

Prof. V. Krishnamurthy's Phycological Contributions

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Prof. V.Krishnamurthy comes from a long line of scholars, being the eldest son of Prof. R. Vasudeva Sarma, a reputed scholar of Sanskrit and Tamil and served as Professor of Sanskrit in National College, Tiruchirapalli, Tamilnadu. He had his schooling in National College School, Tiruchirapalli and graduated from St.Joseph's College, Tiruchirapalli in 1940, securing the B.A.Degree with Botany as his major subject. He then proceeded to obtain his M.A.Degree in Botany at Presidency College, Madras. He then joined the University Botany Laboratory of the University of Madras under the guidance of Prof. M.O.P.Iyengar who is considered the Father of Algology in India and obtained the M.Sc.Degree by research. Prof. Krishnamurthy's dissertation was voluminous and consisted of 4 parts. The main part of the dissertation was a taxonomic account of some freshwater diatoms of South India. A second part dealt with naturally occurring variations of frustule structure in some fresh water diatoms. The third part deals with the ecology of some seaweeds occurring in the estuarine region of River Adyar at Madras and the fourth part with the structure and reproduction of a new species of *Compsopogon (C.iyengari)* occurring in the estuarine region of River Adyar. This was examined by another leading phycologist Prof. Y.Bharadwaja of Banares Hindu University. He was in full appreciation of V.K.'s work and said that it could have been submitted for Ph.D. itself. He got his M.Sc. degree in 1952. He started his algal research in brackish water but later ended as marine algologist. His algal research covered various kinds of water bodies, in different habitats. His first research paper entitled "On the structure and reproduction of *Compsopogon iyengarii* from Madras" was published in 1953. After his M.Sc. he geared himself to the teaching profession and his interest in algology moved him into deeper research in the same field. On Prof.Fritsch's suggestion Prof.M.O.P.Iyengar asked V.K. to go to Manchester for his doctorate, under Dr.Kathlen Drew who gave him the problem on Cytology of *Porphyra umbilicalis*. He went around England, to places like Isle of Mann, Welsh Coast, Bangor, Roshneiger, Liverpool and later along the Atlantic coast of U.S. for his *Porphyra* collection. He got his Ph.D. from Manchester University in 1958. His extensive collection of algae enabled him to erect a number of new spp. and accurate description of certain earlier ones. Most of his collection of *Porphyra* are kept in the herbarium of Krishnamurthy Institute of Algology. Available for reference by any phycologists.

In 1965 he was appointed as the Senior Scientific Officer, later as Assistant Director in Central Salt and Marine Chemicals Research Institute (CSMCRI), Bhavnagar and headed the division of Algology. During his tenure at Bhavnagar, he started various projects such as the collection and survey of drift seaweeds on the Indian Coast, the documentation of algal flora in localities like Okha, Dwaraka, Veraval, Kutch etc. of Gujarat, chemical analysis and utilization of seaweeds etc. He has presented a number of papers on algae both at National and International symposia and seminars. In 1967, at the instance of Dr.R.E.Norris, Prof. V.K. went to US as a Visiting Research Fellow at Friday Harbor Laboratory, University of Washington and stayed for a year studying the species of *Porphyra* along the Pacific Coast of North America. During this period he met Prof. G.F.Papenfuss, the leading marine phycologist with whom he developed a

Algal biodiversity through ages and prospects

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ABSTRACT

Historically, if we look back, most of the earth's crust was covered by water in the beginning and in such habitats dominant plant groups naturally exhibited motile aquatic flora; primitive algal members in such habitats were mostly described as motile forms as typically one can perhaps assume in the form of a genus like, *Chlamydomonas*. Origin of earth has been established about 4500 million years ago and the record of the ancient life on earth comes from very early i.e. 3500 million years ago. The aquatic biodiversity increased to about 2000 million years ago. Algae are the potential colonizers of various water habitats like rivers, ponds, lakes, wells, puddles etc. which are fresh water bodies where algae grow luxuriantly. Algal members can be found in all sorts of different places and surfaces and successfully constitute the running water ecosystem. Majority of these algal members have developed evolutionary adaptations over the time that presents the water current sweeping them away resulting perhaps in the formation of hold-fast etc. Thus perhaps it was in fast flowing waters that from unicellular forms, filamentous forms might have arisen. Blue-green algae or Cyanobacteria are comparatively, cosmopolitan in their distribution. If we trace further progress in thallus organization from filamentous forms, highly evolved thalli were formed. During regular collections the occurrence of rich growth of algae was observed. Slowly due to the increase in population and rapid industrialization have enormously enhanced the production of wastes, which is dumped into water bodies resulting in the damage aquatic population due to pollution. It was observed that slowly the organisms diminishing and also rare occurrence of genera and finally, disappearing altogether. Secondly, the human activities such as dam and building constructions, etc. resulted in damaging the flora which was once richly occurring. Thus, after regular algal collections at many habitats of Hyderabad, Warangal, Karimnagar and other places, over a period of five decades, have shown that once the places which showed rich algal flora, have diminished or almost disappeared. There is need now for the sustainability and conservation of these microalgae which need immediate attention of scientists working in this field. The objectives and significance of the research work is presented in the paper.

