



MINISTERE DE L'EDUCATION NATIONALE
CONSERVATOIRE NATIONAL DES ARTS ET METIERS
ERGONOMIE ET NEUROSCIENCES DU TRAVAIL

Paris, 24th December 1991

parait 6 de Janvier 92!

Dr. Amitabh DE
National Institute for Training in
Industrial Engineering
Vihar Lake
P.O. Nitie
BOMBAY 400 087
Inde

Dear Dr. De,

I hope that you received some time ago the second chronopost letter in which we included the documents you sent us signed by Professeur Pierre FALZON, the new Director of the Laboratory. I personally continue to be Professor. I hope also that these documents will be a positive contribution to the success of your application for a European grant.

I confirm that the programme you have written cannot be followed exactly during the grant period : firstly, it is difficult for you to discuss with workers if you don't speak fluent French ; secondly, the orientation of the laboratory is no longer the one you suggested. But Professeur Falzon agreed on the proposal I sent you in my letter of December 12th. We could help you to understand how our Laboratory and other European Laboratories have oriented their research in relation to new technologies. The result of your study could be a report on the subject or on a more specialised area in relation with health of workers' life and Productivity though the delimitation of research themes have also changed.

I am sending to you you under separate cover a selection of texts I have written in English during the last ten years to show you the type of reflection we may

have on this. Of course, your subject could be in quite different areas. Please do not refrain from writing to me in such a way that we can adjust your stay in Paris in relation with the Indian needs in your country's interest.

With my best wishes,

Yours sincerely,

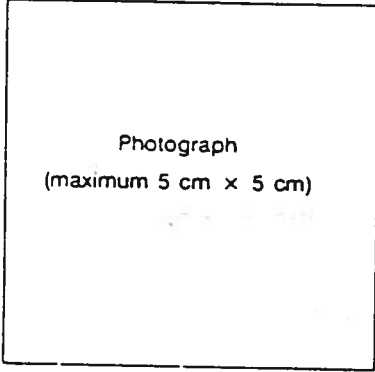
Alain Wisner





INTERNATIONAL SCIENTIFIC COOPERATION POSTDOCTORAL FELLOWSHIPS

A. APPLICANT



Surname: DE Title: DR

Forename(s): -

Maiden name: AMITABHA

Place of birth: CHAKBAJIT WEST BENGAL

Date of birth: 02-05-1953 Sex: M

Marital status: MARRIED No. of children: ONE

Nationality(ies): INDIAN

Passport or identity card number: -

issued on: - at -

B. PRESENT POSITION AND PLACE OF WORK OF APPLICANT

Position: ASSOCIATE PROFESSOR

Institution: NATIONAL INSTITUTE FOR TRAINING IN INDUSTRIAL ENGINEERING

Department: -

Address: TYPE IV, FLAT 23, NITIE CAMPUS, BOMBAY - 400 087.

City: BOMBAY - 400 087. Country: INDIA

Telephone: 578 33 71 Telex:

Telefax: Other:

C. PROPOSED RESEARCH WORK

Title: AN ERGONOMIC STUDY OF SOME SEDENTARY JOBS FOR IMPROVEMENT OF OCCUPATIONAL HEALTH, QUALITY OF WORK LIFE AND PRODUCTIVITY.

Key words: OCCUPATIONAL HEALTH, ERGONOMICS, PRODUCTIVITY.

Duration (in months) 6 MONTHS Intendend Starting date: 1ST OCTOBER, 1992.

D. EC HOST INSTITUTION AND SUPERVISOR (in cases where research work has been planned for more than one EC Institution, please copy and complete separately sections C, D, E and G-3)

Supervisor (Surname, Forename, Title): PROFESSOR ALAIN WISMEYER

Institution: CONSERVATOIRE NATIONAL DES ARTS ET METIERS

Department: LABORATOIRE D'ERGONOMIE ET NEUROSCIENCES DU TRAVAIL

Address: 41 RUE GAY-LUSSAC 75 005

City: PARIS Country: FRANCE

Telephone: 331 / 43 54 1827 / 34 Telex:

Telefax: 331 / 43 25 3614 Other: ✓

E. PLAN OF RESEARCH WORK (to be carried out in the Institution given in D.)

E.1 Title

AN ERGONOMIC STUDY OF SOME SEDENTARY JOBS FOR IMPROVEMENT OF OCCUPATIONAL HEALTH, QUALITY OF WORK LIFE AND PRODUCTIVITY.

E.2 Objectives

1. To study the 'Occupational Health' problems of some sedentary jobs with special reference to fatigue and musculoskeletal problems.
2. To find out their relationships with health status, medical expenses, dissatisfaction, absenteeism, production rate and product quality.
3. To analyse the ergonomic factors such as workstation, workposture, work method pertaining the above health problems.
4. Develop ergonomic norms for work station design and/or work methods to be followed for alleviating the above problems.

E.3 Description of research work

The development of 'Industrial Production Systems' can be described by three major changes in the 'History of Technology': 1st : 'Industrial Revolution'; 2nd : discovery of electricity; and 3rd : use of computer, electronics and information technology. All these three changes were far reaching. Though the initial guiding force was economic reasons; they have their impact on every sphere of life i.e. social, cultural, moral, health and in many other spheres. For the last twenty years, the introduction and spread of new technology (computer and information technology) has not only put the 'Industrialized Countries' on a further higher economic strata, but also it has enabled to control occupational health and safety problems

pertaining to higher physical effort which is synonymous with the technology used earlier. But this new technology is also not free from problems; with its prospects, it has brought new kind of problems also along with it and some of the them are 'Ergonomic' in nature; such as :

- i) Long hours of work
- ii) Unsuitable work tools and work stations
- iii) Postural immobilization
- iv) Visual strain
- v) Unbalanced work stress
- vi) Rise of musculoskeletal health problems.

These above problems are not new, and they are taken seriously in countries like Japan (Sato et al. 1984), Australia (Meyer R.H. 1987), Scandanavian countries (Aaras 1987), USA (Helander M G & Quance L.A. 1990, Keyserling et al., 1982), Nordic countries (Takala E.P. and Juntura V.E. 1991), and United Kingdom (Turner J.P. and Buckle P.W. 1987). The above studies have indicated that the above factors are responsible for major hindrance towards improvement of quality of worklife, viz a vis, productivity. Though, the problems are not new and are at present studied and analysed in simulated laboratory conditions, only recent improvement in field recording equipment and techniques will help to analyse the situations in real life conditions (Cark A.G. et al., 1987). As a result of these recordings and analysis through the new equipment and techniques, the understanding of actual work situation and corrective measures would be more useful from the view points of Ergonomics, Health, Safety & Productivity. Hence this study has been proposed with the following plan of work.

Methodology to be adopted to achieve these objectives, the project will be carried out in four phases.

Phase I : Recording and analysing of the sedentary jobs from the view points of Ergonomics, Health, Safety and Productivity.

Parameters to be recorded:

- Recording of Complex postures at work, through time - lagged and video photography.

contd...

- Identifications of unwanted and unhealthy postures.
- Observations and recording of health and safety data with relation to musculoskeletal injuries, work stress related psychosomatic problems and visual strain.
- Recording and analysing corresponding muscular activity through electromyographic responses.
- Recording and analysing of other psychophysiological responses such as heart rate etc.
- Finding out the economic aspect interms of medical attention, loss of productivity, absenteeism, product quality, pertaining to these problems.
- Biochemical analysis of workposture.

Phase II : Determination of the relationships between productivity, health & safety, jobs design, workstress and ergonomic workstation with special emphasis on fatigue and musculoskeletal problems from the data collected in Phase II.

Phase III: Ergonomic design of improved workstations and worksystem for sedentary jobs.

Phase IV : Preparation of reports and demonstration materials.

F. SCIENTIFIC CURRICULUM VITAE OF APPLICANT (*)

F.1 Academic qualifications

University degree thesis: **NIL**

Title:

.....

Period of completion: from to

Place where completed:

Ph.D. thesis:

Title ...STUDIES ON ERGONOMICS IN INDIAN AGRICULTURAL WORK.....

.....

Period to completion: from ... JUNE, 1977... to JUNE, 1984.....

(AWARDED Ph.D. ON MAY, 1989)

Others:

.....
.....
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.....
.....

F.2 Specialisation and international experience. **NIL**

Advanced and/or specialised courses relevant to the proposed research work sanctioned by a certificate. Type of course, years of attendance, duration, certificates obtained.

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.....

(*) To be filled in, comprehensively, even if the applicant attaches an additional, detailed C.V.

Time spent abroad, excluding brief visits. (Please indicate dates, countries visited and purpose of stay):

15 DAYS , ENGLAND,
 ATTENDING CONFERENCE
 2ND SEPTEMBER 1985 TO 17TH SEPTEMBER 1985.

F.3 Knowledge of language

Mother tongue: BENGALI

European Community languages	Comprehension (*)						Expression (*)					
	Oral			Written			Oral			Written		
	1	2	3	1	2	3	1	2	3	1	2	3
1. ENGLISH	-	-		-	-		-	-		-	-	3
2.												
3.												
4.												
5.												

(*) 1 = limited knowledge; 2 = working knowledge; 3 = very good knowledge.

F.4 Previous Employment (please indicate in reverse chronological order the two previous posts, if applicable, you have held prior to the present post, given in B. Use additional sheets if necessary).

Name and address of the Institution where you worked:

BEFORE JOINING THIS INSTITUTE I WAS A RESEARCH SCHOLAR
 AT CALCUTTA UNIVERSITY FROM 1977 TO 1982.

Date: from JUNE, 1977 to NOVEMBER, 1982

Exact designation of your post: JUNIOR RESEARCH FELLOW

Nature of your research work: ERGONOMIC AND OCCUPATIONAL HEALTH
 ORIENTED WORK IN INDIAN AGRICULTURE.

Name and address of the Institution where you worked:

Date: from to

Exact designation of your post:

Nature of your research work:

F.5 Publications (please state your most significant publications released, in the last 5 years if applicable, in national or international refereed journals. Use additional sheets if necessary).

