

Personal Information:

Name : Anirban Paul
Father's name : Sri Arun Chandra Paul
Mother name : Mrs Anupama Paul
Discipline : **Aquatic Animal Health Management**
Sex : Male
Designation : Scientist (01.01.2016)
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Awards/Prizes/Scholarships Received:

- Secured **first position** in Poster presentation at **International symposium on Aquatic Animal Health and Epidemiology for Sustainable Asian Aquaculture (ISAAHE)**; April 20-21, 2017, “Incidences of different diseases in freshwater aquaculture systems through surveillance in two important aquaculture states of India (Andhra Pradesh and Odisha); Sahoo, P.K., Das, B.K., **Paul, A.**, Pattanayak, S., Sahoo, M.K. and Kumar, P.
- CIFA annual award ‘**Best Division Award**’ 2016, Team- S.S. Mishra, N.K. Maiti, P. Swain, P.K. Sahoo, M. Samanta, Rakesh Das, Pushpa Choudhary, **Anirban Paul**, Ananda Kumar and Farhana Hoque.
- CIFA annual award ‘**Best Division Award**’ 2020, Team- S.S. Mishra, N.K. Maiti, P. Swain, P.K. Sahoo, M. Samanta, Rakesh Das, Pushpa Choudhary, **Anirban Paul**, Ananda Kumar and Farhana Hoque.
- **Scroll of honor** received from Director CIFA for contributing testing of **COVID-19**.

Educational Qualification:

Course/Degree	Subjects	Year	School/College	Board/Institution/University
M.F.Sc	Aquatic Animal Health Management	2014	Central Institute of Fisheries Education, Mumbai, India	CIFE, Mumbai
B.F.Sc.	Fisheries Science	2008- 2012	College of Fisheries, Lembucherra	Central Agricultural University, Imphal

Masters Dissertation:

Title: Screening of ornamental fishes for iridoviruses

Major Advisor: Dr. Gaurav Rathore
Principle Scientist, ICAR-CIFE

Externally Funded Research Projects Involved:

- National Surveillance Programme for Aquatic Animal Diseases (NSPAAD) as CO-PI (from 27.09.2016)

Sub-projects: 1. Surveillance of freshwater fish and shellfish diseases in Odisha and Andhra Pradesh & 2. National Referral Laboratory for Freshwater Fish Diseases.

Institute Funded Research Projects Involved:

- Characterization of gill associated fish pathogens and their diagnosis and control measures I-88 (A) as CO-PI (from 01-09-16)
- Development of suitable health management protocol for challenged freshwater aquaculture systems in India as CO-PI (from 01-04-2018)

Publications:

1. Pattanayak, S., Priyadarsini, S., **Paul, A.**, Kumar, P.R. and Sahoo, P.K., 2020. Diversity of virulence-associated genes in pathogenic *Aeromonas hydrophila* isolates and their in vivo modulation at varied water temperatures. *Microbial Pathogenesis*, p.104424.
2. Sahoo, P.K., Pattanayak, S., **Paul, A.**, Sahoo, M.K. and Kumar, P.R., 2020. Carp edema virus in ornamental fish farming in India: A potential threat to koi carps but not to co-cultured Indian major carp or goldfish. *Indian Journal of Experimental Biology*. 58: 254-262.
3. Sahoo PK, **Paul A**, Sahoo MK, Pattanayak S, Rajesh Kumar P, Das BK. (2020) Incidences of Infectious Diseases in Freshwater Aquaculture Farms of Eastern India: A Passive Surveillance based Study from 2014-2018.. *Journal of Aquaculture Research & Development*. 11: 579. doi: 10.35248/2155-9546.20.10.579.
4. Paul, T., **Paul, A.**, Pal, S. and Aich, N., 2019. New Dimension in Fish Immunotherapeutics: Avian Egg Yolk Antibody (IgY). *Int. J. Curr. Microbiol. App. Sci*, 8(7), pp.86-94.
5. Sharma, A., **Paul, A.**, Parida, S., Pattanayak, S., Mohapatra, A., Kumar, P.R., Sahoo, M.K., Sundaray, J.K. and Sahoo, P.K., 2018. Dynamics of expression of antibacterial and antioxidant defence genes in Indian major carp, *Labeo rohita* in response to *Aeromonas hydrophila* infection. *Microbial pathogenesis*, 125, pp.108-115. (NAAS: 8.33). <https://doi.org/10.1016/j.micpath.2018.09.007>.
6. **A. Paul**, S. Pattanayak, S. Pradhan, S. Saurabh and P. K. Sahoo. First record of the leech, *Glossiphonia complanata* (Linnaeus, 1758) infection in freshwater pearl mussel *Lamellidens marginalis* (Lamarck, 1819). *Indian Journal of Fisheries*. 2018;65(3): 126-129. 10.21077/ijf.2018.65.3.78918-18
7. Aich, N., Ahmed, N. and **Paul, A.** Issues of Antibiotic Resistance in Aquaculture Industry and Its Way Forward. *International Journal of Current Microbiology and Applied Sciences*. 2018; 7(8): 26-41.

