

# Tom Defoirdt

## List of Publications by Year in descending order

Source: <https://exaly.com/author-pdf/5958961/publications.pdf>

Version: 2024-02-01

97  
papers

8,317  
citations

61984

43  
h-index

46799

89  
g-index

99  
all docs

99  
docs citations

99  
times ranked

6610  
citing authors

| #  | ARTICLE  | IF   | CITATIONS |
|----|--|------|-----------|
| 1  | Alternatives to antibiotics for the control of bacterial disease in aquaculture. <i>Current Opinion in Microbiology</i> , 2011, 14, 251-258.   | 5.1  | 582       |
| 2  | The basics of bio-flocs technology: The added value for aquaculture. <i>Aquaculture</i> , 2008, 277, 125-137.  | 3.5  | 580       |
| 3  | Nitrogen removal techniques in aquaculture for a sustainable production. <i>Aquaculture</i> , 2007, 270, 1-14.   | 3.5  | 561       |
| 4  | Biofloc technology in aquaculture: Beneficial effects and future challenges. <i>Aquaculture</i> , 2012, 356-357, 351-356.  | 3.5  | 534       |
| 5  | Quorum-Sensing Systems as Targets for Antivirulence Therapy. <i>Trends in Microbiology</i> , 2018, 26, 313-328.  | 7.7  | 351       |
| 6  | Alternatives to antibiotics to control bacterial infections: luminescent vibriosis in aquaculture as an example. <i>Trends in Biotechnology</i> , 2007, 25, 472-479.   | 9.3  | 304       |
| 7  | Detection and quantification of the human-specific HF183 <i>Bacteroides</i> 16S rRNA genetic marker with real-time PCR for assessment of human faecal pollution in freshwater. <i>Environmental Microbiology</i> , 2005, 7, 249-259.   | 3.8  | 301       |
| 8  | Cinnamaldehyde and cinnamaldehyde derivatives reduce virulence in <i>Vibrio</i> spp. by decreasing the DNA-binding activity of the quorum sensing response regulator LuxR. <i>BMC Microbiology</i> , 2008, 8, 149.   | 3.3  | 262       |
| 9  | Disruption of bacterial quorum sensing: an unexplored strategy to fight infections in aquaculture. <i>Aquaculture</i> , 2004, 240, 69-88.  | 3.5  | 226       |
| 10 | Early Mortality Syndrome Outbreaks: A Microbial Management Issue in Shrimp Farming?. <i>PLoS Pathogens</i> , 2014, 10, e1003919.   | 4.7  | 208       |
| 11 | Can Bacteria Evolve Resistance to Quorum Sensing Disruption?. <i>PLoS Pathogens</i> , 2010, 6, e1000989.   | 4.7  | 192       |
| 12 | The natural furanone (5Z)-4-bromo-5-(bromomethylene)-3-butyl-2(5H)-furanone disrupts quorum sensing-regulated gene expression in <i>Vibrio harveyi</i> by decreasing the DNA-binding activity of the transcriptional regulator protein luxR. <i>Environmental Microbiology</i> , 2007, 9, 2486-2495. | 3.8  | 184       |
| 13 | Quorum Sensing-Disrupting Brominated Furanones Protect the Gnotobiotic Brine Shrimp <i>Artemia franciscana</i> from Pathogenic <i>Vibrio harveyi</i> , <i>Vibrio campbellii</i> , and <i>Vibrio parahaemolyticus</i> Isolates. <i>Applied and Environmental Microbiology</i> , 2006, 72, 6419-6423.  | 3.1  | 169       |
| 14 | Significance of microalgal-bacterial interactions for aquaculture. <i>Reviews in Aquaculture</i> , 2014, 6, 48-61.   | 9.0  | 159       |
| 15 | Quorum sensing and quorum quenching in <i>Vibrio harveyi</i> : lessons learned from <i>in vivo</i> work. <i>ISME Journal</i> , 2008, 2, 19-26.   | 9.8  | 154       |
| 16 | The bacterial storage compound poly- $\gamma$ -hydroxybutyrate protects <i>Artemia franciscana</i> from pathogenic <i>Vibrio campbellii</i> . <i>Environmental Microbiology</i> , 2007, 9, 445-452.  | 3.8  | 150       |
| 17 | Quorum sensing inhibitors: how strong is the evidence?. <i>Trends in Microbiology</i> , 2013, 21, 619-624.   | 7.7  | 150       |
| 18 | Short-chain fatty acids and poly- $\beta$ -hydroxyalkanoates: (New) Biocontrol agents for a sustainable animal production. <i>Biotechnology Advances</i> , 2009, 27, 680-685.  | 11.7 | 145       |

