DR. SANU V. FRANCIS PhD, Post-Doc

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RESEARCH SKILLS / INTERESTS

Zoology, Copepod taxonomy, Zooplankton ecology, Molecular taxonomy

EDUCATIONAL DETAILS

PhD (2019) Title: Morpho-taxonomy, Genetic Analysis and Distribution of Calanoid Copepods from Lakshadweep and Coastal Waters of South West Coast of India Supervising guide : Prof.(Dr.) S. Bijoy Nandan	Faculty of Marine Sciences, Cochin University of Science and Technology (CUSAT) Cochin, Kerala State, India 682022
MSc. Marine Biology (Zoology)(2010)	Dept. of Marine Biology, Microbiology and Biochemistry, School of Marine Sciences, CUSAT
BSc. Zoology (2008)	Mary Matha Arts & Science College (Kannur University) Mananthavady, Kerala State India, 670645

RESEARCH EXPERIENCE

Organisation	Address	Duration	Designation	Research title
Cochin University of Science & Technology (CUSAT)	School of Marine Sciences, Fine Arts Avenue, Cochin 16	06-07-2020 to 23-02-2022	Post-Doctoral Fellow	Plasticity of copepod communities along Lakshadweep waters in response to changing tropical environment
Cochin University of Science & Technology (CUSAT)	School of Marine Sciences, Fine Arts Avenue, Cochin 16	12-12-2013 to 29-12-2018	PhD Research Scholar	Morpho-taxonomy, Genetic Analysis and Distribution of Calanoid Copepods from Lakshadweep and Coastal Waters of South West Coast of India
		15-11-2012 to 31-8-2015	Senior Research Fellow, DBT, Govt. of India Project	Taxonomy and Genetic characterization of Pelagic Copepods (Crustacea) from

				the Marine habitats of the South West Coast of India
National Institute of Oceanography (NIO)	Regional Center, Cochin-18	28-07-2011 to 31-10-2012	Project Assistant-II	Environmental Impact Assessment studies in the sea route for laying cable/overhead line of India-Sri Lanka grid interconnecting project part II (International Project)
National Centre for Aquatic Animal Health (NCAAH)	Marine Sciences Campus, CUSAT Cochin-16	01-07-2010 to 15-11-2010	Project fellow	Determination of the efficacy of carotenoids on shrimp growth and immunity

TECHNICAL SKILLS

Experience in	Description
SCUBA Diving & Snorkelling	PADI Open Water SCUBA Diving Certificate. **Diver No: 1603AL0273**. Underwater sample collection experience in lagoon waters of Lakshadweep.
Field sampling	Participated in field cruises in fishing vessels from Rameshwaram to Srilanka and Lagoon waters of various islands of Lakshadweep. Participated in *FORV Sagar Sampada* cruise No.338 (Southwest coast of India). Experience in the onboard operation of Zooplankton nets, Van Veen grab, Gravity corer, Conductivity Temperature Depth profiler (CTD), and Niskin water sampler.
Taxonomy of calanoid copepods	Experience in the collection and identification of Marine zooplankton fauna and expertise in the taxonomy of marine and coastal calanoid copepods
DNA Barcoding	Experience in DNA barcoding of copepods, fishes, Molluscs, Polychaetes, Crabs and Algae.
Software skills	ODV,PRIMER, SPSS, SURFER, Origin, MEGA, ClustalX

PROFESSIONAL ACTIVITIES

Life time member : Society of Marine Biologists (SOMB) Membership No.SOMB/ER/678/05/070

AWARDS

UGC-Basic Science Research Fellowship, Govt. of India: 2014-15

PUBLICATIONS

28 publications:- 1 Book Chapter, **15** Journal articles, **2** Conference Papers, **10** Abstracts
Hirsch index (*h*-index) : 6
Cumulative Impact Factor (**2020**): **16.47**

----------BOOK CHAPTER----------

1. Sanu V. Francis and S. Bijoy Nandan (**2020**). mt COI sequence-based barcoding of calanoid copepods from lagoon waters of Lakshadweep, southwest coast of India. In: Pandey D., Ravichandran M., Nair N. (eds) *Dynamics of the Earth System: Evolution, Processes and Interactions*. Society of Earth Scientists Series. *Springer*, Cham pp.253-264. doi: 10.1007/978-3-030-40659-2_10. ISBN: 978-3-030-40659-2 https://link.springer.com/chapter/10.1007/978-3-030-40659-2_10