8. Pattanayak, S., Kumar, P.R., Sahoo, M.K., **Paul, A.**, Sahoo, P.K. First field-based evidence of association of *Proteus mirabilis* causing large scale mortality in Indian major carp farming. *Aquaculture*. 2018; 495: 435-442.
9. Sahoo P.K, Pattanayak S, **Paul A**, et al. First record of *Metanophrys sinensis* (Protozoa: Ciliophora: Scuticociliatida) from India causing large scale mortality in a new host *Macrobrachium rosenbergii* larvae. *Journal of Fish Disease*. 2018; 41: 1303–1307. <https://doi.org/10.1111/jfd.12809>
10. Das, A., Debnath, B., Choudhury, T.G., Roy, D., Saha, B. and **Paul, A.**, 2013. Indigenous technical knowledge for pond maintenance, fish health management and fish seed in Tripura, India. '*Indian journal of traditional knowledge*'. 2013 12(1): 66-71.

Popular articles:

1. T. Paul, S. Kumar, **A. Paul** and A. Biswal (2020). Microbial Bioremediation of Emerging Pollutants in Aquatic Environment: An Approach of Environmental Cleanup. *AquaStar*, May, 2020. pp. 58-61.
2. **A. Paul** and Sahoo, P.K (2018). Gill diseases in carps: Parasitic/Bacterial/Viral/Fungal? A Kolleru lake perspective. *Indian Farming*, Volume No. 68 Issue 5, pp. 37–40.
3. Nilav Aich, Sampa Pal and **A. Paul** (2018). Importance of Anaesthesia with special reference to aquaculture. *Aqua Tech*, Volume No. 16 Issue 7, pp.86-88.

Technical bulletins/Books/Compendium Chapters:

- P.R. Kumar, **A. Paul**, S. Pattanayak, M.K. Sahoo and P.K. Sahoo 'Disease surveillance in freshwater aquaculture systems of eastern India revealed association of MDR bacterial pathogens of zoonotic importance causing mortality in fish' National Workshop on Antimicrobial Resistance & Alternatives to Antibiotics use in Aquaculture (AMR-2018) during 12-13 March, 2018, at ICAR-CIFA, Bhubaneswar. Souvenir Edited by S.S. Mishra, P.K. Sahoo, P.Swain, S. Saurabh, R. Das, J. K. Sundaray. ISBN: 978-81- 935417-2- 2. Pp 65-66.
- Sahoo. P.K. and **A. Paul**. (2018). Health Management In Aquaculture: Issues and Concerns. (Ed. By Patra, R.C. and Rath, P.K.) Animal Health Service Delivery.

College of Veterinary Science & Animal Husbandry, Odisha University of Agriculture and Technology, Bhubaneswar-751003, Odisha. Pp. 157-163.