***In vitro* anti-inflammatory activity of *Sargassum ilicifolium* by HRBC membrane stabilization method**

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ABSTRACT

Marine natural products have attracted the attention of biologists and chemists the world over for the last five decades. Till date approximately 16,000 marine natural products have been isolated from marine organisms. The macro algae occupy a potentially important place as a source of biomedical compounds. Among them brown macro alga *Sargassum* is a conspicuous component of the benthic macro algal flora of tropical and subtropical waters. *Sargassum* species have been reported to possess pharmacological activities like antitumor, antioxidant and antibacterial activities. In the present study, *in vitro* anti-inflammatory activity of the seaweed *Sargassum ilicifolium* was investigated by HRBC (Human Red Blood Cell) membrane stabilization method. The principle involved is stabilization of human red blood cell membrane by hypotonicity induced membrane lysis. *Sargassum ilicifolium* was collected from the coastal area of Mandapam, Rameshwaram. They were washed, shade dried and crushed in to powder. The powdered samples were subjected to extraction with various solvents in increasing polarity by maceration. The filtrate was concentrated and dried under reduced pressure in a rotary evaporator and tested for *in vitro* anti-inflammatory activity. *Sargassum ilicifolium* extracts possessed significant anti-inflammatory activity when compared with the standard Diclofenac sodium.

Chemical characterization of cellwall polysaccharide of *Rhodymenia dissecta*

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ABSTRACT

Agar is of great importance in the food, drug and cosmetic industries. In the present work, the cell-wall polysaccharide of *Rhodymenia dissecta* Boergesen collected from Idinthakarai, in two seasons, i.e., summer and winter of the year, was extracted and studied for its ash, galactose, 3,6 anhydrogalactose and sulphate content. The polysaccharides obtained from summer and winter collections of *Rhodymenia dissecta* were subjected to FTIR spectral measurements. Further the spectra have been compared with that of Difco agar. The FTIR analysis of polysaccharides from *Rhodymenia dissecta* showed the presence of agar polymers. The intensity of absorption varies with season. The variations may be due to the enzymes involved in the synthesis of polymers in polysaccharide. The results of these analyses are presented and discussed.

Species diversity of two chlorococcalean colonial genera (*Pediastrum* Meyen and *Scenedesmus* Meyen) from the freshwater ecosystems of Kerala

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ABSTRACT

Pediastrum Meyen and *Scenedesmus* Meyen are the two common non-motile colonial chlorococcalean algae, abundant in the stagnant freshwater ecosystems. They occur as free floating (planktonic) or attached on the surface of other aquatic plants (periphytic). *Pediastrum* is a 4-64 celled discoid alga. The genus *Scenedesmus* is a 2- to 8-celled plate shaped colony. The present study is a part of the investigation on the biodiversity of the freshwater algal flora of Kerala. During the investigation 14 taxa of *Scenedesmus* and 12 taxa of *Pediastrum* have been identified.

Biodiversity of filamentous desmids of Kerala

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ABSTRACT

Twenty-six algal taxa from nine genera of the filamentous desmids, collected from different parts of Kerala are presented. These include eight taxa of *Desmidium* Agardh; five taxa of *Hyalotheca* Ehrenberg ; four taxa of *Spondylosium* Brébisson; three taxa of *Groenbladia* Teiling; two taxa of *Teilingia* Bourrelly and one taxa each of *Sphaerososma* Corda ; *Streptonema* Wallich ; *Onychonema* Wallich and *Babusina* Kützing . Among these four taxa are new to India and seventeen are new to Kerala.

