

CURRICULUM VITAE

Dr. C. EDWARD RAJA

Assistant Professor

Department of Microbiology

VHNSN College, Virudhunagar-626001

Tamil Nadu, India.

Email: edwardrajac@gmail.com



RESEARCH INTEREST

Microbial Bioremediation, Biosensor development for fluoride detection

EDUCATION

PhD (Biochemistry) : Department of Biochemistry, School of Biological Sciences, Madurai Kamaraj University, 2009

M.Sc. (Biochemistry) : JJ college of Arts & Science, Bharathidasan University, 1998

M.Sc. project title : Isolation and characterization of an extracellular lipase producing *Bacillus* sp. from an oil mill refinery effluent

PhD thesis title : Molecular characterization of metal resistant *Pseudomonas aeruginosa* and development of green fluorescent protein based biosensor for heavy metal bioremediation

ACADEMIC POSITIONS

Position	Employer	Date of joining	Date of leaving	Experience
Research Associate	Department of Molecular Biology, Madurai Kamaraj University, Tamilnadu	2022	2023	1 year
DST/SERB Ramanujan Fellow *(Assistant professor/ Scientist-D)	SERB, India , Department of Molecular Biology, Madurai Kamaraj University, Tamilnadu	2016	2021	5 years
ARO-Postdoctoral	The Volcani center, ARO, Israel	2013	2015	2 years

Research Scientist				
JSPS Fellow [¥]	JSPS, Kyushu University, Japan	2010	2012	2 years

* The Esteemed fellowship awarded by **SERB, DST, Government of India.**

[¥] The prestigious fellowship awarded by Japanese Society for the Promotion of Science, **(JSPS) Government of Japan.**

TEACHING EXPERIENCE

5th June 2023- till date	Assistant Professor, Department of Microbiology, VHNSN college, Virudhunagar
2021-2022	Guest Faculty, Department of Microbial Technology, School of Biological Sciences, Madurai Kamaraj University, Madurai-21
2016-2021	Taking classes for M.Sc. Genomics, School of Biological Sciences, Madurai Kamaraj University, Madurai-21
1998-2003	Lecturer in Biochemistry, Maharaja College for women, Perundurai, Erode, Tamil Nadu, India (Affiliated to Bharathiar University)

AWARDS & RECOGNITIONS

2016-2021	DST/SERB Ramanujan Fellow [*](Assistant professor/ Scientist-D) , Department of Molecular Biology, Madurai Kamaraj University, Madurai-21, Tamilnadu, INDIA
2013-2015	ARO-Postdoctoral Research Scientist , The Volcani center, ARO, ISRAEL
2010-2012	JSPS Fellow , Kyushu University, Fukuoka, JAPAN
2007-2009	UGC Meritorious Fellow , Department of Biochemistry, School of Biological Sciences, Madurai Kamaraj University, Madurai, Tamilnadu, INDIA

RESEARCH OUTPUT

Research guidance for **Master students:**

Name	Program	Institution	Period	Title
T. Deepa	M.Sc. Biochem.	Maharaja College for Women, Erode, Tamilnadu	2000	Comparative studies on glucoamylase from <i>A. niger</i> under different fermentation

