APPENDICES

APPENDIX A

MORPHOLOGICAL AND ECOLOGICAL TERMS

Morphological, Ecophysiological terms

Some morphological and ecological vocabulary used in this study were described as follows (the meaning derived from Komárek and Anagnostidis,1998 and 2005):

Akinetes- resting cells, arise from one or more confluent cells after the storage of assimilates and diminishing of thylakoid; akinetes are larger than vegetative cells, enveloped by a thick, multilayer cell wall; they can germinate after the unfavourable conditions; the position of akinetes on a trochome, their morphology and type of germination can be characteristic for species (sometimes for genera).

Apical (terminal) cells- terminal cells in polarized thallus, their shape is often stable and important for species identification.

Baeocytes- small reproductive cells, differentiating from mother cells after simultaneous or successive multiple fission, enveloped by firm sheaths, which splits or gelatinizes during the baeocyte liberation (old incorrect term = endospores).

Benthic- living on the bottom of stagnant or flowing waters.

Biotope- locality (habitat) in which lives a defined community of organisms.

Branching- occurs in filamentous cyanophytes: the two main type are false and true branching. True branching follows after lengthwise or asymmetrical division of intercalary cells and further division of cells perpendiculary to the original trichomes axis.

Calyptra- remnants of a gelatinous sheaths or necridic cell, forming a thickened cap on the outer cell wall of an apical cell in filamentous cyanobacteria.

Colony- microscopic or macroscopic aggregates of cells or filaments, organized in the characteristic form.

Constrictions- attenuations at cross-walls in filamentous cyanobacteria visible in light microscope and electron microscope.

Envelopes (gelatinous, mucilaginous)- a wide range of mucilaginous substances excreted from cells, which are not an integral part of a cell wall; envelopes around cells can be of diverse width and consistency, and clearly delimited of diffluent, stratified, and variously coloured by sheaths pigments; the participate in colony formation and only differ from sheaths by having a more diffluent consistency; structure and colouration of the mucilaginous envelope sometimes is species and genus specific.

Filament- trichome envelope by a sheath or only a trichomes without sheath (broader term than the specialized cyanoprokaryotic “trichomes”).

Granulation, granules- any inclusions within cells visible in microscope; they can be storage granules in different kinds, or caroteniods; they can be distributed over the whole cell volume, or concentrated near cell walls, in the center, or at the cross-walls.

Heterocytes-special cells arising from vegetative cells in distinct places in some filamentous cyanoprocaryotes (basal, intercalary).

Hormogonia- short sections of cyanoprocaryotic trichomes, separating from the original trichomes after fragmentation or after formation of necridic cells or heterocytes, and serving for reproduction; Hormogonia are liberated from sheaths in ensheathed type.

Mat- macroscopic colony, covering substrate of difference kind in form of ±gelatinous or crustaceous layer.

Necridic cells- dying cells.

Pseudofilaments- rows of cells in thallus (colony), which are not distinctly connected in one physiological unit and do not represent one physiological entity.

Sheaths- firm, thin or thick, morphologically distinct mucilaginous layers around cells and trichomes (rarely fasciculate trichomes), excreted from cells; sheaths often have a tube-like form (enveloping the trichomes) open at both ends or closed (inseveral genera).

Thallus- general term used in botany in several senses, referring to body type of algae; usually used in the sense of a colony (particularly macroscopic) of characteristic morphology, sometimes containing morphologically diverse types of cells, but without special organs of differentiated plant body (such as roots, stalks and leaves); in its original sense, but in cyanoprokaryotes it is used to characterize colonies of diverse shape.

Trichome- row of cells (uni- or multiseriate), which are connected into one physiological unit; trichome is the traditional term for "filament" in cyanoprokaryotes without the envelope sheath.

