CHAPTER 18

DISCUSSION AND CONCLUSION

This study was performed on 700 specimens, which were identified to 41 species in12 genera and 8 families pertaining to the order Lecanorales and to 9 species in 3 genera and 3 families of the order Teloschistales.

Species Occurrence

Fifty species of discolichens were found at Phu Luang Wildlife Sanctuary. Of these, 42% belong to Lecanoraceae, 16% to Malmideaceae, 10% to Haematommataceae, 10% to Teloschistaceae, 6% to Ramalinaceae, 6 % to Letrouitiaceae, 2% to Brigantiaeaceae, 2% to Lecideaceae, 2% to Megalariaceae, Pilocarpaceae and Megalosporaceae respectively (see Figure 67).

Lichens pertaining to the family Lecanoraceae show the highest diversity in Phu Luang Wildlife Sanctuary, i.e. 21 species from 356 collections. There are three common species (with number of collections in the parenthesis): *Vainionora flavidorufa* (63), *Ramboldia siamensis* (58), and *Lecanora phaeocardia* (43). Two species, *Lecidella carpathica* and *Lecidella elaeochroma* are new records for Thailand, while *Ramboldia* PL.1, *R. deficiens* and *Malmidea microspora* are expected to be species new to science.

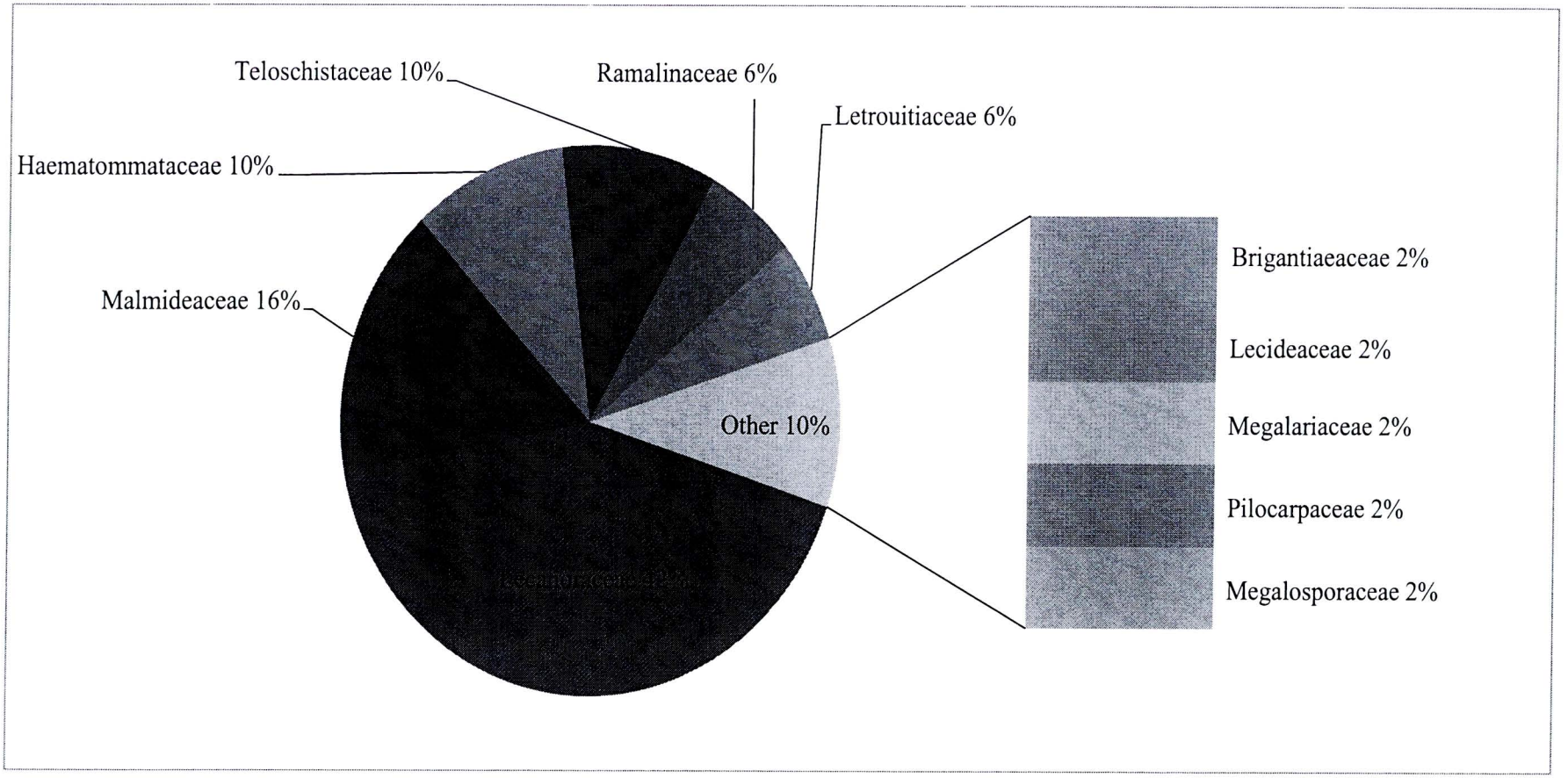

Figure 67 Proportion of numbers of species among eleven families of Discolichens.

Malmideaceae, the second common family represents 8 species from 85 collections. The most common species, *Malmidea eeuuae* was collected 28 times in different forest types. *Malmidea coralliformis* was represented by 23 collections, Twenty collections were determined to *Malmidea bakeri*, 6 collections to *Malmidea perplexa* and 5 collections to *Malmidea piae*. *Malmidea microspora* as well as *Malmidea* PL.1 are expected to be new species.

Both Haematommataceae and Teloschistaceae came in third as far as the number of species concerns. Haematommataceae is represented by five species among 92 collections. There are three common species (with number of collections in the parenthesis): *Haematomma wattii* (39), *Haematomma collatum* (22) and *Haematomma flexuosum* (20). 1 species of 92 collections, namely *Haematomma* cf. *africanum* is a new record for Thailand. Telochistaceae show a great diversity of thallus shape, but most species are characterized by their bright colored apothecia with parietin or related substances, usually with a well-developed thalline margin, simple to 3-septate polarilocular ascospores with strongly thickened septa (Kirk et al., 2001).

Ramalinaceae are represented by 3 species from 18 collections. Ramalinaceae are distinguished by a crustose (or microsquamulous) thallus, plane to convex, biatorine or lecideine apothecia, a hyaline to dark hypothecium, 8 (rarely 16) spored asci, acicular, fusiform or bacillar, transversely 0- to multi-septate, hyaline spores and unbranched paraphyses, often thickened at apices. Three species were found from 18 collections, namely *Bacidia convexula, Bacidia incongruens* and *Bacidia subannexa*.

Letrouitiaceae are distinguished by a green or brownish crustose thallus, which is lacking anthraquinone pigments. The ascomata are without a well-developed thalline margin. The ascospores are hyaline and multiseptate, sometimes muriform (Kirk, Cannon & Stalpers, 2001, p. 280). 3 species from this genus were collected from Phu Luang Wildlife Sanctuary.

Brigantiaeaceae are recognized by a crustose thallus that invariably contains atranorin, a green photobiont, relatively large apothecia, usually vividly colored orange or yellow due to the presence of anthraquinone pigments, single-spored, asci with an amyloid outer wall and a well-developed amyloid tholus, lacking any internal differentiation, simple to sparsely branched paraphyses with only slightly enlarged apices, and relatively large muriform, hyaline ascospores (Kantvilas & Elix, 2009). Only *Brigantiaea leucoxantha* from 27 known species was collected in Phu Luang Wildlife Sanctuary.

Lecideaceae are determined by a crustose to squamulose thallus; sessile apothecial ascomata with an absent or weakly developed thalline margin, hyaline, nonseptate, and thin-walled ascospores (Kirk et al., 2001). Only one specimen, *Bellemerea* PL.1 was collected and it is axpected to be a new species. It was found on rocks in a Lower montane scrub forest in Phu Luang Wildlife Sanctuary.