				regimens
Alphy Jose	M.Sc. Biochem.	Maharaja College for Women, Erode, Tamilnadu	2000	Production & characterization of glucoamylase from <i>A. niger</i> through SSF
J. Beulah kalaiarasi	M.Sc. Biochem.	Maharaja College for Women, Erode, Tamilnadu	2001	Useful of iron, iron binding capacity, ferritin and analyses of iron deficiency anemia
C. Sherine Leena	M.Sc. Biochem.	Maharaja College for Women, Erode, Tamilnadu	2001	Comparison of liver function tests in alcoholic cirrhosis and non-alcoholic liver cirrhosis
R. Rajeswari	M.Sc. Biochem.	Maharaja College for Women, Erode, Tamilnadu	2003	Production & characterization of acid protease from <i>A. niger</i> through SSF
Lakshmy Vijayan	M.Sc. Biochem.	Maharaja College for Women, Erode, Tamilnadu	2003	Production & characterization of extracellular lipase from <i>P. fluorescens</i>
G. Gajalakshmi	M.Sc. Biochem.	Maharaja College for Women, Erode, Tamilnadu	2003	Production & characterization of α -amylase from <i>B. licheniformis</i> by SSF
V. S. Shani	M.Sc. Biochem.	Maharaja College for Women, Erode, Tamilnadu	2003	Antimicrobial activity of <i>Aegle Marmelos</i> for digestive tract pathogens
M. Sirajudeen [‡]	M.Sc. Biochem.	V.H.N.S.N. College, Virudhunagar	2004	Isolation & characterization of heavy metal resistant bacteria from tannery industry effluent
K. Kirupa Sree	M.Sc. Genomics	SBS, MKU	2017	Assessment of fluoride contamination & isolation of fluoride resistant bacteria from bore water in and around Natham taluks, Tamil Nadu, India
A. Selvapriya [‡]	M.Sc. Microbiol.	SBS, MKU	2019	Isolation & identification of skin microbiota from the fruit bat Indian flying fox, <i>Pteropus giganteus</i>
12. Prabu [‡]	M.Sc. Microbiol.	SBS, MKU	2020	Isolation & Identification of Skin Microbiota from Fruit and Insect-eating Bats

[‡] Co-guidance

Research projects:

S.no	Title of the project	Duration	Status	Funding Agency
1	Development of bacterial biosensor for real-time fluoride detection in ground and surface waters: a promising approach	5 years 2016-2021	Completed	Total Rs. 1,02,59,452/- SERB/DST, India
2	Geo-environmental remediation techniques by using effective microorganisms for sustainable development	2 years 2010-2012	Completed	JSPS, Japan
3	Salmonella stress tolerance	2 years 2013-2015	Completed	ARO, Israel

Essential Qualifications with experiences:

➤ Industrial Biotechnology and Fermentation science

Production & characterization of Extracellular lipase from *P. fluorescens*; Production and characterization of Acid protease from *A. niger* through SSF; Antimicrobial activity of *Aegle Marmelos* against digestive tract pathogens

➤ Environmental Biotechnology and Bacterial biosensor development

Screening, identification, Isolation & characterization of heavy metals and Boron resistant bacteria, from various environmental samples (soil, desert soil, waste water, contaminated waste, fly ash dumping site and mining sediment); bacterial Fluoride removal; heavy metals toxicity; Biosorption of heavy metals; Construction & characterization of cadmium resistant gene; Identification of heavy metal resistant genes through PCR and sequencing strategies; Development of bacterial biosensor for heavy metals and Fluoride, Rhizoremediation

➤ Bioinformatics, Molecular Modeling and Microscopic analysis

BLAST analysis, Sequence alignment, Phylogenetic tree construction, Primer design, and three-dimensional analysis of proteins, Experience in phase contrast microscope, Atomic force microscope and Hirox digital Microscope (KH-1300)

➤ Technical proficiency

Plasmid, genomic DNA & RNA isolation, DNA/RNA estimation, Clinical Biochemistry/ Microbiology, Microbial screening, Immunodiagnosics, Animal handling, Restriction analysis, Agarose & Polyacrylamide gel electrophoresis, PCR & cloning strategies, Protein expression, Site directed mutagenesis, ELIZA plate reader, Southern and western Blotting, Plant tissue culture, Animal cell culture, X-ray fluorescence analysis (XRF), proteomic analysis for stress proteins

Research Publications- Citation indices

Total No. of Publications	:	26 (International)
Total No. of Citations	:	683
h-index	:	10 (Google Scholar Citations)
i10-index	:	10 (")
Conference presentation		
/Abstract /invited talks	:	23
No of Master's project guided	:	12
No of PhD's completed	:	

