

3.4

Department of Biotechnology and Microbiology

1. Name of the Department : Department of Biotechnology and Microbiology
2. Year of establishment : 2000
3. Is the Department part of a School/Faculty of the university? Yes.
School of Life Sciences, Faculty of Sciences
4. Names of programmes offered (UG, PG, M.Phil., Ph.D., Integrated Masters; Integrated Ph.D., D.Sc., D.Litt., etc.) :
M.Sc. Biotechnology,
M.Sc. Microbiology
Ph.D. Life Sciences, Biotechnology, Microbiology, Biochemistry
P.G. Diploma in Drug Discovery (Inter University Centre for Biosciences)
5. Interdisciplinary programmes and departments involved : Nil
6. Courses in collaboration with other universities, industries, foreign institutions, etc.: NA
7. Details of programmes discontinued, if any, with reasons : NA
8. Examination System: Annual/Semester/Trimester/Choice Based Credit System: CCSS
9. Participation of the department in the courses offered by other departments : Nil
10. Number of teaching posts sanctioned, filled and actual (Professors/Associate Professors/Asst. Professors/others)

Designation	Permanent/Temporary	Total Number	Actual (Including CAS & MPS)
Professor	1	1	1
Associate Professor	2	2	2
Assistant Professor	3+3	6	6

11. Faculty profile with name, qualification, designation, area of specialization, experience and research under guidance.

Name	Qualification	Designation	Specialization	No. of Years of Experience	No. of Ph.D./M.Phil. students guided for the last 4 years
Dr. M. Haridas	M.Sc. Ph.D.	Emeritus Professor	Fermentation Technology	25	5
Dr. C. Sadasivan	M.Sc., Ph.D.	Professor	Drug Discovery & Molecular Modeling Enzyme kinetics	16	4
Dr. K. Sreejith	M.Sc., M.Phil., Ph.D.	Associate Professor	Microbial Antibiotics Cancer Biochemistry	12	4
Dr. K. Surekha	M.Sc., Ph.D.	Associate Professor	Microbial Vaccine Development	12	4

Dr.E.Jayadevi Variyar	M.Sc., M.Phil., Ph.D.	Assistant Professor	Endocrinology & Immunology	12	6
Dr. Anu Augustine	M.Sc. Ph.D.	Assistant Professor	Plant Tissue Culture Molecular Biology	12	4
Dr. A. Sabu	M.Sc. Ph.D.	Assistant Professor	Microbial Bioprocess	9	3

12. List of senior Visiting Fellows, adjunct faculty, emeritus professors
 1. Prof. Ted Baker Professor Auckland University, New Zealand
 2. Prof. R.V. Thampan, Former Director RGCB, Thiruvananthapuram.
13. Percentage of classes taken by temporary faculty – programme-wise information
 M.Sc. Biotechnology : 33.5
 M.Sc. Microbiology : 33.5
14. Programme-wise Student Teacher Ratio
 12:1
15. Number of academic support staff (technical) and administrative staff: sanctioned, filled and actual
 One Technical Assistant (Temporary)
16. Research thrust areas as recognized by major funding agencies
 Drug Discovery from Phytopharmaceuticals - Kerala Govt
17. Number of faculty with ongoing projects from
 - a) National: 3
 - b) International funding agencies: Nil

	Year	Project	Funding Agency	Amount
1	2012	Immuno modulatory bimolecules from medicinal plants Dr. E. Jayadevi Variyar	KSCSTE	17.01 Lakh
2	2014	Molecular and functional Characterization of glyoxylate eccoding gene(s) of mangrove Genus Rhizophora mucronata - L Dr. Anu Augustine	KSCSTE	20.46 Lakh
3	2014	Isolation and identification of Cyanobacteria for pesticide degradation Dr. A. Sabu	Dept. Environment and Climate Change Kerala	11.93 Lakh