Megalariaceae comprises of one species, namely *Catillochroma melanotropa* which is a new record for Thailand.

Pilocarpaceae with one genus and with one species, *Micarea melaena* is also a new record for Thailand.

Megalosporaceae are recognized by a crustose thallus, sessile apothecia with a brown to black disc; the ascospores are large, hyaline and thick-walled. 19 specimens of *Megalospora tuberculosa* were found in Phu Luang Wildlife Sanctuary.

50 species from of discolichens, pertaining to 11 families and 15 genera, from 700 specimens were identified from different forest types including Coniferous forests (CF), Dry Dipterocarp forests (DDF), Dry evergreen forests (DEF), Lower montane rainforests (LMRF), Lower montane scrub (LMS), Mixed deciduous forests (MDF) and Tropical rain forest (TRF) at Phu Luang Wildlife Sanctuary (see Table 8). Species composition varies among different forest types.

The highest diversity was found in Lower montane scrub (45%), Lower montane rainforests (25%), Dry Dipterocarp forests (11%), the Mixed deciduous forest (10%), the lower in Tropical rainforest (5%), and the lowest diversity was found in Coniferous forest (CF) and Dry evergreen forest (3%) (see Figure 68). The family Lecanoraceae revealed the highest number of genera and species. The lowest number of genera and species was found in Brigantiaeaceae, Lecideaceae, Megalosporaceae and Pilocarpaceae.

Table 8

Families, Genera and Species of Discolichens in Seven Forest Types at Phu Luang Wildlife Sanctuary.

Order	Family	Species	Number of specimens of each forest type							Total
			LMS	CF	TRF	MDF	LMRF	DDF	DEF	
Lecanorales	Ramalinaceae	*Bacidia convexula*	7							7
		Bacidia incongruens	5							5
		Bacidia subannexa	6							6
	Brigantiaeaceae	*Brigantiaea leucoxantha*			15		10			25
	Haematommataceae	*Haematomma* cf. *africanum*						1		1
		Haematomma collatum	2		5		15			22
		Haematomma flexuosum	5				15			20
		Haematomma PL.1	5				5			10
		Haematomma wattii	32				7			39
	Lecanoraceae	*Lecanora achroa*	5					12		17
		Lecanora argentata	1				7			8
		Lecanora austrotropica	1			1	4	2	1	9
		Lecanora flavoviridis	1							1
		Lecanora helva	1					9		10
		Lecanora leprosa						1		1
		Lecanora phaeocardia	36				5	2		43
		Lecanora subimmersa				12		7		19
		Lecanora toroyensis			2					2
		Lecanora tropica	6			3	6	11	11	37
		Lecanora vainioi	23					1		24
		Lecidella carpathica	1							1
		Lecidella elaeochroma	1							1
		Maronina orientalis	5		1		5			11
		Ramboldia deficiens					6	2		8

Table 8 (continued)

Order	Family	Species	Number of specimens of each forest type							Total
			LMS	CF	TRF	MDF	LMRF	DDF	DEF	
Lecanorales	Lecanoraceae	*Ramboldia heterocarpa*	6			1		3		10
		Ramboldia russula	1	1			16	13		31
		Ramboldia cf. *siamensis*	1							1
		Ramboldia siamensis	37	4			10	7		58
		Ramboldia PL.1	1							1
		Vainionora flavidorufa	58			3	2			63
	Lecideaceae	*Bellemerea* PL.1	1							1
	Megalariaceae	*Catillochroma melanotropa*	5				18			23
	Malmideaceae	*Malmidea bakeri*				10	10			20
		Malmidea coralliformis	10			2	11			23
		Malmidea duplomarginata				1				1
		Malmidea eeuuae	1		1	26				28
		Malmidea microspora	1							1
		Malmidea perplexa	6							6
		Malmidea piae							5	5
		Malmidea PL.1			1					1
	Pilocarpaceae	*Micarea melaena*	1							1
Teloshistales	Letrouitiaceae	*Letrouitia domingensis*	4				2			6
		Letrouitia transgressa	3		12	8	12		7	42
		Letrouitia vulpina	4				3		1	8
	Megalosporaceae	*Megalospora tuberculosa*	19							19
	Teloschistaceae	*Caloplaca testaceorufa*	5					4		9
		Caloplaca aff. *ferruginea*	1							1
		Caloplaca flavorubescens	7							7
		Caloplaca PL.1	1				5			6
		Caloplaca bassiae	1					1		1
			317	5	37	67	174	76	24	700

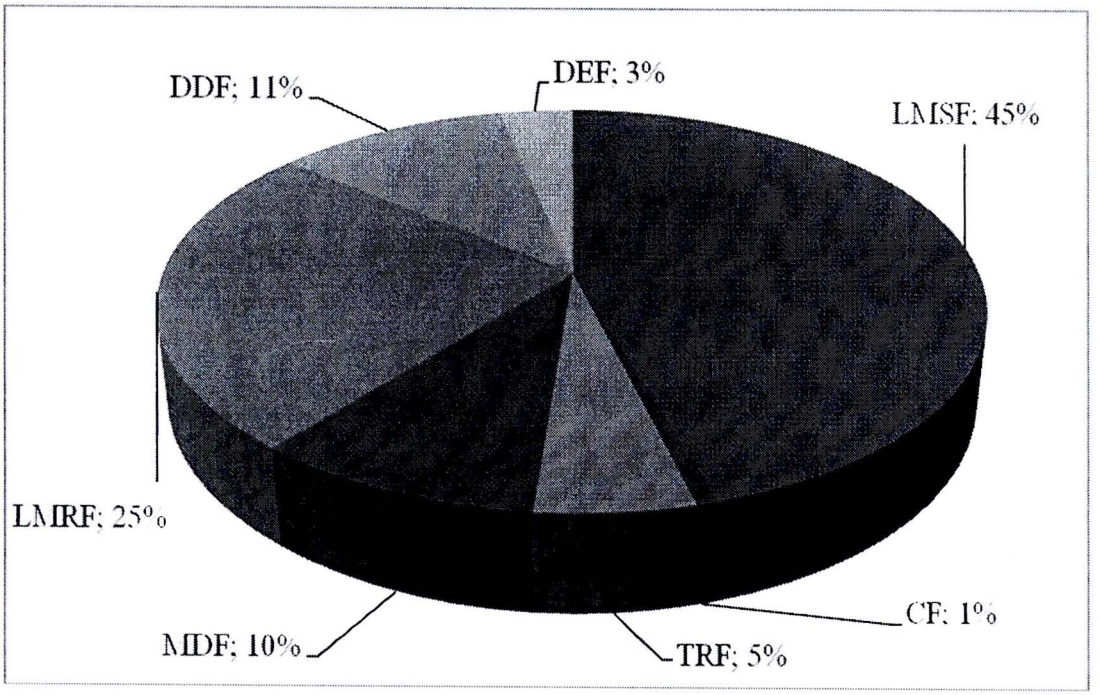

Figure 68 The Percentage of lichen taxa that belong to 15 genera were found in coniferous forest (CF), dry dipterocarp forest (DDF), dry evergreen forest (DEF), lower montane scrub (LMS), lower montane rainforest (LMRF), mixed deciduous forest (MDF) and tropical rainforest (TRF) at Phu Luang Wildlife Sanctuary.

Three species, namely *Lecanora austrotropica* and *Lecanora tropica,* which are common species almost occurred in each forest type except CF and TRF, while *Letrouitia transgressa* was found in nearly all forest types except CF and DDF.

The distribution of the discolichens, were affected by specific microhabitats especially light intensity, temperature, humidity, forest types and altitude of explored site.

