ACADEMIC WRITING AND PUBLICATION

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PLIGHT OF INDIAN SCIENTIFIC RESEARCH
Teaching, from time immemorial, has been considered as a noble profession in this country. We seem to have lost focus and clarity in the fundamental objectives of teaching and research.

**Four cardinal elements that constitute the pillars of the learning process:**
- Teaching
- Research
- Discourse
- Publication

- However, there are basic deficiencies and lacunae in all these four cardinal aspects that have a direct bearing on originality and creativity.

- Many of our teachers, even at highest level, are woefully out dated about the contemporary frontiers of knowledge even in their own field.

- This is mainly due to interest on the part of many teachers in the profession itself for various reasons. However, there is improved funding situation and resource base.
Is science on the death bed in India?

Based on an on-going exercise being carried out at National Institute Of Science, Technology and development studies (NISTADS) on ‘how attractive are science-related jobs in India’, some facts have been disclosed as follows:

• ‘Overall inclination of incoming Indian workforce towards science or making science related career’ is ‘low’ (score of 2.43 on a 5 point scale)

• The ‘awareness’ about the structure, functioning and the work methods of research organizations is ‘very low’ (score of 2.33 on a 5 point scale)

• The respondents perceive that opportunities available to Ph.D students and various JRFs / SRFs associated with them have ‘limited chances’ (score of 2.79 on a 5 point scale) of making a ‘science related career’
Dr. Man Mohan Sigh: Prime Minister of India in his concluding remarks at 94th Indian Science congress
‘I quote: ‘While our government will do its utmost to invest in science.’
I call upon scientific communities to also invest its time and intellectual energy in the revitalization of our science institutions
• Due to **faculty system** (selection of faculty), the present generation is neither able to contribute in many significant ways towards new concepts or ideas, nor undertake any original work.

• Another fact of concern is the widening gap between academicians and professionals which require proper attention and remedial action.

• In an already deteriorated science, obviously the students fail to develop innovative and original thinking, because of which their academic growth is stunted.
About Guides

• The problem is further compounded when the research guide is ill-equipped to inspire the students and utilize them more as a plank for the progress of their own career

• Invariably, such an environment forces the young researchers to copy / imitate (or) adopt ideas from already existing materials, mostly from Western countries

• We need to create a more congenial atmosphere for our youngsters to pursue science as a career that is rewarding at all aspects
RESEARCH METHODS
Goal of Effect Research

• A good and effective Ph.D work can be carried out ideally, only by students who are well trained / taught and thorough in fundamental concept and application

• Research should bring out original thinking / creativity ad innovation

• The objective behind any Ph.D work ought to be proper application of concept and techniques to solve a problem

• The award of Ph.D degree is a beginning in the process of learning and research and not a culmination ]

• Finally, the pursuit of any scientific/ intellectual endeavour should serve the social needs. Otherwise, it leads to loss to the tax payers as well as the under privileged
Research
• Organized and systematic process to acquire knowledge of any natural or human phenomena

Research methodology
• Analysis of the principles of research methods, rules and postulates in order to solve many complex problems of the society

Scientific method

Systematic observations of data → Classification of data → Interpretation of data
Research methods

- **Exploratory research**: Structures and identifies new problems
- **Constructive research**: Develops solutions to a problem
- **Empirical research**: Tests the feasibility of a solution using empirical evidence

**Distinct types of research**

- **Primary research/field research**: Involves collection of data that does not already exist.
- **Secondary Research/Desk research**: Involves the summary, collation and/or synthesis of the existing research
DATA COLLECTION
Data Collection:

- **Systematic collect of information about the objects of study and about the settings in which they occur**

- **Scientific literature:** It is complex and vast with 2000 words being printed / minute that the researcher needs to device some workable techniques to keep up to date

  - Find out if the information which is the object of the present research is already available and

  - Acquire a broad general background in the field by studying carefully selected part of the available material
Primary and secondary data:

**Primary data:**
Original in character and are generated in surveys conducted mostly by government and also by some individuals, institutions and research bodies

**Secondary data:**
Data which are not originally collected but rather obtained from published or unpublished sources are known as secondary data
Searching for literature:

• Encyclopedias and books
• Theses and dissertations
• Internet
• Conference / Proceedings
• Scientific journal
**Encyclopedias**

An encyclopedia (or encyclopedia) is a comprehensive written compendium that contains information on either all branches of knowledge or a particular branch of knowledge.

**Theses and dissertations**

- Dissertation (also called thesis or disquisition) is a document that presents the author's research and findings and is submitted in support of candidature for a degree or professional qualification. normally applied in obtaining Doctorate.

- Thesis: intellectual proposition. normally applied in obtaining Bachelors or Masters course
Internet: The fastest growing source of information

Electronic journals (e–journals) are evaluated by the editorial board that the work before publishing it in their e-journals.

So the quality should be more reliable depending on the reputation of the journal

Disadvantages:

• The information found may be intended for a general audience and may not be suitable for inclusion in the literature review

• Anyone can post information on the internet so the quality may not be reliable
Conference / proceedings:

- Provides the latest information on research that has not been published
- Helpful in tracking down other work by the same researchers

Scientific journal:

- Periodical publication, intended to further the progress of science, usually by reporting new research
- Part of permanent scientific record
- If they are describing experiments or calculations, they supply enough details, so that an independent researcher could repeat the experiment or calculation to verify the results.
SCIENTIFIC WRITING
**Characteristics of scientific writing:**

- Simple and systematic manner
- The thesis, many a times becomes bulky due to one’s own incompetence in the field. Whereas, a good study can be explained in a few pages and with publications
- The arguments should be organized in logical sequence and presented in plain and simple language.