List of publications (International Journals):

- 1) **C. Edward Raja**, K. Anbazhagan & G.S. Selvam (**2006**). Isolation and characterization of a metal resistant *Pseudomonas aeruginosa* strain. *World Journal of Microbiology & Biotechnology*, 22: 577-585. ISSN.No:1573-0972. (Impact factor-1.685).
- 2) K. Anbazhagan, **C. Edward Raja**, & G.S. Selvam (**2007**). Oxalotrophic *Paracoccus alcaliphilus* isolated from *Amorphophallus* sp. rhizoplane. *World Journal of Microbiology & Biotechnology*, 23: 1529 - 1535. ISSN.No:1573-0972. (Impact factor-1.658).
- 3) **C. Edward Raja**, S. SasiKumar & G.S. Selvam (**2008**). Adaptive and cross resistance to cadmium (II) and zinc by *Pseudomonas aeruginosa* BC15. *Biologia*, 63: 461-465. ISSN.No:0006-3088. (Impact factor-0.759).
- 4) **C. Edward Raja** & G.S. Selvam (**2009**). Plasmid profile and curing analysis of *Pseudomonas aeruginosa* as metal resistant. *International Journal of Environmental Science & Technology*, 6: 259-266. ISSN.No:1735-2630. (Impact factor-1.915).
- 5) **C. Edward Raja** & G.S. Selvam (**2011**). Construction of green fluorescent protein based bacterial biosensor for heavy metal bioremediation. *International Journal of Environmental Science & Technology*, 8: 793-798. ISSN.No:1735-2630. (Impact factor-1.915).
- 6) **C. Edward Raja** & G.S. Selvam (**2012**). Characterization of chromosomal mediated cadmium resistance in *P. aeruginosa* strain BC15. *Journal of Basic Microbiology*, 52:175-183. ISSN.No:1521-4028. (Impact factor-1.438).
- 7) **C. Edward Raja** & Kiyoshi Omine (**2012**). Arsenic, boron and salt resistant *Bacillus safensis* MS11 isolated from Mongolia desert soil. *African Journal of Biotechnology*, 11: 2267-2275. ISSN.No:1684-5315. Impact factor (0.44).

- 8) **C. Edward Raja** & Kiyoshi Omine (2012). Characterization of Boron resistant and accumulating bacteria *Lysinibacillus fusiformis* M1, *Bacillus cereus* M2, *Bacillus cereus* M3, *Bacillus pumilus* M4 isolated from former mining site, Japan. *Journal of Environmental Science and Health Part A*, 47: 1341-1349. ISSN.No:1532-4117. (Impact factor-1.425).
- 9) Kiyoshi Omine, M. Azizul Moqsud and **C. Edward Raja** (2012). Soil Restoration of Agricultural Land Damaged by Sea Water in Tohoku Earthquake 2011. *International journal of Environment*, 2(2): 128–134 ISSN.No:2186-0009.
- 10) **C. Edward Raja** & Kiyoshi Omine (2013). Characterization of boron tolerant bacteria isolated from a fly ash dumping site for boron remediation. *Environmental Geochemistry and Health*, 35: 431-438. ISSN.No:0269-4042 (Impact factor-2.616).
- 11) K. Kirupa Sree, **C. Edward Raja***, U. Ramesh (2018). Isolation and characterization of fluoride resistant bacteria from groundwaters in Dindigul, Tamilnadu, India. *Environmental Research and Technology*, 1(2): 69-74.
- 12) **C. Edward Raja*** (2018). Cadmium (heavy metals) bioremediation by *Pseudomonas aeruginosa*: a minireview. *Applied Water Science*, 8:154. (Impact factor-5.411).
- 13) **C. Edward Raja*** (2020). Assessment of physicochemical characteristics of groundwater collected from different taluks, Dindigul district, Tamil Nadu, India. *Environmental Research and Technology*, 3 (1): 1-7.
- 14)A. Selvapriya R. Steffi Christiane, Susmitha Meenakshi S, **C. Edward Raja** and T. Karuppururai. (2020). Isolation and identification of skin microbiota from the fruit bat Indian flying fox, *Pteropus giganteus*. *International Journal of Advanced Research in Biological Sciences*, 7(2): 163-179.
- 15) **C. Edward Raja***, R. Pandeewari, U. Ramesh (2021). High Fluoride resistance and virulence profile of environmental *Pseudomonas* isolated from water sources. *Folia Microbiologica*, 66, 569-578. doi.org/10.1007/s12223-021-00867-z, ISSN 0015-5632. (Impact factor-1.730).
- 16) K. Susithra, K. B. Narayanan, U. Ramesh, C. Edward Raja, G. Premkumar et al. (2021). Statistical optimization of poly- β -hydroxybutyrate biosynthesis using the spent mushroom substrate by *Bacillus tequilensis* PSR-2. Waste and biomass valorization, published online, doi.org/10.1007/s12649-021-01460-8, ISSN 1877-2641, (Impact factor-3.703).
- 17) **C. Edward Raja***, R. Pandeewari, U. Ramesh (2022). Isolation and Identification of high fluoride resistant bacteria from water samples of Dindigul district, Tamil Nadu, South India. *Current research in Microbial Sciences*, 2: 100038, ISSN: 2666-5174.