1. De A., and Sen R.N. (1986) Ergonomics Evaluation of Ploughing Process in Paddy Cultivation in Indian - Human Ergology (Japan) 15 : 103 - 112.
2. Sen R.N., and De A. (1984): Ergonomics Study of Sheafing - a Task Involving Paddy Cultivation in India. Paper presented at the International Symposium of Applied Physiology and Ergonomics at the Session of Industrial Ergonomics, held in Calcutta, 17th to 19th August, 1983. Ind.J. Physiol and Allied Science Vol. 38 : 85 - 94, 1984, published in 1986.
3. Bhasin H.V., Kothiyal K.P., and De A. (1989): Application of Ergonomic Principles to Press Shop Operations in Light Engineering Industry, presented in "Work design in Practice-a Participative Symposium-The Third International Ergonomics Symposium" - 18th to 20th April, 1989, Zadar, Yugoslavia.
4. Kothiyal K.P., Bhasin H.V. and De A. (1989): Precision Manual Assembly Jobs; Biomechanical Considerations in Workplace Design; Presented in Workplace Design in Practice-a Participative Symposium - The Third International Ergonomics Symposium, 18th to 20th April, 1989, Zadar, Yugoslavia.
5. Bhasin H.V., De A., Kothiyal K.P., Workplace Design for Assembly Jobs : A Biomechanical Analysis. In Biomechanics National Conference on Biomechanics, Dec., 17-19, 1988, I.I.T., Delhi, India. Edited K.B. Sahay & R.K. Saxena, Wiley Eastern Ltd., New Delhi, India P.271-279, 1989.
6. Bhasin H.V., De A., Kothiyal K.P.: Changing Role of Ergonomics in Industrial Engineering., Proceedings XXX Ann. Conv. IIIE, April 14-17, 1988, Visakhapatnam, India.
7. Agarwal S.M., Vipat S.C., Divekar A.Y., Bhasin H.V. and De A. : Ergonomic Study of an Assembly Workstation in a Light Engineering Industry; Presented in 3rd National Convention of Indian Institution of Production Engineering; 25th and 26th November, 1988.

G. DECLARATION

G.1 Applicant

I, the undersigned, declare on my word of honour that the information provided above is, to any knowledge, true and complete.

I realise that any false declaration or omission, even if unintended on my part, may lead to the cancellation of my application.

I understand that, in the event that a fellowship is granted, the EC will request, for insurance purposes, medical certificates stating the satisfactory health status of the candidate and, where applicable, of the members of his/her immediate family who will accompany the grant holder at his place of work.

My address for correspondence, if different from that given in B., is the following:

.....
.....
.....

28/11/1991
.....
(Date)

Alan Forbes
.....
(Signature)

G.2 Governmental competent bodies *(Space reserved for governmental competent bodies entitled to provide clearance for the present application).*

.....
(Date)

.....
(Signature)

G.3 Declaration by the Host Institution (to be completed by the Director of the host laboratory and returned to the grant applicant)

Name of the laboratory: LABORATOIRE D'ERGONOMIE ET NEUROSCIENCES DU TRAVAIL
Address of the laboratory: 41 RUE GAY-LUSSAC 75005 PARIS FRANCE
Duration of research work 6 MONTHS months, starting from 1st October 1992

Declaration

I, undersigned Professor Pierre Falzon hereby record
my willingness to receive Dr. AMITABHA DE
as a grantee in my laboratory for the period indicated, in order to carry out the proposed
research work (given in points C and E of the present application). The materials, equipment,
accommodation and staff needed for carrying out the research work will be made available to
the grantee throughout the duration of the grant.

Dr. ALBIN WISNER
will be responsible for supervising the work done by Dr. DE

It is understood that the monthly fixed allowance and the cost of insurance against illness and
accident will be paid, in accordance with the regulations, by the Commission of the European
Communities.

A 'bench fee' grant will be awarded by the Commission of the European Community to the Host
Institution after the commencement of the working period of the applicant.

Dec. 19, 1991
(Date)

P Falzon
(Signature)

19th December, 1991.

Prof. Alain Wisner
Conservatoire National Des
Arts Et Metiers
Ergonomie Et Neurosciences
Du Travail,
41 rue Gay-Lussac, 75005
Paris, FRANCE

Prof. Wisner,

Thank you very much for your kind advice through your letter
dated the 12th instant. As you are well aware that cognitive
work is very much in demand for making working in the area
of expert system or artificial intelligence as such since
these are more traditional in approach of solving problem in
many research in the area of Ergonomics, my first choice was
the area of Physiological research. As such not fully
knowing the capabilities and the strength through which I can
reach you, I opted more for the traditional area, though
I had a mind and acumen to fully acquaint with more recent
trends of research. However, I will be also extremely happy
if I were offered by your good office a chance to do research
in the cognitive aspect of work with computerized system as
kindly advised by you.

I shall await with keen interest your positive reply in this
matter at your earliest.

Yours faithfully,

Yours faithfully,

(Signature)

19th December, 1991.

Prof. J. P. M. Winner
National Des
Batters
Neurosciences
Spavill,
75005

Dear Prof. Winner,

I read your letter about the... cognitive... area... since... choice was... I can... though... recent... happy... research... system as...

I am very happy to hear that you are interested in this...

Yours truly,
[Signature]
[Name]



BY AIR MAIL
PAR AVION

From
Dr. Amitabha De
NITIE
Bombay - 400 087
INDIA

TO,

PROFESSOR A.Y. WISNER
LABORATOIRE D' ERGONOMIC
CONSERVATOIRE NATIONAL DES ARTS ET METEIRS
41 RUE GUY - LUSSAC
75005, PARIS, FRANCE.





MINISTERE DE L'EDUCATION NATIONALE
CONSERVATOIRE NATIONAL DES ARTS ET METIERS
ERGONOMIE ET NEUROSCIENCES DU TRAVAIL

Paris, 12th December 1991

Dr. Amitabh DE
National Institute for Training in
Industrial Engineering
Vihar Lake
P.O. Nitie
BOMBAY 400 087
Inde

Dear Dr. De,

I received with much pleasure your letter dated 28th November 1991 which reached me on 10th December. I enjoy the idea that you could work during six months in our Laboratory. I am sending this letter by chronopost as the delay left over is so short.

First, I would like to share an information about the direction of the Laboratory. I am no longer the Director since July 1991 but I remain as a Full Professor and, as such, am in a position to invite foreign researchers. You know certainly also that French people speak French and although some of the Members of the Laboratory speak English, nobody or hardly anyone speaks English in Industry or Offices. This means that it would be difficult for you as you do not speak French to do some research in French firms without previous training in French. I suggest, therefore, that your stay should be devoted to get acquainted with the Ergonomics approach being practiced in France and in the Laboratory in the fields that you are interested in. Of course, for the last twenty years, the biggest Society demand to Ergonomics is a better conception and use of new technologies. During this period in the industrially developed countries, we have been more interested in a positive approach, a contribution to the success of these technologies more than in fatigue research. One of the main criteria has been prevention of mistakes that could be done by workers.

In the Introduction period (1975-1985) of Display Units, a lot of physiological research has been done on posture and vision. Now these points seem settled but the cognitive aspect of work with computerised system has provoked the apparition of numerous research programmes about the relations between natural and artificial intelligence.

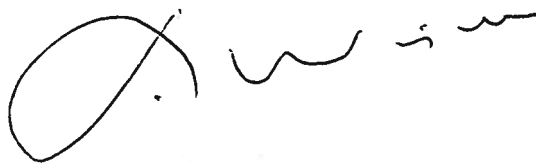
If you wish to familiarise yourself with these aspects, we would be very happy to receive you at the Laboratory but you could be disappointed by our approach if you wish to follow the objectives and the methodology you propose in your letter.

Would you kindly answer very quickly even by a short telegram and then I will return to you the document with my signature. I do not think it is extremely important that the proposals you have drawn up will produce something different after your stay in Paris but you have personally to understand what we are able to offer.

I hope that this letter will not be too worrying to you. I shall understand very well if you prefer to keep the orientation you propose and find another European Laboratory where the present research orientation is more compatible with your own.

With my best regards,

Yours sincerely,

A handwritten signature in black ink, consisting of a large, stylized initial 'A' followed by a series of connected, wavy lines that form the rest of the name.

Alain Wisner



. AMITABH DE
ASSOCIATE PROFESSOR

राष्ट्रीय औद्योगिक इंजीनियरी प्रशिक्षण संस्थान

अंतरराष्ट्रीय श्रम संगठन के जरिये संयुक्त राष्ट्र सहायता

द्वारा भारत सरकार की परियोजना के रूप में स्थापित,

विहार सरोवर, डाकघर - नीटी, बम्बई - ४०० ०८७.

टेलीफोन: (०२२-५८३३७१) तार: "नीटी, बम्बई-७६" टेलिक्स: (०११) ७१३९२ फेक्स: ५८९११४

NATIONAL INSTITUTE FOR TRAINING IN INDUSTRIAL ENGINEERING,

ESTABLISHED AS A GOVERNMENT OF INDIA PROJECT WITH UN ASSISTANCE
THROUGH ILO

VIHAR LAKE, P. O. NITIE, BOMBAY 400 087.

TELEPHONE: (022) 583371 TELEGRAM: "NITIE, BOMBAY 76" TELEX: (011) ~~XXXX~~ 72324

REF..

To:

Recd 210 December

Dear Professor

Winner

Enclose please find a duly filled form and copy of the advertisement for the Post Doctoral fellowship offered by 'The Commission of European Communities' for 1992-93. If you find my credentials and the area of research are worth for persuing my post doctoral work, may I request you to kindly work as the host institute for me.

Hope, you will do the needful and send the duly filled form to me on or before 20th of December, 1991. This request I am making because the cost date for receiving the form to our ministry is on 31st December, 1991.

With regards,

Yours sincerely,

Amritabh de

28/11/1991

(DR. AMITABH DE)

N.B. I hope you will find bio-data
and proposed area of work
suitable for providing a fellowship
for a ~~one~~ year or two in your
organization.

**ADVERTISEMENT
GOVERNMENT OF INDIA
DEPARTMENT OF SCIENCE & TECHNOLOGY
POST-DOCTORAL FELLOWSHIPS OFFERED BY THE COMMISSION
OF THE EUROPEAN COMMUNITIES FOR 1992-93**

. . .

Within the framework of cooperation in science and technology between India and the Commission of the European Communities, the Ministry of Science & Technology, Department of Science and Technology (DST), in agreement with the Commission of the European Communities, Directorate General for Science, Research and Development (DG XII/G 3), invites applications from qualified Indian scientists, residing in India, for the award of Post-Doctoral Fellowships for carrying out research work in laboratories/institutions of the Member States of the European Communities.

2. OBJECTIVES

The objective of this Fellowship Programme is to provide the selected Indian scientists and technologists with an opportunity to work in frontier areas of science and technology and to familiarise themselves with the latest developments.

3. SUBJECT AREAS

1. Agricultural Sciences
2. Biotechnology
3. Chemical Sciences
4. Engineering Sciences
5. Environmental Sciences
6. Earth, Atmospheric and Marine Sciences
7. Life Sciences
8. Physical and Material Sciences
9. Mathematics & Computer Sciences
10. New and Renewable Sources of Energy

4. NUMBER AND DURATION OF FELLOWSHIPS

The following two categories of fellowships will be awarded:-

- | | | | |
|----------|----|---|----------------------------------------------------------------|
| Category | I | : | 20 fellowships, each of 12 month duration for young scientists |
| Category | II | : | 20 fellowships, each of 6 month duration for senior scientists |

5. AGE

- For Category I : Scientists should not be more than 35 years of age on 1.10.1991.
For Category II : Scientists should not be more than 50 years of age on 1.10.1991.

6. QUALIFICATIONS

For both the categories I and II above, the applicants must possess Ph.D. degree or M. D./M. S. in the concerned subject, along with

- (i) a good academic record, and
- (ii) excellent research record as evinced by publications of research papers in standard scientific journals or patents.