**Essential features of scientific writing:**

- Clarity
- Concrete presentation
- Avoiding unnecessary elaboration
- Writing complete, meaningful sentences
- Use of appropriate words
- Use of active verbs, correct grammar and syntax
Thesis/report/manuscript writing:

**Title:** The face of the thesis

- It should have the fewest possible words that adequately describes the contents of the paper/theses

**Abstract:** Abridged version of the paper or thesis

- Brief summary of the main sections
- An abstract should be written in the past tense
- Provide a brief summary of the main sections
- State the principle objectives and scope of the study summarizing the results
- State the conclusions drawn
**Introductory section:**

- Should provide a suitable, theoretical orientation of the problem and review of related studies
- Preparation for understanding the explanation in subsequent sections of how the problem was solved

**An introductory chapter should contain the following:**

- Statement of the problem that is being investigated or the purpose of the study
- The importance of the problem
- Any specialized terms and abbreviations used in the subsequent parts of paper/thesis should be defined
- In some instances, the method of investigations, the principle results and the conclusions should be briefly stated
Review of literature:

• ‘Literature’ - The works consulted in order to investigate the research problem

• The literature review should provide a critical evaluation of existing literature rather than merely summarizing relevant research article

• It should describe in detail, the origin of the problem, the state of the problem and the various methods that have been used to solve the problem

• The literature review must be up to date and should highlight the lacunae and provide justification for the study
**Methodology:**

- Explains the procedure or the method of study
- Provides sufficient details for another researcher to reproduce the study
- If the technique itself is a contribution to research methodology, it is necessary to discuss it extensively in an appendix.
- If the method is well known and commonly utilized, elaborate details may be avoided
- If the data were collected from different organizations, the sources of data should find mention

**Replication:** ‘Repetition of the treatments under investigation’

The repetition of treatments results in more reliable estimate than is possible with a single observation
Results:

• The findings should be sustained in the case of field work and experiments by supporting statistical tables, charts and diagrams together with validation of results.

• As far as possible, the tables and charts should be self explanatory and should not require extended reading of the text in order to understand them.
Discussion:

• The purpose of this section is to demonstrate the relationships among observed facts. It should present the philosophy, reasoning and arguments of the results

The essential features of a good discussion:

• The principle, relationships and generalizations shown in the results section must be effectively interpreted and analyzed

• The results should be discussed but not recapitulated

• It is important to point out exceptions and lack of correlation

• Unexpected results must be explained

• The theoretical implications and practical applications of the work should be highlighted
Conclusions and recommendations:

• Conclusions are not merely assembling the earlier details and presenting them in different generalizations

• Recommendations are the next stage in involving the personnel preference of the investigator. They are the investigators suggestions to the course of action to be taken in practice

• They may or may not be correct and may or may not be accepted by the readers
Analysis of data:

- Computers are ideally suited for data analysis concerning large research projects as researchers are essentially concerned with huge storage of data and their faster retrieval and processing of data.

- Computation of means, standard deviations, correlation, coefficients, ‘t’ test, analysis of variance, analysis of covariates, multiple regression, factor analysis and various non-parametric analysis, programmes for linear programming, multivariate analysis, Monte Carlo simulation *etc.*, are available.

**Statistical analyses:** The word ‘statistics’ means *quantitative figures*.

Inferential statistics/statistical induction

Used to make *inferences* concerning some unknown aspect of a *population*.

Descriptive Statistics

Used to describe the basic features of the *data* gathered from an experimental study in various ways.
**Biometry:**

- Branch of statistics which is concerned with applications in the biological sciences
- It is the science and technology of measuring and analyzing biological data.

**Test of significance:**

**Null hypothesis:**
Asserts that there is no true difference in the sample and that the difference found is accidental, unimportant or arising out of fluctuations of sampling

**Alternative hypothesis:**
Against the null hypothesis, the alternative hypothesis specifies those values to hold true
REFERENCE SYSTEMS
Types of Reference systems:

Name and Year System *(Harvard system)*:
- Popular system
- The major advantage is convenience.
- References can be added or deleted because there is no numbering

Citation Order System *(Vancouver system)*:
- References are cited in order in which they appear in the text
- The advantages of this system include quick referencing.

Alphabet-Number System:
- Modification of the name and year system
- The references are cited by number from an alphabetized listed of references
- Reader friendly and reduces the cost of printing.
SYSTEMATICS TO BE KNOWN
**Difference between hypothesis and theory:**

*Hypothesis* attempts to answer questions by putting forth a plausible explanation that has yet to be rigorously tested.

- *Theory* has already undergone extensive testing by various scientists and is generally accepted as being an accurate explanation of an observation.

**Citation:** A reference to another document

A *citation* is a reference to a source (not always the original source), published or unpublished.

- A *bibliographic citation* is a reference to a book, article, web page, or other published item.

- *Scientific citation* is the process by which conclusions of previous scientists are used to justify experimental procedures, apparatus or goals.

**Citation Frequency:**

- Modern scientists are judged by the number of times their work is cited by others.

- This is actually a key indicator of the relative importance of a work in science.
CITATION REPORT
Author= (N. Munuswamy)
Time span = All Years. Databases = SCI-EXPANDED

This report reflects citations to source items indexed within Web of Science. Perform a Cited Reference Search to include citations to items not indexed within Web of Science.

The latest 20 years are displayed. View a graph with all years.
Results found: 44
Sum of the Times Cited : 189
Average Citations per Item : 4.30
h – index: 9
Use the checkboxes below to view the records. You can choose to view those selected records, or you can exclude them (and view the others).