Total grants received. 49.4 lakh

b) Research projects completed during last five years & their Outlay: 60.58 lakh

Sl. No	Name of Project	Funding Agency	Amount Sanctioned	Amount Utilized	Outcome***	Name of PI
1	Identification and modeling of targets of an endocrine disruptor: Bisphenol – A	DBT, Govt. of India	12.56 lakh	Complete	Three publications in international	Dr C Sadasivan

					journals & One PhD	
2	Biologically active compounds from marine cyanobacteria	OASTC- Ministry of earth sciences, Govt. of India	23 Lakh	Complete		Dr. M. Haridas
3	Studies on staphylococcus aureus for development of rapid diagnostic kit to detect methicillin resistant <i>staphylococcus aureus</i> strains from India	KSCSTE Kerala	13 Lakh	Complete	Two Publications	Dr. K. Surekha
4	Development of antifungal agents against Aspergillus flavus with alpha amylase as the target	KSCSTE Kerala	12.02 Lakh	Complete	3	Dr. C. Sadasivan

18. Inter-institutional collaborative projects and associated grants received

a) National collaboration

b) International collaboration

19. Departmental projects funded by

Project title	Amount	Agency	Period
Bioinformatics Infrastructure Facility	26 lakh	DBT	Five years
Scheme for Augmenting Research and Development, (SARD)	20 lakh	KSCSTE	One Time
Facilitating Infrastructure for Science and Technology	45 lakh	DST	One Time
UGC (special grant to potentially 10 excellent departments)	10 lakh	UGC	One Time

Total Grants Received: 101 lakh

20. Research facility / centre with

- State recognition

Inter University Center for Biosciences

21. Special research laboratories sponsored by / created by industry or corporate bodies
Nil

22. Publications:

- Number of papers published in peer reviewed journals (national / international)
Seventy Seven (77)
- Chapters in Books
- Books: 5
- Book chapters: Eleven (14)
- Books with ISBN with details of publishers

1. Divya Lakshmanan. M, Prasanth GK & Sadasivan C, Laccase from a salt

- tolerant fungus & its Potential applications- A practical account", Scholars' Press Publishing, ISBN 978-3-639-51985-3, 2013
2. Bioconversion of Berberine for enhanced inhibition of Phospholipase A2 - Role of fermentation in Ayurveda, Naveen Chandra D & Haridas M Lap Lambert Academic Publishing, Germany, 2012
 3. L-Glutaminase production by marine fungi (Sabu Abdulhameed and Muthusamy Chandrasekaran). Lap Lambert Academic Publishing, Germany, 2012
- Edited Books
1. Sabu A, Anu Augustine (Eds), Prospects in Bioscience: Addressing the Issues: Proceedings of the International Conference on Advances in Biological Sciences 2012. Springer.
 2. Sabu A, Chemistry and Biotechnology of Polyphenols, Edited Dr. A Sabu along with Dr. S Roussos of France and Dr. C N Aguilar of Mexico.2011.

Book chapters:

1. K.V. Dileep, Abhilash Joseph, A. Sabu, C. Sadasvan and M. Haridas, 'Modeling of Tannin Acyl Hydrolase' (2011) in 'Chemistry And Biotechnology of Polyphenols' edited by A. Sabu, C.N. Aguilar and S. Roussos. Pp. 188-199. CiBET Publishers, Chandni, Love Dale, Thiruvananthapuram-695587.
2. C. Sadasivan and N. Gautham, "Perturbed and unperturbed DNA: The effect of A.T base pairs on the structure of Z-DNA", (1997). In Aspects of Crystallography in Molecular Biology edited by S. Parthasarathy and Jenny P. Glusker, pp 353-362, New Age International (P) Limited, publishers, New Delhi.
3. Sreejith K. *Purification and characterization of antifungal lipopeptide from a soil isolated strain of Bacillus cereus*" In: Worldwide Research Efforts in the Fighting against Microbial Pathogens: from Basic Research to Technological Developments, Brown Walker Press / Universal Publishers, Inc. USA, 227-231(2013)
4. Dileep Francis & Surekha Kuyyalil (2013) Immunoinformatics Prediction and Structure-Based Modeling of HLA-II Binding Epitopes of Iron Surface Determinant B (IsdB) Protein of *Staphylococcus aureus*, Prospects in Biosciences: Addressing the Issues 2013, pp 317-323, Springer India (DOI:10.1007/978-81-322-0810-5_37)
5. N. Ayana, Kuyyalil Surekha Biotyping and Phage Typing of *Salmonella enterica* Serotype Typhi Isolates from Kerala, South India , Prospects in Biosciences: Addressing the Issues 2013, pp 317-323, Springer India (DOI:10.1007/978-81-322-0810-5_37)2013, pp 405-410
6. J. Jeshina, Kuyyalil Surekha, Epidemiological Typing of Methicillin-Resistant *Staphylococcus aureus* (MRSA) Isolated from Kerala Using Phage Typing, Prospects in Biosciences: Addressing the Issues 2013, pp 317-323, Springer India (DOI:10.1007/978-81-322-0810-5_37)2013, pp 393-397
7. K. S. Arun, Anu Augustine, Hypolipidemic Effect of Methanol Fraction of *Acorus calamus* Linn. in Diet-Induced Obese Rats, Prospects in Biosciences: Addressing the Issues 2013, pp 317-323, Springer India (DOI:10.1007/978-81-322-0810-5_37)2013, pp 399-404
8. K. S. Arun, Anu Augustine, A Novel HMG-CoA Reductase Inhibitor from Methanolic Extract of *Holoptelea integrifolia* (Roxb.) Planch Prospects in Biosciences: Addressing the Issues 2013, pp 317-323, Springer India (DOI:10.1007/978-81-322-0810-5_37)2013, pp -55-61