7. VALUE OF SCHOLARSHIPS

The fellowship amounts for both categories I and II in the various EC countries are as follows:

Name of Country	Monthly fellowship in European Currency Units (ECUs) (1 ECU = 1.1 US\$ approx.)
Belgium	: 2,313
Luxembourg	: 2,313
Denmark	: 2,988
Germany	: 2,298
Greece	: 1,808
France	: 2,543
Ireland	: 2,215
Italy	: 2,423
Netherlands	: 2,050
Portugal	: 1,923
Spain	: 2,393
Switzerland (only CERN)	: 3,125
UK	: 2,403

8. SUBSIDY TO THE HOST INSTITUTION

A financial contribution (bench fee) of ECU 10,000/- per annum (or a corresponding pro-rata) will be paid by the EC to the host institution.

9. INSURANCE

Insurance against the risk of illness and accidents of the fellowship holder (alongwith the spouse and children, if accompanying him/her) shall have to be borne by the concerned fellowship holder either through an Indian General Insurance Company or a European Insurance Company.

10. ACCOMMODATION

The cost of accommodation in Europe shall have to be borne by the fellowship holder who shall make his/her own arrangement for the stay. No additional amount will be paid on this account.

11. INTERNATIONAL TRAVEL COST

The international travel cost of the selected candidates from the place of work in India to the final destination in Europe, where the institution of work is located, will be borne by the DST, while the cost of the air fare for the return journey will be met by the Commission of the European Communities; a fixed amount will be added to the last instalment of the fellowship amount drawn by the fellowship holder.

12. ISSUE OF APPLICATION FORMS AND GUIDELINES FOR ITS SUBMISSION

The application forms can be obtained from the Section Officer, International Division, Department of Science and Technology, Technology Bhavan, New Mehrauli Road, New Delhi-110 016. The duly filled application form should be forwarded by the candidate through proper channel (through the head of the institution where the scientist is working, or, the concerned administrative agency of the institution). It should be accompanied by the following documents:-

- i) Attested copies of all the University degrees received by the candidate.
- ii) Proof of age of the candidate.
- iii) List of research papers published in scientific journals.
- iv) Copies of five of the most important papers published by the candidate during the last five years.
- v) Concurrence of the proposed host institution in Europe accepting the scientist and his/her proposed programme of work.

13. LAST DATE FOR SUBMISSION OF APPLICATION

The applications should reach the Section Officer, International Division, Department of Science and Technology, Technology Bhavan, New Mehrauli Road, New Delhi-110016, by registered post latest by December 31, 1991.

NOTES

- a. The receipt of application will be acknowledged and a registration number will be communicated to the candidate. Applicants must write at the above address in case this acknowledgement is not received.
- b. Application incomplete in any respect or received after the expiry of the last date will NOT be considered.
- c. The selection of a candidate will be based on his/her scientific merit, the quality of his/her research papers, future potentiality of his/her work, the relevance and importance of the research work proposed to be carried out as the EC Post-Doctoral Fellow.

1. Name in full
(In block letters) : Dr. AMITABHA DE
2. a) Date of Birth
(in Christian era in figures) : 02/05/1953
3. Nationality : Indian
4. Marital Status : Married, One daughter
5. Father's name : Amiya Kumar De
6. Address for correspondence : NITIE, Vihar Lake Road,
Bombay - 400 087, INDIA.
7. Permanent Address
(In Block letter with Pin Code) : VILLAGE + PO - CHAKBAJIT
DIST : MIDNAPORE, WEST BENGAL
Pin - 721 136, INDIA.
8. Nearest Railway Station : PANSKURA
9. Educational Qualification :

Sr. No.	Course Passed	University/ Institution/ Board	Year of Passing	Subject Taken
4.	Ph.D. (Sc)	Calcutta University	1989	Physiology (Ergonomics)
3.	M.Sc.	Calcutta University	1975**	Physiology (Spl. Work Physiology & Ergonomics)
2.	B.Sc. (Hons)	Calcutta University	1973*	Physiology (Hons) Zoo, Chem 'A'
1.	H.S.	W.B.B.S.E.	1970	Beng, Eng, Physics Chem, Maths, Bio

* Results Came out in December, 1974.

** Results came out in January, 1977.

Training Course attended:

Attended a training programme on 'Industrial Safety Management' conducted by Director General of Factory Advice and Service and Labour Institutes, Ministry of Labour and Welfare, Government of India. Training course was conducted in Calcutta, duration 7 days.

Members of Different Professional Bodies:

Member of the 'Physiological Society of India'
92 APC Road, Calcutta - 700 009.

Founder Member of Indian Society of Ergonomics,
11A Mohan Bagan Lane, Calcutta - 700 004.

Member of the Industrial Ergonomics Subcommittee
of the International Ergonomics Association.

Career Details:

<u>Position</u>	<u>Period</u>		<u>Location</u>	<u>Nature of Activity</u>
	<u>From</u>	<u>To</u>		
Associate Professor	June, 1989	till today	NITIE, Vihar Lake Bombay-400 087 INDIA	Teaching, Training Research, Consultancy
Assistant Professor	Jan, 1986	June, 1986	- same -	- same -
Lecturer	May, 1984	Jan, 1986	- same -	- same -
Teacher	Aug. 1983	Apr, 1984	R.S. Vidyalaya, Howrah, West Bengal, INDIA	Teaching
Research Scholar	June 1977	Nov, 1982	Calcutta University, INDIA.	Research
Lecturer	Feb, 1977	May, 1977	Vidyasagar College, Calcutta, INDIA	Teaching

Research:

A. Projects Completed

Sponsored Projects:

<u>Sponsoring Organisation</u>	<u>Title of Project</u>
Indian Council of Medical Research, Govt. Of India.	Ergonomic and Occupational Health Oriented Work Organisation in Indian Agricultural Work (worked as a Junior Research Scholar of the Projects)

University Grants
Commission, Govt. Of India

Ergonomic study of different tasks performed by Indian Agricultural workers for improvement of productivity (worked as a Junior Research Scholar from 1980 to 1983.

Department of Education
Ministry of Human
Resource Development

New Plan Scheme for creation of infrastructure in the areas of emerging technology "Environmental Engineering" one of the Co-ordinators.

New Plan Scheme for modernisation of laboratories and workshop "Ergonomics Laboratory" one of the Co-ordinators.

B. Project Proposal Proposed

- i) Evaluation, Standardisation and Demonstration of Human Energy Measuring Techniques' - Project Submitted to Department of Nonconventional Energy, (DNES), Government of India.
- ii) Development of a Heat Stress Control Plan of a Steel Industry. A sponsored project is being prepared for a major 'Steel Industry in India.
- iii) Centre of Ergonomic Design and Analysis of Rural Systems - A Project prepared for DNES, Government of India.
- iv) Ergonomic and Occupational Health Impact of Traditional and New Sedentary Jobs in India. A project proposal is being prepared for World Health Organisation.

Teaching

Subject Taught:

- | | | |
|-------------------|---|----------------------------------------------------------------------------|
| Undergraduate | - | Physiology (Hons) |
| Graduate | - | Ergonomics (Theory and Labs)
Job Evaluation and Incentive Schemes. PMTS |
| Subject Developed | - | Safety Engineering and Management - along with Prof. H.V. Bhasin. |

Training Course Conducted as a Course Leader

for Executive Development Programme

- Industrial Safety and Automation
- Work Study
- Methods, Standards, and Human Factors in Industry
- Industrial Safety Management
- Research and Development Management

Research Paper Published in Refereed Journals

Ray, G.G., Sen R.N., Nag P.K., De A and S. Basu (1981), Relationship between Segmental Weight and Whole Body Weight and Volumes of Indians. J. Hum. Ergology (Japan), 10: 35 - 48.

Sen R.N., Ganguli A.K., Ray G.G., De A., and D. Chakraborty (1981) : Ergonomic Study of Tea Leaves Plucking Operations : Criteria for Selection Categorisation, App. Ergonomics (U.K.), 12, 83 - 85.

Sen R.N., Ganguli A.K., Ray G.G., and De A., and D. Chakraborty (1983) : Ergonomics Study of Tea Plucking Operation - Workload and Environmental Studies, Ergonomics (U.K.) 26, 887 - 893.

De A., and Sen R.N. (1986) Ergonomics Evaluation of Ploughing Process in Paddy Cultivation in Indian - Human Ergology (Japan). 15 : 103 - 112.

Sen. R.N., Ganguli A.K., Ray G.G., De A. and D.Chakraborty (1980) : A Preliminary Ergonomics Study of Tea Plucking. Two and a Bud (TRA), 27, 24 - 32.

Sen R.N., and De A. (1984) : Ergonomics Study of Sheafing - a Task Involving Paddy Cultivation in India. Paper presented at the International Symposium of Applied Physiology and Ergonomics at the Session of Industrial Ergonomics, held in Calcutta, 17th to 19th August, 1983. Ind. J. Physiol and Allied Science Vol. 38 : 85 - 94, 1984.

Paper Published in Refereed Proceedings

Bhasin H.V., Kothiyal K.P., and De A., (1989) : Application of Ergonomic Principles to Press Shop Operations in Light Engineering Industry, presented in "Work design in Practice - a Participative Symposium - The Third International Ergonomics Symposium" - 18th to 20th April, 1989. Zadar, Yugoslavia.

Kothiyal K.P., Bhasin H.V. and De A (1989) : Precision Manual Assembly Jobs : Biomechanical Considerations in Workplace Design : Presented in Workplace Design in Practice - a Participative Symposium - The Third International Ergonomics Symposium. 18th to 20th April, 1989. Zadar, Yugoslavia.

(both papers published in Work Design in Practice, Taylor and Francis, 149-154: 161-166, 1990).

Bhasin H.V., De A., Kothiyal, K.P., Workplace Design for Assembly Jobs : A Biomechanical Analysis. In Biomechanics. National Conference on Biomechanics, Dec. 17-19, 1988, I.I.T. Delhi, India. Edited K.B. Sahay & R.K. Saxena, Wiley Eastern Ltd., New Delhi, India. P. 271-279, 1989.

De Amitabha and Bhasin H.V. : A Comparative Investigation into Forward Bending Postures Under Static Load : Paper Accepted for Presentation at ISE-OH-SE, January, 2-6, 1991.

De Amitabha and Bhasin H.V. : An Investigation into Assembly Work Station Layout for Repetitive Tasks. Paper accepted for Poster Presentation and Publication at 11th Congress of International Ergonomics Association to be held at Paris, 1991.

Symposium & Seminar Attended and Paper Presented

Non-refereed Paper of Scholastic in Nature:

Ray G.G., De A. and Sen R.N. (1978) : Studies on Workload of Some Agricultural Workers in West Bengal, Proc. of Physiology, 65th Session of ISCA, Ahmedabad, India.

Sen R.N., De A., Ganguli A.K., and D. Chakraborty (1982) : An Ergonomic Assessment of Walking Speed and Selected Physiological Parameters for Work Study Application in Man of Physiology, 69th Session of ISCA. Mysore, India.