----------JOURNAL ARTICLES----------

1. Neelima Vasu K, Bijoy Nandan S, Radhika R, **Sanu V. Francis** (Accepted: 24/02**/2022).** Taxonomic revision of epiphytic copepod *Metis jousseaumei* Richard, 1892 (Copepoda, Harpacticoida, Metidae) from Kavaratti Island Southeastern Arabian Sea. *Talassas* Manuscript No: THAL-S-21-00211. IF:**0.620**

2. Sanu V Francis, P. Jasmine and S. Bijoy Nandan (Accepted 02/02/**2022**). A new species of *Tortanus* (*Atortus*) (Copepoda, Calanoida, Tortanidae) from Great Nicobar Island, North-eastern Indian Ocean. *Nauplius* Manuscript No: NAU-2021-0423. IF:**0.610**

3. S V Francis, J Purushothaman, A Siddique, A Bhowal, SB Nandan **(2021)** Redescription of poorly known neustonic calanoid copepod *Pontella andersoni* Sewell, 1912 (Pontellidae) from the Bay of Bengal. *Indian Journal of Geo-Marine Sciences*. 50(8) 635-640. IF: **0.496** http://nopr.niscair.res.in/handle/123456789/58550

4. Aishwarya Purushothaman, Tiziana Romagnoli, **Sanu V Francis**, Lathika Cicily Thomas, Padmakumar K.B (**2021**) First report of marine epizoic diatom, *Protoraphis atlantica* (Protoraphidaceae) on calanoid copepods along the Southeastern Arabian Sea. *Symbiosis*. DOI 10.1007/s13199-021-00772-6. IF: **2.268** https://doi.org/10.1007/s13199-021-00772-6

5. Aishwarya, Igor Dovgal, **Sanu V Francis**, Padmakumar K.B (**2020**) Observation of suctorian ciliate *Ephelota coronata* on calanoid copepod *Pontella spinipes* in the Southeastern Arabian Sea. *Symbiosis*. DOI 10.1007/s13199-020-00704-w. IF: **2.268** https://doi.org/10.1007/s13199-020-00704-w

6. Jasmine Purushothaman, Aishee Bhowal, Alfisa Siddique, **Sanu V Francis**, Chelladurai Raghunathan (**2020**) Diversity of epibiont association with a record of two new epibiontic ciliates *Ephelota plana* and *Ephelota gigantea* in the coastal waters of Bay of Bengal, northern Indian Ocean. *Symbiosis*. IF: **2.268** https://doi.org/10.1007/s13199-019-00659-7

7. Sanu Vengasseril Francis and Sivasankaran Bijoy Nandan (**2019**). A new species of *Tortanus* (*Atortus*) (Copepoda, Calanoida, Tortanidae) from Minicoy Island, southeastern Arabian Sea. *Turkish Journal of Zoology* 43 (5) 425-436 DOI: 10.3906/zoo-1811-29. IF: **0.673** https://journals.tubitak.gov.tr/zoology/issues/zoo-19-43-5/zoo-43-5-3-1811-29.pdf

8. Jayachandran P.R., Jima M., Philomina Joseph, **Sanu V.F.** and Bijoy Nandan S. **(2018).** Invasion of biofouling mussel *Mytilopsis sallei* Récluz, 1849 (Bivalvia: Dreissenacea) in the Cochin backwater, south-west coast of India. *Current Science* 115(12) 2198-2200. ISSN: 0011-3891. IF: **1.102** http://www.ischolar.info/index.php/CURS/article/view/184693

9. Oliver P.G., Hallan A., Jayachandran P.R., Joseph P., **Sanu V.F.** and Bijoy Nandan S. (**2018**).

Taxonomy of myid bivalves from fragmented brackish- water habitats in India, with a description of a new genus *Indosphenia* (Myida,Myoidea, Myidae). *ZooKeys* 799: 21–46. IF: **1.546** https://zookeys.pensoft.net/article/25843