APPENDIX B

MEDIA AND BUFFER

Media

1) BG-11

$NaNO_3$	1.50	g
K_2HPO_4	0.04	g
$MgSO_4 \cdot 7H_2O$	0.075	g
$CaCl_2 \cdot 2H_2O$	0.036	g
Citric acid	0.006	g
Ferric ammonium citrate	0.006	g
EDTA (disodium salt)	0.001	g
Na_2CO_3	0.02	g
Trace metal mix A	51.0	ml

Trace metal mix A5:

H_3BO_3	2.86	g
$MnCl_2 \cdot 4H_2O$	1.81	g
$ZnSO_4 \cdot 7H_2O$	0.222	g
$NaMoO_4 \cdot 2H_2O$	0.39	g
$CuSO_4 \cdot 5H_2O$	0.079	g
$Co(NO_3)_2 \cdot 6H_2O$	49.40	mg
Distilled water	1.00	l

Make up to 1 litre with deionized water. Adjust pH to 7.1 with 1M NaOH or HCl. For agar add 15.0 g per litre of Agar. Autoclave at 15 psi for 15 minutes.

2) Zarrouk's Medium (Zarrouk, 1996)

$NaHCO_3$	16.80	g
$NaNO_3$	2.50	g
K_2HPO_4	0.50	g
K_2SO_4	1.00	g
$MgSO_4.7H_2O$	0.20	g
NaCl	1.00	g
$CaCl_2.2H_2O$	0.04	g
$FeSO_4.7H_2O$	0.01	g
EDTA	0.08	g
A_5 Solution	1.00	ml
B_6 Solution	1.00	ml

A5 Solution (stock for 1 litre)

H_3CO_3	2.86	g
$MnCl_2.4H_2O$	1.08	g
$ZnSo_4.H_2O$	0.22	g

MoO_3	0.01	g
$CuSO_4.5H_2O$	0.08	g

B6 Solution (stock for 1 litre)

NH_4VO_3	22.90	mg
$NiSO_4.7H_2O$	47.80	mg
Na_2WO_4	17.90	mg
$Ti(SO_4)_3$	40.00	mg
$CO(NO3)_2.6H_2O$	4.40	mg

Make up to 1 litre with deionized water. Adjust pH to 9-11 with 1M NaOH or HCl. For agar add 15.0 g per litre of Agar. Autoclave at 15 psi for 15 minutes.

3) Castenholtz D Medium Modified (for halophilic cyanobacteria)

NaCl	160	g
NaNo3	0.69	g
Na2HPO4	0.111	g
KNO3	0.103	g
MgSO4.7H2O	0.10	g
CaSO4.2H2O	0.06	g
FeCl3	0.3	mg
Nitrilotriacetic acid	0.1	g
Castenholtz trace metal solution	1.00	ml

Castenholtz trace metal solution

$MnSO_4.H_2O$	2.28	g
H_3BO_3 0.5	g	
$ZnSO_4.7H_2O$	0.5	g
$CO(NO_3)2.6H_2O$	0.025	g
$CuSO_4.5H_2O$	0.025	g
$Na_2MoO_4.2H_2O$	0.025	g
H_2SO_4	0.50	ml

Add nitrolotriacetic acid to 500 ml of distilled water. Dissolve by adjusting pH to 6.5 with KOH and then add remaining components and mix. Adjust pH to 7.5 and bring volume to 1 litre with distilled water. For agar add 15.0 g per litre of Agar. Autoclave at 15 psi for 15 minutes.

Buffers

1) Cacodylate Buffer (arsenate buffer) pH 5-7.4

Stock solutions:

0.2 M sodium cacodylate 1 liter

$Na(CH_3)_2As0_2$*$3H_20$ (MW = 195.92)	42.8	g
H_20 to make	1.00	l

0.2M HC1

Conc. HC1 (36-38%)	10	ml
H_20	603	ml

Working buffer: 0.1M 100 ml

Adjust 50 ml of 0.2 M sodium cacodylate to desired pH with 0.2 M HC1. Dilute to 100 ml with H_20.

pH	**0.2 M HC1 (ml)**
6.4	18.3
6.6	13.3
6.8	9.3
7.0	6.3
7.2	4.2
7.4	2.7

Buffer may also be made with cacodylic acid.