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**Co-Citation:** When two sources (authors, documents, journals, ISI categories, or thematic areas) are cited in the same publication

**Cited Journals:** Journals ranked by total citation

**Cited Authors:** Authors ranked by citation
Impact factor (IF):

• A measure of the citations to science and social journals

• It is frequently used as a proxy for the importance of a journal to its field

• Impact factors are calculated each year by Thomson Scientific for those journals which it indexes and the factors and indices are published in Journal citation reports
Calculation of impact factor ‘IF’:

• Calculated based on a two-year period
• It can be viewed as the average number of citations in a year given to those papers in a journal that were published during the two preceding years

• For example, the 2003 impact factor of a journal would be calculated as follows:

\[ A = \text{the number of times articles published in 2001-2 were cited in indexed journals during 2003} \]
\[ B = \text{the number of "citable items" (usually articles, reviews, proceedings or notes; not editorials and letters-to-the-Editor) published in 2001-2} \]

2003 impact factor = \( \frac{A}{B} \)

(note that the 2003 impact factor was actually published in 2004, because it could not be calculated until all of the 2003 publications had been received)

A convenient way of thinking about it is that a journal that is cited once, on average, for each article published has an IF of 1 in the expression above.
## Journal Citation Reports (JCR)

Science Edition journal rankings sorted by Impact Factor

*Filtered by India*

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Knowledge map:

- A user interface element similar to a graphical organizer, which displays connections between data by a series of shapes (or images) representing ideas and arrows representing relations between them.

- It is a form of knowledge visualization and is also known as a concept map.
Knowledge mapping is the process of creating a knowledge map

1. **Acquire data**
   - Raw data are acquired from one or more sources.

2. **Manipulate data**
   - These raw data are manipulated through basic analysis to produce first order data.

3. **Store data**
   - The first order data are stored in a central knowledge mapping database - KMDB.

4. **Process data**
   - Higher-level insights are gained by applying higher order processing, resulting in higher order data.

5. **Visualize data**
   - Knowledge map is produced that provide insights into knowledge that is available within the organization or a particular domain of work.
Socio-economics of knowledge production:

The **gross domestic product** (GDP) or **gross domestic income** (GDI) is one of the measures of national income and output for a given country's economy. GDP can be defined in three ways, all of which are conceptually identical.

First, it is equal to the total expenditures for all **final goods** and services produced within the country in a stipulated period of time (usually a 365-day year).

Second, it is equal to the sum of the **value added** at every stage of production (the intermediate stages) by all the industries within a country, plus taxes less subsidies on products, in the period.

Third, it is equal to the sum of the income generated by production in the country in the period—that is, **compensation of employees**, **taxes on production and imports** less **subsidies**, and **gross operating surplus** (or profits).
• Social condition, economic and political stability of the countries influence the character of knowledge production enterprise

• Because the GDP (Gross Domestic Product) and the productivity are highly unevenly distributed, their logarithms have been used in doing regression analysis

• The empirical relationship between the sizes of the nation’s economy - it’s GDP and its productivity volume was found to be moderately high (0.50) (NSF 2000)

• GDP may not be the only factor to put the countries on the top of the productivity list; it is an expression of a complex social milieu, impregnated its commitments in wisdom, quality of life and other philosophical imperatives

• For some countries productivity (articles/$ billion GDP) goes in excess of what could be expected based on raw economic size (NSF 2000)
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<th>Productivity (no. of articles)</th>
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<td>1.82</td>
<td>102.1</td>
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<td>41</td>
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<td>238.3</td>
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<td>1.81</td>
<td>1,040.0</td>
<td>3.02</td>
<td>0.04</td>
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</tbody>
</table>
RESEARCH FELLOWSHIPS
CSIR – UGC NET
**CSIR – UGC NET**

**Objective:**
This *national level test* is conducted to determine the eligibility of Indian nationals for the award of Junior Research Fellowships (JRF)-NET and eligibility for appointment of Lecturers (NET) in certain subject areas falling under the *Faculty of Science*

**Eligibility Criteria**

*Educational Qualification:*
M. Sc., or equivalent degree, with minimum 55% marks

*Age Limit:*
The upper age limit for JRF shall be 28 years, which is relaxed up to 5 years in the case of candidates belonging to Schedule Castes/Schedule Tribes, Women, Physically Handicapped and OBC applicants.
## Fellowships and positions offered by CSIR:

<table>
<thead>
<tr>
<th>Fellowship</th>
<th>Qualification</th>
<th>Age and duration</th>
<th>Fellowship (Rs)</th>
<th>Selected / applied</th>
<th>Selection ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>JRF</td>
<td>M.Sc., (1ˢᵗ Class)</td>
<td>3** Years upto 30 years</td>
<td>12,000</td>
<td>1000</td>
<td>1:12</td>
</tr>
<tr>
<td></td>
<td>M.Sc., +2 years res.exp.+ publications</td>
<td></td>
<td></td>
<td></td>
<td>1:15*</td>
</tr>
<tr>
<td>SRF</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>RA</td>
<td>Ph.D., M.D., M.S.</td>
<td>3 Years upto 35 years</td>
<td>18,000</td>
<td>493/1,471</td>
<td>1:3</td>
</tr>
<tr>
<td>Pool Officer</td>
<td>Ph.D. +2 years of post doctoral experience</td>
<td>3 Years</td>
<td>5,000</td>
<td>...</td>
<td>1:3</td>
</tr>
</tbody>
</table>

* For Biologists

** both for a total period of 5 years only
Some of the leading Research Institute where you can apply after qualifying JRF

1. IISc Bangalore: www.iisc.ernet.in
2. IIT-Bombay: www.iitb.ac.in
3. IIT-Delhi: www.iitd.ac.in
4. IIT-Kharagpur: www.iitk.ac.in
5. IIT-Roorkee: www.iitr.ernet.in
6. AIIMS: www.aiims.edu
7. ICGEB, New Delhi: www.icgeb.res.in
8. Institute of Genomics and Integrative Biology: www.igib.res.in
9. IARI: www.iari.res.in
10. Central Drug Research Institute: www.cdriindia.org
11. ACBR, Delhi University: www.acbrdu.edu
12. JNU: www.jnu.ac.in
13. Delhi University South Campus: www.south.du.ac.in
14. NCPGR, New Delhi: www.ncpgr.nic.in
15. National Institute of Virology: www.unipune.ernet.in
18. Bose Institute: www.boseinst.ernet.in
19. Central Food Technological Research Institute: www.cftri.com
SKELETON OF Ph.D. THESIS
STUDIES ON TETRAGENOCOCCUS HALOPHILUS AND ITS POTENTIAL PROBIOTIC ACTIVITY ON PATHOGENIC BACTERIA ASSOCIATED WITH AQUACULTURE SYSTEMS