APPENDIX A

Table 9 The Distribution of Discolichens in the World (Feuerer, 2009)

Countries	Family	Genus	Species
North America			
New Mexico (USA)	10	17	166
Colorado (USA)	13	19	168
Michigan (USA)	14	28	196
Wisconsin (USA)	15	27	168
New York - State (USA)	16	29	246
Quebec (Canada)	14	24	129
Nunavut (Canada)	14	21	112
New Brunswick (Canada)	15	22	107
South America			
Colombia	10	13	22
Ecuador	7	9	11
Bolivia	16	34	93
Paraguay	11	22	52
Uruguay	15	21	128
Rio Grande do Sul (Brazil)	15	30	166
Argentina	20	49	412
Easter Island (Chile)	6	6	11
Europe			
Norway	12	38	585
Svalbard (Norway)	15	24	212
Sweden	17	30	717
Finland	19	36	499
Greenland (Denmark)	15	30	349

Table 9 (Continued)

Countries	Family	Genus	Species
mainland Denmark	15	32	293
Ireland	18	35	278
Poland	19	36	507
Greece	4	4	4
Baden-Württemberg (Germany)	19	40	443
Bayern (Germany)	18	38	469
Turkey	15	25	152
Croatia	18	36	302
Bulgaria	2	2	10
Switzerland	13	22	144
Czechia	20	38	439
Hungary	15	25	245
Slovenia	12	18	144
Steiermark (Austria)	15	34	149
St. Helena (United Kingdom)	11	18	45
South Georgia (United Kingdom)	8	16	40
Portugal	22	32	165
Madeira (Portugal)	19	32	142
the Azores (Portugal)	17	29	129
New Caledonia (France)	15	17	92
Tuscany (Italy)	6	7	16
Castile & Leon (Spain)	14	27	262
Cantabria (Spain)	12	21	105

Table 9 (Continued)

Countries	Family	Genus	Species
Africa			
Egypt	2	2	9
Kenya	8	9	19
Zimbabwe	12	17	39
Kwazulu-Natal (South Africa)	2	3	7
Middle East			
Israel	13	22	131
Jordan	8	11	37
Iran	2	2	41
Kuwait	7	8	14
Saudi Arabia	8	12	27
Asia			
Thailand	12	25	80
Tamil Nadu (India)	14	22	79
Pakistan	6	12	34
Xinjiang (China)	11	22	101
Yunnan (China)	14	35	101
Taiwan	19	40	172
Hong Kong	16	24	67
South Korea	7	7	11
Malaysia	12	17	39
Indonesia	7	8	10
Philippines	1	1	1
Sri Lanka	15	21	103

Table 9 (Continued)

Countries	Family	Genus	Species
Australia			
Queensland (Australia)	1	1	2
New Zealand	18	31	173
Chatham Island (New Zealand)	1	1	1
Antarctica	9	17	73
Oceania			
Vanuatu	2	2	3
Fiji	4	4	5

APPENDIX B

Recently, discolichens contain 7 orders, 30 families and their hierarchical ranks

Kingdom Fungi

Phylum Ascomycota

Subphylum Pezizomycotina

1. Class Lecanoromycetes

1. Subclass Acarosporomycetidae

Order Acarosporales

Family Acarosporaceae

2. Subclass Ostropomycetidae

Order Agyriales

Family Agyriaceae

Order Ostropales

Family Coenogoniaceae

Family Gomphillaceae

Family Gyalectaceae

Family Phlyctidaceae

3. Subclass Ostropomycetidae (families *incertae sedis*)

Order Pertusariales

Family Arctomiaceae

Family Hymeneliaceae

Family Loxosporaceae

4. Subclass Lecanoromycetidae

Order Lecanorales

Family Biatorellaceae

Family Catillariaceae

Family Ectolechiaceae

Family Haematommataceae

Family Lecanoraceae

Family Megalariaceae

Family Micareaceae

Family Miltideaceae

Family Mycoblastaceae

Family Pilocarpaceae

Family Psoraceae

Family Ramalinaceae (Bacidiaceae)

Order Teloshistales

Family Letrouitiaceae

Family Megalosporaceae

Family Teloschistaceae

5.Subclass Lecanoromycetidae

(families *incertae sedis*)

Order Lecanorales

Family Aphanopsidaceae

Family Brigantiaeaceae

Family Lecideaceae

Family Ophioparmaceae

2.Class Lecanoromycetes (orders *incertae sedis*)

Order Candelariales

Family Candelariaceae

APPENDIX C

Table 10

Reports on Discolichens in Thailand during 2002-2007.

Family	Genera-Species	Reference
Bacidiaceae	*Bacidia affinis* Vain.	Wolseley et al., 2002
	Bacidia heterochroa (MÜll. Arg.) Zahlbr.	Aptroot et al., 2007
	Bacidia cf. *hunana* Zahlbr.	The Lichen Research Unit, 2004
	Bacidia incongruens (Stirton) Zahlbr.	The Lichen Research Unit, 2004
	Bacidia manilensis var. *siamensis* Vain.	Wolseley et al., 2002
	Bacidia medialis (Nyl.)	Aptroot et al., 2007
	Bacidia cf. *medialis* (Tuck. in Nyl.) Zahlbr.	The Lichen Research Unit, 2004
	Bacidina penicillata Aptroot	Aptroot et al., 2007
	Bacidina squamellosa S. Ekman	Aptroot et al., 2007
	Bacidia subannexa (Nyl.) Zahlbr.	The Lichen Research Unit, 2004
	Bacidia sp.1	The Lichen Research Unit, 2004
	Bacidia sp.2	The Lichen Research Unit, 2004
	Bacidia umbrina var. *turgida* Th. Fr.	Wolseley et al., 2002
	Bacidiopsora orizabana (Vain.) Kalb	Aptroot et al., 2007
	Bacidiopsora squamulosula (Nyl.) Kalb	Aptroot et al., 2007
	Lecania sp.1	The Lichen Research Unit, 2004
	Lecania sp.2	The Lichen Research Unit, 2004

Table10 (Continued)

Family	Genera-Species	Reference
Bacidiaceae	*Tephromela atra* (Huds.) Hafellner	Aptroot et al., 2007
Brigantiaeaceae	*Brigantiaea leucoxantha* (Spreng.) R. Sant & Hafellner.	Wolseley et al., 2002
	Brigantiaea tricolor (Mont.) Trevis.	Wolseley et al., 2002
Candelariaceae	*Candelariella reflexa* (Nyl.) Lettau	Aptroot et al., 2007
Catillariaceae	*Catillaria testaceolivens* (Vain.) Zahlbr.	Wolseley et al., 2002
	Catillaria unicolor (Vain.) Zahlbr.	Wolseley et al., 2002
Ectolechiaceae	*Calopadia puiggarii* (Müll. Arg.) Vezda	Aptroot et al., 2007
	Calopadia subcoerulescens (Zahlbr.) Vezda	Aptroot et al., 2007
	Lasioloma arachnoideum (Kremp.) R. Sant.	Wolseley et al., 2002
	Sporopodium hossei Vain.	Wolseley et al., 2002
	Sporopodium leucoxanthum (Spreng.) Vain.	Wolseley et al., 2002
Fuscideaceae	*Maronea* sp.1	The Lichen Research Unit, 2004
	Maronea sp.2	The Lichen Research Unit, 2004
	Maronea sp.3	The Lichen Research Unit, 2004
	Maronea sp.4	The Lichen Research Unit, 2004
Gomphillaceae	*Echinoplaca leucotrichoides* (Vain.) R. Sant.	Aptroot et al., 2007
	Echinoplaca pellicula (MÜll. Arg.) R. Sant.	Wolseley et al., 2002
Haematommataceae	*Haematomma collatum* (Stirt.) C.W. Dodge	Wolseley et al., 2002
	Haematomma parda Aptroot	Aptroot et al., 2007

Table10 (Continued)