De A. and Sen R.N. (1985) : Postures in Paddy Cultivation in India', Paper Presented at M 3 Session of the 9th Congress of the International Ergonomics Association, Bournemouth, U.K. 2nd to 6th September 1985.

Raja S., Unni Krishnan E., and De A. (1986) Problems of Noise in Industry - The Indian Scene, Paper Presented at XXVII National Convention of IIIIE, at NITIE, Bombay, January 31st to Feb. 2nd 1986.

Bhasin H.V., De A., Kothiyal K P: Changing Role of Ergonomics in Industrial Engineering., Proceedings XXX Ann. Conv. IIIIE, April 14-17, 1988, Visakhapatnam, India.

Agarwal S.M., Vipat S.C., Divekar A.Y., Bhasin H.V. and De A. ; Ergonomic Study of an Assembly Workstation in a Light Engineering Industry; Presented in 3rd National Convention of Indian Institution of Production Engineeringng: 25th and 26th November, 1988.

Papers Under Preparation :

1. Working Postures in Rice Cultivation in India.
2. Development of Time Study Rating Scale - in Indian Agriculture - Based on Anthropometric and Physiological Measurements
3. An Investigation into the Grasp Difficulty and Speed and Direction of Movement for Seated Assembly Operators.
4. An Investigation into the Material location and Direction of Movements of Seated Assembly Operators.
5. A Status Paper on the Occupational Health and Ergonomic Problems of Few a Selected Sedentary Jobs in India.
6. A Comparative Socio-economic study of a State Owned Agricultural and a Private Owned Agricultural Farms in India.
7. Development of a Methodology for Recording the Movement of Spine.

Student Project Guidance

A Final FGDIE Project in the area of application of Human Factors in Driver's Work Place of a Fork Lift Truck was carried out. The work involves Design of Seat and Control Panel Layout and Control of Environmental Factors in Sitting Work Place (eg: Heat, Vibration and Noise) - 1987. (Name of the Student : Lt. D. Viswanathan).

Doctoral Student Guidance

Guiding one Doctoral Student. Area of research is "Ergonomic Design of Work Station for a Light Engineering Assembly Jobs for Higher Productivity and Better Occupational Safety and Health". (Name of the Student : H.V. Bhasin).

Institutional Project

A Preliminary Ergonomic Study on Tea-plucking Operation (1980); The study was carried out in collaboration with Tocklai Experimental Station, Jorhat, Assam. The study aimed at work load, work method, environmental load on the workers and the relationships with productivity.

A Preliminary Ergonomic Study on Railway Track Maintenance Staff -with Special Emphasis in Design of Railway Track Tools (1980); The study was partly sponsored by RDSO, Lucknow, Indian Railways. The study aimed at workload, workmethod, worktools and environmental load on the workers and the relationships with productivity.

(Both the studies were carried out under the leadership of Prof. F.N. Sen., Calcutta University).

Consultancy

Completed a consultancy assignment at Larsen and Toubro, Switchgear Division, Powai, Bombay, in the area of Ergonomic Study of Workstation. The work involved Ergonomic Design Audit; modification of Existing work station; to make the work place safe and comfortable to the workers. The study also took into account of environmental factors like Noise pollution, illumination and glare and thermal stress and ventilation - 1987.

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PANJWANI
PS, DOMS, DDV, DIM, FCCP (USA)

PHONE : OFF. : 578 14 01

DIRECT : 578 54 41

LARSEN & TOUBRO LIMITED
POWAI WORKS, BOMBAY 400 072
INDIA

Chief Medical Officer
& HEALTH SERVICES

Date December 12, 1991

A. Wisner
Rve Gay-Lussac
is 75005
nce.

enjoyed the 14/12/91

r Dr. Wisner,

was indeed nice meeting you at the recently concluded
I ACOH at Bangkok. I was very much impressed by your
sentation on ~~X~~Occupational Ergotoxicology in Tropical
ntries' and would appreciate receiving from you a copy of
same at the earliest. HW

h kind regards,

Yours sincerely,

R. C. Panjwani

(DR. R. C. PANJWANI)



DR. A. KHALEQUE
Associate Professor
Department of Psychology,
University of Dhaka

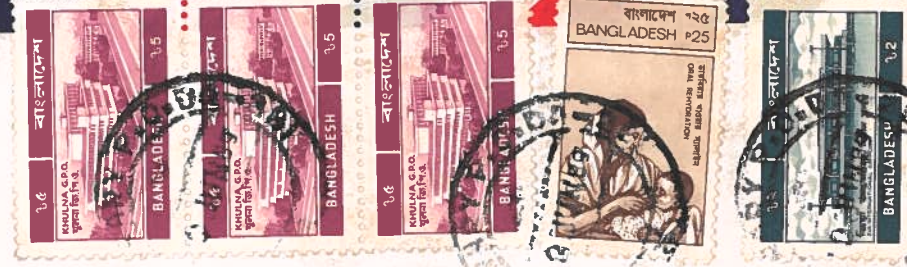
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TEMPORARY P.O. DA-281

Professor A. Wisner
Conservatoire National des Arts et Metiers
Ergonomie et Neurophysiologie du travail
41, Rue Gay-Lussac
75005, Paris
FRANCE



০২৬৫

DR. A. KHALEQUE

B.A. HONS. (DHAKA), M.SC. (Pb.), Ph.D. (LEUVEN, BELGIUM)



DEPARTMENT OF PSYCHOLOGY
UNIVERSITY OF DHAKA
DHAKA-2, BANGLADESH.
PHONE : ~~233439~~ 02-500479

Date June 11, 1989

Professor Dr. A. Wisner
Conservatoire National Des Arts Et Metiers
Ergonomie et Neurophysiologie Du Travail
41, Rue Gay-Lussac, 75005 Paris

Dear Professor Wisner,

Thank you for your letter of 29 May 1989. I agree with your proposal for a few weeks visit to Paris with short visit to Leuven, the Netherland and the United Kingdom to acquaint myself with the current ergonomic research trends in the Western Europe. I think that this academic visit will be very much useful for me.

I hope that it will be possible for you to find some fund for this programme.

With my best personal regards,

Yours sincerely,

A. Khaleque



MINISTÈRE DE L'ÉDUCATION NATIONALE
CONSERVATOIRE NATIONAL DES ARTS ET MÉTIERS

ERGONOMIE ET NEUROPHYSIOLOGIE DU TRAVAIL

Paris, le 29 May 1989

Dr. A. Khaleque
Department of Psychology
University of Dhaka
Dhaka-2
BANGLADESH

Dear Dr. Khaleque:

Thank you very much for your letter of 22 April. I have found our last correspondence in my archives: it dates from five years ago.

I am always very interested in benefitting from your participation in our teaching and research. If it is not too difficult for me to ask you to give a few seminars, it is more difficult for our regular teachers and field researchers, as French people, both students and workers, do not usually speak English. We therefore have to teach and do our research in French, and I am afraid that you might not be sufficiently familiar with our language.

Another question is that I am not sure that I know enough about the current orientations of your research and the type of interests you have for future research directions.

Perhaps the best idea would be for you to visit us for a few weeks, with perhaps a short visit to Leuven, The Netherlands, and the United Kingdom, so that you may confront your own interests with the current research trends in Western Europe.

If you agree, I could try to find some funding for your travel to Paris and a few weeks expenses in Paris.

Hoping that this will be possible, with my best regards, I remain,

Very truly yours,

A. Wisner

DR. A. KHALEQUE

B.A. HONS. (DHAKA), M.SC. (Ph.), Ph.D. (LEUVEN, BELGIUM)



DEPARTMENT OF PSYCHOLOGY
UNIVERSITY OF DHAKA
DHAKA-2, BANGLADESH.
PHONE : ~~02-500479~~ 02-500479

Date April 22, 1989

Prof. A. Wisner
Laboratoire d'Ergonomie
41 rue Gay-Lussac
75005 Paris, France

Dear Professor Wisner,

→? This refers to my previous letter to you (about 2 to 3 years ago) in which I explored the availability of a post-doctoral research fellowship for working with you on 'sociotechnical problems of technology transfer to developing countries'. In reply you expressed interest for it. However, it was not possible for some reasons, perhaps owing to fund limitation.

This time I am requesting you to reconsider my proposal and try to find out some ways and means for it. However, if you still find it difficult, I would request you to forward my curriculum vitae (enclosed) to any of your colleague (preferably in the U.S.A.) who may be interested in this research topic and could help me getting a post-doctoral fellowship for this work.

With best personal regards.

Yours sincerely,

A. Khaleque

June 1986!

CURRICULUM VITAE OF DR. A. KHALEQUE

Name : A. Khaleque

Place of birth : Patuakhali, Bangladesh

Date of birth : 12th April, 1946

Academic career. : Doctorate in Psychology from the Catholic University of Leuven (Leuven, Belgium), 1981.
M.Sc. in Applied Psychology from the University of the Punjab (Lahore, Pakistan), 1968.
B.A. Honours in Philosophy from the University of Dhaka (Dhaka, Bangladesh), 1966.
Diploma in French Language from the Catholic Institute of Paris (Paris, France), 1977.

Scholarship and Fellowship : Undergraduate Scholarship at the Department of Philosophy, University of Dhaka, 1963-1966.
Pakistan Council Fellowship at the Department of Applied Psychology, University of the Panjab, 1966-68.
Research Fellowship at the Department of Psychology University of Dhaka, 1969-1971.
Doctoral Research Fellowship at the Department of Psychology, Catholic University of Leuven, 1976-79.

Positions held : Lecturer in Psychology, University of Dhaka, 1972-75.
Assistant Professor of Psychology, University of Dhaka, 1975-1980.
Associate Professor of Psychology, University of Dhaka, 1980.
Visiting Lecturer, Department of Psychology, University of Otago, Dunedin, New Zealand, September-November, 1985.

Present position : Associate Professor of Psychology, University of Dhaka.

- Research interests : Speed skill in short-cycled repetitive work, anthropotechnology, work load, occupational stress and strain, shift work, job satisfaction, quality of working life, organizational conflict and decision making, health and well-being of working women.
- Participation in international conferences : Human Engineering Training Course, Utrecht, the Netherlands, May 3 - 7, 1976.
- International Ergonomics Association Conference, London, U.K., September, 1977.
- NATO conference on "Changes in the Nature and Quality of Working Life", Thessaloniki, Greece, August 20 - 24, 1979.
- 7th Congress of the International Ergonomics Association, Warsaw, Poland, August 27-31, 1979.
 - 5th International Symposium on Night and Shift Work, Rouen, France, May 12-16, 1980
 - 20th Congress of the International Association of Applied Psychology, Edinburgh, U.K., July 25-31, 1982.
 - 9th Congress of the International Ergonomics Association, Tokyo, Japan, August 23-27, 1982.
 - 6th International Symposium on Night and Shift Work, Kyoto, Japan, August 30 to September 1, 1982.
 - 3rd Asian Regional Conference of the International Association for Cross-cultural Psychology, Bangi, Malaysia, May 2-5, 1983.
 - 20th Annual Conference of the Indian Association of Applied Psychology, Hyderabad, India, 1983.
 - International Conference on Occupational Ergonomics, Toronto, Canada, May 7-9, 1984.
 - 1st International Symposium on Human Factors in Organizational Design and Management, Honolulu, Hawaii, U.S.A., August 20-24, 1984.
 - Indian Psychological Association Conference, Bodh Gaya, India, October 16-18, 1984.
 - 9th Congress of the International Ergonomics Association, Bournemouth, England, September 2-6, 1985.
 - 1st Asian Conference on Behavioural Toxicology & Clinical Psychology, Kanpur, India, January 9-11, 1987.
 - International Symposium on Social Values and Effective Organizations, Taipei, China, November 26-30, 1988.