THESIS
Submitted to the
UNIVERSITY OF MADRAS
for the degree of
DOCTOR OF PHILOSOPHY

By
V. SUJATHA, M.Sc.,

UNIT OF LIVE FEED CULTURE
DEPARTMENT OF ZOOLOGY
UNIVERSITY OF MADRAS
GUINDY CAMPUS
CHENNAI - 600 025
INDIA
AUGUST 2007
1. INTRODUCTION

Objectives

• Morphological, physiological, biochemical and molecular characterization of *T. halophilus* and other bacteria isolated from *P. monodon* culture system.
• Isolation and Characterization of antibacterial substance of *T. halophilus*; and its activity on selected pathogenic bacteria in shrimp culture systems.
• Adaptability, growth pattern of *T. halophilus* in saline conditions.
• Challenge study using *T. halophilus* against *Vibrio parahaemolyticus*.
• Probiotic activity of *T. halophilus* on a variety of pathogenic bacteria, confined to aquaculture system.
• Use of *T. halophilus* in the water quality management and effluent treatment of aquaculture systems and finally
• Influence of *T. halophilus* on the growth of the rotifers under laboratory conditions.
2. MATERIALS AND METHODS

2.2. Bacterial strain
2.3 Morphological, physiological and biochemical characterization of *Tetragenococcus halophilus*
2.4 Scanning Electron Microscopy
2.5 Biochemical Characterization
2.6 Amplification of 16 s rRNA using Polymerase Chain Reaction
2.7 Sequencing and analysis of PCR products
2.8 Evaluation of bacterial resistance to antibiotics
2.9 Assay for antibacterial activity
2.10 Agar spot method
2.11 Inhibition study by well diffusion method
2.12 Purification of antibacterial substance
2.13 Gel-Filtration chromatography
2.14 High performance liquid chromatography
2.15 Estimation of protein
2.16 SDS Polyacrylamide gel electrophoresis
2.17 Characterization of antibacterial substances
2.18 Assessment of growth and adaptability of *T. halophilus*
2.20 Assessment of pathogenic bacteria in various tissues of *P. monodon*
2.21 Evaluation of *T. halophilus* on *V. parahaemolyticus*
2.22 Estimation of phenol oxidase activity
2.23 Water quality assessment
2.24 Microbial study of *Brachionus plicatilis* culture
2.25 Pond effluent treatment using *T. halophilus*
2.26 Statistical analyses
3. RESULTS

3.1 Description of *Tetragenococcus halophilus*
3.2 Resistance to antibiotics
3.3 Antibacterial activity of *T. halophilus*
3.4 Isolation of antibacterial substances from *T. halophilus*
3.5 Characterisation of antibacterial substances
3.6 Effect of different pH and temperature treatment on antibacterial substances
3.7 Bactericidal activity of *T. halophilus*
3.8 Effect of salinity on *T. halophilus*
3.9 *T. halophilus* as probiotic in shrimp culture system
3.10 Growth and survival
3.11 Microflora of *P. monodon* culture system
3.12 Effect of *T. halophilus* on *P. monodon* culture system
   3.13 Probiotic effect of *T. halophilus* on *V. parahaemolyticus*
3.14 Water quality management
   3.15 Microbes associated with *Brachionus plicatilis* culture system
3.16 Effect of *T. halophilus* bacteria on rotifer culture
3.17 Shrimp pond effluent treatment
3.18 Effect of *T. halophilus* on shrimp pond effluent treatment
Fig. 1. Scanning Electron micrograph of *T. halophilus*

Note: The characteristic cocci occurring in pairs
Fig. 2. DNA-Electrophoresis of PCR product from *T. halophilus*

Note: Lane I & IV : Size marker (100-bp ladder)
Lane II & III : *T. halophilus*
3A. *T. halophilus* cells showing inhibitory activity on *V. paraheamolyticus* 3B. Cell free supernatant of *T. halophilus* showing inhibitory activity on *V. paraheamolyticus* 3C. *T. halophilus* cells and cell free supernatant showing inhibitory activity on *A. hydrophila* 3D. *T. halophilus* cells and cell free supernatant showing inhibitory activity on *S. aureus*
Fig. 8. SDS-PAGE of the purified antibacterial substance from *T. halophilus*

Lane 1 Ultra low molecular weight (Da) markers –
- My-h (Myoglobin, horse heart, 17000)
- Al (Alpha lactalbumin, 14200)
- Ap (Aprotinin, 65000)
- Bic (Bovine insulin chain B, 3496)
- Br (Bradkinin, 1060)

Lane 2 Purified antibacterial substance corresponding to molecular weight of ≈ 1 KDa.
Fig. 9. Scanning electron micrograph of *Vibrio parahaemolyticus* showing elongated rod shaped structures

Note: (A) The intact cells of *V. Parahaemolyticus* *V. parahaemolyticus* treated with *T. halophilus* cells

Note: A complete lysis of *V. paraheamolyticus* cells (arrows)
Fig. 27. Shrimp pond effluent treatment with *T. halophilus*
(a) Effect on *T. halophilus* on total heterotrophic bacteria in shrimp pond effluent
(b) Effect on *T. halophilus* on *P. aeruginosa* in shrimp pond effluent
(c) Effect of *T. halophilus* on *A. hydrophila* in shrimp pond effluent
(d) Effect of *T. halophilus* on *V. paraheamolyticus* in shrimp pond effluent
APPENDIX

Paper presented in International Conference
1. Authors: Sujatha,V., S. Kannappan and N. Munswamy
Title: *Lactobacillus rhamnosus* GG (ATCC 53103) as potential probiotic bacteria in larviculture systems with antagonism against fish-borne bacteria.
Croucher Institute for Environmental Science
Hong Kong 6-9, December. 2006.