9. Sudina Kizhakkayil, Arun Raveendran, E. Jayadevi Variyar, Evolutionary Genomics of Avian MHC BLB2 Gene by Molecular Phylogenetic Analysis Prospects in Biosciences: Addressing the Issues 2013, pp 317-323, Springer India (DOI:10.1007/978-81-322-0810-5_37)2013, pp -125-130
 10. Sabu A, Polystyrene beads as an inert solid support for the production of tannase with high specific activity under solid state fermentation. In: Chemistry and Biotechnology of Polyphenols, CiBET Publishers, Thiruvananthapuram, India, 112-123. (2011).
 11. Sabu.A, Polyphenols in plants. In: Chemistry and Biotechnology of Polyphenols, CiBET Publishers, Thiruvananthapuram, India, 135-151. (2011).
 12. Sabu A, Sadasivan C and Haridas M Modelling of tannin acyl hydrolase (2011). In: Chemistry & Biotechnology of Polyphenols, CiBET Publishers, Trivandrum, India, 188-199
 13. A novel plate assay system for screening of antimicrobial agents and β -lactamase inhibitors from natural sources, Prasanth S, Shahana Valsan, Ambika Devi, Preethidan D S, Haridas. M, Sabu. A. In Prospects in Bioscience: Addressing the issues, Ed: Sabu Abdulhameed and Anu Augustine, (2012)
 14. E.Vijayan and E.Jayadevi Variyar (1998) in comparative endocrinology and reproduction. Mammalian GnRH an over view. Ed: Joy, Halder & Krishna,. Pp 3-16.
- Number listed in International Database (For e.g. Web of Science, Scopus,
 - Humanities International Complete, Dare Database - International Social Sciences Directory, EBSCO host, etc.)
 - Impact Factor – range / average
Range: 0.0 - 5.828, Average: 145.748/77 = 1.892

Details of patents and income generated

Sl. No	Name of Patent / Inventions	Patent No. & Year	Country of Patent	Present Status	Patent Owner
1	Process for the production of efficacious anti-inflammatory drugs from natural products	2012	Indian	Patent Application filed	Haridas M, Naveen Chandra D, Dileep KV, A Sabu, Sadasivan C
2	Method for the enhancement of anti inflammatory activity of ayurvedic snehas by fortification with free fatty acids	2013	Indian	Patent Application filed	Haridas M, Dileep KV, A Sabu, Naveen Chandra D, Sadasivan C

23. Areas of consultancy and income generated : NA

24. Faculty selected nationally / internationally to visit other laboratories / institutions / industries in India and abroad

Year	Name of the Award / Recognition	Nature of Award / Recognition**	Name of Teacher

2009-10	BOYSCAST fellowship (DST) – (July 2009- June 2010)	Post Doctoral Fellowship	Dr. Anu Augustine (National)
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25. Faculty serving in
a) National committees b) International committees c) Editorial Boards d) any other (please specify)

1. Dr. A. Sabu, Member, Panel of Experts, Commission on Ecosystem Management, International Union for the Conservation of Nature (IUCN), Switzerland (Since 2007)

27. Faculty recharging strategies (UGC, ASC, Refresher / orientation programs, workshops, training programs and similar programs).