Research publications:

1. Academic motivation and educational achievement of University students. The Dhaka University Journal of Psychology, 1972, 2, 7-16.
2. The estimation of time in darkness. The Dhaka University Studies, 1973, vol. XXI(part 1), 165-171.
3. Work incentives in socialist economy. The Business Review, 1973, vol. 21, 165-169.
4. Effects of fatigue on speed and accuracy in psychomotor performance. The Dhaka University Journal of Psychology, 1973, 3, 9-15.
5. The validity of questionnaire method as a measure of achievement motivation. The Dhaka University Journal of Psychology, 1974, 4, 1-4.
6. Differential effects of flickering and steady light on perceptual motor performance. The Dhaka University Studies, 1974, vol. XXII, 135-138.
7. Effects of continuous and intermittent noises on hand steadiness. The Dhaka University Studies, 1974, Vol. XXII, 123-128.
8. Depressive reaction patterns of physically normal and crippled freedom fighters. The Bangladesh Journal of Psychology, 1975, 3, 9-13.
9. Employee participation in decision making facilitates the development of motivation. Proceedings, Motivation and Industrial Productivity, 1975, 25-30.
10. Speed-accuracy relationship in perceptual motor performance. The Dhaka University Journal of Psychology, 1975, 5, 1-5.
11. (with M.R. Ali & A.U. Sardar). Achievement motivation, knowledge of results and performance. The Bangladesh Journal of Psychology, 1976, 4, 51-55.
12. Performance and Job Satisfaction in Short-cycled Repetitive Work. Ergonomics, 1977, 20, 574.
13. Performance and strain in short-cycled repetitive work. Proceedings of the NATO Conference on the "Changes in the Nature and Quality of Working Life". Thessaloniki, Greece, August 20-27, 1979.
14. Machine stoppages patterns in short-cycled repetitive work. Proceedings of the 7th Congress of the International Ergonomics Association, Warsaw, Poland, August 27-31, 1979.
15. Performance, job satisfaction and absenteeism in repetitive work. The Dhaka University Journal of Psychology, 1980, 10, 17-22.

16. Machine stoppage patterns in short-cycled repetitive work. The Bangladesh Journal of Psychology, 1980, 6, 67-94.
17. Job satisfaction, perceived effort and heart rate in light industrial work. Ergonomics, 1981, 24, 735-742.
18. Performance and strain in short-cycled repetitive work. International Archives of Occupational and Environmental Health, 1981, 48, 309-317.
19. (with M.R. Ali and M.A. Rahman) Intergroup conflicts in industry. Managerial Psychology, 1981, 2, 61-78.
20. Speed skill in short cycled repetitive work. Proceedings of the 8th Congress of the International Ergonomics Association, Tokyo, Japan, 1982.
21. (with M.R. Ali, M.A. Rahman and R. Humbulo). Intergroup conflicts in Industry: A cross-cultural study. Proceedings of the 20th Congress of the International Association of Applied Psychology, Edinburgh, U.K., 1982.
22. (with M.A. Rahman). Perceived importance of job facets and overall job satisfaction of industrial workers. Proceedings of the 20th Conference of the Indian Association of Applied Psychology, Hyderabad, India, 1983.
23. (with N. Choudhury). Perceived importance of job facets and overall job satisfaction of top and bottom levels industrial managers. Proceedings of the 3rd Asian Regional Conference of International Association of cross-cultural Psychology, Bangi, Malaysia, 1983.
24. (with M.A. Rahman). Health problems of industrial shift workers. The Dhaka University Journal of Psychology, 1983, 13, 33, 331-37.
25. Occupational stress, job attitudes and mental health of industrial managers. Proceedings of the Indian Psychological Association conference, Bodh Gaya, India, 1984.
26. Machine pacing, speed skill and time loss in short cycled repetitive work. Proceedings of the International Conference on Occupational Ergonomics. Toronto, Canada, 1984.
27. (with N. Wadud). Perceived importance of job facets and overall job satisfaction of industrial supervisors. International Review of Applied Psychology, 1984, 33, 395-411.
28. (with A.B. Siddique). Job satisfaction and quality of life in shift work. Proceedings of the International Conference on Occupational Ergonomics. Toronto, Canada, 1984.

29. (with M.A. Rahman). Shift workers' attitudes towards shift work and perception of quality of life. *International Archives of Occupational and Environmental Health*, 1984, 53, 291-297.
30. (with N. Choudhury). Job facets and overall job satisfaction of industrial managers. *Indian Journal of Industrial Relations*, 1984, 20, 55-64.
31. Visual stress and occupational strain. *The Dhaka University Journal of Psychology*, 1984, 14, 1-7.
32. Circadian rhythms in heart rate of shift and day workers. *Journal of Human Ergology*, 1984, 13, 23-29.
33. Job attitudes, mental health and well-being of shift workers. *Proceedings of the 11th Asian Conference on Occupational Health*. Manila, 1985.
34. Occupational stress: Its sources and effects as perceived by industrial managers. *The Bangladesh Journal of Psychology*, 1985, 8, 83-91.
35. (with N. Wadud and M. Chowdhury). Work attitudes, stress and mental health of employed mothers. *Proceedings of the 2nd Women and Work Conference*, Nottingham, U.K., 1986.
36. (with S.A. Jahan). Job satisfaction, mental health and life description of working women. *Indian Journal of Industrial Relations*, 1986, 21, 473-478.
37. Workers' perception of assembly work design and quality of working life. *Journal of Human Ergology*, 1987, vol.16 (in press).
38. (with M.A. Rahman). Perceived importance of job facets and overall job satisfaction of industrial workers. *Human Relations*, 40, 1987.
39. (with N. Wadud and M. Chowdhury). Work attitudes, strain and mental health of employed mothers in Bangladesh. *Work and Stress*, 1988, 2, 41-47.

Chapters in edited books:

1. Performance and job satisfaction in short-cycle repetitive work. In R.G. Sell and P. Shipley (Eds.), *Satisfactions in Work Design: Ergonomics and Other Approaches*. Taylor & Francis, London, 1979.
2. (with P. Verhaegen). Circadian effects in short-cycled repetitive work in a two shift system. In A. Reinberg, N. Vieux, and P. Andlauer (Eds.), *Night and Shift work. Biological and Social Aspects*. Pergamon Press, Oxford, 1981.

3. (with M.A. Rahman). Sleep disturbances and health complaints of shift workers. In K. Kogi, T. Miura, and H. Saito (Eds.), *Shift work: Its Practice and Improvement*. Center for Academic Publication, Tokyo, Japan, 1984.
4. (with M.R. Ali, M.A. Rahman, and R. Humbulo). A cross-cultural study of intergroup conflicts in industry and its implications for job design and quality of working life. In H.W. Hendrick and O. Brown (Eds.), *Human Factors in Organizational Design and Management*. North Holland Publishing Co., Amsterdam, 1984.
5. Occupational Stress, job satisfaction and mental health of industrial managers. In I.D. Brown, R. Goldsmith, K. Coombes, and M.A. Sinclair (Eds.), *Ergonomics International '85*. Taylor & Francis, London, 1985.

Books written:

1. *Job Satisfaction and Work in Industry: Three Case Studies in Bangladesh*. Publisher: University of Dhaka, Dhaka, 1984.
2. *Industrial Psychology (a text book in Bengali)*. Publisher: University of Dhaka, Dhaka, 1985.
3. (with M.A. Rahman & M. Rahman). *Ergonomics (a text book in Bengali)*. Publisher: Bengali Academy, Dhaka, 1988.
4. (with M.A. Rahman & N.R. Sorcar). *Research Methodology in Social Science*. Publisher: Bengali Academy, Dhaka, 1988.

Journal Editing:

1. Co-editor, *The Bangladesh Journal of Psychology*.
2. Co-editor, *The Dhaka University Journal of Psychology*.
3. Reviewer, *Human Relations*, Tavistock Institute, London.

Membership of learned societies:

- Member of the Bangladesh Psychological Association.
- Member of the International Association of Applied Psychology.
- Member of the South-East Asian Ergonomics Society.
- Member of the Human Factors Society.

Countries visited:

Belgium, France, Greece, India, Italy, Luxembourg, the Netherlands, New Zealand, Pakistan, Poland, Singapore, Switzerland, West Germany, and the United Kingdom, Hong Kong, Thailand and China.

July 30th 1964

Dr A. KHALEQUE
Department of Psychology
University of Dhaka
Dhaka-2, Bangladesh

Dear Dr Khaleque,

I have found your letter after my return from holidays and before leaving France for U.S.A. where I hope to meet you in Honolulu;

I have read with high interest your list of publications and I would like very much to receive some of your reprints. It would be useful both for me and for my students in antropotechnology (human factors in transfer of technology).

I hope that SEAES will be very successful. As you have seen perhaps, I am one of the founding members though I am only a friend and not a member of South East Asia Countries.

I will study in September your interesting proposal to stay some time in our lab for a post doctoral research fellowship. There are many problems before we succeed but I am ready to try seriously.

Thank you again for your kind letter.

Truly yours.

A. Wisner

DR. A. KHALEQUE

B.A. HONS. (DHAKA), M.SC. (Pb.), Ph.D. (LEUVEN, BELGIUM)



DEPARTMENT OF PSYCHOLOGY
UNIVERSITY OF DHAKA
DHAKA-2, BANGLADESH.
PHONE : 233138

Date June 22, 1984

Prof. A. Wisner
Laboratoire de Physiologie du Travail
et d'Ergonomie
41, rue Gay-Lussac
75005 Paris, France

Dear Prof. Wisner,

Thank you for including my name in the list of I.E.A. specialists to help in organizing the congress of ergonomics in developing countries. I shall try, in my own humble way, to do whatever is possible for me in this respect. I am connected with the founding of the South East Asian Ergonomics Society (SEAES). I have already written a letter to Dr. Manuaba (Secretary to the Promoters of SEAES) in Indonesia urging him that SEAES should take active part in organizing this congress.

Now I like to draw your attention to a research proposal. I am exploring the availability of a post doctoral research fellowship in your Laboratory to work with you on any of the following areas:

1. Technology transfer and socio-technical problems in developing countries.
2. The impacts of technology transfer on occupational health and quality of working life in developing countries.
3. Positive and negative effects of total and partial technology transfer.