A comparative study of physico-chemical and phycological characters of Muthalamozhi pond and Kadampa pond of Tiruchendur taluk of Tuticorin District

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ABSTRACT

Environmental pollution is affecting all of us in one way or the other but there is no doubt water and sustainable developments are inextricably linked. The present study reports a comparative survey of physico-chemical parameters and phytoplankton in surface water samples of Muthalamozhi pond and Kadampa pond of Tiruchendur Taluk of Tuticorin District. The survey was conducted for a period of six months from January 2011 to June 2011 in both the ponds. As the physico-chemical properties influence the phytoplankton, the percentage composition of various groups were also evaluated.

A study of Phytoplankton in river Tamiraparani

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ABSTRACT

Rivers form a major type of ecosystem in any country. River Tamiraparani is one of the important perennial rivers in Tamilnadu. The river Tamiraparani originates from the peak of Periya Pothigai hills of the Western Ghats above Papanasam in the Ambasamudram taluk at an altitude of 1725 meters above mean sea level; prior to the bifurcation of the Tirunelveli district, the Tamiraparani was the only major river in Tamilnadu which had its source and end in the same district. After bifurcation, the river traverses the two districts of Tirunelveli and Tuticorin before joining the Gulf of Mannar of the Bay of Bengal at Punnaikayal in Tiruchendur taluk of Thoothukkudi district. Spelt differently as Tampraparani, Tamraparani, Tamiravaruni, etc., the river is mentioned as the Porunainathi in Tamil Poetic literature. The present investigation includes identification and systematic study on the algal flora (Phytoplankton) of River Tamiraparani at Vannarpetai. The study was carried out during the months of March to August 2011 and their taxonomic hierarchy given. There is heavy pollution in aquatic ecosystems through intensive oil, sewage dispersal and water washing of vehicles. etc., Planktons play an important role in the ecosystem as they are located at the beginning of food chain. Algal communities have been used for monitoring the effect of Industrial pollution. Polluted water, of this river is supporting several groups of algae. A detailed systematic account of algae found in the site is given.

Preparation and properties of *Sargassum myriocystum* methyl esters as on alternate fuel for automobile engines

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ABSTRACT

World is facing an ecological imbalance. Fossil fuel depletion is leading to an energy crisis with more dependence on import and unavoidable escalating prices. Furthermore, the continued combustion of fossil fuels has created serious environmental concerns over global warming due to the increased release of greenhouse gases (GHG). Biofuels are one of the potential options to reduce the world's dependence on fossil fuels but biofuels have their limitations. One of the recent concerns with respect to increased biofuels production is the availability of land. Bio-diesel from algae has the potential to replace the current diesel usage without using up much land for cultivation. This paper examines the feasibility of *Sargassum myriocystum* biodiesel as a potential replacement for petroleum-based liquid fuels. Bio-diesel was obtained using transesterification of the raw algal oil. The reaction conditions were optimized to be 1:5 oil : alcohol (vol/vol) for two hours and 60°C for methanol transesterification. The bio-diesel obtained was analyzed according to ASTM D6751 standards for commercial application. Kinematic viscosity, Acid number, iodine number and sulfur content met ASTM D6751 specifications. Water content and flash point were slightly higher than the standards of ASTM D6751.

New records Cladophorales; Chlorophyceae from West Bengal

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ABSTRACT

During a study of algal biodiversity of rice field of Sagar Island (The Sunderbans) the authors collected several taxa of Cladophorales (Chlorophyceae). Present communication describes four taxa viz. *Rhizoclonium fontanum* Kützing, *R. tortuosum* (Dillwyn) Kützing, *Pithophora polymorpha* Wittrock and *P. roettleri* (Roth) Wittrock of which first one is new record from India and the other three are addition to the West Bengal algal flora.

