

NEW RECORDS OF LICHENS FROM VIETNAM

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ABSTRACT: 83 species of macrolichens are reported from Langbian Mountain and Ngoclinh Mountain, located in the Western Highlands of central Vietnam, including 61 new records for Vietnam.

Key words: Vietnam, Dalat, Ngoclinh, macrolichens.

1. INTRODUCTION

The territory of Vietnam is a relatively narrow strip running north-south along the eastern coast of the Indochinese Peninsula. The territory extends from 23° 37.5' to 16° 00.5'N and occupies an area of 331,689 km². The country is topographically complex with narrow coastal lowlands in the central region and two large deltas: the Red River Delta in the north and the Mekong Delta in the south. Mountain ranges extend along Vietnam's border with China in the north, and along the borders with Laos and Cambodia in the west. The Hoang Lien mountain range in the north with the peak Fansipan at 3143m is called "the Roof of Indochina". The Annamese Range is a continuation in southern direction, and covered by extensive forests.

Vietnam has a tropical monsoon climate with one dry and one rainy season annually. Humidity averages 84% and annual rainfall is ranging between 120 and 300 cm. However, the climate tends to vary considerably from place to place.

Lichens are symbiotic organisms. Their components are a fungus and one or more algae and/or a cyanobacteria. The fungus provides a home and some nutrients for the algae; the algae supplies food in the form of carbohydrate to the fungal partner. Lichens can grow almost anywhere including soil, rock, or even the sides of trees. So that they have a significant ecological contribution by generating carbohydrates through photosynthesis, reducing carbon dioxide levels and fixing nitrogen so that it is in a form suitable for living organisms.

The lichen flora of Vietnam has been neglected for a long time. Most of the taxa reported previously were collected in the north (known as Tonkin) and some of them in Central Vietnam (known as Annam). Recently, Aptroot & Sparrius (2006) published a survey of the lichens known until then from Vietnam and added a list of 275 records. Since 2000 the author is studying its lichens flora and establishing a representative collection of lichens.

2. COLLECTING SITES

Langbian Mountain belongs to Dalat plateau and Ngoclinh Mountain is in Kontum plateau. Both plateaus consist of granite and dacite are located in the Annamese Range. Langbian Mountain now is a tourist site, with considerable disturbance. Coniferous forest with *Pinus merkusii* is dominant, and near the peak broadleaf forest. Ngoclinh Mountain is located in the Ngoclinh Nature Reserve. The forest cover is 88%. The forest is in natural, well conserved state.

3. MATERIALS AND METHODS

The specimens from Langbian were collected between 2000 and 2006 during summer time, at an elevation of 900 – 1500 m. The specimens from Ngoclinh Mountain were collected in August 2006 at 1000 – 1800 m. They are preserved in the herbarium of the Botany and Ecology Department, University of Natural Sciences, Hochiminhcity. Included in this study are some specimens collected in Langhanh at 900 m in 1968 (Langhanh is located in Lamdong Province), and some specimens are not clear (the collecting site in Dalat plateau).

The specimens were identified by observing morphology and anatomy thallus and apothecia, testing with chemical (K, C) (Orange et al., 2001) and comparing to the specimens in Herbarium Berlin-Dahlem. Some specimens belong to *Parmotrema*, *Hypotrachyna*, *Rimelia* tested by TLC method (Orange et al., 2001).

Identification was doing in the Botanical Museum Berlin-Dahlem with the kind assistance of Dr. Harrie J. M. Sipman.

Keys to the lichen genera of the Neotropics by Dr. Harrie J. M. Sipman (2005) was used to identify genera. Some keys are used to identify species level in table 1.

4. RESULTS AND DISCUSSION

83 species were identified, belonging to 31 genera (table 2). The genera *Usnea*, *Parmotrema*, *Pseudocyphellaria*, *Leptogium*, *Hypotrachyna* are the commonest. 44 species were found on Ngoclinh Mountain, 39 on Langbian Mountain. Of these 61 species are new records for Vietnam, increasing total lichen flora in Vietnam to 335 species. Aptroot & Sparrius (2006) estimated at least 1000 species lichen is Vietnam. So there is a need for investigating lichens in Vietnam.

CÁC LOÀI ĐỊA Y MỚI CỦA VIỆT NAM

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TÓM TẮT: 83 loài địa y lớn được ghi nhận trên vùng núi Langbian và núi Ngọc Linh, trong số đó có 61 loài là loài mới cho Việt Nam.

Từ khóa: Việt Nam, Đà Lạt, Ngọc Linh, địa y lớn.

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Table 1. Keys and references.

