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Contributed Paper

Diversity, New and Rare Taxa of *Pediastrum* spp. in Some Freshwater Resources in Thailand

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ABSTRACT

Pediastrum spp., one of the most beautiful phytoplankton, are green algae belonging to the Division Chlorophyta. This research aims to study the diversity of *Pediastrum* spp. in terms of morphology and cell wall ultrastructure which are recognizable under light microscope and scanning electron microscope. The water quality based on certain physical and chemical parameters at 66 from various freshwater resources in Thailand was also investigated. A total of 60 taxa consisting of 26 species were found and 22 taxa were newly recorded from Thailand. *Pediastrum duplex* var. *duplex* Meyen, *P. tetras* (Ehrenberg) Ralfs and *P. simplex* var. *simplex* Meyen were the dominant species. Three species, namely *P. alternans* Nygaard, *P. asymmetricum* T. Yamagishi & E.Hegewald and *P. privum* (Printz) E.Hegewald are considered rare in Thailand. An evaluation of the water quality from all sampling sites based on the trophic status indicated that these water resources could be classified into 4 statuses as oligo-mesotrophic, mesotrophic, meso-eutrophic and eutrophic statuses. Most of the sites were found to be meso-eutrophic status. The species which could assess the water quality as being meso-eutrophic status were *P. duplex* var. *duplex* Meyen, *P. tetras* (Ehrenberg) Ralfs and *P.simplex* var. *simplex* Meyen.

Keywords: *Pediastrum*, chlorophyta, phytoplankton, water quality

1. INTRODUCTION

Pediastrum spp. are green algae belonging to the Division Chlorophyta, Class Chlorophyceae, Order Chlorococcales, Family Hydrodictyaceae [1]. The dominant characteristics include the coenobia disc shape or stellate. The cells in the coenobia are usually arranged in a single layer, froming a flat circular plate. Rarely to the large coenobia have cell arranged in two layers in the center. There is one chloroplast per cells, parietal and massive and the chloroplasts contain one pyrenoid, which sometimes multiplies in older cells, particularly in the large adult coenobia [2]. The recent genus *Pediastrum* was only found in freshwater. The published scientific data on *Pediastrum* spp. taken from brackish and salty water are very rare [3]. The planktonic species occur frequently in the algal community of permanent or semi-permanent lakes, pools, ponds and ditches [4], particularly many varieties of *P. boryanum, P. duplex*, *P simplex* and *P. tetras* [5]. A checklist of the algae in Thailand recorded about 40 taxa consisting of 15 species of *Pediastrum* [6].

They are found in many water bodies, especially in meso-eutrophic and eutrophic waters with a high nutrient content, especially with regard to nitrogen and phosphorus [4]. The major taxonomic characteristics for identification of the species of *Pediastrum* are, (i) the forms and characteristics of coenobia (outline and holes), (ii) the number of cells in coenobia (distinct limits in various species) (iii) the morphology of the cells (particularly of marginal cells with characteristic lobe, incisions and processi) and (iv) the surface sculpture of the cell wall [3, 5, 7].

Preliminary data has indicated that *Pediastrum* spp. grows significantly faster than other algae [8] and has a high protein content of up to 46% [9]. There have been only a few previous studies on *Pediastrum* spp. in Thailand. This research aims to study the diversity of *Pediastrum* spp. and the water quality based on some physical and chemical parameters in some water resources of Thailand. Species identification were carried out based on cell morphology and cell wall ultrastructure which are recognizable under a light microscope and scanning electron microscope.

2. MATERIALS AND METHODS

Pediastrum spp. were collected from 66 freshwater resources, susch as lakes, reservoirs, ponds, ditches and pools located throughout Thailand (Figure 1). The limnological data including latitude, longitude and practical utilization of the sampling site, such as forestry or agriculture, along with the and community of each sampling site were recorded.

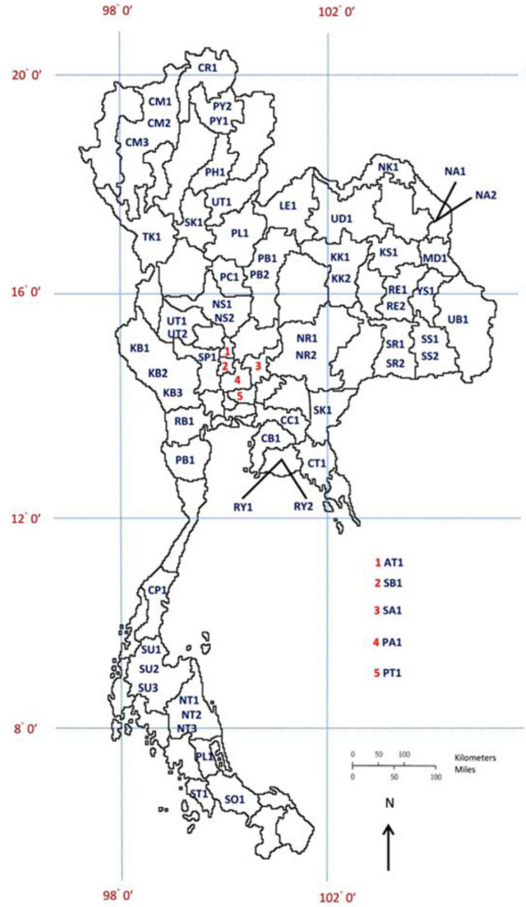
Water samples were collected using polyethylene bottles which were kept in a cool box (5-7°C). Planktonic *Pediastrum* spp. were collected by filtering 20 liters of water with a 10 μm pore size plankton net. The samples were preserved with Lugal's iodine solution [10]. and the fresh samples were kept in a cool box to be photographed.