- 18) **C. Edward Raja***, R. Pandeewari, U. Ramesh (2022). Characterization of high fluoride resistant *Pseudomonas aeruginosa* species isolated from water samples. *Environmental Research and Technology* 5 (4): 325-339. e-ISSN: 2636-8498.
- 19) **C. Edward Raja* (2023)**. Fluoride bioremediation by bacterial species- a mini review. Water and environment (to be submitted).
- 20) **C. Edward Raja*** and Kiyoshi Omine (2021). Characterization of high salt tolerant *Bacillus* species isolated from compost soil **(to be submitted)**.
(*Corresponding author).

Articles in Japanese:

- 21) Kiyoshi Omine, M. Azizul Moqsud and **C. Edward Raja (2012)**. A study on restoration of agricultural land damaged by Tsunami and its geo-environment.

Books/ Books chapters:

- 22) Shlomo Sela (Saldinger) and **Chellaiah Edward Raja (2016)**. "Desiccation of *Salmonella enterica* induces cross-tolerance to other stresses" in **Stress and Environmental Regulation of Gene Expression and Adaptation in Bacteria**, 2 Volume Set (Frans J. de Bruijn, Editor) July 2016, Wiley- Blackwell, pp. 725-735, ISBN: 978-1-119-00488-2.

International Conference Proceedings:

- 23) **C. Edward Raja**, G. S. Selvam and Kiyoshi Omine. Isolation, identification and characterization of heavy metal resistant bacteria from sewage. International joint symposium on Geodisaster prevention and Geoenviornment in Asia, September **2009, Fukuoka, Japan**.
- 24) Kiyoshi Omine, Noriyuki Yasufuku, Taizo Kobayashi, Taiga Hashimoto and **C. Edward Raja**. Reduction of effect on leaching effect of chromium (VI) from fly ash by selected microorganisms. 9th Geo environmental Engineering conference held on Seoul National University, May **2010, Seoul, Korea**.
- 25) K. Omine, N. Yasufuku, K. Tamura and **C. Edward Raja**. Leaching property of Cr (VI)-contaminated soil by mixing useful Microorganisms. Sixth International Congress on Environmental Geotechnics. November 8-12, **2010, New Delhi, India**.
- 26) **C. Edward Raja** and Kiyoshi Omine. Isolation, identification of boron resistant bacteria from fly ash dumping site. International conference on Geo-Environmental Engineering, May 21-22, **2011. Kagawa, Japan**.
- 27) Kiyoshi Omine, MD. Azizul Moqsud and **C. Edward Raja**. Geo-Environment approach to restoration of agricultural land damaged by seawater in Tohoku

region pacific coast Earthquake. International conference on environmental aspects of Bangladesh (ICEAB11) held on September 10-11, **2011, Kitakyushu, Fukuoka, Japan.**