Three faculty members have attended Refresher course in Life Sciences.

28. Student projects

- percentage of students who have done in-house projects including inter-departmental projects
- percentage of students doing projects in collaboration with other universities / industry / institute : 60 %

29. Awards / recognitions received at the national and international level by

- Faculty

2009-10	AZRA (Applied Zoologist Research Association) fellowship award for the year 2009 conferred for the outstanding contributions in the field of applied zoology during the past 10 years	Honorary	Dr. K. Surekha (National)
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- Doctoral / post-doctoral fellows : Nil
- Students : Mr. Dilip Francis, Best Poster Award in Biotechnology, 27th Kerala Science Congress

30. Seminars/ Conferences/Workshops organized and the source of funding (national / international) with details of outstanding participants, if any.

Sl.No	Name of Academic Development Program	Number of Participants	Period	
			From	To
1	International Conference on Advances in Biological Sciences	350	15.03.2012	17.03.2012
2	Workshop on Biothermodynamics and Bioinformatics in Drug Discovery	25	29.09.2012	29.09.2012
3	Workshop on Animal experiment Procedure	25	02.11.2012	03.11.2012

31. Code of ethics for research followed by the departments

The department strictly follows all rules as mentioned under the clause natural justice. The department also sticks to the requirements in terms of performing experiments with animals, microbes, genetic modification as per government of India rules. All other issues are discussed and solved by research meetings in which all faculty are members

32. Student profile programme-wise:

Sl. No.	Programme	Men	Women	Total
1	Ph.D.	10	18	28
2	M.Sc.	3	45	48
	Total	13	63	76

	2009-10	2010-11	2011-12	2012-13	2013-14
Number of Seats (a)	30	30	30	30	30
Number of Applications (b)	358	253	227	198	176

33. Diversity of students

Name of the Programme (refer to question no. 4)	% of students from the same university	% of students from other universities within the State	% of students from universities outside the State	% of students from other countries
M.Sc	58.4%	41.6%	Nil	Nil
Ph.D.	28.6%	35.7%	35.7%	Nil
P.G. Diploma in Drug Discovery (IUCB)	14.3%	57.1%	28.6%	Nil

34. How many students have cleared Civil Services and Defense Services examinations, NET, SET, GATE and other competitive examinations? Give details category-wise.
NET - 16

35. Student progression

Student progression	Percentage against enrolled
UG to PG	
PG to M.Phil.	
PG to Ph.D.	15%
Ph.D. to Post-Doctoral	
Employed <input type="checkbox"/> Campus selection <input type="checkbox"/> Other than campus recruitment	
Entrepreneurs	

36. Diversity of staff

Faculty who are graduates of the same university	20 %
From other universities within the State	60 %
from universities from other States from	20 %

37. Number of faculty who were awarded M.Phil., Ph.D., D.Sc. and D.Litt. during the assessment period

One (Dr. Naveen Chandra D.) Assistant Professor on Contract awarded with Ph.D.

38. Present details of departmental infrastructural facilities with regard to

- Library 1357 Books (Reference and Text)
- Internet facilities for staff and students : Wi-Fi and LAN
- Total number of class rooms 3
- Class rooms with ICT facility 2
- Students' laboratories 2
- Research laboratories 4