Water temperature, air temperature, light intensity, pH and conductivity were measured in the field using portable meters. Secchi depth and dissolved oxygen (DO) were also measured in the field by Secchi disc and the azide modification method, respectively [11]. Biochemical oxygen demand (BOD) was determined in the laboratory by the azide modification method [11]. Water turbidity was measured using a turbidity meter. Total alkalinity and nutrient contents, especially, ammonium nitrogen, nitrate nitrogen and soluble reactive phosphorus (SRP) and chlorophyll *a,* were also determined in the laboratory by the phenolphthalein methyl orange indicator method, nesslerization method, cadmium reduction method and ascorbic method [11], respectively and chlorophyll *a* content was determined by the method of Saijo [12]; Winterman and De Mots [13].

The trophic status of water was classified according to the method of Peerapornpisal *et al.* [14] which was based on Wetzel [10]; Lorraine and Vollenweider [15] but were modified by altering the amounts of DO, BOD, conductivity, nutrients (NO^-_3, NH^+_4 and PO^{3-}_4) and chlorophyll *a* .

Pediastrum spp. were observed under a light microscope of 40X and 100X, and were photographed with Olympus with the Normaski interference contrast microscope and reproduced by line drawing. Samples for scanning electron microscope (SEM) were prepared in the following way: samples were first rinsed with distilled water, laid on cover glasses, air dried at 30-40 °C and then affixed to aluminium stubs with carbon tape. Finally, the stubs were coated with gold and photographed by SEM according to the method of Wetzel [10]; Kowalska and Wolowski [16].

Species identification was conducted according to [1;5-16]. The cells were counted under a light microscope [8].



Northern region: Chiang Rai: CR1, Chiang Mai: CM1, CM2, CM3, Phayao: PY1, PY2, Uttaradit: UT1,Phrae: PH1

Central region: Sukhothai: SK1, Phitsanulok: PS1, Nakhon Sawan: NS1, NS2, Phichit: PC1, Phetchabun: PB1, PB2, Saraburi: SA1, Pathum Thani: PT1, Phra Nakhon Si Ayutthaya: PA1, Ang Thong: AT1, Sing Buri: SB1, Suphan Buri: SP1, Uthai Thani: UT1, UT2, Nakhon Pathom: NP1, NP2

Western region: Tak: TA1, Phetchaburi: PB1, Ratchaburi: RB1, Kanchanaburi: KB1, KB2, KB3

Eastern region: Chachoengsao: CC1, Chon Buri: CB1, Rayong: RY1, RY2, Chanthaburi: CT1, Sa Kaeo: SK1

Northeastern region: Loei: LE1, Udon Thani: UD1, Nong Khai: NK1, Nakhon Phanom: NA1, NA2, Mukdahan: MD1, Yasothon: YS1, Roi Et: RE1, RE2, Kalasin: KS1, Khon Kaen: KK1, KK2, Nakhon Ratchasima: NR1, NR2, Surin: SR1, SR2, Si Sa Ket: SS1, SS2, Ubon Ratchathani: UB1

Souhtern region: Chumphon: CP1, Surat Thani: SU1, SU2, SU3, Nakhon Si Thammarat: NT1, NT2, NT3, Phatthalung: PL1, Songkhla: SO1, Satun: ST1

Figure 1. Map of Thailand showing 66 study sites in various regions.

3. RESULTS

A total of 60 taxa consisting of 26 species were found (Table 1) and 22 taxa were newly recorded in Thailand (Table 2). *P. duplex* var. *duplex* Meyen, *P. tetras* (Ehrenberg) Ralfs and *P. simplex* var. *simplex* Meyen were found to be the dominant species. *P. duplex* var. *duplex* Meyen was the most common followed by *P. tetras* (Ehrenberg) Ralfs and *P. simplex* var. *simplex* Meyen, respectively (Table 1, Figure 2). Three species appeared to be rare in Thailand, which were *P. alternans* Nygaard, *P. asymmetricum* T.Yamagishi & E. Hegewald and *P. privum* (Printz) E. Hegewald (Table 1, Figure 3, 4). All new taxa were recorded by line drawing (Figure 5, A-V).