- 28) **C. Edward Raja** and Kiyoshi Omine. Screening of boron tolerant bacteria isolated from fly ash dumping site for boron remediation. EurAsia waste management symposium held on 14-16 November, **2011, Istanbul, Turkey.**

Conference Workshops and Symposia attended:

- 29) **C. Edward Raja.** Isolation and characterization of *Bacillus licheniformis* from oil mill refinery effluent. Participate and present a paper in the National conference on recent trends in Biotechnology and Microbial research organized by at J. J. College of Arts and Science, Pudukkottai on **20 - 21 May 1998.**
- 30) **C. Edward Raja,** K. Anbazhagan and G. S. Selvam. Heavy metal tolerance and metal accumulation by bacterial species. International conference on Biotechnology and Neuroscience organized by center for Neuroscience, Cochin University of Science and Technology, Cochin on **29-31 December 2004.**
- 31) **C. Edward Raja,** K. Anbazhagan and G. S. Selvam. Microbial biosorption of Heavy metals. Science Day & Aqua-Terr Annual Conference, held at the School of Biological Sciences, Madurai Kamaraj University, Madurai on **5th March 2005.**
- 32) **C. Edward Raja,** V. Veeramani and G.S. Selvam. Cloning, characterization and expression of nickel resistant gene from *Pseudomonas aeruginosa* BC15. Science Day & Aqua-Terr Annual Conference, held at the School of Biological Sciences, Madurai Kamaraj University, Madurai on **4th March 2006.**
- 33) **C. Edward Raja,** S. Sasi Kumar and G.S. Selvam. Cadmium adaptive and cross resistance to zinc by *Pseudomonas* sp. from different environmental regimens. Science Day & Aqua-Terr Annual Conference, held at the School of Biological Sciences, Madurai Kamaraj University, Madurai on **10th March 2007.**
- 34) **C. Edward Raja** and G. S. Selvam. Isolation of an efficient fluorescent *Pseudomonas* for rhizoremediation of cadmium contaminated soil. Science Day & Aqua-Terr Annual Conference, held at the School of Biological Sciences, Madurai Kamaraj University, Madurai on **10th March 2007.**
- 35) **C. Edward Raja** and G. S. Selvam. Rhizoremediation of cadmium contaminated soil by *Pseudomonas aeruginosa* BCRh3. International conference on New Horizons in Biotechnology (NHBT-2007) organized by Regional research laboratory held at Trivandrum on **26-29 November 2007.**
- 36) **C. Edward Raja,** K. Mahendran and G. S. Selvam. Isolation, identification, characterization of arsenic resistant bacteria from paper industry waste contaminated soil. Science Day & Aqua-Terr Annual Conference, held at the School of Biological Sciences, Madurai Kamaraj University, Madurai on **14th March 2009.**