10. Sanu Vengasseril Francis, Shuhei Nishida and Sivasankaran Bijoy Nandan (**2018**). Validation of male *Pontella spinipes* Giesbrecht, 1889 (Copepoda: Calanoida: Pontellidae) based on morphological and mitochondrial COI gene sequence analysis. *Zoological studies*. 57(16) 1-11 IF: **2.058** http://zoolstud.sinica.edu.tw/Journals/57/57-16.html

11. Jayachandran P.R., S. Bijoy Nandan, **V. F. Sanu**, M. Jima, P.R. Anu, N. D. Don Xavier, Philomina Joseph, A.M. Midhun, and C.V. Asha (**2018**). Authentication of *Nassodonta insignis* H. Adams, 1867 (Gastropoda: *Nassariidae*) from the Kodungallur - Azhikode backwater, southwest coast of India using mitochondrial COI marker. *Indian Journal of Geo Marine Sciences* 47(3): 623-628. IF: **0.496** http://nopr.niscair.res.in/handle/123456789/44121

12. Sanu V. Francis and Shuhei Nishida (**2018**). Amendment of the status of *pontella sewelli* Heinrich, 1987, as a junior synonym of *P. sinica* Chen and Zhang, 1965, with confirmation of female-male matching by genetic analysis. *Crustaceana* 91(4) 439-449. IF: **0.529** https://www.jstor.org/stable/26570919

13. V.F. Sanu, S. Bijoy Nandan, J. Deepak, and M. Harikrishnan (**2016**). Molecular identification and systematic assessment of *Labidocera madurae* A Scott, 1909 (calanoid copepod) from Lakshadweep Archipelago, South West coast of India, based on mitochondrial COI gene sequences. *Marine Biodiversity* 46: 95-103. ISSN: 1867-1624. IF: **1.533** https://link.springer.com/article/10.1007/s12526-015-0326-8

14. V.F. Sanu, S. Bijoy Nandan, M. Rithin Raj and R. Radhika (**2014**). Mesozooplankton Distribution in Kavaratti Atoll, Lakshadweep Archipelago, South West Coast of India With Special Reference to Calanoid Copepods, *IOSR Journal of Environmental science, Ecotoxicology and Food technology*. Vol. 8, Issue 10 Ver. II, pp 69-78.doi: 10.9790/2402-081026978**.** https://www.iosrjournals.org/iosr-jestft/papers/vol8-issue10/Version-2/J081026978.pdf

15. P.R. Jayachandran, S. Bijoy Nandan, O.K. Sreedevi, and **V.F. Sanu** (**2013**). Influence of Environmental Factors on Fish Assemblage in the tropical Estuary of South West Coast of India, A Case Study of Kodungallur – Azhikode Estuary. *International Journal of Marine Science*, Vol.3, No.2, pp.4-16.

----------CONFERENCE PAPERS----------

1. Jima M., S. Bijoy Nandan, **Sanu V.F**., Radhika R and Jayachandran P.R. (**2015**). Community structure and systematics of arrow worms (phylum: Chaetognatha) from the lagoons of Lakshadweep archipelago, India. *Biodiversity & Evaluation: Perspectives and Paradigm shift*, December 1-3, Kalady pp.296-298.

2. V.F. Sanu, P.R. Jayachandran, O.K. Sreedevi and S. Bijoy Nandan (**2010**). Fishery Catch Structure of Kodungalur-Azhikode Estuary and it's Sustainable Management. *Proceedings of the International Conference on Green path to Sustainability - prospects and challenges*, pp.223-231.doi: 10.13140/2.1.3430.0160 [**Paper presented**].

----------ABSTRACTS----------

1. Aishwarya, Lathika Cicily Thomas, **Sanu V. Francis** and K.B. Padmakumar (**2021**). Occurrences of Epibiotic and Endobiotic Associations in Marine Plankton along the West Coast of India. *Annual National Conference on sustainable ecosystems, aquaculture, fisheries and fisherfolk,* 04 - 05 March 2021, University of Kerala, Thiruvananthapuram, 60

2. Jasmine Purushothaman, Basudev Tripathy, Rakesh Madhusoodhanan, Divya David, Kailash Chandra and **Sanu Francis** (**2019**). Vertical distribution of mesozooplankton community in the glacial fjord of Svalbard during summer. International conference on frontiers in marine science challenges and prospects. December 16-20, School of Marine Sciences, Cochin, India, 38.