Stock solutions:

0.2M cacodylic acid 1 liter

$(CH_3)_2AsO_2H$	(MW = 138.0)	27.6	g
H_2O to make		1.00	l

0.2M NaOH 100 ml

NaOH	(MW = 40)	0.8	g
H_20 to make		100	ml

Working buffer: 0.1 M

Adjust 50 ml. of 0.2 M cacodylic acid to desired pH with 0.2 M NaOH. Dilute to 100 ml with ddH_2 or dilute 1:1 with fixative.

2) Veronal-acetate Buffer (Michaelis buffer)

Stock solution: 0.28 M 100 ml.

Sodium veronal (barbitone sodium)

$C_8H_{11}0_3N_2Na$	(MW = 206.18)	2.89	g	
Sodium acetate (anhydrous)				
CH_3C00Na	(MW = 82.03)	1.15	g	or
Sodium acetate (hydrated)				
$CH_3C00Na \cdot 3H_20$	(MW = 136.09)	1.90	g	
dH_2O to make		100	ml	

Solution is stable and may be stored for some months at 4 ºC.

Working buffer:

Veronal acetate stock solution	5	ml
H_2O	15	ml

Add 0.1 HC1 gradually to desired pH.

Solution cannot be stored. Supports growth of bacteria and molds even at 4 ºC. Crystallizes in absence of osmium tetroxide.

APPENDIX C

RAW DATA OF CROSS GRADIENT EXPERIMENT AND

RAW DATA OF GROWTH UNDER SALINITY GRADIENTS

1. Raw data of growth (μ) of *Nostoc* sp.1 with position in cross gradient of light and temperature unit (length and width).

located	Length (cm)	Width (cm)	μ [1st]	μ [2nd]	μ [3th]	mean
A3	88	34	0.12	0.1	0.14	0.12
A4	88	25	0.18	0.14	0.13	0.15
A5	88	16	0.11	0.13	0.13	0.12
A6	88	8	0.16	0.18	0.12	0.15
B3	75	34	0.12	0.14	0.11	0.12
B4	75	25	0.17	0.15	0.08	0.13
B5	75	16	0.27	0.23	0.18	0.23
B6	63	8	0.21	0.21	0.21	0.21
C4	63	25	0.13	0.11	0.15	0.13
C5	63	16	0.1	0.18	0.14	0.14
C6	63	8	0.06	0.11	0.16	0.11
D1	50	50	0.11	0.14	0.16	0.14
D3	50	34	0.07	0.11	0.23	0.14
D4	50	25	0.11	0.13	0.11	0.12
D5	50	16	0.14	0.15	0.17	0.15
D6	50	8	0.14	0.19	0.17	0.17
E1	50	50	0.1	0.17	0.18	0.15
E2	37	43	0.18	0.18	0.22	0.19
E3	37	34	0.2	0.24	0.26	0.23
E4	37	25	0.16	0.2	0.21	0.19
E5	37	16	0.17	0.32	0.42	0.30
E6	37	8	0.27	0.35	0.38	0.33
F1	37	50	0.24	0.28	0.31	0.27
F2	24	43	0.24	0.24	0.26	0.25
F3	24	34	0.34	0.36	0.34	0.35
F4	24	25	0.25	0.29	0.3	0.28
F5	24	16	0.28	0.37	0.28	0.31
F6	24	8	0.22	0.25	0.22	0.23
G1	11	50	0.27	0.26	0.34	0.29
G2	11	43	0.28	0.29	0.3	0.29
G3	11	34	0.29	0.32	0.3	0.30
G4	11	25	0.26	0.29	0.31	0.29
G5	11	16	0.33	0.35	0.35	0.34
G6	11	8	0.35	0.35	0.36	0.35