| #  | ARTICLE   | IF  | CITATIONS |
|----|---|-----|-----------|
| 19 | The impact of mutations in the quorum sensing systems of <i>Aeromonas hydrophila</i> , <i>Vibrio anguillarum</i> and <i>Vibrio harveyi</i> on their virulence towards gnotobiotically cultured <i>Artemia franciscana</i> . <i>Environmental Microbiology</i> , 2005, 7, 1239-1247. | 3.8 | 136       |
| 20 | The emergence of <i>Vibrio</i> pathogens in Europe: ecology, evolution, and pathogenesis (Paris, 11 <sup>th</sup> -12 <sup>th</sup> October 2004). <i>Overlook 10</i>   | 3.5 | 136       |
| 21 | Microbiology and immunology of fish larvae. <i>Reviews in Aquaculture</i> , 2013, 5, S1.  | 9.0 | 122       |
| 22 | Quorum sensing positively regulates flagellar motility in pathogenic <i>Vibrio harveyi</i> . <i>Environmental Microbiology</i> , 2015, 17, 960-968.   | 3.8 | 118       |
| 23 | Pathogenesis, virulence factors and virulence regulation of vibrios belonging to the <i>Harveyi</i> clade. <i>Reviews in Aquaculture</i> , 2012, 4, 59-74.  | 9.0 | 117       |
| 24 | Regulation of virulence factors by quorum sensing in <i>Vibrio harveyi</i> . <i>Veterinary Microbiology</i> , 2011, 154, 124-129.   | 1.9 | 113       |
| 25 | Effects of micro-algae commonly used in aquaculture on acyl-homoserine lactone quorum sensing. <i>Aquaculture</i> , 2011, 317, 53-57.   | 3.5 | 101       |
| 26 | The effect of poly- $\beta$ -hydroxybutyrate on larviculture of the giant freshwater prawn <i>Macrobrachium rosenbergii</i> . <i>Aquaculture</i> , 2010, 302, 76-81.  | 3.5 | 100       |
| 27 | Disruption of Bacterial Cell-to-Cell Communication by Marine Organisms and its Relevance to Aquaculture. <i>Marine Biotechnology</i> , 2011, 13, 109-126.   | 2.4 | 99        |
| 28 | The application of bioflocs technology to protect brine shrimp ( <i>Artemia franciscana</i> ) from pathogenic <i>Vibrio harveyi</i> . <i>Journal of Applied Microbiology</i> , 2010, 109, no-no.  | 3.1 | 97        |
| 29 | Poly- $\beta$ -hydroxybutyrate-accumulating bacteria protect gnotobiotic <i>Artemia franciscana</i> from pathogenic <i>Vibrio campbellii</i> . <i>FEMS Microbiology Ecology</i> , 2007, 60, 363-369.  | 2.7 | 88        |
| 30 | Long-chain acylhomoserine lactones increase the anoxic ammonium oxidation rate in an OLAND biofilm. <i>Applied Microbiology and Biotechnology</i> , 2011, 90, 1511-1519.  | 3.6 | 80        |
| 31 | Virulence mechanisms of bacterial aquaculture pathogens and antivirulence therapy for aquaculture. <i>Reviews in Aquaculture</i> , 2014, 6, 100-114.  | 9.0 | 73        |
| 32 | Short-chain fatty acids protect gnotobiotic <i>Artemia franciscana</i> from pathogenic <i>Vibrio campbellii</i> . <i>Aquaculture</i> , 2006, 261, 804-808.  | 3.5 | 70        |
| 33 | Effects of poly- $\beta$ -hydroxybutyrate (PHB) on Siberian sturgeon ( <i>Acipenser baerii</i> ) fingerlings performance and its gastrointestinal tract microbial community. <i>FEMS Microbiology Ecology</i> , 2012, 79, 25-33.  | 2.7 | 69        |
| 34 | Quorum quenching bacteria protect <i>Macrobrachium rosenbergii</i> larvae from <i>Vibrio harveyi</i> infection. <i>Journal of Applied Microbiology</i> , 2010, 109, 1007-1016.  | 3.1 | 68        |
| 35 | <i>Vibrio parahaemolyticus</i> and <i>Vibrio harveyi</i> causing Acute Hepatopancreatic Necrosis Disease (AHPND) in <i>Penaeus vannamei</i> (Boone, 1931) isolated from Malaysian shrimp ponds. <i>Aquaculture</i> , 2019, 511, 734227.   | 3.5 | 67        |
| 36 | Presence of typical and atypical virulence genes in <i>Vibrio</i> isolates belonging to the <i>Harveyi</i> clade. <i>Journal of Applied Microbiology</i> , 2010, 109, 888-899.  | 3.1 | 61        |