DR. A. KHALEQUE

B.A. HONS. (DHAKA), M.SC. (Pb.), Ph.D. (LEUVEN, BELGIUM)



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DEPARTMENT OF PSYCHOLOGY
UNIVERSITY OF DHAKA
DHAKA-2, BANGLADESH.
PHONE : 233138

Date _____

4. Information and training needs for choice of technology and improving working conditions and occupational health.
5. The problems of technology assimilation and development of indigenous technology in developing countries.

However, the final selection of a specific research problem, a detailed programme and a time schedule for it could be ^{made} in consultation with you harmonizing with your research interests and activities.

I am enclosing a copy of my curriculum vitae for your kind consideration and necessary action.

I like to add here that I have two special reasons to prefer your Laboratory for research work:

- 1) to get myself acquainted with the latest methods and techniques of assessing socio-technical problems of technology transfer, and occupational health and quality of working life in which you are one of the well-known specialists; and
- 2) to relearn a little bit of French (it may be mentioned here that I obtained a diploma in French language from the Catholic Institute of Paris, and also from the Catholic University of Leuven), which I am forgetting day by day owing to lack of practice. But I do not like to forget this internationally important language.

With best personal regards,

Yours sincerely,


(Dr. A. Khaleque)

CURRICULUM VITAE

- Name : A. Khaleque
- Date of birth : 12th April, 1946. 38 yrs
- Place of birth : Patuakhali, Bangladesh.
- Postal address : Department of Psychology, University of Dhaka, Dhaka-2, Bangladesh.
- Academic career : Ph.D. in Psychology from the Catholic University of Leuven (Leuven, Belgium) in 1979.
- M.Sc. in Applied Psychology from the University of the Punjab (Lahore, Pakistan) in 1968.
- B.A. Honours in Philosophy from the University of Dhaka (Dhaka, Bangladesh) in 1966.
- Diploma in French Language from the Catholic Institute of Paris, 1977.
- Scholarship and Fellowship : Under Graduate Scholarship at the Department of Philosophy, University of Dhaka from 1963-1966.
- Pakistan Council Fellowship at the Department of Applied Psychology, University of the Punjab from 1966-1968.
- Research Fellowship at the Department of Psychology, University of Dhaka from 1969-1971.
- Doctoral Research Fellowship at the Department of Psychology, Catholic University of Leuven, Leuven, Belgium, from 1976-1979.
- Positions held : Research Fellow at the Department of Psychology, University of Dhaka from 1969-1971.
- Lecturer in Psychology, University of Dhaka from 1972-1975.
- Assistant Professor of Psychology, University of Dhaka from 1975-1980.
- Doctoral Research Fellow in Ergonomics at the Department of Psychology, Catholic University of Leuven (Leuven, Belgium) from 1976-1979.
- Present position : Associate Professor of Psychology, University of Dhaka, (Dhaka-2, Bangladesh) from 1980

Membership in Learned Societies:

- Member of the Bangladesh Psychological Association.
- Member of the Human Factors Society.
- Member of the International Ergonomics Association.
- Member of the International Association of Applied Psychology.

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Research interests : Speed skill in short-cycled repetitive work, workload, occupational stress & strain, problems of shift work, job satisfaction, quality of working life, organizational conflict and decision making.

Participation in International Conferences, Seminars and Symposia:

- Human Engineering Training Course, held in Utrecht, the Netherlands, May 3-7, 1976.
- International Ergonomics Association Conference on "Job Satisfaction", held in London, U.K., September, 1977.
- NATO conference on "Changes in the Nature and Quality of Working Life," held at Thessaloniki, Greece, August 20-24, 1979.
- 7th Congress of the International Ergonomics Association, held in Warsaw, Poland, August 27-31, 1979.
- 5th International Symposium on Night and Shift Work, held in Rouen, France, May 12-16, 1980.
- 20th Congress of the International Association of Applied Psychology, held in Edinburgh, U.K., July 25-31, 1982.
- 8th Congress of the International Ergonomics Associations, held in Tokyo, Japan, August 23-27, 1982.
- 6th International Symposium on Night and Shift Work, held in Kyoto, Japan, August 30 - September 1, 1982.
- 3rd Asian Regional Conference of the International Association for Cross-Cultural Psychology, Bangi, Malaysia, May 2-5, 1983.
- 20th Annual Conference of the Indian Association of Applied Psychology, Hyderabad, India, 1983.
- International Conference on Occupational Ergonomics, Toronto, Canada, May 7-9, 1984.
- First International Symposium on Human Factors in Organizational Design and Management, Honolulu, Hawaii, U.S.A., August 20-24, 1984 (invited to participate).

Countries visited : Belgium, France, Greece, India, Italy, Luxembourg, Netherlands, Pakistan, Poland, Switzerland, West-Germany, and U.K.

LIST OF RESEARCH PUBLICATIONS

Publications in international journals:

3. Machine stoppages patterns in short-cycle repetitive work. Proceedings of the 7th Congress of the International Ergonomics Association, Warsaw, Poland, August 27-31, 1979.
4. Performance and job satisfaction in short-cycle repetitive work. In *Satisfactions in Work Design: Ergonomics and Other Approaches*. (Eds. R.G. Sell P. Shipley), Taylor and Francis, London, 1979.
5. Job satisfaction, perceived effort and heart rate in light industrial work. *Ergonomics*, 1981, 24, 735-742.
6. Circadian effects in short-cycled repetitive work in a two shift system, In *Night and Shift Work: Biological and Social Aspects*. (Eds. A. Reinberg, N. Vieux and P. Andlauer), Pergamon Press, Oxford, 1981.
7. Performance and strain in short-cycled repetitive work, *International Archives of Occupational and Environmental Health*, 1981, 48, 309-317.
8. Inter-group conflict in industry as perceived by top and bottom managements. *Managerial Psychology*, 1981, 2, 61-78.
9. Intergroup conflict in industry: A cross-cultural study. Proceedings of the 20th Congress of the International Association of Applied Psychology, Edinburgh, U.K., 1982, p.305.
10. Speed skill in short cycle repetitive work. Proceedings of the 8th Congress of the International Ergonomics Association, Tokyo, Japan, 1982, pp. 172-173.
11. Sleep disturbances and health complaints of shift workers. In *Shiftwork: Its Practice and Improvement*. (Eds. K. Kogi, T. Miura, and H. Saito), Center for Academic Publications, Tokyo, Japan, 1982.
12. Perceived importance of job facets and overall job satisfaction of industrial workers. Proceedings of the 20th Annual Conference of Indian Association of Applied Psychology, Hyderabad, India, 1983.
13. Perceived importance of job facets and overall job satisfaction of top and bottom levels industrial managers. Proceedings of the 3rd Asian Regional Conference of International Association for Cross-Cultural Psychology, Bangi, Malaysia, 1983, pp.77-79.
14. Machine pacing, speed-skill, and time loss in short-cycle repetitive work. Proceedings of the International Conference on Occupational Ergonomics, Toronto, Canada, 1984.
15. Perceived importance of job facets and overall job satisfaction of industrial supervisors. *International Review of Applied Psychology*, 1984, vol. 33, 395-411.
16. Job satisfaction and quality of life in shift work. Proceedings of the International Conference on Occupational Ergonomics, Toronto, Canada, 1984.

Publications in national journals:

1. Academic motivation and educational achievement of university students. The Dhaka University Journal of Psychology, 1972, 2, 7-16.
2. The estimation of time in darkness. The Dhaka University Studies, 1973, vol. XXI (part A), 165-171.
3. Work incentives in socialist economy. The Business Review, 1973, Jan-April, 22-31.
4. Effects of fatigue on speed and accuracy in psychomotor performance. The Dhaka University Journal of Psychology, 1973, 3, 9-15.
5. The validity of questionnaire method as a measure of achievement motivation. The Dhaka University Journal of Psychology, 1974, 4, 1-4.
6. Differential effects of flickering and steady light on perceptual motor performance. The Dhaka University Studies, 1974, vol. XXII (part B), 135-138.
7. Effects of continuous and intermittent noises on hand steadiness. The Dhaka University Studies, 1974, part A XXII(1), 123-128.
8. Depressive reaction patterns of physically normal and crippled freedom fighters. The Bangladesh Journal of Psychology, 1975, 3, 9-13.
9. Employee participation in decision making facilitates the development of motivation. Proceedings, Motivation and Industrial Productivity, 1975, 25-30.
10. Speed-accuracy relationship in perceptual motor performance. The Dhaka University Journal of Psychology, 1975, 5, 1-5.
11. Achievement motivation, knowledge of result and performance. The Bangladesh Journal of Psychology, 1976, 4, 51-55.
12. Machine stoppage patterns in short cycle repetitive work. The Bangladesh Journal of Psychology, 1980, 6, 67-94.
13. Performance, job satisfaction and absenteeism in repetitive work. The Dhaka University Journal of Psychology, 1980, 10, 17-22.
14. Health problems of industrial shift workers. The Dhaka University Journal of Psychology, 1983, 13, 31-37.
15. Visual stress and occupational strain. The Dhaka University Journal of Psychology, 1984, vol. 14.

Papers accepted for publication:

1. Perceived importance of job facets and overall job satisfaction of top and bottom levels industrial managers. Indian Journal Industrial Relations, 1984.

Papers submitted for publication:

1. Circadian rhythms in heart rate of shift and day workers. Journal of Human Ergology, Center for Academic Publications, Tokyo, Japan.
2. Perceived importance of job facets and overall job satisfaction of industrial workers. International Review of Applied Psychology, Sage Publications, London, U.K.

Research in progress:

1. Psycho-social problems of shift workers.
2. Job satisfaction and job behaviour of shift workers.
3. Diurnal and seasonal effects on sleep duration of shift workers.
4. Shift work and occupational stress.
5. Work schedule and job stress of career women.

Supervision of research works of students:

- Guided a number of dissertations of Master Degree students.
- Presently supervising the dissertations of a Master Degree and a Ph.D. students.
- Supervising the research works of two Research Fellows of the Science and Technology Division, President's Secretariat, Government of Bangladesh.

Journal Editing:

- Co-editor, The Bangladesh Journal of Psychology.
- Co-editor, The Dhaka University Journal of Psychology.

Books written:

1. Contributed a chapter in the book entitled "Satisfactions in Work Design: Ergonomics and Other Approaches". Edited by R.G. Sell and P. Shipley. Publisher: Taylor and Francis, London, 1979.
2. Contributed a chapter in the book entitled "Night and Shift Work: Biological and Social Aspects". Edited by A. Reinberg, N. Vieux and P. Andlauer. Publisher : Pergamon Press, Oxford, 1981.
3. Contributed a chapter in the book entitled "Shiftwork: Its Practice and Improvement". Publisher: Center for Academic Publications, Tokyo, 1982.
4. Job Satisfaction and Work in Industry (Accepted for publication by the University of Dhaka).
5. Industrial Psychology (a text book in Bengali, submitted to Dhaka University for publication).