2. Raw data of growth (μ) of *Nostoc* sp.2 with position in cross gradient of light and temperature unit (length and width).

located	**Length (cm)**	**Width (cm)**	**μ [1st]**	**μ [2nd]**	**μ [3th]**	**mean**
A6	88	8	0.16	0.14	0.09	0.13
B5	75	16	0.23	0.21	0.13	0.19
B6	63	8	0.14	0.12	0.14	0.13
C6	63	8	0.12	0.2	0.15	0.16
D4	50	25	0.13	0.15	0.16	0.15
D5	50	16	0.15	0.14	0.15	0.15
D6	50	8	0.11	0.13	0.15	0.13
E4	37	25	0.14	0.11	0.13	0.12
E5	37	16	0.14	0.14	0.12	0.13
E6	37	8	0.12	0.12	0.13	0.12
F4	24	25	0.17	0.18	0.13	0.16
G5	11	16	0.13	0.08	0.1	0.10

3. Raw data of growth under salinity Grandients.

***Leptolyngbya* sp.**

Time	0 %	2 %	6 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %
0.00	0.08	0.08	0.07	0.08	0.08	0.11	0.08	0.08	0.10	0.09
0.69	0.09	0.08	0.09	0.08	0.08	0.13	0.10	0.08	0.14	0.09
1.69	0.13	0.14	0.13	0.12	0.12	0.15	0.14	0.07	0.13	0.08
2.69	0.20	0.24	0.23	0.15	0.12	0.17	0.18	0.07	0.11	0.08
3.69	0.27	0.29	0.26	0.12	0.11	0.14	0.15	0.06	0.10	0.07
4.69	0.32	0.32	0.26	0.12	0.12	0.15	0.17	0.06	0.10	0.08
5.69	0.41	0.37	0.25	0.14	0.13	0.18	0.18	0.06	0.10	0.08
6.69	0.46	0.39	0.23	0.15	0.14	0.19	0.19	0.06	0.10	0.08
7.69	0.52	0.43	0.25	0.15	0.16	0.20	0.20	0.06	0.10	0.08
8.69	0.55	0.44	0.30	0.19	0.18	0.22	0.22	0.06	0.10	0.08

***Nostoc* sp.1**

Time	0 %	2 %	6 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %
0.00	0.17	0.16	0.16	0.10	0.12	0.12	0.09	0.12	0.09	0.08
1.02	0.18	0.13	0.16	0.11	0.13	0.13	0.10	0.11	0.09	0.08
2.04	0.20	0.15	0.18	0.12	0.14	0.13	0.11	0.11	0.10	0.08
3.06	0.23	0.17	0.19	0.14	0.16	0.14	0.12	0.10	0.10	0.08
4.06	0.24	0.18	0.21	0.15	0.16	0.15	0.13	0.10	0.10	0.08
5.02	0.27	0.20	0.23	0.16	0.18	0.16	0.14	0.10	0.10	0.08
6.04	0.29	0.21	0.24	0.17	0.19	0.17	0.15	0.10	0.10	0.09
7.10	0.30	0.22	0.25	0.18	0.19	0.18	0.15	0.10	0.10	0.09
8.10	0.31	0.23	0.27	0.19	0.21	0.19	0.16	0.10	0.10	0.09
9.08	0.34	0.24	0.27	0.20	0.22	0.20	0.16	0.10	0.10	0.09
10.08	0.36	0.26	0.30	0.21	0.23	0.21	0.18	0.10	0.10	0.09