| #  | ARTICLE  | IF  | CITATIONS |
|----|--|-----|-----------|
| 37 | The impact of quorum sensing on the virulence of <i>Aeromonas hydrophila</i> and <i>Aeromonas salmonicida</i> towards burbot ( <i>Lota lota</i> L.) larvae. <i>Veterinary Microbiology</i> , 2012, 159, 77-82.   | 1.9 | 59        |
| 38 | Bactericidal, quorum quenching and anti-biofilm nanofactories: a new niche for nanotechnologists. <i>Critical Reviews in Biotechnology</i> , 2017, 37, 525-540.  | 9.0 | 57        |
| 39 | Quorum sensing negatively regulates chitinase in <i>Vibrio harveyi</i> . <i>Environmental Microbiology Reports</i> , 2010, 2, 44-49.   | 2.4 | 55        |
| 40 | PHB-degrading bacteria isolated from the gastrointestinal tract of aquatic animals as protective actors against luminescent vibriosis. <i>FEMS Microbiology Ecology</i> , 2010, 74, 196-204.   | 2.7 | 51        |
| 41 | Monitoring of <i>Vibrio harveyi</i> quorum sensing activity in real time during infection of brine shrimp larvae. <i>ISME Journal</i> , 2012, 6, 2314-2319.  | 9.8 | 47        |
| 42 | Norepinephrine and dopamine increase motility, biofilm formation, and virulence of <i>Vibrio harveyi</i> . <i>Frontiers in Microbiology</i> , 2014, 5, 584.  | 3.5 | 46        |
| 43 | A Quorum Sensing-Disrupting Brominated Thiophenone with a Promising Therapeutic Potential to Treat Luminescent Vibriosis. <i>PLoS ONE</i> , 2012, 7, e41788.   | 2.5 | 46        |
| 44 | N-acylhomoserine lactone-degrading <i>Bacillus</i> strains isolated from aquaculture animals. <i>Aquaculture</i> , 2011, 311, 258-260.   | 3.5 | 44        |
| 45 | <i>In vitro</i> and <i>in vivo</i> expression of virulence genes in <i>Vibrio</i> isolates belonging to the Harveyi clade in relation to their virulence towards gnotobiotic brine shrimp ( <i>Artemia</i> ). <i>Journal of Applied Microbiology</i> , 2017, 123, 1071-1080. | 1.0 | 10        |
| 46 | Indole signalling and (micro)algal auxins decrease the virulence of <i>Vibrio campbellii</i> , a major pathogen of aquatic organisms. <i>Environmental Microbiology</i> , 2017, 19, 1987-2004.   | 3.8 | 39        |
| 47 | The gnotobiotic brine shrimp ( <i>Artemia franciscana</i> ) model system reveals that the phenolic compound pyrogallol protects against infection through its prooxidant activity. <i>Free Radical Biology and Medicine</i> , 2015, 89, 593-601.                             | 2.9 | 38        |
| 48 | Production of acylated homoserine lactones by <i>Aeromonas</i> and <i>Pseudomonas</i> strains isolated from municipal activated sludge. <i>Canadian Journal of Microbiology</i> , 2005, 51, 924-933.   | 1.7 | 37        |
| 49 | Novel approach of using homoserine lactone-degrading and poly- $\beta$ -hydroxybutyrate-accumulating bacteria to protect <i>Artemia</i> from the pathogenic effects of <i>Vibrio harveyi</i> . <i>Aquaculture</i> , 2009, 291, 23-30.  | 3.5 | 37        |
| 50 | Luminescence, virulence and quorum sensing signal production by pathogenic <i>Vibrio campbellii</i> and <i>Vibrio harveyi</i> isolates. <i>Journal of Applied Microbiology</i> , 2008, 104, 1480-1487.   | 3.1 | 36        |
| 51 | <i>In vivo</i> effects of single or combined N-acyl homoserine lactone quorum sensing signals on the performance of <i>Macrobrachium rosenbergii</i> larvae. <i>Aquaculture</i> , 2009, 288, 233-238.  | 3.5 | 34        |
| 52 | The Apparent Quorum-Sensing Inhibitory Activity of Pyrogallol Is a Side Effect of Peroxide Production. <i>Antimicrobial Agents and Chemotherapy</i> , 2013, 57, 2870-2873.   | 3.2 | 34        |
| 53 | RpoS and Indole Signaling Control the Virulence of <i>Vibrio anguillarum</i> towards Gnotobiotic Sea Bass ( <i>Dicentrarchus labrax</i> ) Larvae. <i>PLoS ONE</i> , 2014, 9, e111801.  | 2.5 | 34        |
| 54 | Specific quorum sensing-disrupting activity (AQSI) of thiophenones and their therapeutic potential. <i>Scientific Reports</i> , 2015, 5, 18033.  | 3.3 | 31        |