3. Sanu V. Francis and S. Bijoy Nandan (**2019**). Taxonomic composition of pelagic calanoid copepods from the oceanic and lagoon waters of Minicoy island, south-eastern Arabian sea. International conference on frontiers in marine science challenges and prospects. December 16-20, School of Marine Sciences, Cochin, India, 162. **[Paper presented]**

4. Neelima Vasu K., S. Bijoy Nandan, **Sanu V Francis** and Radhika R (**2019**). Composition and diversity of harpacticoid copepods (crustacea, copepod) fauna from lagoon waters of Agatti, Southeastern Arabian Sea. International conference on frontiers in marine science challenges and prospects. December 16-20, School of Marine Sciences, Cochin, India, 168.

5. **Sanu V. Francis** and S. Bijoy Nandan (**2019**). Underwater observation on copepod swarm in a coral reef ecosystem from the south-west coast of India. *International conference on Benthos*. March 6-8, Cochin University of Science and Technology, Cochin, 37. [**Poster presented**]

6. Sanu V. Francis, Bijoy Nandan S. and Harikrishnan M. (**2018**). Community organization and molecular systematics of pelagic calanoid copepods from the lagoon waters of South West coast of India. *International Seminar on Status And Protection Of Coral Reefs STAPCOR 2018* October 22-24, Bangaram, Union territory of Lakshadweep, 9. [**Paper presented**]

7. S.Bijoy Nandan, **V.F. Sanu** and R. Radhika (**2015**). Ecology and systematics of Pelagic copepods (Crustacea) from South West Arabian Sea. *Dynamics of the Indian Ocean: Perspective and Retrospective*- November 30 – December 4, Goa, 479.

8. M. Rithin Raj, S. Bijoy Nandan, **V.F. Sanu** and R. Radhika (**2015**). A comparative study on mesozooplankton abundance and diversity between selected coral lagoons of Lakshadweep, India. *World Ocean Science Congress*-2015 .05-08 February 2015 Kochi.

9. S.Bijoy Nandan, **V.F. Sanu** and M. Harikrishnan (**2014**). Taxonomy and Molecular description of *Labidocera acuta* Dana, 1849 (Calanoid copepod) from Lakshadweep archipelago, South West coast of India. *Marine Ecosystems – Challenges and Opportunities* 2 – December 2014, Kochi, pp. 205-207. [**Paper presented**]

10. R.Radhika, S.Bijoy Nandan, **V.F. Sanu** and M. Rithin Raj (**2014**). Diversity of Poecilostomatoid copepods including new records from Kavarathi, Lakshadweep Island, India. 3rd International conference on *Hydrology* & Meterology -September 15-16, Hyderabad pp-1633.

Popular articles Published in News Papers

1. ആഗോളതാപനം വരെ നിയന്ത്രിക്കാൻ ശേഷിയുണ്ട്; കൗതുകം മാത്രമല്ല കാര്യവുമുണ്ട് ഈ കുഞ്ഞൻജീവികളെക്കൊണ്ട് ...
   Read more at: https://www.mathrubhumi.com/kids/amazing-facts/a-group-of-small-crustaceans-named-copepods-habits-and-other-facts-1.5721900