Table 1. Distribution of *Pediastrum* spp. and water quality in66 freshwater resources in Thailand (Occurrence: + rare, ++ = occasional, +++ = frequent and **= dominant species).

species	Trophic status of the water at each water resource			
	Oligo-mesotrophic	Mesotrophic	Meso-eutrophic	Eutophic
	SS1,SS2, NA1, NA2, KS1, KK2, NT2, SO1, ST1	CM1, CM2 ,PY1, SK1, PH1, NS1, NS2, PB1, PB2, PT1, UT1, UT2, KB2, CT1, SK1, UD1, NK1, MD1, YS1, RE1, CP1, SU1, SU3, NT1, NT3	CR1, CM3, PY2, PS1, PC1, SA1, PA1, AT1, SB1, SP1, NP1, PB1, RB1, KB1, KB3, CC1, CB1, RY1, UB1, SR1, SR2, NR1, NR2, LE1, RE2, KK1,SU2, PL1	UT1, NP2, TA1, RY2
Pediastrum alternans Nygaard		+		
P. angulosum Ehrenberg ex Meneghini		+	+	
P. angulosum var. *coronatum* (Raciborski) J.Komαrek & V. Jankovskα		+	+	
P.argentinense Bourrelly & Tell		+	+	
P. asymmetricum T.Yamagishi & E.Hegewald			+	
P. biradiatum Meyen		+	++	+
P. biradiatum var. emarginatum (Ehrenberg) Lagerheim		+	+	
P. biradiatum var. glabrum (Raciborski) Parra		+	+	
P. biwae Negoro	+	++		
P. boryanum (Turpin) var. *boryanum* Meneghini		++	++	+
P. boryanum var. *brevicorne* Braun		+	+	
P. boryanum var. *caribeanum* A.Comas			+	+
P. boryanum var. *cornutum* (Raciborski) Sulek		+	++	
P. boryanum var. *forcipatum* (Corda) Chodat			++	
P. boryanum var. *longicorne* Reinsch		+	++	
P. boryanum var. *perforatum* (Raciborski) Nitardy			++	
P. boryanum var. *pseudoglabrum* Parra Barrientos	+	+		
P. clathratum (Schröder) Lemmermann		+	+	
P. clathratum var. *radians* (Lemmermann) Bachmann			+	
P. duplex var. *duplex* Meyen**	++	++	+++	++
P. duplex var. *asperum* A.Braun			++	+
P. duplex var. *clathralum* (A. Braun) Lagerheim	+	+	++	+
P. duplex var. *cohaerens* (Bohlin) Ergashev		+	+	
P. duplex var. *cornutum* J.Komαrek & V. Jankovskα			++	
P. duplex var. *coronatum* Raciborski			++	
P. duplex var. *genuinum* (A.Braun) Lagerheim		+	+	
P. duplex var. *gracillimum* West & G.S.West	+++	+	+	

Table 1. Continued.

species	Trophic status of the water at each water resource			
	Oligo-mesotrophic	Mesotrophic	Meso-eutrophic	Eutophic
	SS1,SS2, NA1, NA2, KS1, KK2, NT2, SO1, ST1	CM1, CM2 ,PY1, SK1, PH1, NS1, NS2, PB1, PB2, PT1, UT1, UT2, KB2, CT1, SK1, UD1, NK1, MD1, YS1, RE1, CP1, SU1, SU3, NT1, NT3	CR1, CM3, PY2, PS1, PC1, SA1, PA1, AT1, SB1, SP1, NP1, PB1, RB1, KB1, KB3, CC1, CB1, RY1, UB1, SR1, SR2, NR1, NR2, LE1, RE2, KK1,SU2, PL1	UT1, NP2, TA1, RY2
P. duplex var. *punctatum* (Willi Krieger) Parra		+	+	
P. duplex var. *reticulatum Lagerheim*		+	+	
P. duplex var. *rotundatum* Lucks			+	+
P. duplex var. *rugulosum* Raciborski	+++	+	+	
P. emarginatum Kützing			+	+
P. integrum Nägeli		+	+	
P. integrum var. *perforatum* Raciborski		+	+	
P. kawraiskyi Schmidle			+	+
P. longicornutum Gutwinski	+	+	+	
P. muticum Kützing			++	
P. obtusum Lucks		+	+	
P. orbitale Komarek			+	+
P. pertusum Kützing		+	+	
P. privum (Printz) E.Hegewald			+	
P. simplex var. *simplex* Meyen**	+	++	+++	+
P. simplex var. *biwaense* Fukushima		+	+	
P. simplex var. *clathratum* Schröter	+	++	++	+
P. simplex var. *duodenarium* (J.W.Bailey) Rabenhorst		+	++	
P. simplex var. *echinulatum* Wittrock	++	++	++	+
P. simplex var. *granulatum* Lemmermann		+	++	
P. simplex var. *pseudoglabrum* Parra Barrientos	+	++	++	+
P. simplex var. *radians Lemmermann*		+	+	
P. simplex var. *sturmii* (Reinsch) Wolle	+	++	+++	+
P. subgranulosum Raciborski		+	++	
P. tetras (Ehrenberg) Ralfs**	+	++	+++	++
P. tetras var. *apiculatum* Playfair		+	++	
P. tetras var. *excisum* Rabenhorst			++	
P. tetras var. *tetraodon* (Corda) Hansgirg	+	+	+++	
P. sculptatum G.M.Smith	+		+++	
Pediastrum sp. 1		++	++	+
Pediastrum sp. 2		+	+	
Pediastrum sp. 3		+	+	
Pediastrum sp. 4		+	+	