Genus	Key and references
<i>Bulbothrix</i>	Flora of Australia (1994)
<i>Bunodophoron</i>	Flora of Australia (2001)
<i>Cetrelia</i>	Culberson & Culberson (1968)
<i>Cladia</i>	Stenroos (1986) and Ahti (2000)
<i>Cladonia</i>	Stenroos (1986) and Ahti (2000)
<i>Coccocarpia</i>	Arvidsson (1982)
<i>Heterodermia</i>	Kurokawa (1962 & 1998), Swinscow & Krog (1988)
<i>Hyperphyscia</i>	Swinscow & Krog (1988)
<i>Hypogymnia</i>	Awasthi (1986) and Elix & Jenkins (1989)
<i>Hypotrachyna</i>	Divakar & Upreti (2005)
<i>Leioderma</i>	Flora of Australia (1992)
<i>Leprocaulon</i>	Flora of Australia (2001)
<i>Leptogium</i>	Jørgensen, (1975 and 1997), Swinscow & Kog (1988)
<i>Lobaria</i>	Yoshimura (1971), Swinscow & Kog (1988), and Awasthi (1986)
<i>Normandina</i>	Swinscow & Kog (1988)
<i>Parmelinella</i>	Divakar & Upreti (2005)
<i>Parmelinopsis</i>	Divakar & Upreti (2005)
<i>Parmotrema</i>	Divakar & Upreti (2005)
<i>Peltigera</i>	Swinscow & Krog (1988)
<i>Physcidia</i>	Kalb & Elix (1995)

<i>Physcia</i>	Swinscow & Krog (1988)
<i>Pseudocyphellaria</i>	Galloway (1994)
<i>Pyxine</i>	Roger (1986)
<i>Ramalina</i>	Stevens (1987)
<i>Rimelia</i>	Divakar & Upreti (2005)
<i>Sticta</i>	Flora of Australia (2001)
<i>Usnea</i>	Awasthi (1986) and Swinscow & Krog (1988)

Table 2. List of macrolichens in Langbian Mountain and Ngoclinh Mountain.

	Species	Collecting site
*	<i>Bulbothrix isidiza</i> (Nyl.) Hale	Lb
	<i>Bunodophoron dyplotylum</i> (Vain.) Wedin	Lb
*	<i>Cetrelia braunsiana</i> (Müll. Arg.) W. Culb. & C. Culb.	Nl
*	<i>Cladia aggregata</i> (Sw.) Nyl.	Nl
	<i>Cladonia bacillaris</i> Nyl.	Nl
	<i>Cladonia didyma</i> (Fée) Vain.	Lb
*	<i>Cladonia leucophylla</i> Ahti & Krog	Nl
*	<i>Cladonia ochrochlora</i> Flörke	Nl
*	<i>Cladonia ramulosa</i> (With.) J. R. Laudon	Lb, Nl
*	<i>Cladonia rappii</i> A. Evans	Lb
*	<i>Cladonia squamosa</i> Hoffm.	Lb
*	<i>Coccocarpia erythroxyli</i> (Spreng.) Swinsc. & Krog	Nl
*	<i>Coccocarpia pellita</i> (Ach.) Müll. Arg.	Nl
	<i>Everniastrum cirrhatum</i> (Fr.) Hale ex Sipman	Nl
*	<i>Everniastrum vexans</i> (Zahlbr. ex W. Culb. & C. Culb.) Hale ex Sipman	Lb, Nl
*	<i>Heterodermia angustiloba</i> (Müll. Arg.) D. D. Awasthi	Nl
*	<i>Heterodermia boryi</i> (Fée) Kr. P. Sing & S. R. Singh	Lb
	<i>Heterodermia diademata</i> (Tayl.) D. D. Awasthi	Lb, Lh
*	<i>Heterodermia fimula</i> (Nyl.) Trevis	Nl
*	<i>Heterodermia flabellata</i> (Fée) D. D. Awasthi	Nl
*	<i>Heterodermia galactophylla</i> (Tuck.) W. L. Culb.	Lb
*	<i>Heterodermia hypocaesia</i> (Yasuha) D. D. Awasthi	Lb
	<i>Heterodermia japonica</i> (Sato) Swinscow & Krog	Lb
*	<i>Heterodermia leucomelos</i> (L.) Poelt ssp. <i>boryi</i> (Fée) Swinscow & Krog	Lb
	<i>Heterodermia podocarpa</i> (Bel.) D. D. Awasthi	Lb
*	<i>Hyperphyscia pandani</i> (H. Magn.) Moberg	Lb
*	<i>Hypogymnia pectinatula</i> (Zahlbr.) Elix	Nl
*	<i>Hypogymnia pseudobitteriana</i> (Awasthi) Awasthi	Nl
*	<i>Hypotrachyna adducta</i> (Nyl.) Hale	Lb
*	<i>Hypotrachyna degelii</i> (Hale) Hale	Nl
*	<i>Hypotrachyna physcioides</i> (Nyl.) Hale	Nl
*	<i>Hypotrachyna pluriformis</i> (Nyl.) Hale	Nl
*	<i>Hypotrachyna rockii</i> (Zahlbr.) Hale	Nl