***Wollea* sp.**

Time	0 %	2 %	6 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %
0.00	0.08	0.11	0.15	0.11	0.09	0.08	0.08	0.08	0.07	0.07
1.02	0.14	0.15	0.18	0.16	0.12	0.10	0.08	0.09	0.07	0.08
2.04	0.16	0.16	0.16	0.16	0.10	0.12	0.08	0.09	0.08	0.09
3.06	0.19	0.23	0.18	0.16	0.11	0.15	0.08	0.09	0.08	0.09
4.06	0.28	0.28	0.22	0.19	0.12	0.17	0.08	0.09	0.09	0.09
5.02	0.31	0.32	0.21	0.22	0.13	0.19	0.09	0.10	0.09	0.10
6.04	0.39	0.35	0.21	0.24	0.14	0.21	0.09	0.10	0.09	0.10
7.10	0.42	0.36	0.22	0.25	0.15	0.22	0.09	0.10	0.09	0.10
8.10	0.46	0.38	0.24	0.26	0.16	0.24	0.09	0.10	0.10	0.11
9.08	0.50	0.40	0.26	0.27	0.17	0.24	0.09	0.10	0.10	0.11
10.08	0.51	0.44	0.28	0.29	0.17	0.25	0.10	0.10	0.10	0.11

Oxynema thaianum

Time	**0 %**	**2 %**	**6 %**	**10 %**	**15 %**	**20 %**	**25 %**	**30 %**	**35 %**	**40 %**
0.00	0.10	0.15	0.09	0.14	0.18	0.15	0.09	0.11	0.08	0.09
1.04	0.19	0.24	0.15	0.21	0.24	0.19	0.15	0.17	0.15	0.17
2.08	0.18	0.24	0.15	0.22	0.25	0.20	0.15	0.18	0.15	0.17
3.00	0.18	0.25	0.15	0.21	0.26	0.22	0.17	0.18	0.15	0.16
4.00	0.17	0.23	0.16	0.21	0.28	0.23	0.18	0.18	0.14	0.16
4.75	0.17	0.21	0.15	0.21	0.28	0.23	0.17	0.18	0.14	0.16
5.71	0.17	0.22	0.16	0.21	0.30	0.24	0.19	0.18	0.14	0.16
6.71	0.17	0.22	0.14	0.20	0.32	0.24	0.18	0.17	0.13	0.15
7.71	0.17	0.22	0.15	0.20	0.31	0.25	0.18	0.17	0.14	0.16
8.71	0.17	0.22	0.15	0.19	0.32	0.24	0.18	0.17	0.14	0.15

Nostoc **sp.2**

Time	0 %	2 %	6 %	10 %	15 %	20 %	25 %	30 %	35%	40 %
0.00	0.09	0.09	0.10	0.10	0.10	0.11	0.12	0.10	0.10	0.09
1.02	0.10	0.10	0.11	0.11	0.14	0.15	0.14	0.09	0.09	0.08
2.04	0.11	0.12	0.12	0.11	0.14	0.16	0.14	0.09	0.08	0.08
3.06	0.13	0.14	0.12	0.12	0.15	0.17	0.15	0.09	0.09	0.09
4.06	0.15	0.16	0.13	0.12	0.14	0.17	0.14	0.09	0.09	0.09
5.02	0.16	0.17	0.13	0.12	0.12	0.17	0.14	0.09	0.09	0.09
6.04	0.19	0.20	0.14	0.13	0.13	0.15	0.13	0.09	0.09	0.09
7.10	0.20	0.21	0.14	0.13	0.13	0.15	0.13	0.09	0.10	0.09
8.10	0.22	0.25	0.14	0.13	0.13	0.15	0.13	0.09	0.10	0.09
9.08	0.25	0.27	0.15	0.13	0.13	0.14	0.12	0.09	0.10	0.09
10.08	0.28	0.30	0.16	0.14	0.13	0.14	0.12	0.09	0.10	0.09

APPENDIX D

RAW DATA OF SOIL ANALYSIS

Raw data of soil analysis results of each sampling site.