- 37) K. Kirupa Sree and **C. Edward Raja***. Water quality assessment and screening of fluoride resistant bacteria in groundwater samples collected from Dindigul district. National conference on Innovations in Modern Biology & 48th Aqua-Terr Annual Conference held at the School of Biological Sciences, Madurai Kamaraj University, Madurai on **27-28 February 2017**.
- 38) R. Pandeewari and **C. Edward Raja***. Assessment of fluoride contamination and isolation of fluoride resistant bacteria from bore water in and around Natham taluks, Tamil Nadu, India. Aqua-Terr Golden Jubilee International conference on Genome Biology and Host Defence: Bacteria to Mammals held at the School of Biological Sciences, Madurai Kamaraj University, Madurai on **27-28 Feb & 1st March 2019**.
- 39) A. Selvapriya, R. Steffi Christiane, S. Susmitha Meenakshi, **C. Edward Raja** and T. Karupudurai. Isolation and Identification of Skin Microbiota from Fruit and Insect-eating Bats. Aqua-Terr Golden Jubilee International conference on Genome Biology and Host Defence: Bacteria to Mammals held at the School of Biological Sciences, Madurai Kamaraj University, Madurai on **27-28 Feb & 1st March 2019**.
- 40) Pavithra Gayathri, U. Ramesh, **C. Edward Raja**. Gut bacterial diversity analysis of freshwater fishes and understanding their role in fish condition as well as its potential applications. 3rd International Conference on Genome Biology (ICGB-3) (Virtual) and 53rd Annual Aqua-Terr day organized by the School of Biological Sciences, Madurai Kamaraj University, Madurai, Tamil Nadu, India held on **28th Feb to 2nd Mar, 2022**.
- 41) K. Pavithra Gayathri, **C. Edward Raja**, U. Ramesh, Isolation of an emerging fish pathogen *Aeromonas allosacharophila* and elucidating the pathogenesis through PCR and experimental infection in *Oreochromis niloticus*. International Conference on Antimicrobial resistance and microbiome under changing climate, organized by the Department of Microbiology, Pondicherry University, Puducherry, India held on **10-12th October, 2022**.
- 42) Participated in the State level symposium on recent trends in Immunology and biotechnology at Kongu arts and Science College, Erode on 17th August, 2001.
- 43) Participated in the Science Day & Aqua-Terr Annual Symposium held at the School of Biological Sciences, Madurai Kamaraj University, Madurai on 28th February 2003.
- 44) Participated in the National seminar on Cancer Genomics, held at the School of Biological Science, Center for Advanced studies in Functional Genomics, Madurai Kamaraj University, and Madurai on 28th February 2004.
- 45) Participated in the Science day & Aqua -Terr Annual Conference, held at the School of Biological Sciences, Madurai Kamaraj University, Madurai on 5th March 2005.

- 46) Participated in the Science Day & Aqua-Terr Annual Conference held at the School of Biological Sciences, Madurai Kamaraj University, Madurai on 4th March 2006.
- 47) Participated in the Science Day & Aqua-Terr Annual Conference held at the School of Biological Sciences, Madurai Kamaraj University, Madurai on 10th March 2007.
- 48) Participated in the XIX National Symposium on Chronobiology held at the School of Biological Sciences, Madurai Kamaraj University, Madurai between 7 and 9 December 2007.
- 49) Participated in the Science Day & Aqua-Terr Annual Conference held at the School of Biological Sciences, Madurai Kamaraj University, Madurai on 29th March 2008.
- 50) Participated in the Science Day & Aqua-Terr Annual Conference held at the School of Biological Sciences, Madurai Kamaraj University, Madurai on 14th March 2009.
- 51) Participated in the National conference on Innovations in Modern Biology & 48th Aqua-Terr Annual Conference held at the School of Biological Sciences, Madurai Kamaraj University, Madurai on 27-28 February 2017.
- 52) Participated in the Aqua-Terr Golden Jubilee International conference on Genome Biology and Host Defence: Bacteria to Mammals held at the School of Biological Sciences, Madurai Kamaraj University, Madurai on 27-28 Feb & 1st March 2019.

(*Corresponding author)

Invited Talks:

- 53) The invited talk in the topic of “Spectroscopy techniques and its application” was given at UGC-NRCBS XXIX- Winter School on “Research Methodology” organized by UGC-Networking Resource Centre in Biological Sciences, School of Biological Sciences at Madurai Kamaraj University, Madurai on 20th November 2016.