- Sahoo, P.K. and **A. Paul** (2017). Climate change and its influence on freshwater fish diseases. In: Agriculture under climate change: Threats, strategies and policies. (Ed. By V.V. Belavadi, N. Nataraja Karaba and N.R. Gangadharppa). Allied Publishers Private Limited, New Delhi. Pp. 336-343.
- **A. Paul** and Sahoo, P.K (2016). Recombinant and submit vaccines for aquaculture. Consortium Research Platform on Vaccines and Diagnostics, Compendium on prophylaxis in aquaculture. CIBA. Pp. 108-120
- Sahoo, P.K, S. Pattanayak and **A. Paul** (2016). Status of Viral diseases in freshwater aquaculture systems in India. National symposium on 'Innovative approaches for diagnosis and control of emerging and re-emerging diseases of livestock, poultry and fish' Compendium. Veterinary Pathology congress-2016. Pp. 171-174.

Training Manual chapters:

- **A. Paul** and P.K. Sahoo. Major Parasitic Diseases of Freshwater Fishes and their Diagnosis for Better Health Management. ICAR sponsored winter school on 'Advanced Molecular Techniques in Fish Disease Diagnosis and Management in Freshwater Aquaculture'. ICAR-CIFA Training Manual No. 101., pp. 35-40.
- S. N. Sahoo, **A. Paul**, Rakesh Das and P. Swain. Necropsy Techniques in Fish Disease Diagnosis. ICAR sponsored winter school on 'Advanced Molecular Techniques in Fish Disease Diagnosis and Management in Freshwater Aquaculture'. ICAR-CIFA Training Manual No. 101., pp. 50-52.
- S. N. Sahoo, **A. Paul**, P. Choudhury and P. Swain. Haematology Techniques in Fish Disease Diagnosis. ICAR sponsored winter school on 'Advanced Molecular Techniques in Fish Disease Diagnosis and Management in Freshwater Aquaculture'. ICAR-CIFA Training Manual No. 101., pp. 53-56.
- P. Choudhary, S. N. Sahoo, **A. Paul** and S.S. Mishra. PCR Based Diagnostic methods for Fish Bacterial Diseases. ICAR sponsored winter school on 'Advanced Molecular Techniques in Fish Disease Diagnosis and Management in Freshwater Aquaculture'. ICAR-CIFA Training Manual No. 101., pp. 61-65.
- P.K. Sahoo & **A. Paul**. Disease surveillance mechanisms in India for exotic pathogens: A CIFA perspective. ICAR sponsored winter school on 'Advanced Molecular Techniques in Fish Disease Diagnosis and Management in Freshwater Aquaculture'. ICAR-CIFA Training Manual No. 101., pp. 152-157.

- S. Sarkar, **A. Paul** and P. K. Tiwari. Soil and water quality management for better aquatic animal health management. ICAR-CIFA sponsored Training-Demonstration programme for NEH on 'Improvement of aquaculture production through innovative feed and health management' 4-5 October, 2018. ICAR-CIFA Training manual no. 86. Pp. 35-41.
- **A. Paul**, J. Debbarma, S. N. Sahoo R. Das and P. Swain. Necropsy techniques in fish disease diagnosis. NFDB sponsored Training of Trainers (ToT) programme on 'Fish Health and Environment Management in Freshwater Aquaculture' 18-22 September, 2018. ICAR-CIFA Training manual no. 82. Pp. 26-29.
- S. N. Sahoo, R. Das, **A. Paul**, J. Debbarma, P. Choudhury and P. Swain. Haematology techniques in fish disease diagnosis. NFDB sponsored Training of Trainers (ToT) programme on 'Fish Health and Environment Management in Freshwater Aquaculture' 18-22 September, 2018. ICAR-CIFA Training manual no. 82. Pp. 30-35.
- J. Debbarma, R. Das, S. N. Sahoo, Rajesh Kumar, **A. Paul**, P. Choudhury and S. S. Mishra. Common parasitic diseases in freshwater fishes and their diagnosis. NFDB sponsored Training of Trainers (ToT) programme on 'Fish Health and Environment Management in Freshwater Aquaculture' 18-22 September, 2018. ICAR-CIFA Training manual no. 82. Pp. 46-51.
- S. N. Sahoo, R. Das, J. Debbarma, **A. Paul**, and P.K. Sahoo. Histopathology methods in fish disease diagnosis. NFDB sponsored Training of Trainers (ToT) programme on 'Fish Health and Environment Management in Freshwater Aquaculture' 18-22 September, 2018. ICAR-CIFA Training manual no. 82. Pp. 61-65.
- S. N. Sahoo, R. Das, J. Debbarma and **A. Paul**. Necropsy techniques for fish disease diagnosis. Hands –On- Training on fish health & environment management in freshwater aquaculture, 19-28 June, 2017. ICAR-CIFA Training manual no. 55. Pp. 44-51.
- R. Das, A. Sahu, **A. Paul**, J. Debbarma and S. N. Sahoo. Haematological study in fish disease diagnosis. Hands –On- Training on fish health & environment management in freshwater aquaculture, 19-28 June, 2017. ICAR-CIFA Training manual no. 55. Pp. 52-56.
- J. Debbarma, R. Das, S.N. Sahoo, **A. Paul**, P. Choudhury, A. Baruah, S.K. Swain and S.S. Mishra. Common parasitic diseases of fish and their control. Hands – On- Training on fish health & environment management in freshwater aquaculture, 19-28 June, 2017. ICAR-CIFA Training manual no. 55. Pp. 68-77.