Family	Genera-Species	Reference
Haematommataceae	*Haematomma puniceum* (Ach.) A. Massal.	The Lichen Research Unit, 2004; Wolseley et al., 2002
	Haematomma rufidulum (Fée) A. Massal.	Aptroot et al., 2007
	Haematomma wattii (Stirt.) Zahlbr.	The Lichen Research Unit, 2004; Wolseley et al., 2002
Hymeneliaceae	*Aspicilia* sp.1	Wolseley et al., 2002
	Ionaspis tropica Aptroot	The Lichen Research Unit, 2004
	Hymenelia lacustris (With.) M. Choisy	Wolseley et al., 2002
	Biatora spaeroides (Dicks.) Hornem.	Aptroot et al., 2007
	Biatora vernalis (L.) Fr.	The Lichen Research Unit, 2004
	Biatora sp.1	The Lichen Research Unit, 2004
Lecanoraceae	*Lecanora achroa* Nyl.	The Lichen Research Unit, 2004
	Lecanora caesiorubella Ach.	Wolseley et al., 2002; Aptroot et al., 2007
	Lecanora casuarinophila Lumbsch	Wolseley et al., 2002; Aptroot et al., 2007
	Lecanora cenisia Ach.	Wolseley et al., 2002; Aptroot et al., 2007
	Lecanora ecoronata Vain.	The Lichen Research Unit, 2004
	Lecanora flavidorufa Hue	Wolseley et al., 2002; Aptroot et al., 2007
	Lecanora flavoviridis Kremp.	Wolseley et al., 2002; Aptroot et al., 2007
	Lecanora helva Stizenb.	Wolseley et al., 2002; Aptroot et al., 2007
	Lecanora insignis Degel.	Wolseley et al., 2002; Aptroot et al., 2007
	Lecanora muralis (Schreb.) Rabenh.	The Lichen Research Unit, 2004

Table10 (Continued)

Family	Genera-Species	Reference
Lecanoraceae	*Lecanora phaeocardia* Vain.	Wolseley et al., 2002; Aptroot et al., 2007
	Lecanora polytropa (Hoffm.) Rabenh.	The Lichen Research Unit, 2004
	Lecanora pseudistera Nyl.	Wolseley et al., 2002; Aptroot et al., 2007
	Lecanora sp.1	The Lichen Research Unit, 2004
	Lecanora subimmersa (Fée) Vain.	Wolseley et al., 2002; Aptroot et al., 2007
	Lecanora vainioi Vänskä	Wolseley et al., 2002; Aptroot et al., 2007
	Lecanora tropica Zahlbr.	Wolseley et al., 2002; Aptroot et al., 2007
	Maronina sp.1	The Lichen Research Unit, 2004
	Pyrrhospora fuscisidiata Aptroot & Wolseley	Wolseley et al., 2002; Aptroot et al., 2007
Lecideaceae	*Lecidea* sp.1	The Lichen Research Unit, 2004
Letrouitiaceae	*Letrouitia transgressa* (Malme) Hafellner & Bellem.	The Lichen Research Unit, 2004
	Letrouitia vulpina (Tuck.) Hafellner & Bellem.	The Lichen Research Unit, 2004
	Letrouitia sp.1	The Lichen Research Unit, 2004
Megalariaceae	*Megalaria laureri (*Th. Fr.) Hafellner	Wolseley et al., 2002; Aptroot et al., 2007
Megalosporaceae	*Austroblastenia* sp.1	The Lichen Research Unit, 2004
	Austroblastenia sp.2	The Lichen Research Unit, 2004
	Austroblastenia sp.3	The Lichen Research Unit, 2004
	Megalospora coccodes (Bél.) Sipman ssp.	Wolseley et al., 2002; Aptroot et al., 2007

Table10 (Continued)

Family	Genera-Species	Reference
Pilocarpaceae	*Byssoloma chlorinum* (Vain.) Zahlbr.	Wolseley et al., 2002
	Byssoloma leucoblepharum (Nyl.) Vain.	Wolseley et al., 2002
	Byssoloma sp.1	The Lichen Research Unit, 2004
	Byssoloma subdiscordans (Müll. Arg.) R. Sant.	Aptroot et al., 2007
	Byssoloma tricholomum (Mont.) R. Sant.	Wolseley et al., 2002
	Calenia graphidea Vain.	Wolseley et al., 2002
	Calopadia fusca (Müll. Arg.) Veezda	Wolseley et al., 2002
Teloschistaceae	*(Caloplaca) Placodium testaceorufum* Vain.	Wolseley et al., 2002
Trapeliaceae	*Placopsis* sp.1	The Lichen Research Unit, 2004
	Placynthiella sp.1	The Lichen Research Unit, 2004
	Placynthiella sp.2	The Lichen Research Unit, 2004
	Placynthiella sp.3	The Lichen Research Unit, 2004
Trapeliaceae	*Placynthiella* sp.4	The Lichen Research Unit, 2004
	Placynthiella sp.5	The Lichen Research Unit, 2004
	Placynthiella sp.6	The Lichen Research Unit, 2004
	Placynthiella sp.7	The Lichen Research Unit, 2004
	Placynthiella sp.8	The Lichen Research Unit, 2004
	Trapelia coarctata (Sm.) M. Choisy	Wolseley *et al.*, 2002
	Trapelia sp.1	The Lichen Research Unit, 2004

Table10 (Continued)

Family	Genera-Species	Reference
Trapeliaceae	*Trapelia subconcolor* (Anzi) Hertel	Wolseley et al., 2002
	Trapeliopsis viridescens (Schrad.) Coppins & P. James	Wolseley et al., 2002

APPENDIX D

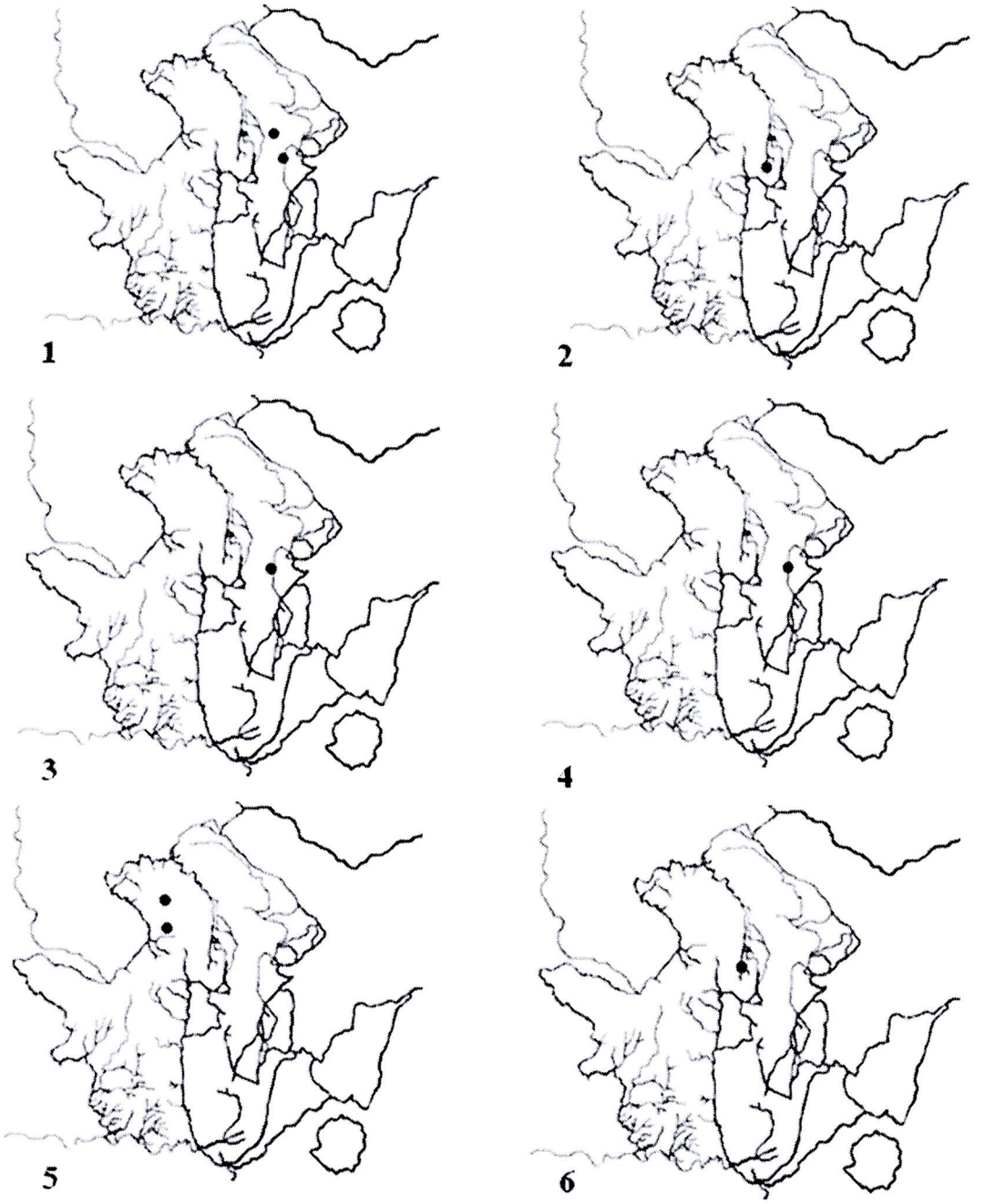

Figure 69 Distribution of Discolichens at Phu Luang Wildlife Sanctuary (1).