2. Authors: Sujatha,V., S. Kannappan and N. Munswamy
Title: *Tetragenococcus halophilus*, a potential marine probiotic bacteria in controlling the pathogenic bacteria associated with shrimp and live feed.
World Aquaculture Society (WAS), Aquaculture 2007
San Antonio, Texas USA
February, 26 – March 2, 2007.
GUIDELINES FOR D.Sc. DEGREE
First assess your scientific contribution in your chosen field of research

Have a good number of publications

If you are satisfied with publications and concept of your scientific achievement, develop a concept note, based on your vast experience in chosen field of research (Science/ Social Science)

The concept / theme should be totally different from your Ph.D programme or may be extension of your Ph.D programme

With concept note (contribution/ achievement notes) append full text of all your publications, pertaining to the concept note

Submit to the University authority for evaluation, along with a copy of your Ph.D thesis.
Concept

• Publication to be numbered as per your quoting (Alphabet-Number System) in the text

• Annex the full text of your publications

• Other publications, if any

• Citation documents of the publications
Fairy shrimps

Survey and Identification of Fairy shrimps

SEM & TEM
Cyst surface topography & Ultrastructural details

Ca^{2+} ionophore & Calmodulin pathway
Cyst hatching
Administration of retinoic acid and Cairns' medium

Adults

Sex-specific proteins
Role of enzymes
Bioencapsulation

Phospholipase & Phenoloxidase
Fatty acids
Carotenoids
Gold fish & Prawn
**Artemia**

Survey and Biodiversity of *Artemia*

- Furcal morphology
- Cyst surface topography Puthalam Strain
- Morphology SEM and TEM
- Biometry & Hatching
- Trehalase & Protease activity Activities of LDH and MDH
- Cysts
- Embryonic viability - α-tocopherol Enzymic & non-enzymic antioxidants
- Nauplii
- HUFA and PUFA enrichment
- Ornamental fish fry
- Prawn larvae
Rotifers

- Resting egg morphology
  - SEM

- Mass production of Rotifers
  - Bacterial infection & treatment

- Preservation of Resting eggs
DAAD FELLOWSHIP / SCHOLARSHIP PROGRAMMES
**Fellowships for Young Researchers and Recent Post Doctoral Scholars**

**Objective:**

- Meant for advanced studies and research at universities and research institutes in Germany to enable young scholars, scientists and University teachers to broaden their knowledge in their fields, to give them an opportunity to carry out research in Germany, and to familiarize themselves with current methods of research there.

**Target Group:**

- Candidates who are working as teachers in Indian universities or recognized institutes of university standard, Indian Institutes of Technology, and scientists at CSIR Labs and institutes, and at research institutes of national importance
**Fellowship Benefits:**

- Monthly stipend, study and research subsidy, contribution to health insurance, German language course, air-fare.

- Fellowships are awarded, initially, for one year preceded by a two-to-six, most commonly four-month German language course in Germany, arranged and funded by DAAD. Upon application and proper documentation, they are extendable up to another 12 months.
**Eligibility Criteria:**

**Degree/Prior Work Experience:**

- Candidates must possess a Master's degree with a first class at Master's or Bachelor's level plus at least two years of teaching or research experience

- **Age Limit:** Candidates should not be more than 32 years of age on 1st October of the year in which the fellowship begins

- **Domicile:** Candidates must be residing in India at the time of application

- **Confirmation of Placement:** Candidates must have a recent-dated letter of placement from a German professor; scholars need a written confirmation that states that their research plan is feasible at the selected German University / Institute and that placement for the duration of at least one year to carry out research
**Application Procedure:**
- These fellowships are announced once a year by the New Delhi office of the DAAD.

- The announcement of the fellowships is made sometime in July/August. Application forms are available from the DAAD New Delhi office or from the website: [http://www.daad.de/en/form](http://www.daad.de/en/form)

- The application should be submitted to the DAAD New Delhi office and NOT to the DAAD Office in Bonn.

- The deadline for submission of applications is 1st October each year.

**Subject Fields:**
All subject fields, excluding Medicine, Music and the Arts.

**Note:**
These fellowships are not for obtaining Bachelors’ or Masters’ degrees in Germany!
HUMBOLDT FELLOWSHIP
• The Alexander von Humboldt Foundation is a non-profit foundation established by the Federal Republic of Germany for the promotion of international research cooperation. It enables highly qualified scholars not resident in Germany to spend extended periods of research in Germany and promotes the ensuing academic contacts.

• Humboldt Research Fellowships for postdoctoral researchers are the instrument with which the Alexander von Humboldt Foundation enables highly-qualified scientists and scholars from abroad who are just embarking on their academic careers and who completed their doctorates less than four years ago to spend extended periods of research (6-24 months) in Germany.

• Candidates choose their own research projects and their host in Germany and prepare their own research plan.
Criteria for Assessment:

• The academic quality and feasibility of the research proposal submitted by the candidate
• Academic publications in internationally-reviewed journals and for publishing houses
• Statements on the candidate’s academic achievements and potential contained in the expert references submitted by the candidate

Fellowship specifications

• The fellowship is worth 2,250 EUR per month. This includes a mobility lump sum and a contribution towards health and liability insurance.
Application requirements

• Doctorate or comparable academic degree (Ph.D., C.Sc. or equivalent), completed less than four years prior to the date of application. Candidates who have nearly completed their doctoral degrees are eligible to apply provided that they submit the manuscript of their dissertation or publications containing the results of their dissertation.