Table 2. Morphological characteristic and ecological data of newly recorded species for Thailand.

Taxa	Diameter of Coenobia	Cell long (μm)	Cell wide (μm)	Coenobia shape	Marginal cell	Cell wall	Ecological data
Pediastrum alternans Nygaard	70-130	15-28	12-22	Circular, with very small irregular holes of the outer side of inner cell	Very deep U-or V-like incisions reaching up to the middle of the cell body	Fine wavy or net-like sculpture.	Mesotrophic
P. angulosum Ehrenberg ex Meneghini	70-320	8-38	7-36	Irregular rectangular, without holes or small holes	Conical lobes, U-like incisions	Irregularly net-like sculpture distinct	Mesotrophic and meso-eutrophic
P. angulosum var. *coronatum* (Raciborski) J.Komαrek& V.Jankovskα	70-220	8-26	10-24	Circular, irregular dispose holes	O-like incisions	Irregularly net-like sculpture distinct	Mesotrophic and meso-eutrophic
P. asymmetricum T.Yamagishi & E.Hegewald	45-90	8-14	4-8	Circular, large holes in young stages and smaller in old stages	Elongated and paired creating opening between cells.	Densely regularly granular	Meso-eutrophic
P. biradiatum var. *glabrum* (Raciborski)Parra	50-82	10-26	8-21	Circular, with holes smaller than cell diameter	Each lobes divided into two secondary conical lobes, inner cells are X- like	Smooth	Mesotrophic and meso-eutrophic
P. biwae Negoro	60-130	10-35	7-20	Circular, diameter of holes larger than the diameter of the cell	Two neighboring always arcuate one to another	Smooth or slightly punctuate	Oligo-mesotrophic and mesotrophic
P. boryanum var. *caribeanum* A.Comas	70-130	8.5-13	8.0-12	Circular, without holes	Incisions narrow V-like, lobe with processes up to 2 times longer than cell body	Fine granulate	Meso-eutrophic and eutrophic
P. boryanum var. *forcipatum* (Corda) Chodat	70-190	13-27	12-23	Circular or slightly irregular	Lobes very small and conical,processes narrow, incisions shallow V- to U-like	Very densely and distinctly granular	Meso-eutrophic
P. boryanum var. *longicorne* Reinsch	39-170	4-15	2-10	Circular, without holes or very small	Incisions V-like, deep (reaching the middle of marginal cells, processes long	Scarcely and distinctly granular	Mesotrophic and meso-eutrophic
P. boryanum var. *perforatum* (Raciborski) Nitardy	100-120	8-26	8-21	without holes or irregular holes	Incisions wide, V-like, processes long	Very distinctly granular	Meso-eutrophic
P. boryanum var. *pseudoglabrum* Parra Barrientos	20-96	8-14	8-11	Circular, without holes	Incisions V-like	Very finely granular	Oligo-mesotrophic and mesotrophic
P. duplex var. *asperum* A.Braun	30-90	8-19	8-18	Circular, hole in coenobia smaller than cell diameter	Incisions wide, V-like,	Irregularly net-like sculpture.	Meso-eutrophic and eutrophic
P. duplex var. *asperum* A.Braun	30-90	8-19	8-18	Circular, hole in coenobia smaller than cell diameter	Incisions wide, V-like,	Irregularly net-like sculpture.	Meso-eutrophic and eutrophic
P. duplex var. *coronatum* Raciborski	120-214	21-25	25-26	Circular, with holes	Process of marginal cells ending with short spines	Net -like of punctate	Meso-eutrophic
P. duplex var. *genuinum* (A.Braun) Lagerheim	45-65	6-16	6-18	Circular, with large intercellular spaces	With stout processes which straight or slightly curved	Smooth or punctate	Mesotrophic and meso-eutrophic
P. *integrum* var. *perforatum* Raciborski	70-110	8-20	8-18	Circular to rectangular, with small intercellular spaces	With two short truncate processes from outer face, one from each side	Very finely granular	Mesotrophic and meso-eutrophic
P. kawraiskyi Schmidle	50-100	15-21	11-16	Circular, without holes	Elongate, massive lobes divide into conical secondary lobes	Irregularly and indistinctly granular	Meso-eutrophic and eutrophic
P. muticum Kützing	50-120	21-25	19-21	Circular, without holes or very small	Inverted heart-shape, with or without two short on the free side	Smooth or granular	Mesotrophic

Table 2. Continued.