- R. Das, A. Sahu and **A. Paul**. Haematological study in fish disease diagnosis. ICAR sponsored Winter School on current trends in molecular diagnosis for better health management in aquaculture, 15th Feb – 7th March, 2017. ICAR-CIFA Training manual no. 47. Pp. 19-23.
- R. Das, A. Sahu and **A. Paul**. Importance of necropsy techniques in fish disease diagnosis. ICAR sponsored Winter School on current trends in molecular diagnosis for better health management in aquaculture, 15th Feb – 7th March, 2017. ICAR-CIFA Training manual no. 47. Pp. 24-30.
- **A. Paul**, M. K. Sahoo and P.K. Sahoo. Major parasitic diseases of freshwater fishes and their diagnosis. ICAR sponsored Winter School on current trends in molecular diagnosis for better health management in aquaculture, 15th Feb – 7th March, 2017. ICAR-CIFA Training manual no. 47. Pp. 31-37.
- P. Choudhary, R.das, **A. Paul** and S. S. Mishra. Haematological study in fish disease diagnosis. ICAR sponsored Winter School on current trends in molecular diagnosis for better health management in aquaculture, 15th Feb – 7th March, 2017. ICAR-CIFA Training manual no. 47. Pp. 65-67.
- Sahoo, P.K, **A. Paul**, S. Pattanayak and M.K. Sahoo. Necropsy technique and collection, preservation and processing of infective material for disease diagnosis. Hands-on Training on Diagnosis of Freshwater Fish Pathogens For Disease Surveillance. 17-21st Jan, 2017. ICAR-CIFA Training manual no. 45. Pp. 28-34.
- P.R. Kumar, **A. Paul**, S. Pattanayak and M.K. Sahoo. Biochemical characterization of bacterial fish pathogens. Hands-on Training on ‘Diagnosis of Freshwater Fish Pathogens for Disease Surveillance’, 17-21st Jan, 2017. ICAR-CIFA Training manual no. 45. Pp. 35-46.
- S. Pattanayak, **A. Paul**, P.R. Kumar M.K. Sahoo and P.K. Sahoo. PCR -based molecular diagnostic techniques for bacterial fish pathogens. Hands-on Training on Diagnosis of Freshwater Fish Pathogens for Disease Surveillance. 17-21st Jan, 2017. ICAR-CIFA Training manual no. 45. Pp. 47-55.
- S. Pattanayak, **A. Paul**, P.R. Kumar M.K. Sahoo, A. Mohapatra, S. Parida and P.K. Sahoo. PCR-based diagnosis for fish viruses. Hands-on Training on Diagnosis of Freshwater Fish Pathogens for Disease Surveillance. 17-21st Jan, 2017. ICAR-CIFA Training manual no. 45. Pp. 56-60.
- Mohapatra, **A. Paul**, S. Pattanayak and P.K. Sahoo. Quantitative real-time PCR. Hands-on Training on Diagnosis of Freshwater Fish Pathogens for Disease Surveillance. 17-21st Jan, 2017. ICAR-CIFA Training manual no. 45. Pp. 61-62