• Academic publications reviewed according to international standards and printed in journals and/or by publishing houses.

• Confirmation that research facilities are available and a detailed expert’s report by an academic host at a research institution in Germany.

• Expert references from the doctoral supervisor and other academics qualified to comment on the applicant’s eligibility, preferably including reviewers not working at the applicant’s own institute.

• Language skills: scholars in the humanities or social sciences and physicians must have a good knowledge of German if it is necessary to carry out the project successfully; otherwise a good knowledge of English; scientists and engineers must have a good knowledge of German or English.
FULBRIGHT PROGRAM
Congress created the Fulbright Program in 1946 at the end of World War II to increase mutual understanding between the people of the United States and other countries, through the exchange of persons, knowledge and skills.

<table>
<thead>
<tr>
<th>Field of Study</th>
<th>Advanced research, graduate study, language study or teaching at the university, secondary or elementary level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Graduate</td>
</tr>
<tr>
<td>Place of Study</td>
<td>Over 140 countries</td>
</tr>
<tr>
<td>Award amount</td>
<td>Travel &amp; educational expenses; language or orientation courses; maintenance for one academic year; supplemental health and accident insurance</td>
</tr>
<tr>
<td>MIT Deadline</td>
<td>September 11</td>
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</tbody>
</table>
Eligibility criteria

• Hold an undergraduate degree before the beginning day of the grant, but not have been awarded a doctoral degree at the time of application.

• Be in good health; grantees will be required to submit a satisfactory Certificate of Health from a physician.

• Have sufficient proficiency in the written and spoken language of the host country to communicate with the people and to carry out the proposed course of study.

• Preference will be given to students who have received a majority of their high school and undergraduate college education in the U.S.

• Preference will usually be given to candidates who have not resided or studied in the country to which they are applying for more than six months.

• Duty abroad in the Armed Forces is not considered disqualifying. Nor are junior year study abroad programs (such as the Cambridge-MIT Exchange), where the total actual time in residence does not much exceed six months in aggregate, considered disqualifying.
INDIAN NATIONAL SCIENCE ACADEMY (INSA)
Objective:

• For conducting advanced research or undergoing specialized training in Indian Research Institutes/Laboratories

Criteria for selection:
Scientific contributions and the purpose of the visit

Eligibility details of Award:

• The applicant should be a scientist and hold a regular position in any R & D organization including Universities or Affiliated Colleges in India.

These Fellowships will be awarded on a competitive basis to the scientists for furtherance of their research and/or research capabilities for carrying out collaborative research, undergoing training in specific techniques, or utilizing facilities not available in their own institutions.
Support to INSA Young Scientist Awardees:
Provides opportunity to visit abroad under the Bilateral Exchange Programme with full travel support once within the five years of having received the award

Countries offering positions available under exchange programme are as follows:

<table>
<thead>
<tr>
<th>The Netherlands</th>
<th>Brazil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philippines</td>
<td>China</td>
</tr>
<tr>
<td>Poland</td>
<td>Czech Republic</td>
</tr>
<tr>
<td>Russia</td>
<td>France</td>
</tr>
<tr>
<td>Slovak Republic</td>
<td>Germany</td>
</tr>
<tr>
<td>Republic of Slovenia</td>
<td>Hungary</td>
</tr>
<tr>
<td>Ukraine</td>
<td>Kyrgyz Republic</td>
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<tr>
<td>U.K</td>
<td>South Korea</td>
</tr>
<tr>
<td></td>
<td>Nepal</td>
</tr>
</tbody>
</table>
NOMINATION TO INDIAN / INTERNATIONAL ACADEMY
National academy of sciences (NASI)
FNAAS agricultural academy (New Delhi)
FNA Fellow of national academy of sciences (INSA New Delhi)
National Academy of Agricultural Sciences
FA fellow of National Allahabad academy (Allahabad)
F.N.A.Sc. Bangalore Academy
INSA – JSPS – Japan
INSA – DFG – Germany
INSA – RS- England
GRE INTERNATIONAL STUDY PROGRAM
• The Graduate Record Examination is a Standardized test that measures verbal, mathematical and analytical skills

• The GRE Test is developed and administered by the US-based "Educational Testing Service" (ETS) under the direction of the Graduate Record Examination Board, a non-profit organization of graduate business schools worldwide
GRE test is conducted in two categories:

General GRE test

Subject GRE test.

General GRE test:

• Conducted all-round-the-year. Unlike other exams, you can choose your own date and time for taking the GRE Test

• The test is administered in the five-days-a-week (Monday through Friday), twice-a-day. September to December is the high season for GRE Test

Eligibility to appear for GRE exam/test:

• Anyone is eligible to appear in GRE General test. There are no restrictions based on age or qualifications. The test scores are valid for five years, i.e., most universities accept scores up to five years old
The GRE Subject test

- To assess candidate's qualification in a specific field of study

- It is required mainly for Doctoral Study in the US and is also required by some Universities for Masters Level programs

- GRE Subject test is a written test and not a computer test like the General GRE test. It is held thrice a year

The test is available in eight different areas:

- Biochemistry, Cell and Molecular Biology
- Biology
- Chemistry
- Computer Science
- Literature in English
- Mathematics
- Physics
- Psychology
What is “publication”

• a copy of a printed work offered for distribution
• the communication of something to the public
• making information generally known

To publish is to make content publicly known. The term is most frequently applied to the distribution of text or images on paper, or to the placing of content on a website.

Publication is the action or process of publishing something.