Note. 1. *Bacidia convexula* 2. *Bacidia incongruens* 3. *Bacidia subannexa*

4. *Bellemerea* PL.1 5. *Brigantiea leucoxantha* 6. *Caloplaca* aff. *ferruginea*

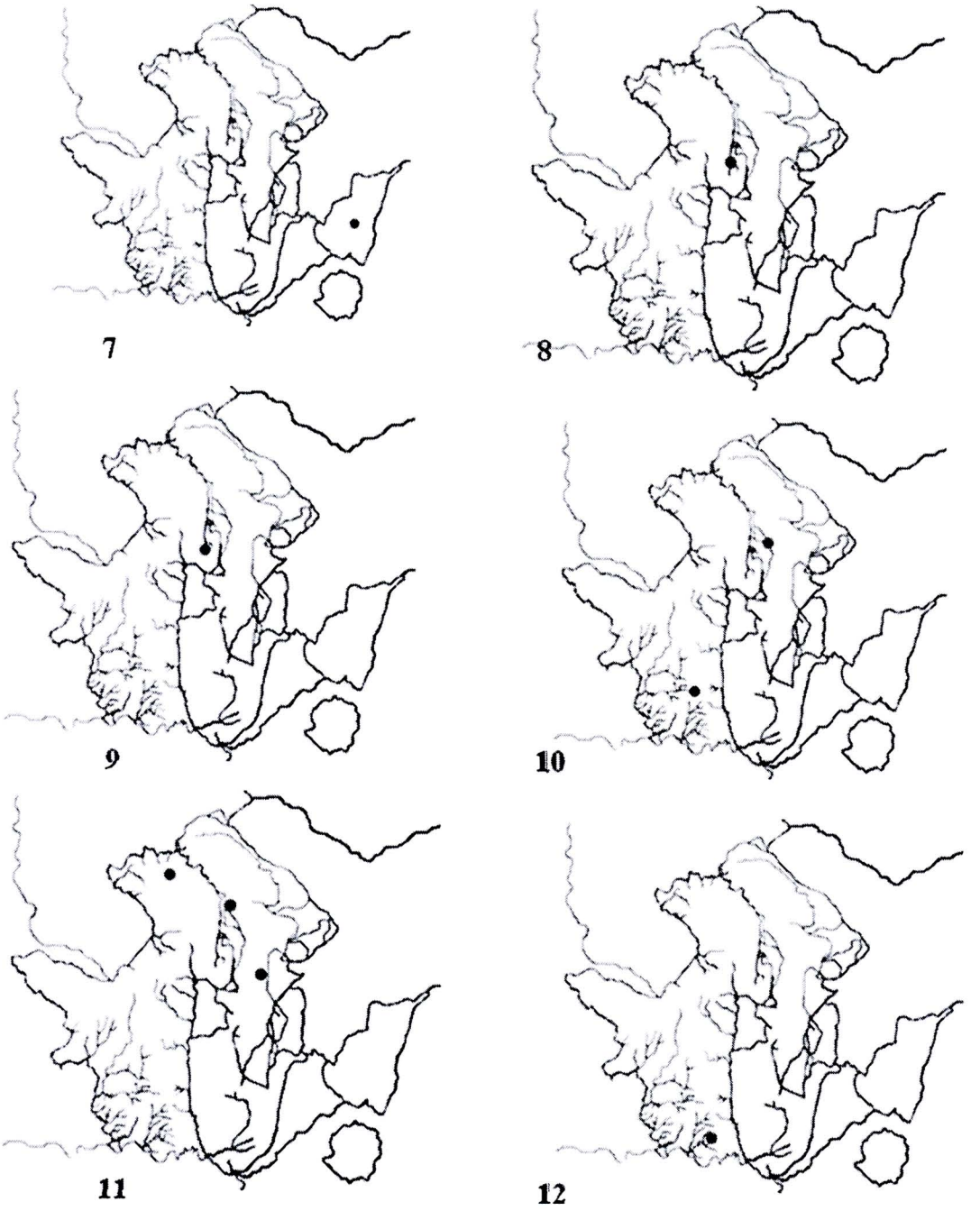

Figure 70 Distribution of discolichens at Phu Luang Wildlife Sanctuary (2).