39. List of doctoral Students

Sl. No	Name of Research Students	Topic of Research
1	Amrutha A Nisthul	Development of inhibitors to the enzymes involved in tumor progression
2	Arun Kumar G.	Identification of adenosine deaminase inhibitors – <i>in silico</i> and in vitro approach
3	Sandeep P.M.	Studies on the effect of some medicinal plants on poly cystic ovary syndrome
4	Jenson Jacob	Studies on anti-inflammatory activities of some medicinal plants
5	Shabeer Ali H.	Antimicrobial Properties of the Cyclic Lipopeptide „Kannurin“
6	Aparna T.	Study of pest resistance in wild variety of Coffee – <i>Psilanthus travencorensis</i>
7	Dileep Francis	Studies on staphylococcus aureus antigens for the development of vaccine against Methicillin resistant <i>Staphylococcus aureus</i> in India
8	Zephyr C. Kottayil	Studies on antibodies in response to methicillin resistant <i>Staphylococcus aureus</i> (MRSA) antigens for vaccine development
9	Sujina K.P.	Therapeutic effects of probiotics on virulence gene of <i>salmonella enterica</i> sub sp. enterica serover Typhi
10	Sumesh Kumar T.M.	Biochemical Characterization of certain immunopotent active principles from medicinal plants
11	Punya Premrajan	Studies on the anti-arthritic activity of selected medicinal plants
12	Remya Chandran	Interaction studies of some acetyl choline esterase inhibitor
13	Sudina K.	Diversity of major histocompatibility complex (MHC) in indigenous and exotic cross –bred Poultry
14	Kavitha	Effect of chlorinated hydrocarbon pesticides on female reproductive system and thyroid hormones
15	Sony Jayaraman	Isolation and elucidation of the role of immune-modulatory biomolecules from selected medicinal plants
16	Siraj M.V.P.	Over expression of Glyoxylate1 in <i>Hevea Brasiliensis</i>
17	Tintu George	Characterization and target identification of plant based antifungal agents against <i>Aspergillus flavus</i> .
18	Anusha Sreesan	Studies on salt tolerant Mechanisms in

		<i>Rhizophora mucronata -L</i>
19	Meera S.P.	Molecular cloning and characterization of glyoxylase encoding gene(s) of mangrove genus <i>Rhizophora mucronata L</i>
20	Shahna Valsan	Screening and structure function study of biologically active compounds from <i>Oscillatoria Sp</i>
21	Prasanth S.	Biologically active compounds from marine Cyanobacteria
22	Swaroop S. Kumar	Production and structural characterization of bacterial fibrinolytic enzymes.
23	Jisha M.	Studies on lipoxygenase inhibitors and their microbially transformed derivatives from <i>Premna integrifolia Linn Mant.</i>
24	Manju Govind B.	Studies on anti-convulsive activity of aqueous extract of <i>Withania somnifera D</i> and its fermented products.
25	Ambika Devi R.	Isolation of bioactive compounds from marine cyanobacteria <i>Lyngbya sps.</i>
26	Surya Sukumaran	X- ray crystallographic investigation of binary complexes of legume lectins
27	Sharanya Suresh C.	Isolation of novel compounds from medicinal plants and transforming them as multifunctional drug candidates by in vitro and in silico methods
28	Vijaytha Vijayakumar	Bioactivity of secondary metabolites from <i>Viburnum coriaceum blume</i> and their derivatives

Post-doctoral students and Research Associates

1. Dr. Cejoice DST Fast Track
 2. Dr. Preethidan, IUCB
 3. Dr. Bhavya IUCB
 4. Dr. Jyothi, IUCB
40. Number of post graduate students getting financial assistance from the university. Janaki Ammal fellowships are given to two meritorious candidates pursuing their M.Sc projects in the department.
41. Was any need assessment exercise undertaken before the development of new programme(s)? If so, highlight the methodology.
42. Does the department obtain feedback from
- a. Faculty on curriculum as well as teaching-learning-evaluation? If yes, how does the department utilize the feedback?
Yes, Improvement based on the low scoring aspects of the feedback form
 - b. Students on staff, curriculum and teaching-learning-evaluation and how does the department utilize the feedback?
Yes, Based on the questionnaire and the points awarded by the students
 - c. Alumni and employers on the programmes offered and how does the department utilize the feedback?

43. List the distinguished alumni of the department (maximum 10)

Dr. Applonia Josephine Rose
 Dr. Soumya K.
 Dr. Divya Sivaraman
 Dr. Shabeesh Balan
 Dr. Cejoice R.P.
 Dr. Sajeesh K.
 Dr. Nisha N.K.
 Dr. Sasikala S.