• Publish : prepare and issue (a book, journal, or piece of music) for public sale.
• print in a book or journal so as to make generally known.
Types of publication

- Book
- Book chapter/section
- Conference paper/proceedings
- E-article
- E-book
- Book review
- Journal article
- Magazine article
- Newspaper article
- Wiki
- Report
- Thesis
- Webpage
- Presentation
- Handout
- Personal communication (letter, blog, email, discussion list, chat room…)

Why Publish?

- “A paper is an organized description of hypotheses, data and conclusions, intended to instruct the reader. If your research does not generate papers, it might just as well not have been done” (G. Whitesides, Adv. Mater., 2004, 16, 1375)

- “if it wasn’t published, it wasn’t done” - in E.H. Miller 1993
Scientific Publication is a Team Effort

Authors

Journal

Reviewer
Author Responsibilities
– Preparation and Submission of Manuscripts:

Follow General Rules:
– Ensure work is new and original research
– All Authors listed on ms are aware of submission and agree with content and support submission
– Agree that the manuscript can be examined by anonymous reviewers.
– Provide copies of related work submitted or published elsewhere
– Obtain copyright permission if figures/tables need to be reproduced
– Include proper affiliation
What is publishable....

Journals like to publish papers that are going to be widely read and useful to the readers

• Papers that report “original and significant” findings that are likely to be of interest to a broad spectrum of its readers

• Papers that are well organized and well written, with clear statements regarding how the findings relate to and advance the understanding/development of the subject

• Papers that are concise and yet complete in their presentation of the findings
What is not acceptable…

- Papers that are routine extensions of previous reports and that do not appreciably advance fundamental understanding or knowledge in the area
- Incremental / fragmentary reports of research results
- Verbose, poorly organized, papers cluttered with unnecessary or poor quality illustrations
- Violations of ethical guidelines, including plagiarism of any type or degree (of others or of oneself)
Useful Definitions: Scientific Misconduct

“Scientific misconduct means fabrication, falsification, plagiarism, or other practices that seriously deviate from those that are commonly accepted within the scientific community for proposing, conducting or reporting research”

Useful Definitions: Plagiarism and Self-Plagiarism

- **Plagiarism:** using the ideas or words of another person without giving appropriate credit (Nat. Acad. Press document)

- **Self-Plagiarism:** The verbatim copying or reuse of one’s own research

Both types of plagiarism are considered to be unacceptable practice by most scientific publications
Other Types of Ethical Violations

- Duplicate publication/submission of research findings; failure to inform the editor of related papers that the author has under consideration or “in press”

- Unrevealed conflicts of interest that could affect the interpretation of the findings

- Misrepresentation of research findings - use of selective or fraudulent data to support a hypothesis or claim
Sooner or later

....... ethical violations get exposed

Some recent examples
Pioneering Physics Papers Under Suspicion for Data Manipulation

Recent discoveries at Bell Laboratories—the research arm of Lucent Technologies in Murray Hill, New Jersey—said to be of Nobel quality suddenly became mired in questions last week. Outside researchers presented evidence to Bell Labs management on 10 May suggesting possible manipulation of data involving five papers published in Science, Nature, and Applied Physics Letters over 2 years. In response, Bell Labs officials said that they are forming a committee of independent researchers to investigate. Their conclusions may not be known for months, but scientists who have seen the data are already saying that the potential fallout from the investigation could be devastating.

The Bell Labs papers describe a series of different experiments with organic conductors, says Charles Lieber, a chemist and nanoscience expert at Harvard University in Cambridge, Massachusetts: “It’s virtually impossible for me to believe that some of this wasn’t made up.”

Schoën himself acknowledges that the similar noise pattern is “difficult to explain.” But others affiliated with Bell Labs suggest privately that a systematic artifact in the measurement equipment might account for...
Striking resemblance. Published data from studies of different devices revealed a similarity in recorded "noise." Schön says the bottom figure was sent to Science by mistake (see correction, p. 1400).
Original Paper
Oriented Assembly of Fe3O4 Nanoparticles into Monodisperse Hollow Single-Crystal Microspheres
Yu et al. J. Phys. Chem. B 2006, 110, 21667-21671 (Figure 3)

Original paper:
Ultra-large-scale syntheses of monodisperse nanocrystals, Park et al. Nature Materials, 2004, 3, 891 (Figure 3C)

Plagiarized paper:
Fabrication of Monodisperse Magnetic Fe3O4-SiO2 Nanocomposites with Core-Shell Structures Hua Fang,* Chun-yang Ma, Tai-li Wan, Mei Zhang, and Wei-hai Shi J. Phys. Chem C 2007, 111, 1065-1070
Retraction

We wish to retract our report “CDX2 gene expression and trophectoderm lineage specification in mouse embryos” (1). Allegations of research misconduct were received by the University of Missouri-Columbia (MU) Provost, and an investigation found that the first author (K.D.) engaged in research misconduct by intentionally falsifying and fabricating digital images in the preparation of Figs. 4I; 4N; 4S; 2G; 3, J to L; S2, V to X; and S6, I to K accompanying the Science article. In addition, the original raw image files for the majority of the figures in the paper have not been located (the exceptions being the confocal scanning images in Figs. S1, S3, S4, S5, and S6), raising the possibility that the data they represent may also be suspect. We have decided to withdraw the article in its entirety in view of the fact that the paper was founded at least in part on falsified or fabricated images.

The corresponding author (R.M.R.) takes responsibility for placing excessive trust in his co-worker and for not assuring that a complete set of raw data existed at the time the questions first arose about the paper. We deeply regret any scientific misconceptions that have resulted from the publication of this article.

The first author resigned from MU shortly after the allegations of research misconduct were received and could not be found to sign the retraction.

R. Michael Roberts,1 M. Sivaguru,2 H. Y. Yong3

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Reference
Summary

• Scientific Ethics is an integral part of graduate research.

• STATEMENTS, FIGURES AND TABLES
  • Reproduced in a Report, Presentation and/or Paper require proper citation.