*	<i>Leioderma sorediata</i> D. J. Galloway & P. M. Jørg.	Nl
	<i>Leprocaulon arbuscula</i> (Nyl.) Nyl.	Lb, Nl
*	<i>Leptogium acutisporum</i> P. M. Jørg.	Nl
	<i>Leptogium cochleatum</i> (Dickson) P.M. Jørg. & P.James	Lb, Lh
*	<i>Leptogium coralloideum</i> (Meyen & Flotow) Vain.	Lb
	<i>Leptogium cyanescens</i> (Rabenh.) Körber	Nl
*	<i>Leptogium moluccanum</i> (Pers.) Vain.	Nl
	<i>Leptogium trichophorum</i> Müll.Arg	Nl
*	<i>Lobaria adscripturiens</i> (Nyl.) Hue	Nl
*	<i>Lobaria clemensiae</i> Vain.	Lb, Nl
*	<i>Lobaria dendrophora</i> Zahlbr.	Nl
	<i>Myelochroa</i> sp.	Lb
	<i>Normandina pulchella</i> (Borrer) Nyl.	Nl
*	<i>Parmelinella wallichiana</i> (Tayl.) Elix & Hale	Lb
*	<i>Parmelinopsis cryptochlora</i> (Vain.) Elix & Hale	Lb
*	<i>Parmelinopsis horrescens</i> (Tayl.) Elix & Hale	Lb
*	<i>Parmotrema cristiferum</i> (Tayl.) Hale	Lb
*	<i>Parmotrema durumae</i> (Krog & Swinscow)	Lh
*	<i>Parmotrema eunetum</i> (Stirton) Hale	Lb
*	<i>Parmotrema praesorediosum</i> (Nyl.) Hale	Lb, Lh
*	<i>Parmotrema robustum</i> (Degel.) Hale	Lh
	<i>Parmotrema stuppeum</i> (Tayl.) Hale	Lb, Lh
	<i>Parmotrema tinctorum</i> (Nyl.) Hale	Lb
*	<i>Parmotrema vartakii</i> Hale	Nl
*	<i>Parmotrema zollingeri</i> (Hepp) Hale	Lh
*	<i>Peltigera dolichorhiza</i> (Nyl.) Nyl.	Nl
*	<i>Phycia undulata</i> Moberg	Lb, Lh
	<i>Phycidia cylindrophora</i> (Tayl.) Hue	Lb
*	<i>Phycidia wrightii</i> Tuck.	Lb
*	<i>Polychidium</i> sp.	Lb
*	<i>Pseudocyphellaria argyracea</i> (Delise) Vain.	Lb
*	<i>Pseudocyphellaria aurata</i> (Ach.) Vain.	Nl
*	<i>Pseudocyphellaria beccarii</i> (Kremp.) D. J. Galloway	Lb
*	<i>Pseudocyphellaria dissimilis</i> (Nyl.) D. J. Galloway & P. James	Nl
	<i>Pseudocyphellaria sulphurea</i> (Schaer.) D. J. Galloway	Nl
*	<i>Pyxine limbulata</i> Müll. Arg.	Nl
*	<i>Ramalina glaucescens</i> Kremp.	Nl
*	<i>Ramalina subfraxinea</i> var <i>norstictica</i> N. Stevens	Nl
	<i>Rimelia cetrata</i> (Ach.) Hale & Fletcher	Lb
	<i>Rimelia clavulifera</i> (Räsänen) Kurok.	Lb, Nl
	<i>Rimelia reticulata</i> (Tayl.) Hale & Fletcher	Lb
	<i>Stereocaulon</i> sp.	Nl
*	<i>Sticta cyphellulata</i> (Müll. Arg.) Hue	Lb
	<i>Sticta duplolibata</i> (Hue) Vain.	Lb
	<i>Sticta weigeli</i> (Ach.) Vain.	Lb
	<i>Usnea baileyi</i> (Stirt.) Zahlbr.	Lh, Nl

*	<i>Usnea bismolliuscula</i> Zahlbr.	Lb, Lh
*	<i>Usnea complanata</i> (Müll. Arg.) Mot.	Nl
*	<i>Usnea fragilis</i> Stirt.	Lh, Nl
	<i>Usnea himalayana</i> Bab.	Lb, Nl
*	<i>Usnea pectinata</i> Tayl.	Lh, Nl
*	<i>Usnea undulata</i> Stirt.	Lb, Nl
*	<i>Usnea vulneraria</i> Mot.	Lh

(*): new records