sites	pH	Salinity (ppt.)	Moisture (%)	Electro conductivity: EC (ds/m)	Organic matters (g/100g)
PP_1A	7.7	53	85.4	187.6	3.06
PP_2A	7.61	65	215.9	271.6	2.98
PP_3A	7.61	65	215.9	271.6	2.98
PP_4A	ND	ND	ND	ND	ND
PP_1B	7.92	90	84.6	164.1	2.49
PP_2B	7.95	125	37	349.6	3.74
PP_3B	8.00	150	51	340.5	3.41
PP_4B	8.05	249	60.4	397.5	2.33
SS_1A	7.54	55	81.3	210	2.84
SS_2A	6.77	35	49.4	327.1	1.83
SS_3A	7.24	300	65.9	345.6	2.36
SS_4A	7.19	86	84.1	344.4	2.74
SS_1B	7.60	55	53	84.7	2.98
SS_2B	ND	ND	ND	ND	ND
SS_3B	ND	ND	ND	ND	ND
SS_4B	7.56	45	42.8	119.6	1.91
CP_1A	5.03	355	34.6	296.1	1.50
SN_1A	4.98	400	29.2	30.0	2.56

Raw data of soil analysis results of each sampling site (continued)**.**

Sites	**NH_4^+-N** (g/100g)	**NO_3^--N** (g/100g)	**Phosporus: P** (mg/kg)	**Potassium: K** (mg/kg)	**Calcium ion(Ca^{2+})** (mg/kg)
PP_1A	16.58	6.22	87.31	2,350	4,479
PP_2A	157.43	3.58	110.07	2,222	6,788
PP_3A	157.43	3.58	110.07	2,222	6,788
PP_4A	ND	ND	ND	ND	ND
PP_1B	12.94	0.39	132	2,037	6,809
PP_2B	1.80	0.39	80.84	1,888	28,375
PP_3B	3.47	0.39	87.11	1,902	12,018
PP_4B	10.48	0.39	115.15	4,349	28,100
SS_1A	23.31	0.07	16.89	2,039	6,656
SS_2A	8.25	0.08	54.80	2,374	3050
SS_3A	5.67	9.46	44.82	3,505	7,569
SS_4A	18.29	0.07	77.33	2,294	17,475
SS_1B	11.72	2.97	28.95	1521	3815
SS_2B	ND	ND	ND	ND	ND
SS_3B	ND	ND	ND	ND	ND
SS_4B	8.80	6.47	30.11	2,008	11,321
CP_1A	2.23	6.68	2.59	1,259	21,665
SN_1A	9.27	6.42	6.08	545	545

Raw data of soil analysis results of each sampling site (continued)**.**

sites	Na^+ (mg/kg)	Mg^{2+} (mg/kg)	Mn (mg/kg)	Fe (mg/kg)	S (mg/kg)	Cl^- (g/100g)
PP_1A	16,300	3,021	58.95	71.33	6.45	1,635
PP_2A	20,400	3,633	146.28	45.74	6.77	3,789
PP_3A	20,400	3,633	146.28	45.74	6.77	3,789
PP_4A	ND	ND	ND	ND	ND	ND
PP_1B	12,938	2,182	99.23	38.82	4.40	1,624
PP_2B	18,215	3,873	97.49	41.06	8.37	3,312
PP_3B	24,002	1,685	78.74	37.03	6.02	5,385
PP_4B	14,049	3,810	207.65	40.04	7.62	9,551
SS_1A	30,600	3,624	44.74	55.54	4.99	2,595
SS_2A	41,900	6,214	94.76	37.30	6.65	3,789
SS_3A	20,800	5341	77.64	34.25	8.03	5,917
SS_4A	21,500	6,460	118.48	14.67	12.42	5,554
SS_1B	7,899	2,215	51.53	68.99	1.95	1,902
SS_2B	ND	ND	ND	ND	ND	ND
SS_3B	ND	ND	ND	ND	ND	ND
SS_4B	10,805	3,746	47.36	37.87	3.11	3,953
CP_1A	26,700	3,094	0.98	27.34	5.41	4,308
SN_1A	21,700	119	5.67	102.03	5.36	623