23rd May, 1986

Dear Mr Registrar,

I am sending you, under the same cover my examiner's report on the thesis (Ph. D.(Sc)) of M. Sri Asis Goswami. As you shall observe, my opinion is highly positive.

With my best regards.

Yours sincerely.

A. Wisner

Professor at CONSERVATOIRE NATIONAL
DES ARTS ET METIERS - PARIS.



Ph D. EXAMINATION

EXAMINER'S REPORT FROM.....Alain WISNER.....

Name of the Candidate.....MR SRI ASIS GOSWAMI.....

Subject.....

Title of Thesis...B.I.O.ENGINEERING / ERGONOMICS EVALUATION OF DIFFERENT TYPES OF MOBILITY AIDS FOR LOWER EXTREMITY

I recommend*/~~recommend~~ subject to fulfilment of ^{HANDICAPPED} ~~following~~ conditions*/~~do not recommend~~* the thesis for the award of the Ph.D. Degree of the University of Calcutta.

Date....20...MAY...1986

Signature of the Examiner

(*Please delete the portions inapplicable)

COMMENTS OF THE EXAMINER : Alain Wisner, M.D., Sc.D. (Physiol.) Psychol Dipl. Professor of Ergonomics and Work Neurophysiology Conservatoire National des Arts et Métiers (Paris).

The thesis submitted by Mr Sri Asis Goswami demonstrates clearly the scientific value of its author and I fully recommend on this basis the attribution of the title of Ph. D. (Sc) of the University of Calcutta to Mr Sri Asis Goswami.

I have been highly interested by the text of this thesis as a physiologist and as an ergonomist. I would like first to stress the broadness and the adequation of the bibliography. As a professional scientist, I appreciate this rare quality. The analysis of the litterature gives both an excellent view of the current litterature published in industrialized countries and a description of the important researches performed in India.

All the results are very convincing : we have precise descriptions of the experimental situation, of the measures taken and of the population studied. It is easy to realize then how difficult it has been to obtain rather numerous and very good samples of the population using the different aids studied.

(... see p. 2)

Date 20th MAY 1986

Mr Sri Asis Goswami

The anthropometric measurements of handicapped people are rather unique in the literature and are by themselves very illuminating. The thesis gives also excellent proofs of the relations between the oxygen consumption and the weight of muscles in action but it shows also precisely how narrow are the limits of this "normal" activity in relation with the limited oxygen fixation. All these experiments give an excellent physiological basis to understand the cardiac decompensation observed too often among handicapped persons using badly designed aids.

The biomechanical considerations developed by Mr Sri Asis Goswami are also very well established. The author shows clearly how a detail in the design of a chair can produce extremely dangerous effects. For an engineer, it is a question of centimeters; for the handicapped person, it is a question of survival.

From the cardiorespiratory limitations of the handicapped person to the correct design of the chair, each step of the demonstration is correct and convincing. It is rare to find such a clear relation between physiological and biomechanical considerations and the design of material.

I would like also to give a very special appreciation about the excellent choice of the thesis subject. Very few good research is done in the world on the ergonomics of handicapped people and, when it is done, it is usually related to some commercial product of which the price is so high that it is of limited use even in rich countries. Here, we have excellent and clear recommendations that can be applied easily to the hundreds of thousands of lower extremity handicapped persons using simple and cheap aids. This diffusion is possible because of the scientific basis of the recommendations, so clearly given and described.

As it is written at the beginning of this report, Mr Sri Asis Goswami is really worthy of being recognized as Ph. D. (Sc) of the University of Calcutta and a very distinguished workphysiologist, bioengineer and ergonomist.

hauteur exam du noy

Par d'usage du données

Mauvaise p.e.

Normal subjects
beginners

beginners	26	164	46
beginners	23,7	165	54
parties beginners	27,9	163	49,4

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beginners 58%

beginners
54
73

par FC par par 1/2

Amplitude

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167

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7 cells)

2,78

166

52

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CALCUTTA UNIVERSITY

Extract from the University Regulations

Chapter XXXIII-A

DOCTOR OF PHILOSOPHY IN ARTS AND

SCIENCE (Ph.D.)

1. Any Master of Arts and Science or Master of Science (Tech.) of the University of Calcutta, or (subject to the sanction of the Syndicate) any Master of Arts or Science or Master of Science (Tech.) of any other University recognised by this University for this purpose, may apply to the Registrar for registration for the Ph.D. degree in the subject within the purview of the Regulations in which he has obtained the degree of Master of Arts or Science, as the case may be, or in an allied subject.

2. The applicant shall state in the application for registration his qualifications and indicate the subject which he proposes to investigate. The application must be supported by a certificate in a form to be prescribed by the Syndicate from a teacher recognised by the University for this purpose, under whose guidance he intends to carry out the work. The Syndicate may exempt a candidate from production of the certificate in special cases.

3. Every application shall be placed before a Ph.D. Degree Committee consisting of the Vice-Chancellor, the Dean of the Faculty concerned, Head of the Department in the particular subject, and two experts in the subject to be appointed by the Syndicate in consultation with the relevant Executive Committee. The Syndicate will grant the application for registration for the Ph.D. degree after considering the recommendation of the said Ph. D. Degree Committee.

4. On his application being granted by the Syndicate the applicant shall be registered and shall work for two years under a teacher recognised by the University for the purpose and prepare a thesis for the degree. He may, not later than one year after his registration, be permitted to change the

subject or scope of his research with the approval of the Ph.D. Degree Committee.

5. The candidate for the Ph.D. degree shall submit three type-written or printed copies of his thesis embodying the results of research and affording evidence of originality shown by him by the discovery of new facts or by a critical survey of facts or relations between facts discovered by others.

The candidate must produce along with the thesis a certificate from the teacher under whom he has worked, stating that he has fulfilled the requirements of the Regulations relating to the nature and prescribed period of research work.

Notwithstanding anything contained above, the Syndicate may, in special cases, after considering the recommendation of the Ph.D. Degree Committee, permit a candidate for the Ph.D. degree to submit a thesis prepared independently or under the guidance of a person having special knowledge in the subject or under the guidance of one of the University teachers recognised above provided that the candidate concerned has carried on research work for a period of at least two years after he has passed the M.A. or M.Sc. Examination. The candidate shall for this purpose submit an application to the Registrar which shall not be entertained unless two Doctors in any Faculty or two members of the Faculty concerned of this University or unless two members of the relevant Council of Post-Graduate Teaching of this University have testified to the satisfaction of the Syndicate that in habits and character the candidate is a fit and proper person for the Ph.D. degree. After the permission to present the thesis for the Ph.D. degree has been granted by the Syndicate the candidate shall be enrolled as a candidate for the Ph.D. degree in a register for such candidates.

6. The candidate may also submit in support of his thesis the contents of any work he may have previously published but he shall not submit as his thesis any work for which a Degree of Distinction has been conferred on him in this or any other University. He will not, however, be precluded from incorporating any such work in a thesis covering a wider field, provided he indicates in a written statement the work so incorporated.

7. Every candidate shall forward with his thesis a fee of Rs. 200. No candidate who fails to pass or present himself for examination shall be entitled to claim a refund of his fee.

8. After considering the recommendation of the Ph.D. Degree Committee, the Syndicate shall refer the thesis to a Board of three Examiners including the teacher, if any, under whom the candidate has worked.

If the thesis is approved by the Board of Examiners, they will furnish the Syndicate with a report indicating in what respects the thesis affords evidence of originality.

9. After the thesis has been approved by the Board of Examiners, the candidate shall be asked to appear at an oral examination, and also in the case of a Science subject at an oral or a practical examination or both, in respect of the subject of his thesis to be held by at least two Examiners of whom the teacher, if any, under whom he worked will ordinarily be one.

The Examiners may also ask questions beyond the subject of the thesis in order to satisfy themselves that the candidate has adequate knowledge of the particular branch of Arts or Science on which he has submitted his thesis.

10. If the Examiners are satisfied with the oral or/and practical examination, they shall submit a report to the Syndicate approving the work of the candidate.

If the candidate fails to satisfy the Examiners at the oral or/and practical examination, the Syndicate may on the recommendation of the Examiners, permit him to appear again at the oral or/and practical examination after six months but within a period not exceeding one year following the date of his failure. The fee on re-entry shall be half the fee originally paid.

11. If the Syndicate, after considering the report of the Examiners, are satisfied that the candidate is worthy of the Degree of Ph.D., they shall cause his name to be published with the title of the subject of his thesis.

12. A diploma under the seal of the University and signed by the Vice-Chancellor will be given to each successful candidate at the next Convocation held for conferring degrees.

13. Notwithstanding anything contained in the above Regulations, if the thesis of a candidate, originally presented

for admission to the D.Litt. or D.Sc. degree under the provisions of Chapters XXXIV and XXXIII, respectively, is not recommended by the Board of Examiners concerned, but is on the other hand adjudged by them to be of sufficient merit to justify his admission to the Ph.D. degree, the thesis shall, if the candidate so elects, be deemed to be a thesis presented and approved for the Ph.D. degree for the purpose of Sections 8 and 9 above. Such a candidate shall, unless specially exempted by the Syndicate on the recommendation of the Board of Examiners, be asked to appear at an oral or/and practical examination, as the case may be, to be conducted by a Board of Examiners to be specially constituted by the Syndicate for the purpose. The Examiners may ask questions beyond the range of the subject of the thesis.

The provision of Sections 10, 11 and 12 will apply to these candidates.

N.B.—Ph.D. Registration fee—Rs. 50.

Last dates for submission of applications of the thesis—

31st January,

30th April,

31st July,

15th November,

S.C.U.P. —31R—312.85—5,000.

No. 2557

/Ph.D.(Sc.)
D.Sc./D.Litt.

(When replying please quote
Number, Date and Subject)

UNIVERSITY OF CALCUTTA

SENATE HOUSE
Calcutta-73

Prof. A. Wisner.

The 14.2.86.....INDIA:198 .

Dear Sir/Madam,

Kindly refer to your letter, dated

I am sending herewith, for favour of your adjudication and report,
a copy of the thesis submitted by the undernoted candidate for the Ph.D.
(Sc.) ~~D.Sc./D.Litt.~~ degree of this University in **Physiology.**

Either you may examine the thesis in consultation with your
colleagues and forward a join report to this University or you may forward
your individual opinion about the merit of the thesis, stating
definitely whether you commend the thesis for the award of the degree or not.
Your report may kindly be sent, through the medium of English language, to
this office together with the copy of the thesis within three months or
earlier, if possible. Your kind attention is specially invited to
Rule 13 in the enclosed extract from the Regulations.
Rule 8 & 9

I am to state, in this connection, that the University of Calcutta
has instituted two Doctorate Degrees of different standards - Ph.D.(Arts/
Science/Medical/Agriculture/Engineering/Veterinary Science/Law/Technology)
being the lower degree and the D.Litt or D.Sc. being the higher, just as
they obtain in some British or Foreign Universities.

Yours faithfully,

J. Mukhopadhyay

Registrar.