Life member and membership bodies:

- 1) Life member of Aqua-Terr Society for Biological Sciences, MKU

Sequences submitted in the NCBI database:

S.No.	Accession numbers	Type of sequence	Bacteria
1.	AY971518	16S rRNA	<i>Pseudomonas aeruginosa</i>
2.	EF683085	''	<i>Ac. radioresistens</i> isolate BC3
3.	EF683086	''	<i>Proteus vulgaris</i> isolate BC1
4.	EF683087	''	<i>P. aeruginosa</i> isolate BC2
5.	EF683088	''	<i>P. aeruginosa</i> isolate BC5
6.	EF695446	''	<i>P. aeruginosa</i> strain BCRh1
7.	EF695447	''	<i>P. aeruginosa</i> strain BCRh3
8.	EF695448	''	<i>P. aeruginosa</i> strain BCRh4
9.	EF695449	''	<i>Stenotrophomonas maltophilia</i> strain BCRhA3
10.	EF695450	''	<i>Stenotrophomonas maltophilia</i> strain BCRhA4
11.	EF695451	''	<i>Stenotrophomonas maltophilia</i> strain BCRhA5
12.	JF756592	''	<i>Lysinibacillus fusiformis</i> strain M1
13.	JF836882	''	<i>Bacillus cereus</i> strain M2
14.	JF836883	''	<i>B. cereus</i> strain M3
15.	JF836884	''	<i>B. pumilus</i> strain M4
16.	JF836885	''	<i>B. safensis</i> strain MS11
17.	JF683607	''	<i>B. megaterium</i> strain KU1
18.	JF895478	''	<i>B. aryabhatai</i> strain KU2
19.	JF895479	''	<i>B. firmus</i> strain KU3
20.	JF895480	''	<i>B. thuringiensis</i> strain KU4
21.	JF895481	''	<i>Bacillus</i> sp. KU6
22.	JF895482	''	<i>B. beringensis</i> strain KU11-9
23.	JF895483	''	<i>B. indicus</i> strain KU12
24.	JF895484	''	<i>B. megaterium</i> strain KU13

25.	JF895485	''	<i>B. cibi</i> strain KU14
26.	JF895486	''	<i>Lysinibacillus</i> sp. KU22
27.	JF895487	''	<i>B. thioparans</i> strain KU23
28.	JF895488	''	<i>B. horneckiae</i> strain As-14
29.	JF895489	''	<i>B. megaterium</i> strain As-30
30.	JF895490	''	<i>B. cereus</i> strain Cr-50
31.	JF895491	''	<i>Microbacterium</i> sp. Cr-D
32.	JF895492	''	<i>Ralstonia</i> sp. FAI
33.	MF487852	''	<i>Pseudomonas</i> sp. strain THP6
34.	MF487853	''	<i>Pseudomonas</i> sp. strain THP41
35.	MG751413	''	<i>P. aeruginosa</i> strain OHP5
36.	MW131637	''	<i>Enterobacter cloacae</i> strain 3
37.	MW131639	''	<i>E. hormaechei</i> strain 14
38.	MW131650	''	<i>Enterobacter</i> sp. strain 21
39.	MW131651	''	<i>E. hormaechei</i> strain 22
40.	MW131652	''	<i>E. coli</i> strain S2-9
41.	MW131653	''	<i>Aeromonas caviae</i> strain 31
42.	MW131654	''	<i>A. caviae</i> strain 32
43.	MW131655	''	<i>A. caviae</i> strain 34
44.	EU815850	CadR-like (cadR) gene	<i>P. aeruginosa</i> strain BC15
45.	ON840002	16S rRNA	<i>A. veronii</i> strain SRAV7
46.	ON840013	''	<i>A. enteropelogenes</i> strain SRAE12
47.	ON840014	''	<i>A. veronii</i> strain SRAV16
48.	ON840084	''	<i>Aeromonas</i> sp. strain SRAA9
49.	ON840100	''	<i>Exiguobacterium indicum</i> strain SREI4