Taxa	Diameter of Coenobia	Cell long (μm)	Cell wide (μm)	Coenobia shape	Marginal cell	Cell wall	Ecological data
P. privum (Printz) E.Hegewald	15-25	3.5-7	5.5-12	Circular or rounded square shape, without holes	On the outer side with very shallow concavity	Very fine, irregularly, net-like (wavy) sculpture	Meso-eutrophic
P. simplex var. *pseudoglabrum* Parra Barrientos	80-200	11-20	10-17	Circular, diameter of holes large than the diameter of the cell	Long processes	smooth	Mesotrophic
P. subgranulosum Raciborski	50-160	5-25	4-20	Circular, with regular disposed holes between cells	With two long prominent radial conical lobes usually longer than the cell body	Varies from irregularly, densely and distinctly granular.	Mesotrophic and meso-eutrophic
P. tetras var. *apiculatum* Playfair	20-80	8-19	6-18	Circular or rectangular	Divided into two lobes and less deeply concave, each lobe truncated, narrow incisions and trapezoidal in shape	Smooth or granular	Mesotrophic and meso-eutrophic
P. tetras var. *excisum* Rabenhorst	13-50	5-15	4-12	Circular or rectangular	Incisions V-like, deep	Smooth or granular	Meso-eutrophic

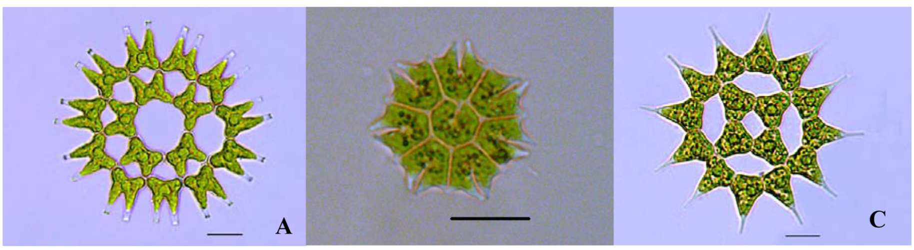


Figure 2. Light micrographs of *Pediastrum* dominant species A. *P. duplex* var. *duplex* Meyen, B. *P. tetras* (Ehrenberg) Ralfs and C *P. simplex* var. *simplex* Meyen (scale bar = 10 μm).

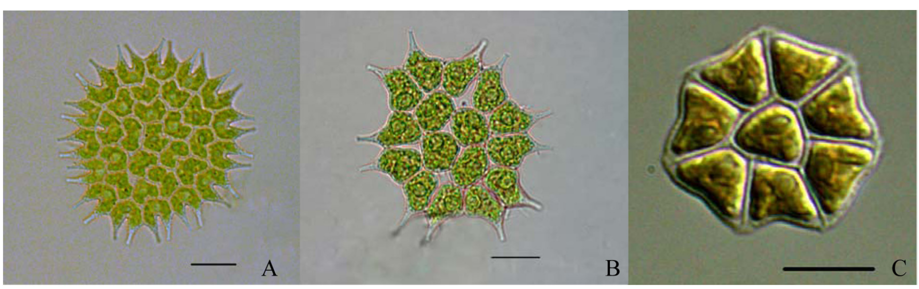


Figure 3. Light micrographs of *Pediastrum* spp. rare species of Thailand A. *P. alternans* Nygaard, B. *P. asymmetricum* Hegewald C. *P. privum* (Printz) E.Hegewald (scale bar = 10 μm).

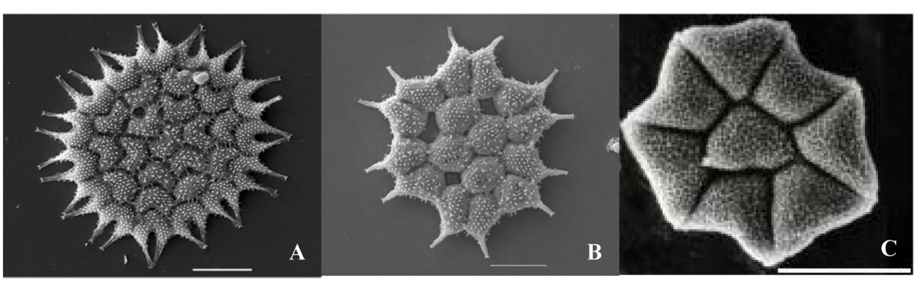


Figure 4. Scanning electron microscope of *Pediastrum* spp. rare species of Thailand A. *P. alternans* Nygaard, B. *P. asymmetricum* Hegewald C. *P. privum* (Printz) E. Hegewald (scale bar = 10 μm).