CURRICULUM VITAE

Name Miss Thomrat Chatchawan

Date of birth 21st February 1983

Educations

2001-2004 **B.Sc.** (Microbiology), Chiang Mai University, Chiang Mai, Thailand

Thesis title: Water quality in Ang Kaew Reservoir using phytoplankton and coliform bacteria in 2004

(advisor: Assoc. Prof. Dr. Yuwadee Peerapornpisal)

1995-2000 Chiang Mai University Demonstration School

Field of Specialization/Interests

- Morphology and taxonomy of cyanobacteria
- Ecology and physiology of cyanobacteria in hypersaline environments
- Ecology of other microorganisms in extreme habitats
- Isolation and cultivation of cyanobacteria

Scholarships

2007-2009 Ph.D. thesis funded by the Royal Golden Jubilee Ph.D. Program and the Thailand Research Fund.

2007-2008 The Biodiversity Research and Training Program.

Attended workshops

April 2004 Workshop on "Classification of edible and toxic mushroom" by Department of Biology, Faculty of Science, Chiang Mai University, Chiang Mai, Thailand

May 2005 Workshop on "Toxic cyanobacteria and their toxin in freshwater resources" by Deparment of Forensic Medicine, Facultyof Medicine, Chiang Mai University, Chiang Mai, Thailand.

April 2007 Workshop on "Taxonomy of freshwater algae and their cultivation" by Department of Biology, Faculty of Science, Chiang Mai University, Chiang Mai, Thailand.

Attended conferences

16-19 October 2006 Poster presentation "Water Quality of Ang Kaew Reservoir of Chiang Mai University using phytoplankton and coliform bacteria in 2004 in International Conference on Marine Algae and Global

	Warming, The National Assembly Building of Korea, Seoul, South Korea.
15-19 August 2010	Poster presentation “Diversity of algae in a man-made solar saltern, Petchaburi province, Thailand in 18th Symposium of the International Association for Cyanophyte Research, Ceske Budejovice, Czech Republic.
22 November 2010	Oral presentation “Study of cyanobacteria in Thailand and diversity of cyanobacteria from solar salterns of Thailand” in Annual meeting of Section of Plant Ecology, Institute of Botany, Czech Academy of Sciences, Trebon, Czech Republic.
16-18 March 2011	Oral presentation “Diversity of algae in some man-made saltern in Thailand” in 5th National Conference on Algae and Plankton, B.P. Smila Beach and Resort Hotel, Songkla, Thailand.

Scientific training

November-December 2008, June-July 2009	Training on “Molecular methods for analysis microorganisms from environmental samples” at Extremophiles Research Group, School of Biological sciences, Faculty of Sciences, University of HongKong, HongKong SAR, [Assoc. Prof. Dr. Stephen B. Pointing].

May 2010-October 2011, Training on "Taxonomic classification and evaluation of cyanobacteria from hypersaline habitats by combined approaches" at Institute of Botany, Academy of Sciences of Czech Republic [Prof. Dr. Jiři Komárek].

August 2011 Atteded on "Determination course of freshwater and terrestrial cyanobacteria" at University of South Bohemia, Czech Republic

Publications

Chatchawan, T., Peerapornpisal, Y. and Komárek, J. 2011. Diversity of cyanobacteria in man-made solar saltern, Petchaburi Province, Thailand-a pilot study. Fottea. 11(1):203-214.

Chatchawan, T., Komárek, J., Strunecky, O. and Šmarda, J. and Peerapornpisal, Y. 2012. *Oxynema*, a new genus separated from the genus *Phormidium* (Cyanophyta). Crytogamie/Algologie. 33(1):41-59.

Chatchawan, T., Peerapornpisal, Y. and Komárek, J. 2012. Five new taxa record of cyanobacteria from solar saltworks in Thailand. Proceeding on 1st Asean Plus Three Graduate Research Congress.