| #  | ARTICLE   | IF  | CITATIONS |
|----|---|-----|-----------|
| 55 | Bacillus sp. LT3 improves the survival of gnotobiotic brine shrimp ( <i>Artemia franciscana</i> ) larvae challenged with <i>Vibrio campbellii</i> by enhancing the innate immune response and by decreasing the activity of shrimp-associated vibrios. <i>Veterinary Microbiology</i> , 2014, 173, 279-288. | 1.9 | 30        |
| 56 | Antivirulence Therapy for Animal Production: Filling an Arsenal with Novel Weapons for Sustainable Disease Control. <i>PLoS Pathogens</i> , 2013, 9, e1003603.  | 4.7 | 29        |
| 57 | Effects of feeding regime and probiotics on the diverting microbial communities in rotifer <i>Brachionus</i> culture. <i>Aquaculture International</i> , 2009, 17, 303-315.   | 2.2 | 26        |
| 58 | Expression and Quorum Sensing Regulation of Type III Secretion System Genes of <i>Vibrio harveyi</i> during Infection of Gnotobiotic Brine Shrimp. <i>PLoS ONE</i> , 2015, 10, e0143935.  | 2.5 | 26        |
| 59 | Isolation of Vibrionaceae from wild blue mussel ( <i>Mytilus edulis</i> ) adults and their impact on blue mussel larviculture. <i>FEMS Microbiology Ecology</i> , 2017, 93, .   | 2.7 | 26        |
| 60 | Ingestion of bacteria overproducing DnaK attenuates <i>Vibrio</i> infection of <i>Artemia franciscana</i> larvae. <i>Cell Stress and Chaperones</i> , 2009, 14, 603-609.  | 2.9 | 25        |
| 61 | The <i>Vibrio campbellii</i> quorum sensing signals have a different impact on virulence of the bacterium towards different crustacean hosts. <i>Veterinary Microbiology</i> , 2013, 167, 540-545.  | 1.9 | 25        |
| 62 | Quorum sensing-disrupting compounds protect larvae of the giant freshwater prawn <i>Macrobrachium rosenbergii</i> from <i>Vibrio harveyi</i> infection. <i>Aquaculture</i> , 2013, 406-407, 121-124.  | 3.5 | 25        |
| 63 | Isolation of AHL-degrading bacteria from micro-algal cultures and their impact on algal growth and on virulence of <i>Vibrio campbellii</i> to prawn larvae. <i>Applied Microbiology and Biotechnology</i> , 2015, 99, 10805-10813.   | 3.6 | 25        |
| 64 | <i>Photobacterium sanguinicancris</i> sp. nov. isolated from marine animals. <i>Antonie Van Leeuwenhoek</i> , 2016, 109, 817-825.   | 1.7 | 24        |
| 65 | Quorum sensing regulation of virulence gene expression in <i>Vibrio harveyi</i> <i>in vitro</i> and <i>in vivo</i> during infection of gnotobiotic brine shrimp larvae. <i>Environmental Microbiology Reports</i> , 2011, 3, 597-602.   | 2.4 | 21        |
| 66 | The catecholamine stress hormones norepinephrine and dopamine increase the virulence of pathogenic <i>Vibrio anguillarum</i> and <i>Vibrio campbellii</i> . <i>FEMS Microbiology Ecology</i> , 2014, 90, 761-769.   | 2.7 | 20        |
| 67 | Quorum sensing is required for full virulence of <i>Vibrio campbellii</i> towards tiger grouper ( <i>Epinephelus fuscoguttatus</i> ) larvae. <i>Journal of Fish Diseases</i> , 2019, 42, 489-495.   | 1.9 | 19        |
| 68 | Host-induced increase in larval sea bass mortality in a gnotobiotic challenge test with <i>Vibrio anguillarum</i> . <i>Diseases of Aquatic Organisms</i> , 2014, 108, 211-216.  | 1.0 | 18        |
| 69 | Impact of mucin, bile salts and cholesterol on the virulence of <i>Vibrio anguillarum</i> towards gnotobiotic sea bass ( <i>Dicentrarchus labrax</i> ) larvae. <i>Veterinary Microbiology</i> , 2015, 175, 44-49.   | 1.9 | 17        |
| 70 | Rearing water microbiomes in white leg shrimp ( <i>Litopenaeus vannamei</i> ) larviculture assemble stochastically and are influenced by the microbiomes of live feed products. <i>Environmental Microbiology</i> , 2021, 23, 281-298.  | 3.8 | 17        |
| 71 | Implications of Ecological Niche Differentiation in Marine Bacteria for Microbial Management in Aquaculture to Prevent Bacterial Disease. <i>PLoS Pathogens</i> , 2016, 12, e1005843.   | 4.7 | 17        |
| 72 | Stimulation of heterotrophic bacteria associated with wild-caught blue mussel ( <i>Mytilus edulis</i> ) adults results in mass mortality. <i>Aquaculture</i> , 2014, 431, 136-138.  | 3.5 | 15        |

