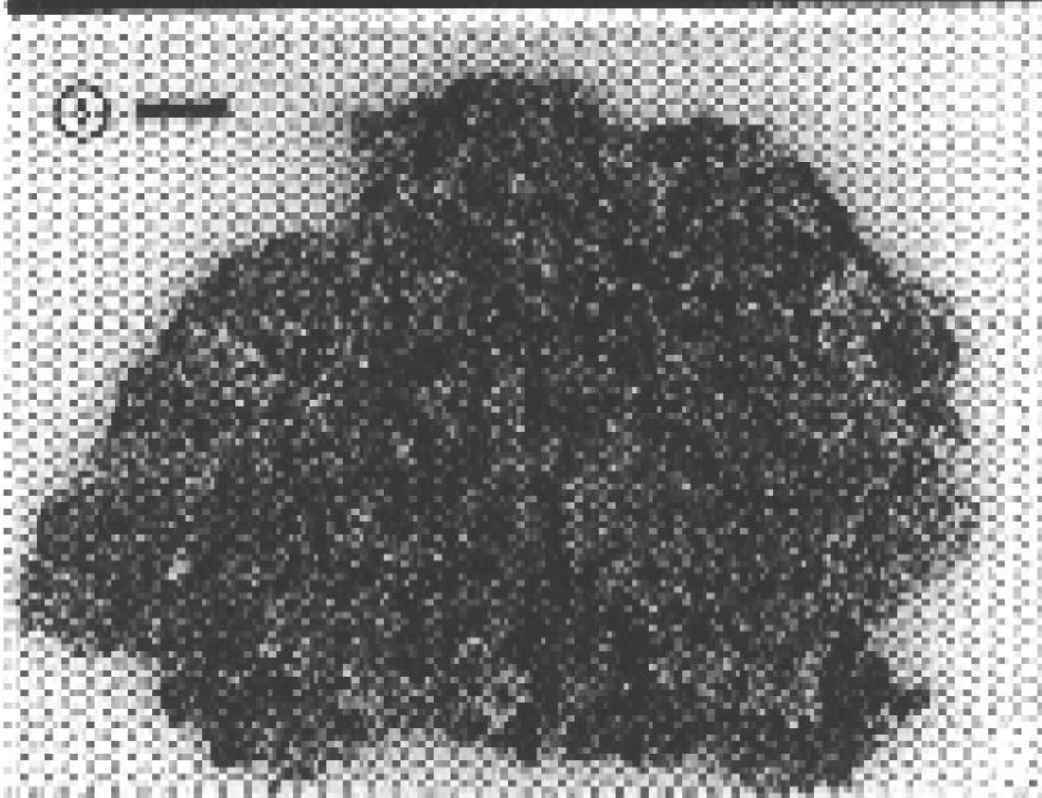
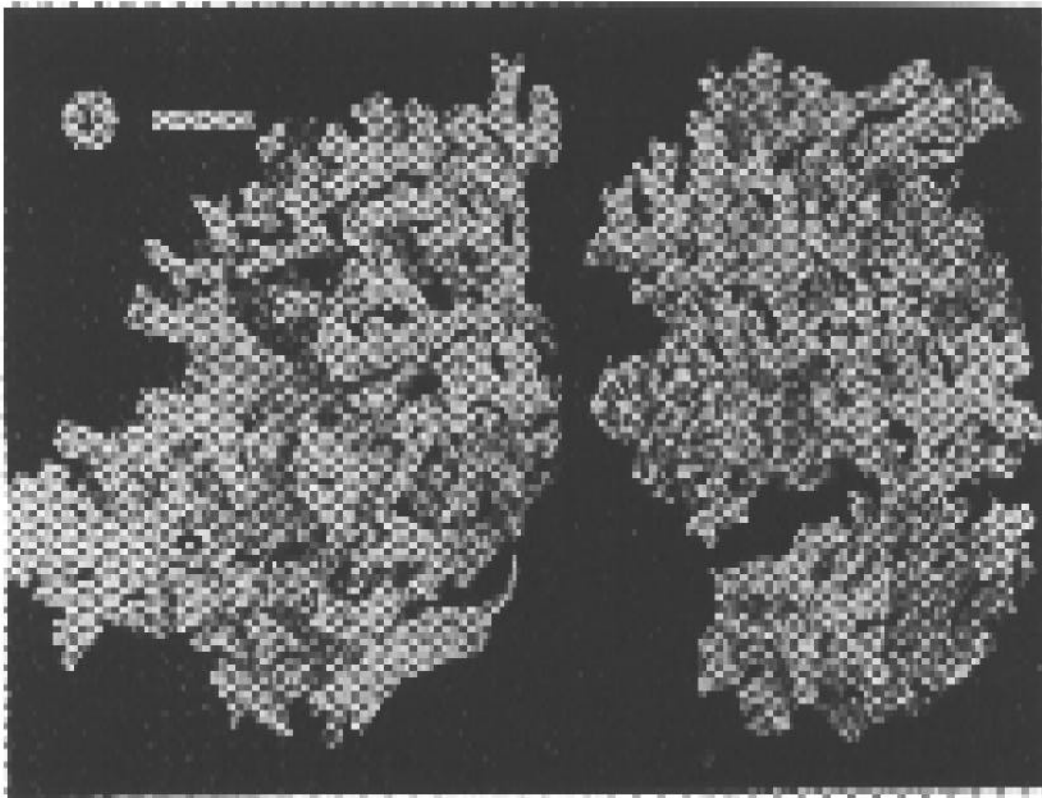
Type. Brazil. Minas Gerais, Serra da Piedade, approximately 100 m below summit, ca. 30 km east of Belo Horizonte, 43°40'W, 19°49'30"S, ca. 1500 m, on acidic rock, *T. H. Nash 29238*, 2 June 1990; ASU-holotype.