44. Give details of student enrichment programmes (special lectures / workshops / seminar) involving external experts.

Special lectures by : Prof. Ted Baker, Professor, Auckland University, New Zealand

Sl.No	Name of Programme	Duration	Target Group
1	Workshop on Biothermodynamics and Bioinformatics in Drug Discovery	1day, 29 th September, 2012	Research Scholars and PG students
2	Two Day Workshop on Animal experiment Procedure	2 days, 2-3, November,2012	Research Scholars and PG students

45. List the teaching methods adopted by the faculty for different programmes.

Faculty members use internet facilities for regularly updating teaching modules
 Use of Power Point presentations for lecture hours
 Regular interaction with students to encourage critical thinking

46. How does the department ensure that programme objectives are constantly met and learning outcomes are monitored?

Regular tests, quizzes are conducted as part of internal assessment
 Students are encouraged to make present journal papers to improve analytical and presentation skills

47. Highlight the participation of students and faculty in extension activities.

The faculty of the department are involved in giving advice in terms of plantation, gardening, composting etc

48. Give details of “beyond syllabus scholarly activities” of the department.

The department has a Journal club where research scholars present their work or discuss papers in their areas of interest. Post graduate students are also encouraged to attend these clubs

49. State whether the programme/ department is accredited/ graded by other agencies? If yes, give details. : No

50. Briefly highlight the contributions of the department in generating new knowledge, basic or applied.

All faculty members have extramural funding in their respective areas of specialization.

51. Detail five major Strengths, Weaknesses, Opportunities and Challenges (SWOC) of the department.

Strength

The Department with two post graduate programs in Biotechnology and Microbiology and the centre with a post graduate diploma program in Drug discovery has adequately qualified faculty who are exposed to international level of training in various aspects of study and application of traditional medicine. The department and the center are supported by various state and central government schemes like DBT-BIF (DBT, Govt of India),

DST- FIST(DST, Govt of India), SARD-KSCSTE (Govt. of Kerala), UGC (Govt. of India) special fund for potentially excellent departments and individual faculty members are supported by extramural funding from the DBT, DOEAC and KSCSTE. Even with this limited funding the department and the centre in a short span of 14 years has received many acclamations in terms of publications and in training students who are now pursuing research at various international and national institutes.

Weaknesses

Although the centre are supported by various state and central government schemes there is still a lot to be desired in terms of infrastructure, manpower and availability of basic and sophisticated instruments.

Due to constraint in space, very often, the department hesitates to procure expensive instruments. Very often the non-availability of regular power supply leads to regular breakdown of these instruments

Adequate training to post graduate students is still desirable due to unavailability of state of art laboratories.

The faculty members due to decreased numbers are currently tied down with Post graduate classes and laboratory activities which cut down the desirable time for research. Also, they are loaded with routine administrative matters which again compromise on research activities.

Opportunities

A separate building for the School of Life Sciences is envisaged. The department with more faculty members who are specialized in other areas of Life Science and better infrastructure could encourage and train researchers to harness the knowledge of the basic structure of metabolites, understanding their function which would enhance the acceptance of traditional medicine and also could lead to the development of new drugs without any side effects. Also areas of research using molecular biology which is very expensive could lead to development of diagnostic kits as well as give way to development of salt tolerant varieties of plants and microbes.

Challenges

Very often, researchers in the department are restricted due to non-availability of funds for chemicals and publications in highly rated journals. International journals charge for publication of figures, graphs, colour pictures, etc., without which the strength of the paper is lost. So, adequate funds for research and publishing could take the department a long way it dissipating its findings. Also very often the lack of space and instruments require the researchers to wait for long periods to obtain results. A regulated power supply is lacking which leads to failures in performing experiments

52. Future plans of the department.

The department envisages to focus on the study of new drug leads from biological resources, study their activity and enhance their activity, which may be further effectively used in traditional medicine, or used to develop novel therapeutics. With afflictions of various disease and other pathological disorders on the rise, the need of the hour is to find new combinations which would ease/ mollify these conditions. The department proposes work into current thrust areas like Hermeneutics of Traditional Medical Texts, Combinatorial Chemistry, Plant Metabolic Engineering, Therapeutically

Active Principles, Separation and Derivatization Science, Toxicology Studies, Developing New Herbal Products, Biomolecular Structure and Information Science, Instrumentation and Instrument Maintenance Division, Animal and Cell Culture Facilities and Green House. The department is planning to offer to additional courses if better infrastructure facilities and adequate number of teaching and non-teaching staff are appointed. It shall conduct seminars, symposia, workshops and special training sessions for the students and teachers of tertiary level institutions in the region. It shall be a hub of frontier level activity. The Department of Biotechnology and Microbiology and the Inter university center for Biosciences has already several achievements on this front and if funds are made available it would further boost this. This would also give the department an opportunity to interact with hospitals and other organizations with similar research interests.