| #  | ARTICLE  | IF   | CITATIONS |
|----|--|------|-----------|
| 73 | Characterization of the virulence of Harveyi clade vibrios isolated from a shrimp hatchery in vitro and in vivo, in a brine shrimp ( <i>Artemia franciscana</i> ) model system. <i>Aquaculture</i> , 2015, 435, 28-32.   | 3.5  | 15        |
| 74 | Does quorum sensing interference affect the fitness of bacterial pathogens in the real world?. <i>Environmental Microbiology</i> , 2018, 20, 3918-3926.  | 3.8  | 15        |
| 75 | Virulence-inhibitory activity of the degradation product 3-hydroxybutyrate explains the protective effect of poly- <sup>12</sup> -hydroxybutyrate against the major aquaculture pathogen <i>Vibrio campbellii</i> . <i>Scientific Reports</i> , 2018, 8, 7245. | 3.3  | 15        |
| 76 | Amino acid-derived quorum sensing molecules controlling the virulence of vibrios (and beyond). <i>PLoS Pathogens</i> , 2019, 15, e1007815.   | 4.7  | 15        |
| 77 | The blue mussel inside: 3D visualization and description of the vascular-related anatomy of <i>Mytilus edulis</i> to unravel hemolymph extraction. <i>Scientific Reports</i> , 2020, 10, 6773.   | 3.3  | 15        |
| 78 | Specific Antivirulence Activity, A New Concept for Reliable Screening of Virulence Inhibitors. <i>Trends in Biotechnology</i> , 2016, 34, 527-529.   | 9.3  | 13        |
| 79 | Indole decreases the virulence of pathogenic vibrios belonging to the <i>Harveyi</i> clade. <i>Journal of Applied Microbiology</i> , 2022, 132, 167-176.   | 3.1  | 13        |
| 80 | Analysis of the evolution of microbial communities associated with different cultures of rotifer strains belonging to different cryptic species of the <i>Brachionus plicatilis</i> species complex. <i>Aquaculture</i> , 2009, 292, 23-29.                    | 3.5  | 12        |
| 81 | The impact of catecholamine sensing on the virulence of <i>Vibrio parahaemolyticus</i> causing acute hepatopancreatic necrosis disease (AHPND). <i>Aquaculture</i> , 2017, 470, 190-195.   | 3.5  | 11        |
| 82 | A method for the specific detection of resident bacteria in brine shrimp larvae. <i>Journal of Microbiological Methods</i> , 2012, 89, 33-37.  | 1.6  | 10        |
| 83 | Expression of virulence genes in luminescent and nonluminescent isogenic vibrios and virulence towards gnotobiotic brine shrimp ( <i>Artemia franciscana</i> ). <i>Journal of Applied Microbiology</i> , 2011, 110, 399-406.                                   | 3.1  | 9         |
| 84 | Media Optimization, Strain Compatibility, and Low-Shear Modeled Microgravity Exposure of Synthetic Microbial Communities for Urine Nitrification in Regenerative Life-Support Systems. <i>Astrobiology</i> , 2019, 19, 1353-1362.                              | 3.0  | 9         |
| 85 | Virulence of luminescent and non-luminescent isogenic vibrios towards gnotobiotic <i>Artemia franciscana</i> larvae and specific pathogen-free <i>Litopenaeus vannamei</i> shrimp. <i>Journal of Applied Microbiology</i> , 2009, 106, 1388-1396.              | 3.1  | 8         |
| 86 | Can bacteria actively search to join groups?. <i>ISME Journal</i> , 2011, 5, 569-570.  | 9.8  | 8         |
| 87 | Light and transmission electron microscopy of <i>Vibrio campbellii</i> infection in gnotobiotic <i>Artemia franciscana</i> and protection offered by a yeast mutant with elevated cell wall glucan. <i>Veterinary Microbiology</i> , 2012, 158, 337-343.       | 1.9  | 8         |
| 88 | Ureolytic Activity and Its Regulation in <i>Vibrio campbellii</i> and <i>Vibrio harveyi</i> in Relation to Nitrogen Recovery from Human Urine. <i>Environmental Science &amp; Technology</i> , 2017, 51, 13335-13343.  | 10.0 | 8         |
| 89 | The impact of the multichannel quorum sensing systems of <i>Vibrio tasmaniensis</i> and <i>Vibrio crassostreae</i> on virulence towards blue mussel ( <i>Mytilus edulis</i> ) larvae. <i>Aquaculture</i> , 2022, 547, 737414.                                  | 3.5  | 8         |
| 90 | The impact of quorum sensing on the virulence of <i>Vibrio anguillarum</i> towards gnotobiotic sea bass ( <i>Dicentrarchus labrax</i> ) larvae. <i>Aquaculture Research</i> , 2018, 49, 3686-3689.   | 1.8  | 5         |