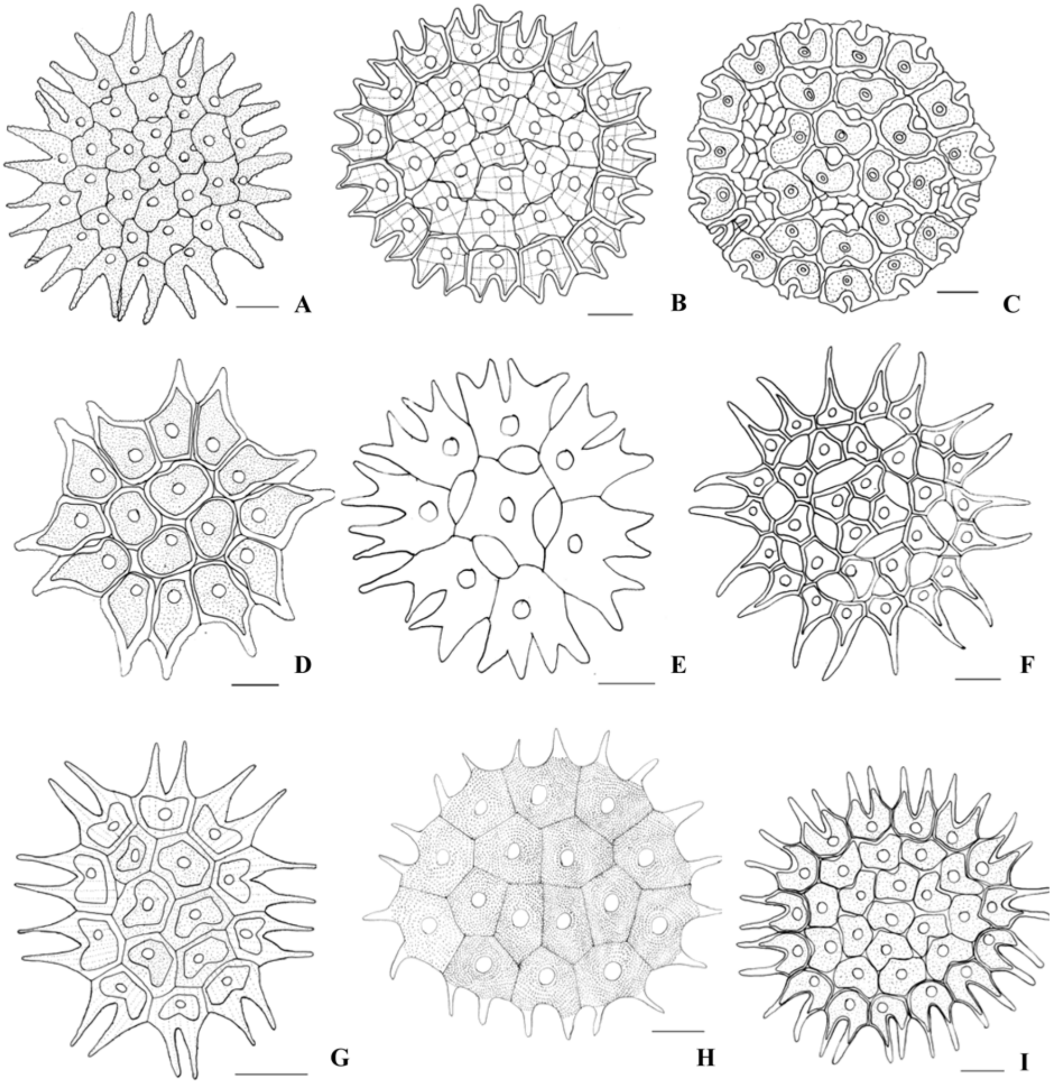


Figure 5. Illustration of new record of *Pediastrum* spp. A. *Pediastrum alternans* Nygaard, B. *P. angulosum* Ehrenberg ex Meneghini, C. *P. angulosum* var. *coronatum* (Raciborski) J.Kom□rek & V.Jankovskα, D. *P. asymmetricum* T.Yamagishi & E.Hegewald, E. *P. biradiatum* var. *glabrum* (Raciborski) Parra, F. *P. biwae* Negoro, G. *P. boryanum* var. *caribeanum* A.Comas, H. *P. boryanum* var. *forcipatum* (Corda) Chodat, I. *P. boryanum* var. *longicorne* Reinsch (scale bar = 10 μm).