Phytoplankton and Zooplankton (Cladocera, Copepoda) relationship in the eutrophicated Daha river

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ABSTRACT

The Quality assessment of water can be done by using the biological indices which can be calculated from the species composition of the sample, diversity of species, their distribution pattern and evaluation of the biotic index. The seasonal variation in primary production, individual numbers and biomass of phyto- and zooplankton was studied in the Daha River in 2009. The secondary production of two dominant zooplankton species (*Thermocyclops hyalinus* and *Daphnia carinata*) were also estimated. In the growing season (July to Dec.) Individual numbers, dry weights and chlorophyll-a contents of phytoplankton ranged between $30-90 \times 10^6$ individuals l^{-1} , 3-12 mg l^{-1} and 50-170 $g l^{-1}$ respectively. Bacillariophyta dominated in the phytoplankton with a sub dominance of chlorococcales in summer. Individual numbers and dry weights of Crustacean Zooplankton ranged between 1400-6500 individuals m^{-3} and 1.2-12 mg. m^{-3} respectively. The daily mean gross production was 970 mg $cm^{-3} d^{-1}$, and the net production was 660 $cm^{-3} d^{-1}$. *Thermocyclops hyalinus* populations produce 0.5 mg $cm^{-3} d^{-1}$ as an average and *Daphnia carinata* 0.8 mg $cm^{-3} d^{-1}$. The ecological efficiency between phytoplankton and crustacean zooplankton has 0.03%.

Antimicrobial and antitumor activity of biologically synthesized silver nanoparticles from *Spirulina platensis*

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ABSTRACT

Silver nanoparticles synthesized by biomass of *Spirulina platensis* was evaluated against drug resistant *Escherichia coli* and *Staphylococcus aureus*. The nanoparticles were synthesized by dried biomass of *Spirulina platensis* and the synthesized purified particles were characterized by UV-Vis spectroscopy and SEM. The UV-Vis spectroscopy revealed the formation of silver nanoparticles by yielding the typical silver plasmon absorption maxima at 430nm and SEM micrograph indicates the uniform spherical particles with the size range of 45-60nm. The antibacterial activity with these synthesized nanoparticles showed distinct effect on both tested strains and minimum inhibitory concentration (MIC) was found to be 50µg/ml for *Escherichia coli* and 75µg/ml *Staphylococcus aureus*. Antitumor activity of the synthesized nanoparticles over HEP2 cell lines by MTT assay reveals 100µ/ml concentration inhibited maximum viability followed by 90 and 80 µg/ml.

A report on the seaweeds from saline habitats of Kakinada, the East coast of India

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ABSTRACT

Kakinada is situated at Lat. 16°56'00"N and Long. 82°13'00"E on the East coast of India. This place has estuarine (hyposaline), marine and also salt pan (hypersaline) habitats. The present paper reports the occurrence and distribution along with taxonomic descriptions of 5 seaweeds from different saline habitats of this geographical area. Among these algae, three taxa are new records to Andhra Pradesh, the East coast of India.

Fresh water algal mix enriches the quality of vermicompost

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ABSTRACT

Vermitechnology is an important field of biotechnology involving the use of earthworms for processing various types of organic materials into valuable resources. In the present study the vermicompost was prepared by using fresh water algal mixture with rabbit waste and elephant dung. The algal mixture was also used as a supplementary feed for earthworms. Its effects on the reproductive rate of earthworms, N P K values of vermicomposts and its impact on the growth of *Abelmoschus esculentus* were analysed. The results showed, comparatively higher rate than the cow dung based vermicomposts.

Diversity of algae in different water bodies of Meghalaya

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ABSTRACT

Meghalaya, a State of North East India is known for its rich flora and fauna and also for receiving highest rainfall. But due to human pressure these natural water bodies are reducing in size at a fast pace and also getting affected by different anthropogenic activities like coal mining, lime quarrying and deposition of agricultural wastes. The present paper deals with the diversity of algal communities in different water bodies in relation to its physico-chemical properties. Totally 340 algal taxa have been recorded from six water bodies of different nature. Among them 168 species belong to Chlorophyceae, 108 to Bacillariophyceae, 39 species to Cyanophyceae, 21 species to Euglenophyceae, 2 species to Xanthophyceae and one species each to Chrysophyceae and Rhodophyceae. *Batrachospermum vagum* belonging to Rhodophyceae was found only in unimpacted stream in Jaintia Hills. High diversity (1.70) was observed in nutrient impacted lake which indicated that agricultural runoff has not yet affected the algal population adversely rather the leached nutrients enhanced the growth of different algal groups. Lime quarrying effluents in river Umiew did not show any prominent effect on diversity (1.06 & 1.25) and richness of algal groups. Coal mining showed the most pronounced effect on distributional pattern of different algal communities reducing species diversity from (1.70) in unimpacted stream to (0.74) in coal mine affected stream, favouring growth of only few tolerant species.