| #  | ARTICLE   | IF  | CITATIONS |
|----|---|-----|-----------|
| 91 | Probiotics: their action against pathogens can be turned around. <i>Scientific Reports</i> , 2021, 11, 13247.   | 3.3 | 4         |
| 92 | One health pathogen surveillance demonstrated the dissemination of gut pathogens within the two coastal regions associated with intensive farming. <i>Gut Pathogens</i> , 2021, 13, 47.                               | 3.4 | 4         |
| 93 | Insights into a Pyruvate Sensing and Uptake System in <i>Vibrio campbellii</i> and Its Importance for Virulence. <i>Journal of Bacteriology</i> , 2021, 203, e0029621.  | 2.2 | 4         |
| 94 | Indole decreases the virulence of the bivalve model pathogens <i>Vibrio tasmaniensis</i> LGP32 and <i>Vibrio crassostreae</i> J2-9. <i>Scientific Reports</i> , 2022, 12, 5749.                                       | 3.3 | 4         |
| 95 | Relation between virulence of <i>Vibrio anguillarum</i> strains and response to the host factors mucin, bile salts and cholesterol. <i>Journal of Applied Microbiology</i> , 2015, 119, 25-32.                        | 3.1 | 3         |
| 96 | Impact of the organic load on the efficacy of chlorine disinfection against acute hepatopancreatic necrosis diseaseâ€œcausing <i>Vibrio parahaemolyticus</i> . <i>Journal of Fish Diseases</i> , 2018, 41, 1609-1612. | 1.9 | 3         |
| 97 | Quorum Sensing Regulation of Virulence Gene Expression in <i>Vibrio harveyi</i> during its Interaction with Marine Diatom <i>Skeletonema marinoi</i> . <i>Journal of Pure and Applied Microbiology</i> , 0, , .       | 0.9 | 1         |