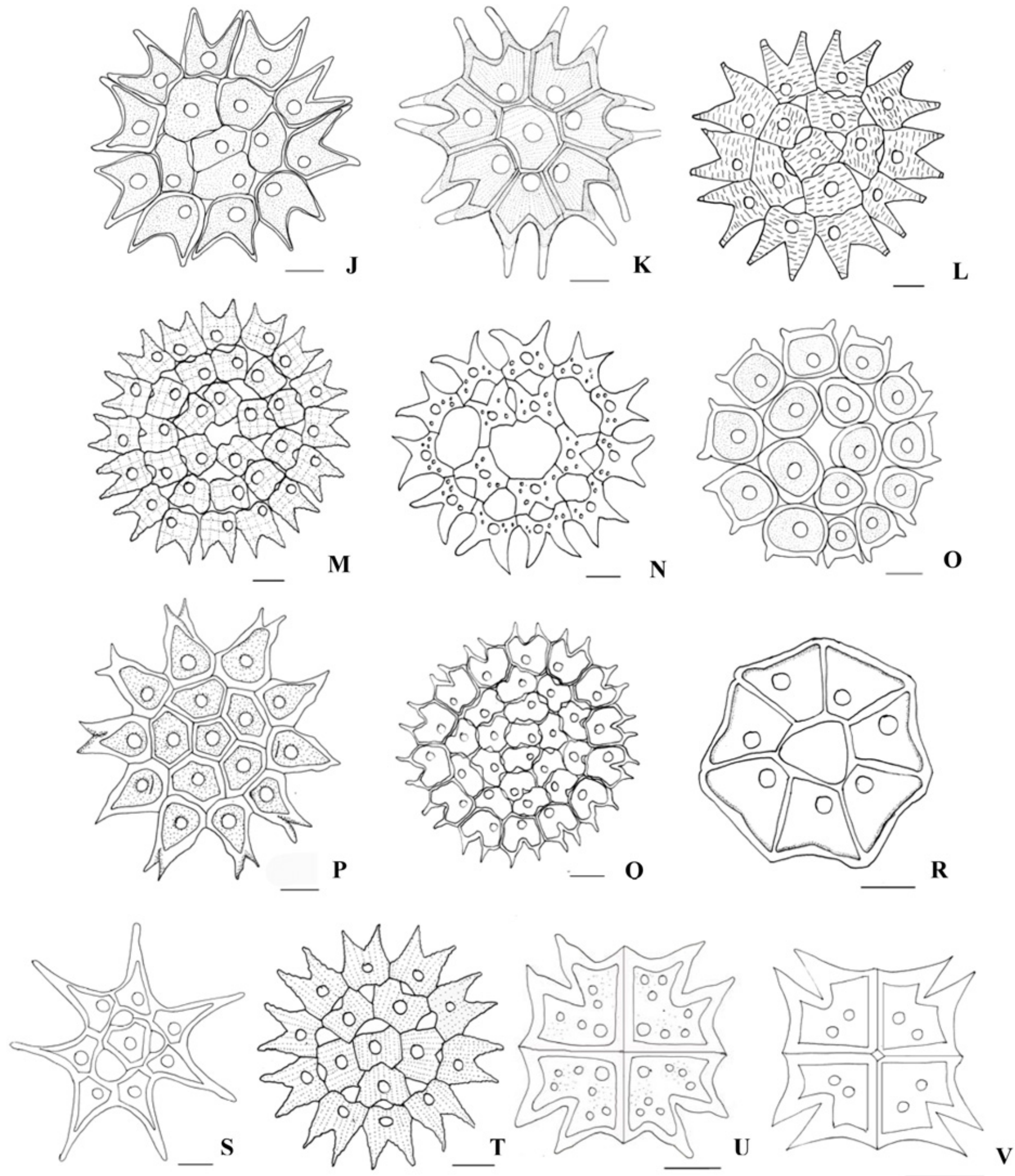


Figure 5. Continued. J. *P. boryanum* var. *perforatum* (Raciborski) Nitardy, K.P. boryanum var. *pseudoglabrum* Parra Barrientos, L. *P. duplex* var. *asperum* A.Braun, M. *P. duplex* var. *coronatum* Raciborski, N. *P. duplex* var. *genuinum* (A.Braun) Lagerheim, O. *P. integrum* var. *perforatum* Raciborski, P. *P. kawraiskyi* Schmidle, Q. *P. muticum* Kützing, R. *P. privum* (Printz) E.Hegewald, S. *P. simplex* var. *pseudoglabrum* Parra Barrientos, T. *P. subgranulosum* Raciborski, U. *P. tetras* var. *apiculatum* Playfair and V. *P. tetras* var. *excisum* Rabenhorst (scale bar = 10 μm).