- M.K. Sahoo and **A. Paul**. Major parasitic diseases of freshwater fishes. Hands-on Training on Diagnosis of Freshwater Fish Pathogens for Disease Surveillance. 17-21st Jan, 2017. ICAR-CIFA Training manual no. 45. Pp. 63-67.
- R. Das, P. Choudhary, A. Sahu, and **A. Paul**. Gross pathology and necropsy techniques in disease diagnosis. Hands-on training in fish & shellfish health management. 5th to 9th Sep, 2016. ICAR-CIFA Training manual no. 36. Pp. 21-27.
- R. Das, **A. Paul** and A. Sahu. Haematological study in fish disease diagnosis. Hands-on training in fish & shellfish health management. 5th to 9th Sep, 2016. ICAR-CIFA Training manual no. 36. Pp. 28-31.

Teaching/Training/Conducting programs/Workshops/Seminars:

Training Conducted as Course-Coordinator:

- Five-day long Hands-on training programme on “Diagnosis of Freshwater Fish Pathogens for Disease Surveillance” under NSPAAD project during 20-24 December, 2016 for the Andhra Pradesh state fisheries officials.
- Five-day long Hands-on training programme on “Diagnosis of Freshwater Fish Pathogens for Disease Surveillance” under NSPAAD project during 17-21 January, 2017 for the Odisha state fisheries officials.
- NFDB sponsored Skill Development Programme on ‘Fish Disease diagnostics and aquaculture technologies for sustainable development’ 11-13th December, 2018.
- NFDB sponsored Skill Development Programme on ‘Disease surveillance and management in freshwater aquaculture’ 04-06 Nov. 2019
- NFDB sponsored **Training of Trainers (ToT)** programme on ‘Hands on training on Fish Health and Environment Management in Freshwater Aquaculture’ 17-21st Sept., 2019.
- NFDB sponsored **Training of Trainers (ToT)** programme on ‘Hands on training on Fish Health and Environment Management in Freshwater Aquaculture’ 19-23rd Sept., 2019.
- **ICAR sponsored Winter School** on ‘Advanced Molecular Techniques in Fish Disease Diagnosis and Management in Freshwater Aquaculture’ 26thNov. – 16th Dec. 2019.

Training Conducted as Co-Course Coordinator:

- **ICAR sponsored Winter School** on ‘Current Trends in Molecular Diagnosis for Better Health Management in Aquaculture’ 15 Feb – 7 Mar 2017.
- NFDB sponsored **Training of Trainers (ToT)** programme on ‘Fish Health and Environment Management in Freshwater Aquaculture’ 18-22 September, 2018.
- NFDB sponsored **Skill Development Programme** on ‘Fish health and environment management for quality seed production in freshwater aquaculture’ 27-29th September, 2018.
- NFDB sponsored **Training of Trainers (ToT)** programme on ‘Fish Health and Environment Management in Freshwater Aquaculture’ 20-24th November, 2018.
- ASCI training programme on “Aquatic animal health Lab Assistant” at ICAR-CIFA, Bhubaneswar, 20 February to 20 March, 2020

Workshops conducted as Organizing Secretary:

- **National Workshop** on "Responsible use of Antibiotics & Chemicals: Impact on Animal Health & Aquaculture" on 10th March 2017 at ICAR-CIFA, Bhubaneswar

Workshops conducted as Co-Organizing Secretary:

- **National Workshop** on ‘Antimicrobial resistance & alternatives to antibiotics use in aquaculture (AMR- 2018)’ during 12-13 March, 2018 at ICAR-CIFA, Bhubaneswar.

Farmers awareness workshop

1. Farmer’s awareness program on freshwater fish diseases has been organized under National Surveillance Programme on Freshwater Fish Diseases at Tangi block of Khordha District on 06th March, 2019.
2. Farmer’s awareness program on freshwater fish diseases has been organized under National Surveillance Programme on Freshwater Fish Diseases at Gop block of Puri District on 06th March, 2020.