DESCRIPTION. *Thallus* foliose, adnate to loosely adnate, coriaceous, pale yellowish green to yellowish-grey, 5-8 cm wide. *Lobes* short-sublinear, 1-3 mm wide, dichotomously branched, imbricate. *Upper surface* continuous, shiny, emaculate, black marginate near the apices, lacking soredia and isidia. *Medulla* white. *Lower surface* black except for a narrow dark brown rim at the tips, plane, moderately rhizinate; rhizines black, 0.2-0.8 mm long, rather coarse, dichotomously branched. *Apothecia* numerous, adnate, 1-3 mm wide, disc flat to concave, deep brown; thalline exciple thin, continuous, smooth; spores ellipsoid, 7-10 x 5-6 μ m. *Pycnidia* common, appearing as black dots on the surface, immersed; conidia bifusiform, 5.5-6.5 x 1 μ m.

CHEMISTRY. Cortex K-; medulla K-, C-, KC+red, P-; containing usnic acid, alectorialic acid (minor/trace) and hypoalectorialic acid (major).

NOTES. *Hypotrachyna hypoalectorialica* is chemically unique in being the first reported lichen to contain hypoalectorialic acid as a medullary metabolite [standard TLC Rf values x 100: Rf(A) 35; Rf(B) 40; Rf(C) 14]. The structural elucidation

Figures 4-5. New species of Parmeliaceae. 4, *Hypotrachyna hypoalectorialica* (holotype in ASU); 5, *Relicina xanthoparmeliformis* (holotype in ASU). Scale bar = 5 mm.



of this new benzyl ester will be reported separately (Elix, Nash & Wardlaw, in preparation). Morphologically this new species resembles *H. flavida*, a common saxicolous species in southern Brazil (Hale 1975a), which differs in having longer spores (10-12 cf. 7-10 μm) and in containing medullary protocetraric acid.

Additional Specimen Examined

BRAZIL. Type locality, on acidic rock, *T. H. Nash 29240*, 2 June 1990 (SP).

Relicina xanthoparmeliformis Elix & T. H. Nash, sp. nov. Fig. 5

Species *Relicina subabstrusae* simili sed thallo saxatili, laxe adnato, lobis imbricatis et ciliis parum tumidis differt.

Type. Brazil. Minas Gerais, km post 605, 17 km west of Diamantina, 43°45'W, 18°12'S, ca. 1200 m, on acidic rock, *T. H. Nash 29263*, 3 June 1990; ASU-holotype.

DESCRIPTION. *Thallus* foliose, saxicolous, loosely adnate to adnate, 4-6 cm wide. *Lobes* imbricate, sublinear, subirregularly to subdichotomously branched, 0.5-2.0 mm wide, elobulate; the margins bulbate-ciliate, cilia dense, very weakly inflated, to 2.0 mm long. *Upper surface* pale yellow-green to dull green or darkening in the centre, flat or becoming rugulose, dull, emaculate, cracked with age, lacking soredia and isidia; lobes often black-margined particularly towards the apices. *Medulla* white. *Lower surface* black; rhizines sparse to moderate, simple, shiny, black. *Apothecia* not seen. *Pycnidia* common, appearing as black dots on the surface, immersed; conidia bifusiform, 5.5-7 x 1 μm .

CHEMISTRY. Cortex K-; medulla K+ yellow then deep red, C- or C+ pink, KC-, P+ red-orange; containing usnic acid, salazinic acid (major), consalazinic acid (trace), \pm gyrophoric acid (minor). **NOTES.** Superficially this new *Relicina* resembles various *Xanthoparmelia* species with its loosely adnate thalli, subirregular lobes with blackened margins and in the saxicolous substrate. However *R. xanthoparmeliformis* is clearly distinguished from the *Xanthoparmeliae* by the densely ciliate lobe margins. This species does resemble *R. subabstrusa* (Gyeln.) Hale in medullary reactions (*R. subabstrusa* contains norstictic and connorstictic acids) but *R. subabstrusa* is clearly distinguished by the adnate thalli, the

linear-elongate, dichotomously to subdichotomously branched lobes and the strongly inflated, bulbate cilia (Hale 1975b). At present this new species is only known from the type locality where it is not uncommon.

Additional Specimen Examined

BRAZIL. Type locality, on acidic rocks, *T. H. Nash 29274*, 3 June 1990 (ASU, SP).

Acknowledgements

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