Pediastrum spp. could be found in oligo-mesotrophic, mesotrophic, meso-eutrophic and eutrophic statuses. *Pediastrum* spp. had the most abundant distribution in the meso-eutrophic and mesotrophic statuses, respectively which the pH value was 8.2, the conductivity value was 393 $\mu S.cm^{-1}$ and the DO and BOD values were 9.2 $mg.L^{-1}$ and 6.7 $mg.L^{-1}$, respectively. Concentrations of nitrate nitrogen, ammonium nitrogen and soluble reactive phosphorus were 0.41 $mg.L^{-1}$, 0.30 $mg.L^{-1}$ and 0.26 $mg.L^{-1}$, respectively.

The most abundant species were found to be *P. duplex* var. *duplex* Meyen, *P. tetras* (Ehrenberg) Ralfs and *P. simplex* var. *simplex* Meyen, respectively. They were found in the meso-eutrophic status consequently, they had a tendency to be used in the assessment of water quality for the meso-eutrophic status. Besides, two species, namely *P. duplex* var. *gracillimum* West & G.S.West and *P. duplex* var. *rugulosum* Raciborski, were mostly found to be in the oligo-mesotrophic status which had a tendency to be used in the assessment of water quality for the oligo-mesotrophic status.

4. Discussions

A total of 60 taxa consisting of 26 species were found and 22 taxa were newly recorded from Thailand. A comparison on *Pediastrum* spp. diversity in this study with previously reported in Thailand [6] and indicated that the 40 taxa consisted of 15 species, which was higher in number than those previously reported. *Pediastrum* spp. were most abundant because the samples were collected throughout Thailand and there was a greater frequency of collection sampling. In addition, the details of the cell wall under SEM were increasingly clear, which is an the important components for identification [16]. Additionally, 15 taxa of *Pediastrum* spp. were found in Poland. It could be concluded that the *Pediastrum* spp. diversity per sampling site found in this study was higher in numbers than those previously reported. This might be due to the fact that Thailand is situated in the tropical zone which is considered appropriate an location for species biodiversity [22]. The tropical zone is considered considered appropriate in topography and climate, as high temperatures are a limiting factor for the distribution of *Pediastrum* spp. in tropical areas [23].

Although, *Pediastrum* spp. can be generally found in oligo-mesotrophic, mesotrophic, meso-eutrophic and eutrophic conditions, they were most commonly found in meso-eutrophic and mesotrophic conditions. So, they can be used to assess water quality in the meso-eutrophic status. The use of the species *P. duplex* var. *duplex* Meyen, *P. tetras* (Ehrenberg) Ralfs and *P. simplex* var. *simplex* Meyen for water quality assessment is in agreement with Xu *et al.* [4]; Komarek and Jankovska [5]. However, to determine the ecological situation in the lake, the whole assemblage of more species in one biotope should be studied [5].

Most of the sampling sites showed a different trophic status due to the fact that different activities were taking place a along the reservoir. Most sampling sites with oligo-mesotrophic status were surrounded by deciduous forests, so there was not much contamination in the water bodies, whereas most sampling sites with mesotrophic and meso-eutrophic status were contaminated by the general community, restaurants, fish ponds, and agricultural activities. Most sampling sites with eutrophic status were contaminated which wastewater from drainage pipes. Some sampling sites were situated in water treatment areas, which were directly affected. This situation was similar to that which was previously reported in other countries [24].

Pediastrum spp. grows faster than many forms of microalgae [8] and has high protein content [9]. So, it should be isolated and cultured to produce single cell proteins for food supplements in human and animal food.

5. Conclusions

The study of the diversity of *Pediastrum* at 66 sites situated in various parts of Thailand revealed a total of 60 taxa consisting of 26 species and 22 taxa were first recorded in Thailand. *P. duplex* var. *duplex* Meyen, *P. tetras* (Ehrenberg) Ralfs and *P. simplex* var. *simplex* Meyen were the dominant species. Three species such as *P. alternans* Nygaard, *P. asymmetricum* T.Yamagishi & E.Hegewald and *P. privum* (Printz) E.Hegewald are considered rare in Thailand. *Pediastrum* spp. can be found in oligo-mesotrophic, mesotrophic, meso-eutrophic and eutrophic statuse, however, they were abundant in meso-eutrophic and mesotrophic statuses. The most abundant species were found to be *P. duplex* var. *duplex* Meyen, *P. tetras* (Ehrenberg) Ralfs and *P. simplex* var. *simplex* Meyen and they were found in meso-eutrophic status. Consequently, they had a tendency to be used for the assessment of meso-eutrophic water quality. Two species, namely *P. duplex* var. *gracillimum* West & G.S.West and P. *duplex* var. *rugulosum* Raciborski were most commonly found in the oligo-mesotrophic status, which had a tendency to be used in the assessment of water quality for the oligo-mesotrophic status. These were first recorded for data ecology from Thailand.

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