Photosynthetic pigments and fatty acid composition of four marine green algae from the coastal zones of Goa

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ABSTRACT

Pigments and fatty acid composition of four algal species, *Caulerpa sertularioides*, *Chaetomorpha media*, *Enteromorpha intestinalis* and *Ulva fasciata* belonging to the Chlorophyceae, isolated from marine ecosystems were investigated for their pigments and fatty acid composition. Results revealed a pigment pattern similar to that of higher plants. Chlorophyll a, chlorophyll b, chlorophyllide-B, neoxanthin, violaxanthin and lutein were detected in all the four alga studied, while phaeophytin B and phaeophorbide B were detected only in *Enteromorpha*. Loroxanthin, a carotenoid which has been reported from various species of *Chaetomorpha* and *Ulva* was not detected in the present study. Antheraxanthin was also not found in *Ulva* but present in all other algae studied. Fatty acid profile showed the presence of saturated fatty acids such as lauric acid (C12:0), myristic acid (C14:0), palmitic acid (C16:0) and stearic acid (C18:0) and unsaturated fatty acids such as oleic acid (C18:1), linoleic acid (C18:2) and linolenic acid (C18:3) in all investigated species. The Chlorophyta comprise the most modern group and this is supported primarily by occurrence of C18 fatty acids typical of the vegetative tissue of higher plants. Presence of large number of pigment and fatty acid may have possible value for nutritional purpose.

Phycodiversity in irrigation tanks of Kheda and Anand district, Gujarat

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ABSTRACT

The Kheda district is located (between 72°32' to 73°37' East longitude and between 22°30' to 23°18' North latitude) and Anand district is located (between 72°15' to 73°18' East longitude and between 22°07' to 23°29' North latitude) in Gujarat. A critical study has been made on the diversity of algae in six irrigation tanks of two taluka of Kheda district and one irrigation tank of one taluka of Anand district, Gujarat. In this 11 parameters (Physico-chemical) were estimated. The physico-chemical analysis revealed that the irrigation tank is suitable for the growth of phytoplankton. The higher value of hardness and lower temperature favoured the growth of Cyanophyceae members. The present paper enumerates fifty three species of algae in which 21 species belong to the class Cyanophyceae, 27 species of Chlorophyceae and 5 species of Bascillariophyceae.

A thanksgiving and a remembrance

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Dr. Vijaya Parthasarathy, the Editor – in – Charge of this number of Indian Hydrobiology has informed me that it is being dedicated to me on my 90th Birth Anniversary. It is very kind on her part and on the part of the Editorial Board of the Journal that they should felicitate me in this manner. But is it a great achievement to have turned ninety? Anyway, I am grateful to them for their gesture, as I know the affection with which they are doing this.

In this context, I wish to recollect the birth anniversary of a great phycologist.



Fifteenth December, 2011 marked the 125th Birth Anniversary of Prof.M.O.Parthasarathy Iyengar, whom we all revere as the Father of Algology in India. I bow my head to his memory as I happened to be the last student to get the benefit of his guidance and nurture as also the only living student of that great savant.

I first met Professor Iyengar in 1940 when I was a post-graduate student in Presidency College, Madras, under another great teacher, Dr. Todla Ekambaram. Prof. Ekambaram and Prof.Iyengar were close friends and one time colleagues in Presidency College and there was no social function in the Department of Botany in the college, without Prof.Iyengar as an invited guest. It was during one of those occasions that I met Prof.Iyengar and I was attracted to him immediately. I resolved then and there

that I should seek his guidance in research in Algology. So, after I took my Master's Degree in Botany from Presidency College, in 1942, I joined Prof.Iyengar as a research scholar. The Professor's department in the University of Madras was called The University Botany Laboratory and was known worldwide by that name.

Even before that, during my final year at Presidency College, and as a part of the curriculum in a course leading to the Master's Degree, I had to offer an elective subject, which was the study of Algae. Prof. Ekambaram asked me and other students seeking a Master's Degree to attend a course of lectures by Prof. Iyengar at the University Botany Laboratory or UBL as it was known to us. We were mesmerized by the great man's lectures which were stimulating as he embellished his lectures with the latest trends in algology, illustrating them with some of his original findings.

As a research guide, he was exemplary. He expected us to come up to his standards. He made his students give the same meticulous attention to details as he himself showed and he would also verify for himself whatever his students reported to him.