CONTRIBUTION TO INDIAN BIODIVERSITY				
	Species	**Faunal group**	**Habitat**	**Reference**
New species:	*Tortanus dhritiae*	Copepod	Coral reef	JA2
	Tortanus minicoyensis	Copepod	Coral reef	JA7, BC1
	Indosphenia kayalum	Bivalve	Estuarine	JA9
New records:	*Pontella sinica*	Copepod	Marine	JA11, BC1
	Mytilopsis sallei	Bivalve	Estuarine/Marine	JA7
	Ephelota plana & *Ephelota gigantea*	Ciliates	Estuarine/Marine	JA6
	Ephelota coronata		Estuarine/Marine	JA5
	Protoraphis atlantica	Diatom	Marine	JA4
Redescription:	*Metis jousseaumei*	Copepod	Marine	JA1
	Pontella andersoni	Copepod	Marine	JA3
	Pontella spinipes	Copepod	Coastal /Marine	JA10, BC1
	Labidocera madurae	Copepod	Marine/ Coral reef	JA13, BC1
No. of records:	65 species	Calanoid copepods	Marine/ Coral reef	PhD Thesis
	1 Species	Harpacticoid copepod	Marine	JA1
	63species	Finfishes	Estuarine	JA15
	3 species	Bivalves	Estuarine/ Marine	JA8, JA9, JA11
	3 species	Ciliates	Estuarine/ Marine	JA6, JA5
	1 species	Diatom	Marine	JA4

*__JA__: Journal Article, __BC__: Book chapter

PUBLISHED GENE SEQUENCES (NCBI)			
Faunal group	**No. of Species**	**No of Sequences Developed**	**Gene**
1. Copepods	25*	111	mtCOI
2. Fishes	6	7	mtCOI
3. Mollusca	3*	11	18S rRNA & mtCOI
4. Polychaeta	1*	1	mtCOI
5. Algae	1*	2	18S rRNA

***** First time submission from INDIA; sequences of 23 species were new to science

Details of published gene sequence https://www.ncbi.nlm.nih.gov

Sl No	Group	Species name	No. of sequences	Accession numbers (NCBI)
1	***Calanoid copepods***	*Undinula vulgaris*	**2**	KJ940173,KJ940174
2		*Canthocalanus pauper*	**2**	KX831912, KX831913
3		*Subeucalanus subcrassus*	**4**	KP842700, KP842701, KP842702, KP842703
4		*Euchaeta concinna*	**5**	KP749945 to KP749949
5		*Euchaeta indica*	2	KY421045, KY421046
6		*Euchirella sp*	**1**	KT800383
7		*Centropages furcatus*	**1**	KJ561888
8		*Temora discaudata*	**2**	KJ940171,KJ940172
9		*Candacia catula*	**5**	KP068662 to KP068666
10		*Candacia truncata*	**2**	KX831914,KX831915
11		*Calanopia thompsoni*	**4**	KP068656, KP068657, KP068658, KP068659
12		*Labidocera acuta*	5	KJ940166 to KJ940170
13		*Labidocera bataviae*	**4**	KU881728, KU881729, KU881730, KU881731
14		*Labidocera detruncata*	**2**	KU881732,KU881733
15		*Labidocera kroyeri*	**2**	KP068677,KP068678
16		*Labidocera madurae*	**7**	KJ701546 to KJ852656, KJ911917, KJ933427 to KJ933429
17		*Labidocera minuta*	**5**	KP068667 to KP068671
18		*Ivellopsis denticauda*	**5**	KT800377 to KT800381
19		*Pontella diagonalis*	**10**	KT282363 to KT282372
20		*Pontella spinipes*	**10**	KT267166 to KT186891
21		*Pontella fera*	**5**	KT186882 to KT186886
22		*Pontella sinica*	7	KT 336554 to KU881726
23		*Pontellina plumata*	3	KP068679 , KP068680, KP068681
24		*Pontellopsis armata*	**5**	KT186892 to KT186896
25		*Tortanus minicoyensis*	6	KP749950 to KP749955
26		*Acartia bispinosa*	5	KP068672 to KP06867
27	***Fishes***	*Decaprerus ruselli*	2	KI800386,KI800387
28		*Megalaspis cordyla*	1	KR011052
29		*Arius subrostratus*	1	KR011049
30		*Selar cremunopthalmus*	1	KR011053
31		*Liza macrolepis*	1	MF380528
32		*Moolgarda perusi*	1	MF405730
33	***Mollusca***	*Nassodonta insignis*	5	KT985460 to KT985464
34		*Indosphenia kayalym*	4	MH644188 to MH644190
35		*Mytilopsis sallei*		KY013490
36	***Polychaeta***	*Lysippe sp.*	1	MH940296
37	***Algae***	*Thalssiosira weissflogii*	2	KX938350, KX938351