Trainings attended:

- Undergone 3 months **FOCARS Training** during 1st Jan 2016 to 31st March 2016 at ICAR-NAARM.
- Undergone 3 months **Professional Attachment Training** during 11th May 2016 to 10th August 2016 at ICAR-NBFGR.
- Training program on ‘Indian Patent Filing Procedure’ on 24th March, 2017 at ICAR-CIFA, Bhubaneswar.
- **ICAR- Winter School** on “Rapid Diagnostics for Fish Health Management” during 18 Nov - 8 Dec, 2016 (21 days) at ICAR-CIFE, Mumbai.
- “**Epidemiology School**” by Prof. Kenton Morgan Emeritus Professor of Epidemiology, Institute of Veterinary Science, University of Liverpool, Leahurst during 24-04-17 to 28-04-17 (5 Days) at ICAR-NBFGR.
- Training and awareness program on ‘J-Gate@CeRA’ on 19th December, 2017 at ICAR-CIFA, Bhubaneswar, jointly organized by CeRA, ICAR-DKMA and ICAR-CIFA.
- International Livestock Research Institute sponsored ‘Introduction to analytical veterinary epidemiology’ at ICAR-NIVEDI during 3-5th December, 2018.

Leaflets:

- S.S. Mishra, P. Swain, P.K. Sahoo, S. Sarkar, R. Das, S. N. Sahoo, **A. Paul**, J. Debbarma and S. Mohanty (2018). *Fish health and environment management for quality seed production in freshwater aquaculture.*
- S. Saurabh, S. Pradhan, U.L. Mohanty, **A. Paul**, G.S. Saha, J.K. Sundaray, B.R. Pillai and P. Jayasankar (2017). *Misti jole designer mukto utpadon projukti.* ICAR-CIFA Extension Series-27 (Bengali)

- **A. Paul**, M.K. Sahoo, P.R. Kumar and P.K. Sahoo (NSPAAD team), (2016). Freshwater Fish Farmer's Pocket Book On - *Major freshwater fish diseases management and remedial measures*.

Conference/ Symposia/ Seminars/ workshops/Other forum attended:

- 3rd International symposium on genomics in aquaculture - 2020 (**ISGA-III**) from 21 - 23 January 2020, ICAR-CIFA, Bhubaneswar, India.
- **Fourth PAF congress** (pafc-2019) increasing aquaculture production in india through synergistic approach between multinational industries, domestic entrepreneurs and aquaculturists” During 15-17 Nov. 2019 at icar-cifa, bhubaneswar
- **ASIAN-PACIFIC AQUACULTURE 2019 (APA)** Chennai international conference ‘Aquaculture for Health, Wealth and Happiness’
- **National Workshop on ‘Antimicrobial Resistance & Alternatives to Antibiotics use in Aquaculture (AMR-2018)’** during 12-13 March, 2018, at ICAR-CIFA, Bhubaneswar.
- **11th Indian Fisheries and Aquaculture Forum** on ‘Fostering Innovations in Fisheries and Aquaculture Focus on Sustainability and Safety’ During 21 to 24th November, 2017 at Kochi, Kerala.
- **National consultation meet** on ‘Forecasting reach of innovations from aquaculture research through media: A science communication perspective’ during 27th October, 2017 at ICAR-CIFA, Bhubaneswar.
- **National seminar** on Climate Change: Impact on aquatic environment and fish health, Bhubaneswar during 6th September, 2017 at ICAR-CIFA, Bhubaneswar.
- **International symposium** on Aquatic Animal Health and Epidemiology for Sustainable Asian Aquaculture (ISAAHE), Lucknow during April 20-21, 2017 at ICAR-NBFGR.
- **Awareness workshop** on NGS and other innovative technologies at ICAR-CIFA during 26-27th Aug, 2016. Jointly organized by Genotypic technology private limited, Bengaluru and ICAR-CIFA.
- **International Conference** on “Urban Lakes: Ecology, Rejuvenation, Technology and Economics” at NASS, Powai, Mumbai during 7-8 Sept, 2012.

- **International Workshop** on Fish Genomics at ICAR-Central Institute of Fisheries Education (C.I.F.E), Mumbai during 19-21 January, 2015.