Note. 7. *Caloplaca bassiae* 8. *Caloplaca flavorubescens* 9. *Caloplaca* PL.1

10. *Caloplaca testaceorufa* 11. *Catillochroma melanotropa*

12. *Haematomma* cf. *africanum*

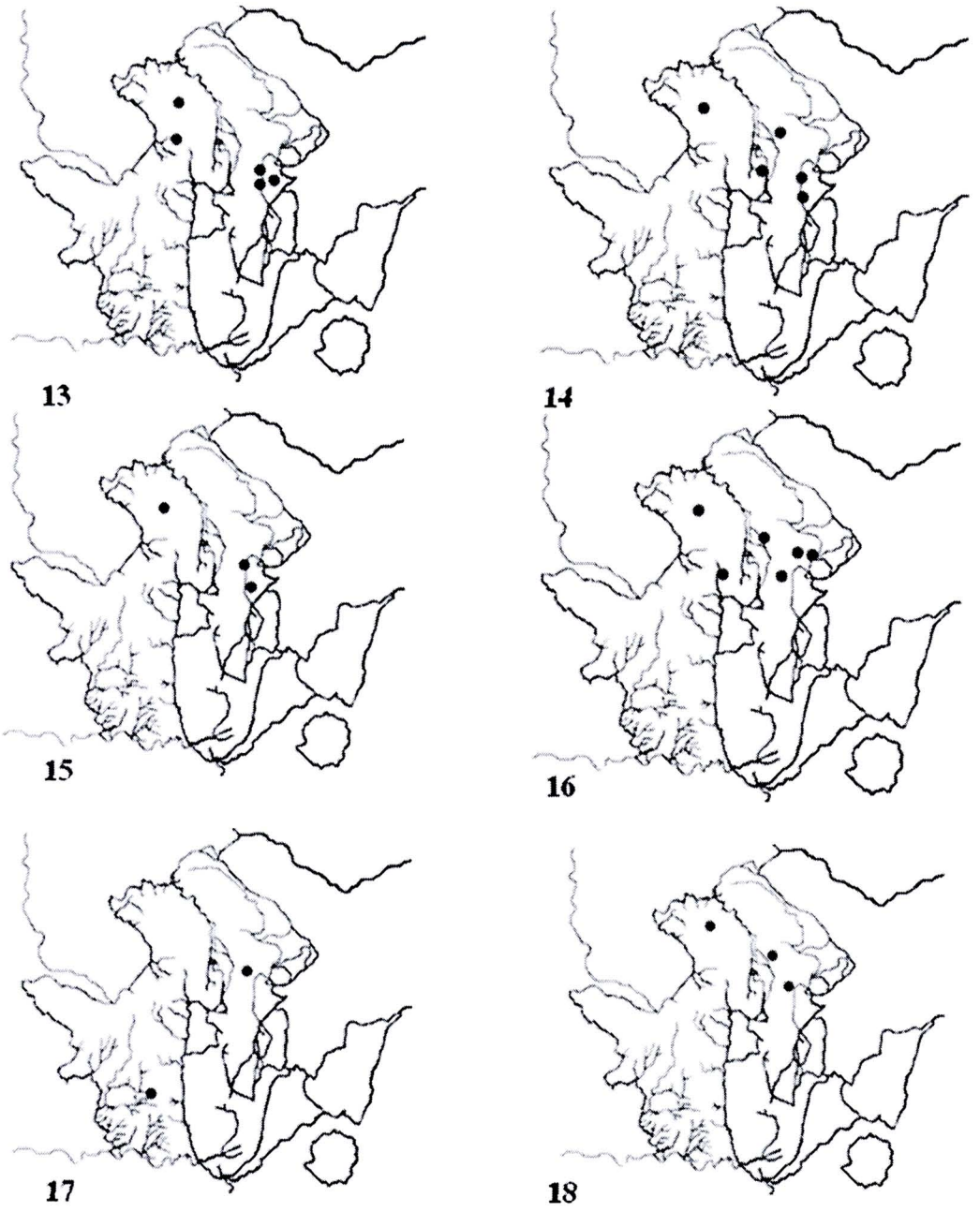

Figure 71 Distribution of discolichens at Phu Luang Wildlife Sanctuary (3).

Note. 13. *Haematomma collatum* 14. *Haematomma flexuosum*

15. *Haematomma* PL.1 16. *Haematomma wattii* 17. *Lecanora achroa*

18. *Lecanora argentata*

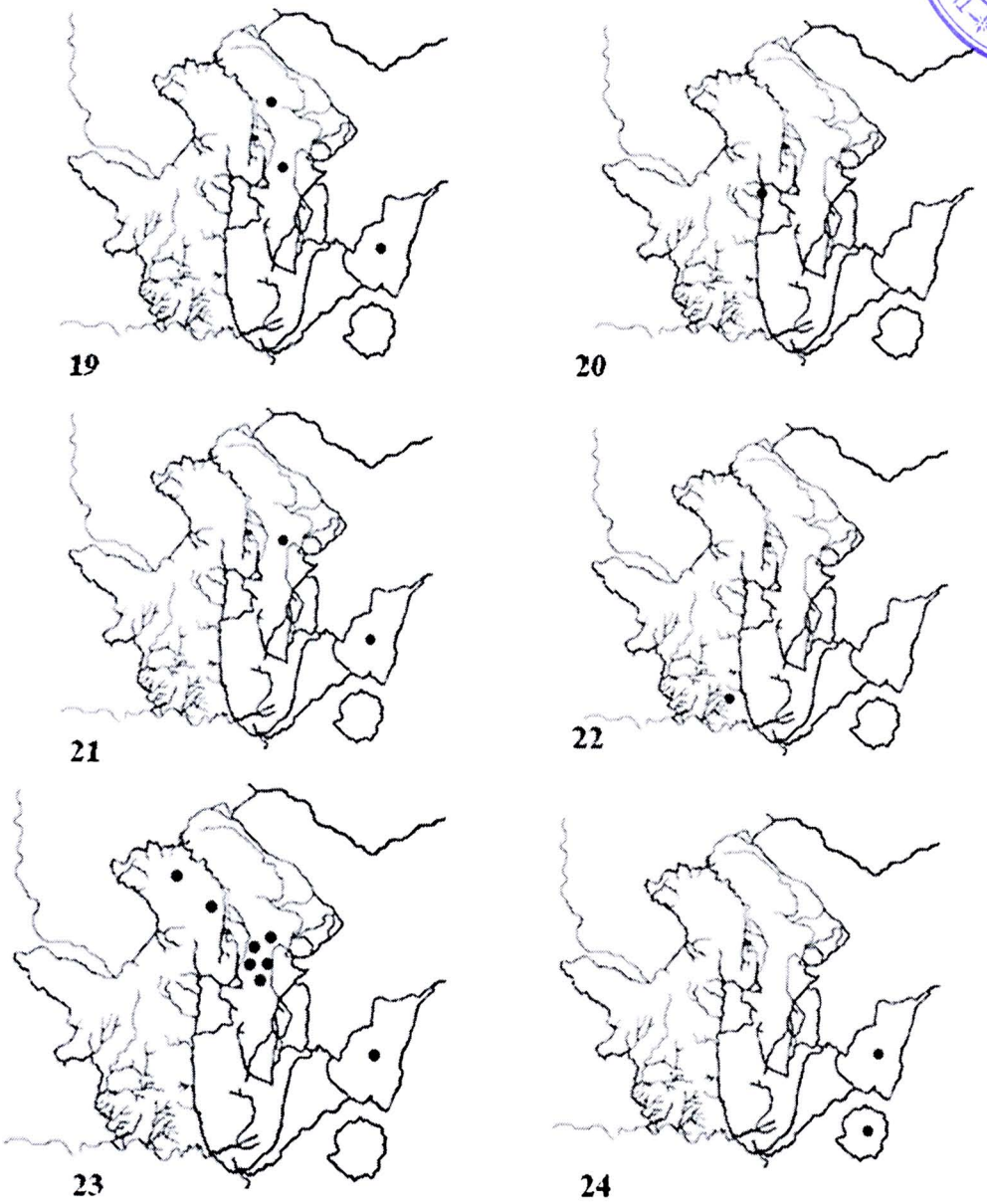

Figure 72 Distribution of discolichens at Phu Luang Wildlife Sanctuary (4).