• Published work is protected by Copyright Law
  • Copyright permission is necessary if you are reproducing your work in another publication (This applies even if it is your own work)
Guidelines For Authors and Scientists

- Ethical Guidelines to Publication of Chemical Research (ACS Pubs. Div.) - available via Paragon or ACS Journals web site


WRITING A SCIENTIFIC MANUSCRIPT
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Part I: Publication & Peer Review:
Deciding to Publish and Submitting Your Paper

• What to publish?
  – abstract vs. full report
• Choosing your forum
  – Which type of journal is best for you?
  – What audience are you targeting?
  – (The JYI advantage!)
• Research the journal
  – Publication guidelines
  – Article style
After Submission

• Publication Procedure (6-12 months)
  – Author submits
  – Editor is assigned to manuscript
  – Editor assigns reviewers (associate editors) to inspect
  – Reviewers decide on whether to review paper
  – Several reviewers inspect and edit
  – Editor decides on accuracy of revisions and whether to accept paper
  – If accepted, editor sends paper back to author with revisions
  – Author revises paper and sends it back
  – Possibility of second review process
  – Publication!
What is Peer Review?

• Review process for scientists by scientists
• Purpose
  – To filter what is published as “science”
  – To provide researchers with perspective
• Where is peer review used?
  – Scientific publication
  – Grant review
  – Tenure promotion
Constraints of Peer Review

• Slow
• Conflicting views
  – Confronting theory bias
• Personal views
  – Objective vs. personal edits
• Fraud
  – Data manipulation and invention

“Editors and scientists portray peer review as a quasi-sacred process that helps to make science our most objective truth teller. But we know that the system of peer review is biased, unjust, unaccountable, incomplete, easily fixed, often insulting, usually ignorant, occasionally foolish, and frequently wrong.”

-- Richard Horton, editor of The Lancet,
Scientific Misconduct

- Gift Authorship
- Redundant Publication
- Plagiarism
- Fabrication
- Falsification
- Conflict of Interest
Part II: Writing a Scientific Manuscript
Writing Style and Audience

• Checklist:
  • Void of anecdotes or stories
  • Reports facts not outlandish conclusions
  • No misspellings
  • Grammatical accuracy
  • Meets formatting guidelines
  • Avoids using the first person

• Who’s the audience?
  • Write for your target audience
Word Choice

• **Examine vs. Analyze**
  – Activity to gain knowledge vs. Describing the analysis of that knowledge

• **Bloom’s Taxonomy**
  – Knowledge
  – Comprehension
  – Application
  – Analysis
  – Synthesis
  – Evaluation
Word Choice

• Bloom’s Taxonomy
  – **Knowledge**: Recitation of fact
    • Found, identified, labeled
  – **Comprehension**: State a problem or interpret fact
    • Discuss, predict, compare
  – **Application**: Apply old information to solve new problems
    • Solve, show, examine, classify
  – **Analysis**: Used to explain patterns or meaning
    • Analyze, investigate, compare, contrast
  – **Synthesis**: Making predictions or discussing possibilities
    • Predict, plan, devise, propose
  – **Evaluation**: Drawing conclusions, making recommendations
    • Justify, verify, argue, recommend, determine
Manuscript Structure

- Abstract
- Introduction
- Body of Article
- Results
- Discussion and Conclusions
- Acknowledgements
- References
- Figures and Tables
Abstract

• Summary of Manuscript (200-300 Words)
  • Problem investigated
  • Purpose of Research
  • Methods
  • Results
  • Conclusion

• Common Mistakes
  – Too much background or methods information
  – Figures or images
  – References to other literature, figures or images
  – Abbreviations or acronyms
Introduction

- Broad information on topic
  - Previous research
- Narrower background information
  - Need for study
- Focus of paper
  - Hypothesis
- Summary of problem (selling point)
- Overall 300-500 words

Common Mistakes
- Too much or not enough information
- Unclear purpose
- Lists
- Confusing structure
- First-Person anecdotes
Methods and Materials

- Provides instruction on exactly how to repeat experiment
  - Subjects
  - Sample preparation techniques
  - Sample origins
  - Field site description
  - Data collection protocol
  - Data analysis techniques
  - Any computer programs used
  - Description of equipment and its use

Common Mistakes

- Too little information
- Information from Introduction
- Verbosity
- Results/ sources of error reported
Results

• Objective presentation of experiment results
  – Summary of data
• NOT a Discussion!

Common mistakes
• Raw data
• Redundancy
• Discussion and interpretation of data
• No figures or tables
• Methods/materials reported
Discussion

• Interpret results
  – Did the study confirm/deny the hypothesis?
  – If not, did the results provide an alternative hypothesis? What interpretation can be made?
  – Do results agree with other research? Sources of error/anomalous data?
  – Implications of study for field
  – Suggestions for improvement and future research?

• Relate to previous research

Common Mistakes

• Combined with Results
• New results discussed
• Broad statements
• Incorrectly discussing inconclusive results
• Ambiguous data sources
• Missing information
Figures and Tables

• Tables
  – Presents lists of numbers/text in columns

• Figures
  – Visual representation of results or illustration of concepts/methods
    (graphs, images, diagrams, etc.)

• Captions
  – Must be stand-alone

• Guidelines for Figures and Tables
  – High resolution
  – Neat, legible labels
  – Simple
  – Clearly formatted
  – Indicate error
  – Detailed captions
References

- Check specific referencing style of journal
- Should reference:
  - Peer-reviewed journal articles, abstracts, books
- Should not reference:
  - Non-peer-reviewed works, textbooks, personal communications

- Common Mistakes
  - Format, Format, Format
    - (Figures & Tables, Equations, and References)
  - Redundant Information
    - Text, Figures, Tables, and Captions
  - Type of Reference
THANK YOU