Abstracts Published:

- S. Pattanayak, A. Paul and P.K. Sahoo (2020) ‘Detection of infectious spleen and kidney necrosis virus (ISKNV) in ornamental fish from non-clinical cases: First report from India. ISGAA III during 21-23rd January, ICAR-CIFA, Bhubaneswar.
- S. Pattanayak, S. Priyadarsini, A. Paul, P. Rajesh Kumar and P.K. Sahoo (2020) ‘Diversity of virulence genes in pathogenic *Aeromonas hydrophila* isolates and their in vivo modulation at varied water temperature. ISGAA III during 21-23rd January, ICAR-CIFA, Bhubaneswar.
- A. Paul and P.K. Sahoo (2020) ‘A new monogenean species *Dactylogyrus scorpius* from India: Host range and modulation of immune response in *Labeo rohita* under experimental condition. ISGAA III during 21-23rd January, ICAR-CIFA, Bhubaneswar.
- V. Bajpai, S. Pattanayak, D. Pragyan, K. Suman, A. Paul, J. Mohanty and P.K. Sahoo (2019) ‘Development of molecular diagnostics for few freshwater viral pathogens and their practical applications’XIV Agricultural Science Congress, 20-23 February, 2019. Pp. 814-815.
- M.K. Sahoo, S. Pattanayak, **A. Paul**, P. Rajesh Kumar, Rajesh Kumar and P.K. Sahoo (2017) ‘Association of multiple bacterial and parasitic infections causing large scale mortality in adult *Channa striata*’. 11th Indian Fisheries and Aquaculture Forum on ‘Fostering Innovations in Fisheries and Aquaculture Focus on Sustainability and Safety’ During 21 to 24th November, 2017, pp. 311.
- J. Debbarma, S. N. Sahoo, R. Das, **A. Paul**, A. Baruah, M. K. Bairwa, P. Choudhary, A. Biswal, S. K. Swain, P. Swain, S.S. Mishra (2017) ‘ Incidences of parasitic infestations of cyprinid ornamental fishes during pre-monsoon and monsoon season’. 11th Indian Fisheries and Aquaculture Forum on ‘Fostering Innovations in Fisheries and Aquaculture Focus on Sustainability and Safety’ During 21 to 24th November, 2017, pp. 326.
- Sahoo, P.K., Das, B.K., **Paul, A.**, Pattanayak, S., Sahoo, M.K. and Kumar, P. (2017) “Incidences of different diseases in freshwater aquaculture systems through surveillance in two important aquaculture states of India (Andhra Pradesh and Odisha). International symposium on Aquatic Animal Health and Epidemiology for Sustainable Asian Aquaculture (ISAAHE), April 20-21, 2017, pp. 27.
- S. Pattanayak, P. R. Kumar, M.K. Sahoo, **A. Paul**, S. S. Rath, G. Sreenivasulu, B. K. Das and P. K. Sahoo (2016). Incidences of exotic or new pathogens in

freshwater aquaculture systems in four states of India: a passive surveillance-based study. National Seminar on Aquaculture Diversification: the Way Forward for Blue Revolution, 03 December 2016. pp. 92.

- C. Yadii, P.P. Srivastava, H. Priyadarshi, S. Gupta, **Paul. A.**, B. D. Tyagi, A. Ranjan, M. P. Ande and W. S. Lakra. (2014). Effects of graded levels of dietary Vitamin-C on gene expression of metabolic enzyme, prolyl-4-hydroxylase in the muscle and swim bladder of suchi fish, *Pangasianodon hypophthalmus* (Sauvage, 1878). The National Academy of Sciences, India, 84th Annual Session, December 5-6, 2014, pp. 8.