Note. 19. *Lecanora austrotropica* 20. *Lecanora flavoviridis*

21. *Lecanora helva* 22. *Lecanora leprosa* 23. *Lecanora phaeocardia*

24. *Lecanora subimmersa*

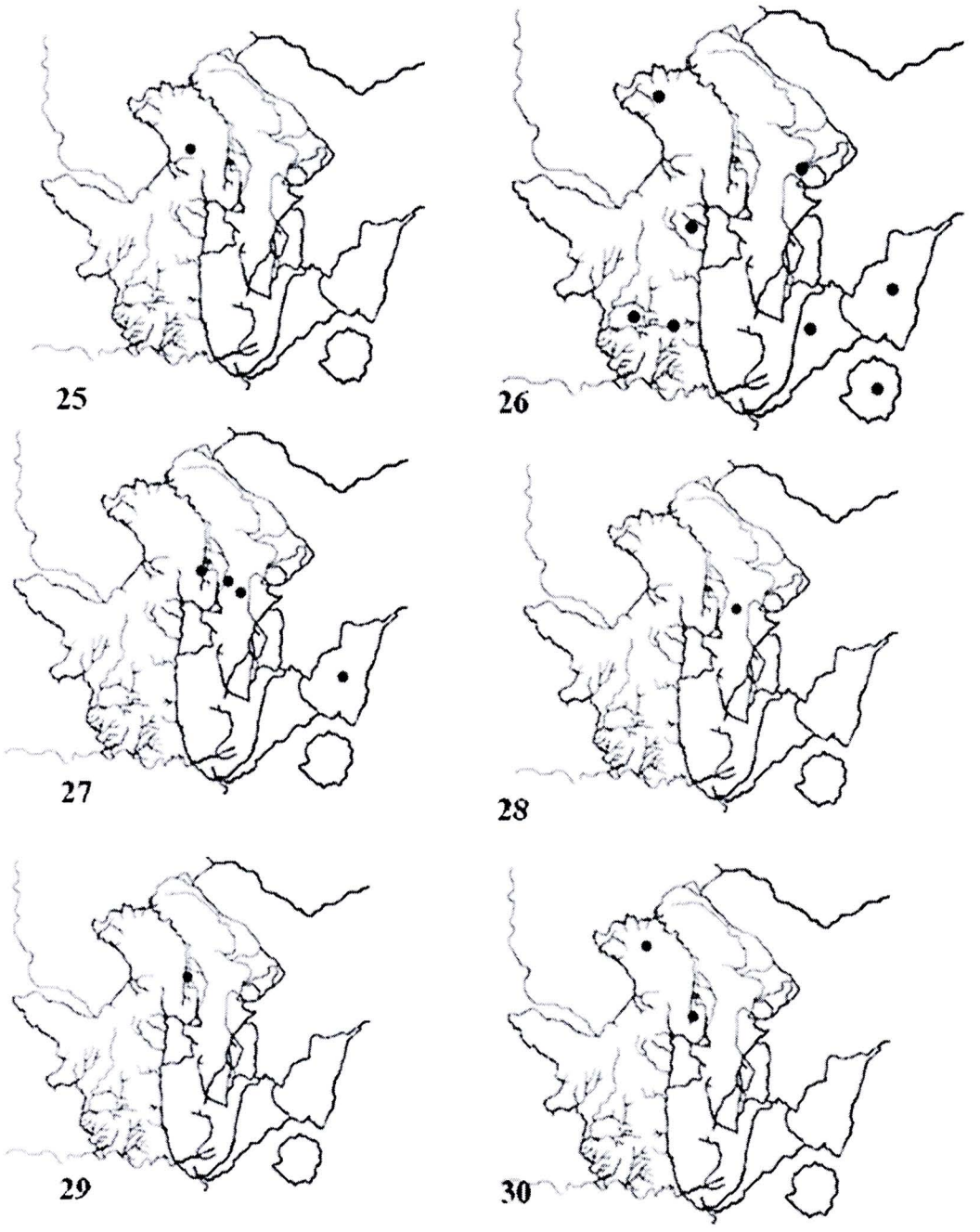

Figure 73 Distribution of discolichens at Phu Luang Wildlife Sanctuary (5).

Note. 25. *Lecanora toroyensis* 26. *Lecanora tropica*

27. *Lecanora vainioi* 28. *Lecidella capathica* 29. *Lecidella elaeochroma*

30. *Letrouitia domingensis*

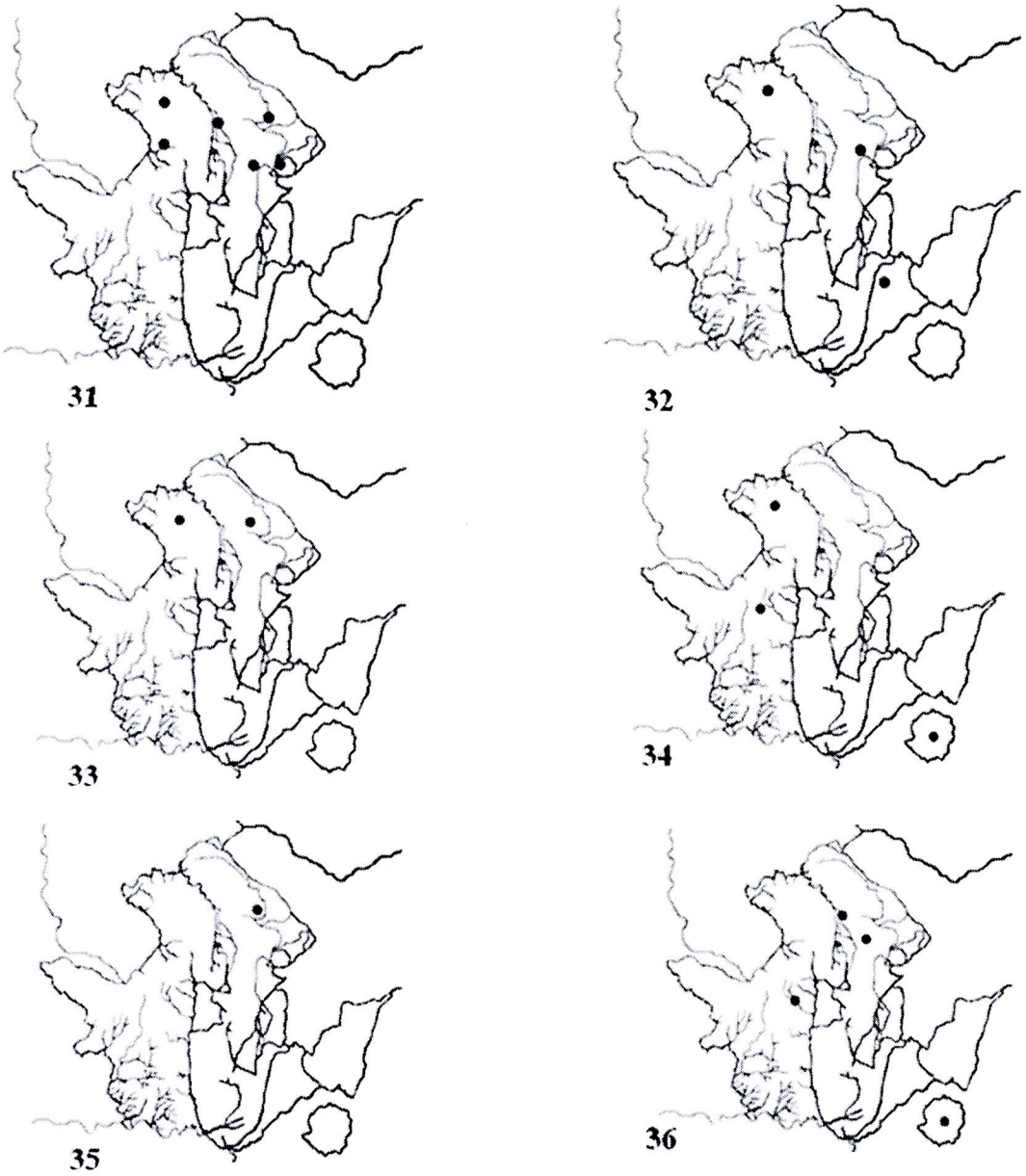

Figure 74 Distribution of discolichens at Phu Luang Wildlife Sanctuary (6).

Note. 31. *Letrouitia transgressa* 32. *Letrouitia vulpina* 33. *Malmidea bakeri* 34. *Malmidea coralliformis* 35. *Malmidea duplomarginata* 36. *Malmidea eeuuae*

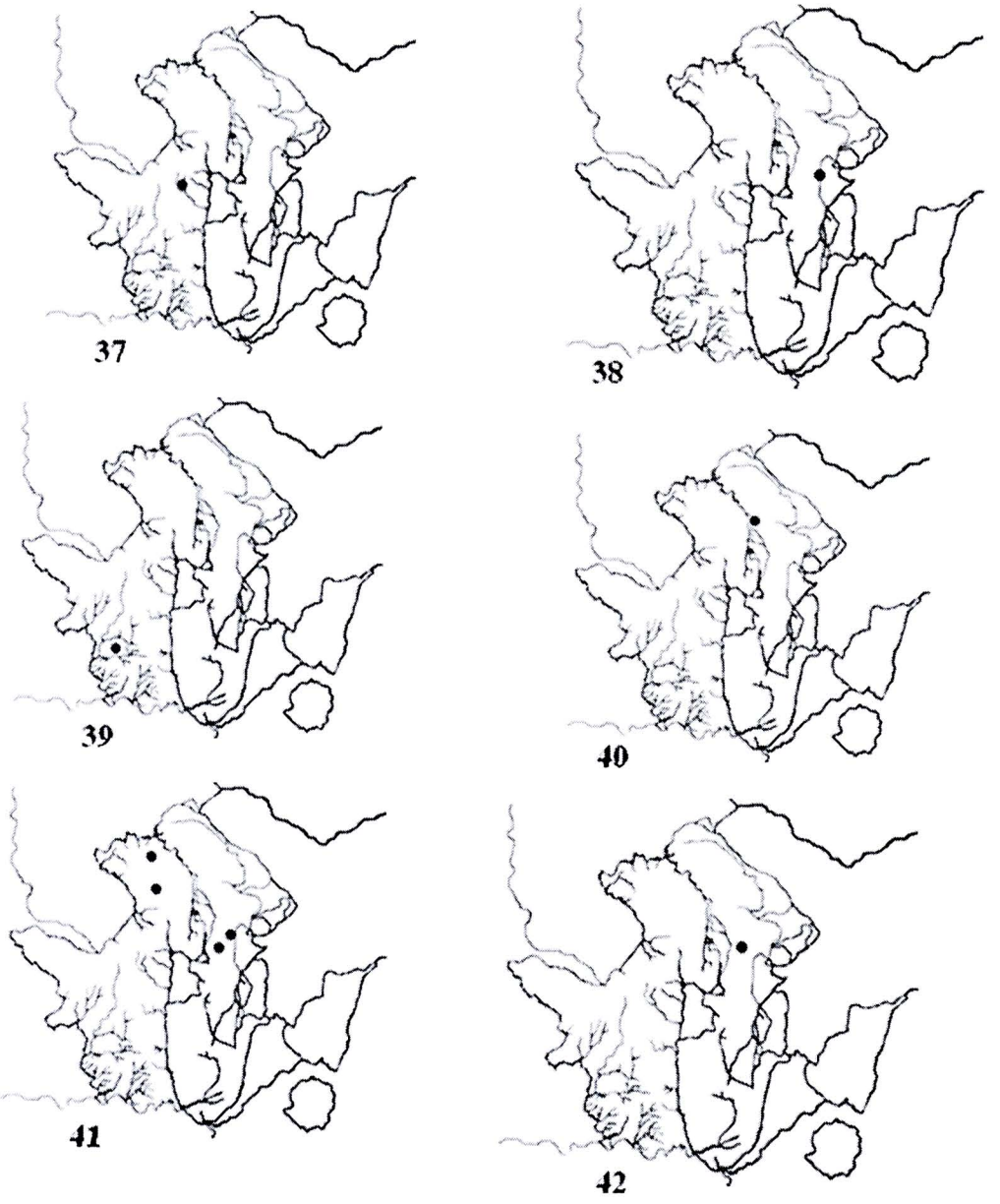

Figure 75 Distribution of discolichens at Phu Luang Wildlife Sanctuary (7).

Note. 37. *Malmidea microspora* 38. *Malmidea perplexa* 39. *Malmidea piae* 40. *Malmidea* PL.1 41. *Maronina orientalis* 42. *Megalospora tuberculosa*

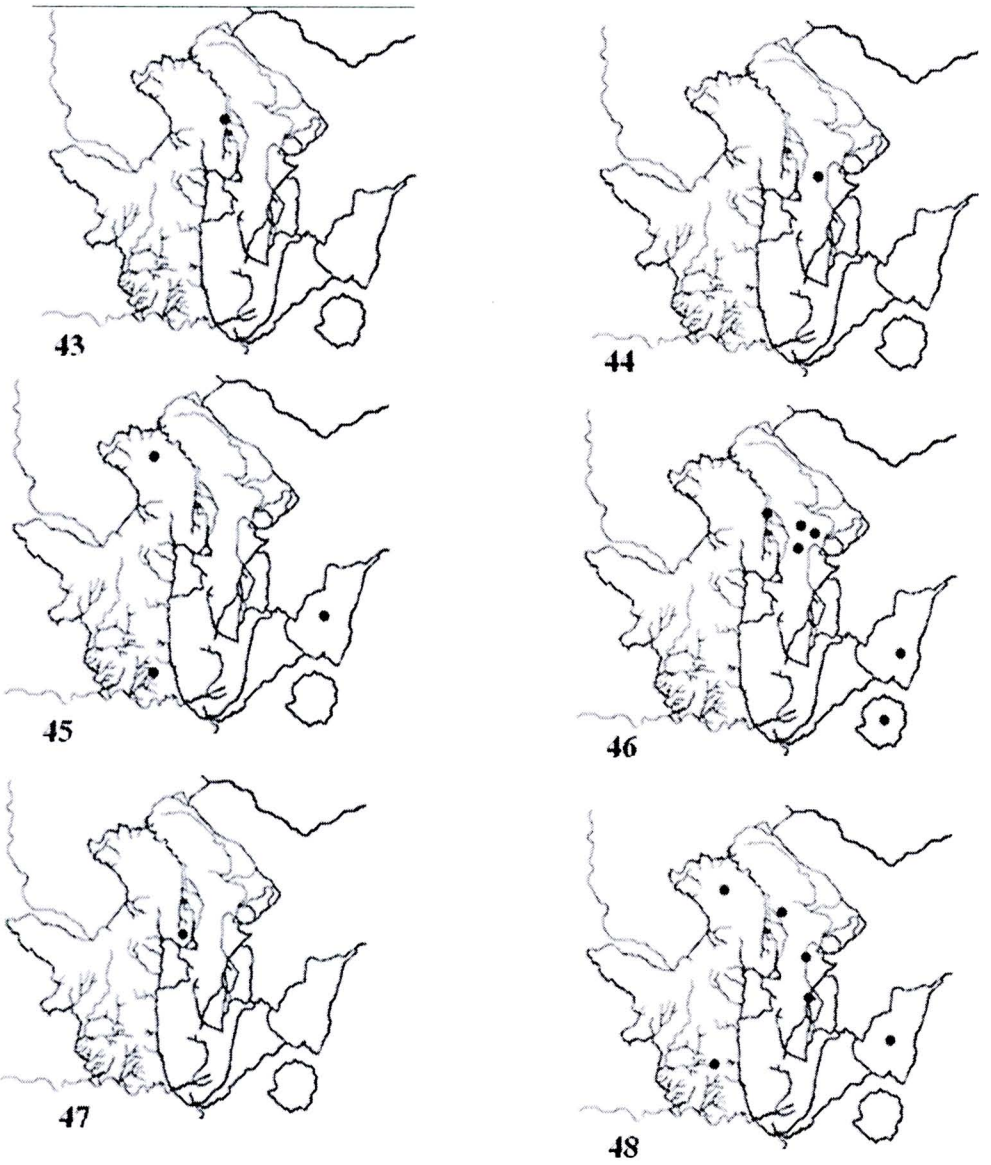

Figure 76 Distribution of discolichens at Phu Luang Wildlife Sanctuary (8).

Note. 43. *Micarea melaena* 44. *Ramboldia* cf. *siamensis* 45. *Ramboldia deficiens* 46. *Ramboldia heterocarpa* 47. *Ramboldia* PL.1 48. *Ramboldia russula*

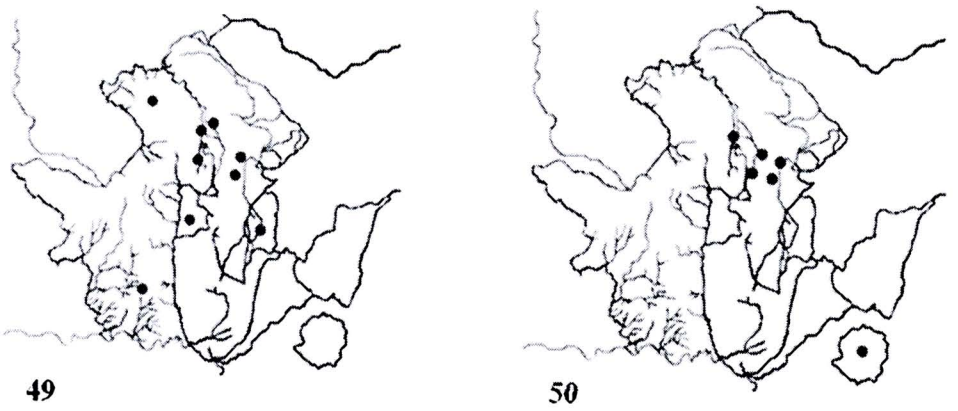

***Figure** 77* Distribution of discolichens at Phu Luang Wildlife Sanctuary (9).

Note. 49. *Ramboldia siamensis* 50. *Vainionora flavidorufa*