Presentation in Conference/ Symposia/ Seminars/ Other forum:

- **Oral presentation at National Seminar on ‘Aquaculture Diversification: the Way Forward for Blue Revolution’** (NaSAD-2016); 03 December 2016, ‘Incidences of exotic or new pathogens in freshwater aquaculture systems in four states of India: a passive surveillance-based study’; S. Pattanayak, P. R. Kumar, M.K. Sahoo, **A. Paul**, S. S. Rath, G. Sreenivasulu, B. K. Das and P. K. Sahoo.
- **Lead Paper presentation at Veterinary Pathology congress-2016.** Status of Viral diseases in freshwater aquaculture systems in India. National symposium on ‘Innovative approaches for diagnosis and control of emerging and re-emerging diseases of livestock, poultry and fish’. Sahoo, P.K, S. Pattanayak and **A. Paul**.
- **Lead Paper presentation at XIII Agricultural science congress-2017,** Climate change and its influence on freshwater fish diseases. Sahoo, P.K. and **A. Paul**.
- **Poster presentation at International symposium on Aquatic Animal Health and Epidemiology for Sustainable Asian Aquaculture (ISAAHE);** April 20-21, 2017, “Incidences of different diseases in freshwater aquaculture systems through surveillance in two important aquaculture states of India (Andhra Pradesh and Odisha); Sahoo, P.K., Das, B.K., **Paul, A.**, Pattanayak, S., Sahoo, M.K. and Kumar, P.
- **Poster presentation at 11th Indian Fisheries and Aquaculture Forum** on ‘Fostering Innovations in Fisheries and Aquaculture Focus on Sustainability and Safety’ During 21 to 24th November, 2017, ‘Association of multiple bacterial and parasitic infections causing large scale mortality in adult *Channa striata*’; M.K. Sahoo, S. Pattanayak, **A. Paul**, P. Rajesh Kumar, Rajesh Kumar and P.K. Sahoo.

- **Lead Paper presentation** at 36th Annual Convention of Indian Society for Veterinary Medicine & National Symposium on ‘**Animal Health Service Delivery- The Priorities of the Professionals for Enhancing Farmers Income.** (February 1st-3rd, 2018). Health Management in Aquaculture: Issues and Concerns. Sahoo. P.K. and **A. Paul.**
- **Lead Paper presentation** at **National Workshop on ‘Antimicrobial Resistance & Alternatives to Antibiotics use in Aquaculture (AMR-2018)’** during 12-13 March, 2018, at ICAR-CIFA, Bhubaneswar. ‘Disease surveillance in freshwater aquaculture systems of eastern India revealed association of MDR bacterial pathogens of zoonotic importance causing mortality in fish.’ P.R. Kumar, **A. Paul**, S. Pattanayak, M.K. Sahoo and P.K. Sahoo.

Contribution made in compilation/ documentation:

- Proceeding document of **34th Institutional research council (IRC)** meeting of ICAR-CIFA held during 26-28th May, 2020.
- Training Manual for Hands-on Training on Diagnosis of Freshwater Fish Pathogens for Disease Surveillance. 17-21st Jan, 2017. ICAR-CIFA Training manual no. 45.
- Training Manual for Hands-on Training on Diagnosis of Freshwater Fish Pathogens for Disease Surveillance. 20-24th Dec, 2016.
- Proceeding document of **31st Institutional research council (IRC)** meeting of ICAR-CIFA held during 3rd – 5th May, 2017.
- Proceeding document of **32st Institutional research council (IRC)** meeting of ICAR-CIFA held during 11th – 13th April, 2018.
- **Proceeding document** of State level farmer’s innovation fair and workshop on ‘Status of farmer’s innovation in the agricultural knowledge information system during 8th June 2018.
- ICAR-CIFA 2018. **Annual Report** 2017-2018. ICAR-Central Institute of Freshwater Aquaculture, Bhubaneswar, India. pp.132.
- Hindi version. ICAR-CIFA 2018. **Annual Report** 2017-2018. ICAR-Central Institute of Freshwater Aquaculture, Bhubaneswar, India. pp.132.
- FANI cyclone effect on Odisha

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Membership of Professional Societies/ Bodies:

- Life Membership of “Association of Aquaculturists” (ICAR-CIFA, Bhubaneswar-751002)
- Life Membership of “Indian Fisheries Association” (ICAR-CIFE, Mumbai-400061)

YouTube video published:

- “How to manage *Argulus* in aquaculture ponds” (2017)
<https://www.youtube.com/watch?v=KQFRpWZO-Ow&t=184s>.

Android Mobile Application Developed:

 **Treat My Fish** ‘A farmer-friendly ICT tool for remote diagnosis & advisory for freshwater fish health issues’