Name of the Candidate : Sri Asis Goswami, M.Sc., Class-II.

Title of the thesis : "Bioengineering/Ergonomic Evaluation of different
types of Mobility Aids for lower Externily
Handicapped"

Constitution of the Board of Examiners :

- 1) Prof. A. Wisner.
- 2) Prof. E. Unni Krishnan,
- 3) Dr. Siddhartha Ganguly(Int).

Enclosures : 1) One copy of the thesis
2) An extract from the Regulations.
3) A remuneration Bill.

CALCUTTA UNIVERSITY

Report received
Pay remuneration

Assistant Registrar.



Name of the Examiner—Prof./Dr./Sri A. Misra

Voucher No.....

Rem. Reg. Page.....

Cheque No.....

Calcutta University..... **Dr.**

To

My remuneration as Examiner in connection with the Ph.D. (Se), ~~D.Sc., D.Litt.~~
thesis Examination of 1966.

(Candidate—Sri/Smt. Asis Golmari)

Rupees (Rs. 200), Three Hundred only

*Signature.....

Received payment.

Official Designation.....

*Twenty P.
Revenue Stamp
for payment
exceeding
Rs. 20

Present Address (in block letters).....

N.B.—The payee is requested to sign in both the places marked*.

PARIS

(FOR USE IN THE AUDIT AND FINANCE OFFICE)

Amount of the Bill.....Rs.....

Debit :—

Budget head—B. I. No. 19 (d)

Remuneration to Examiners, Ph.D.,

D.Sc., D.Litt., etc.

TOTAL

Credit.....

Net Amount

Amount		Ledger Folio	Balance of Grant		Initial of Checking Assistant
Rs.	P.		Rs.	P.	

Checked and passed for payment of Rs. P. (Rupees)

.....(Rupees) only.

Audit Assistant.

Checking Assistant.

Accountant.

Pay

Date, 1966

Accounts Officer,

(P.T.O.)

Instructions

1. The bill, which has been prepared in the Registrar's Office, is forwarded to the payee, with the request that he will present it at the Registrar's Office, either personally or through a messenger, after having duly stamped and signed it. After the bill is passed and the cheque is ready for payment an intimation card will be sent to the Examiner, Paper-Setter or Scrutiniser concerned. If there is any objection in signing the receipt in advance, it need not be done, but in such a case, the payee should call at the Registrar's Office on receipt of the intimation card to receive payment and sign the receipt. In no case payment will be made unless a receipt is given at the same time. The bill should always be signed, though it need not necessarily, be receipted, before it is presented.

Note.—Gentlemen not residing in Calcutta should sign the bill and the receipt, and return the same to the Registrar who will remit the amount by money order after deducting the commission as soon as possible after receipt of the bill.

2. Examiners are requested to state their designations below their signatures. Government Officers (excepting Officers of the Education Department of the Government of West Bengal) are requested to note their official designations and to furnish the permission letter from the competent authority, along with the bill.

3. The spaces provided for the purpose, viz., for signature, official designation and address, may please be filled in before the bill submitted to the University for payment.

4. Under the rules all payments to the persons residing outside Calcutta will be made by Money Order only.

Board of Examiners :-

- | | | | | |
|-----|------------------------|-------|-----|----------|
| (1) | Prof. A. Misra | V. G. | dt. | 24/12/84 |
| (2) | Prof. E. Muni Krishna | Ph.D. | dt. | |
| (3) | Dr. Siddhartha Ganguly | Snd. | dt. | |

SCUP-412-17-11-83-7,000.

Instructions

1. The bill, which has been prepared in the Registrar's Office, is forwarded to the payee, with the request that he will present it at the Registrar's Office, either personally or through a messenger, after having duly stamped and signed it. After the bill is passed and the cheque is ready for payment an intimation card will be sent to the Examiner, Paper-Setter or Scrutiniser concerned. If there is any objection in signing the receipt in advance, it need not be done, but in such a case, the payee should call at the Registrar's Office on receipt of the intimation card to receive payment and sign the receipt. In no case payment will be made unless a receipt is given at the same time. The bill should always be signed, though it need not necessarily, be receipted, before it is presented.

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3. The spaces provided for the purpose, viz., for signature, official designation and address, may please be filled in before the bill submitted to the University for payment.

4. Under the rules all payments to the persons residing outside Calcutta will be made by Money Order only.

Board of Examiners :—

- | | V. C. | dt. |
|-----|------------------------|-----|
| | Ph.D. | dt. |
| | Exam. | dt. |
| (1) | Prof. D. Misner | |
| (2) | Prof. F. Muni Krishna | |
| (3) | Dr. Siddhartha Ganguly | |

24/12/87

SOUP—41E—17.11.83—7,000.

THE PENNSYLVANIA STATE UNIVERSITY

119 NOLL LABORATORY
UNIVERSITY PARK, PENNSYLVANIA 16802

Laboratory for
Human Performance Research

Area Code 814
865-3453

September 9, 1982

21.9.82

Dr. A. Wisner
Laboratory of Work Physiology
and Ergonomics
Conservatoire National des Arts et Metiers
41 rue Gay-Lussac
75005
Paris, FRANCE

Dear Dr. Wisner:

You would perhaps recall our meeting during your visit to the Central Labour Institute, Bombay a few years ago. I belong to the same Institute and work in the Department of Industrial Physiology.

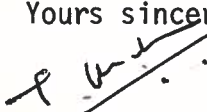
As an ILO Fellow I have been visiting different institutions/universities in Sweden and the U.S.A. for the last 3 to 4 months. Currently I am visiting the Laboratory for Human Performance Research, The Pennsylvania State University. The object of my visit is to acquaint myself with the latest research methodologies and techniques used in the Western Countries in the field of Work Physiology and Ergonomics. I shall be here in this laboratory until September 17, 1982 and return to my country towards the end of this month.

A couple of days ago I saw an interesting article of yours in a book entitled "Machine Pacing and Occupational Stress" edited by Dr. G. Salvendy and Dr. M. J. Smith. I would greatly appreciate if you could kindly send a reprint of the same along with reprints of other publications of yours in the area of work physiology and ergonomics to my following address:

Paresh Nath Saha, Head
Industrial Physiology Division
Central Labour Institute
Sion, Bombay 400022
INDIA

With kindest regards,

Yours sincerely,



Paresh Nath Saha

PNS/bmn



AMITABHA DE
LECTURER

राष्ट्रीय औद्योगिक इंजीनियरी प्रशिक्षण संस्थान,

अंतर्राष्ट्रीय श्रम संगठन के जरिये संयुक्त राष्ट्र सहायता
द्वारा भारत सरकार की परियोजना के रूप में स्थापित,
विहार सरोवर, डाकघर-नीटी, बम्बई-400 087.

टेलीफोन : (022- 583371 तार : "नीटी, बम्बई 76" टेलिक्स : (011) 71392

NATIONAL INSTITUTE FOR TRAINING IN INDUSTRIAL ENGINEERING,

ESTABLISHED AS A GOVERNMENT OF INDIA PROJECT WITH UN ASSISTANCE
THROUGH ILO,

VIHAR LAKE, P. O. NITIE, BOMBAY 400 087.

TELEPHONE : (022) 583371 TELEGRAM : "NITIE, BOMBAY 76" TELEX : (011) 71392

REF. : **ERG/AD/85/6535**

BY AIR MAIL

October 9, 1985.

16

To:

Dr. A. Wisner
Professor De Physiology
41, Rul Gay Lussac
Paris
FRANCE

Dear Dr. Wisner:

Thank you very much for the guidance during the conference and valuable advice toward ergonomics for the developing countries. I am sending you our Institute's brochures and other relevant documents for your information. I will be attending a Co-ordination Seminar on 15th and 16th October, 1985 at Ahmedabad and will meet Dr. Sen, Dr. Ganguli, Dr. Nag and others and after coming back from it I will write you about it.

Kindly let me know about your/your organisations present/future work so that we can do collaboration in future.

With regards,

Yours faithfully,

Amitabha De
(AMITABHA DE)

nlm/

Report of The Ergonomics Laboratory

1. Established in 1963 as one of the major facets of the NITIE.
2. PGP & PIE
 - 1971-1984 - Ergonomics as a part of Work system design.
 - 1977 - Human Factors Engineering as an elective subject.
 - 1984 - Ergonomics compulsory separate course for the PGDIE Student.
 - 1984 - Three doctoral level courses were started
 1. Advance Topics in Human Factors Engineering
 2. Human Engineering in the Design of Transport and Traffic systems
 3. Human Engineering in the Design and Control of the physical working environment.

<u>EDP</u>	Human Factors Engineering	-	Dr. E. Unni Krishnan
	Industrial Safety and Automation	-	Dr. E. Unni Krishnan & Mr. Amitabha De.
	Methods standards & Human Factors	-	Dr. E. Unni Krishnan & Mr. Amitabha De.
	Work study	-	Dr. E. Unni Krishnan & Mr. Amitabha De

Brochures attached.

3. Laboratory report :

1. Past Report

- a) **An Anthropometric Study of Indian Works in Selected Heavy Industry - Dutta S.P. and Neena Naik**
- b) **Research Report on Ergonomics Norms in Process Design - Dutta S.P. and Kulkarni**
- c) **A Pilot Study on Traffic Signs and Signalling Systems in Bombay - Dutta, S.P.**

Present -

- 1. **Noise Pollution Control in Industry**
- 2. **Psychophysiological and Biomechanical aspect of Load Lifting & Posture**
- 3. **Ergonomics and Industrial Engineering application for eliminating drudgery in the village industries.**
- 4. **Design of dynamic simulators for designing surface vehicle from the view points of driver's safety, Driver's comfort and Driver's training.**

Future intended project

- 1. **Manual Material handling - Safe limits of lifting loads and safe posture**
- 2. **Objective evaluation of Time standards with respect to setting up relaxation allowances.**

3. An ergonomics evaluation of work environment and workers fitness requirements in mines.
4. An ergonomic evaluation of work loads biomechanical/postural considerations in Tea & Coffee industry and in Agriculture with special reference to women workers.
5. Ergonomics & Industrial Engineering applications in small scale industry.
6. A study on Presbycusis and noise induced hearing loss.
7. An ergonomic study of work environment in steel industry.
8. A study of the problem of work environment - noise as a work and health Hazard.

4. Staffs

Faculty - Dr. E. Unni Krishnan - Professor incharge Ergonomics Laboratory. Joined in April, 1984
JOB Evaluation and Ergonomics norms and design, He was previously attached to Indian Institute of Technology, Madras.

Dr. S. Raja - Assistant Professor Joined in June, 1985. Specialization : Human Engineering, Work and Environmental Physiology, Noise pollution and Control.

He was with the Industrial Management department of the Indian Institute of Science before joining NITIE.

**Amitabha De. Lecturer, Joined in May, 1984.
Specialization : Manual Materials Handling,
Work Physiology, Information Ergonomics.
He was previously attached to Ergonomic
Laboratory, Calcutta University.**

FIE Scholars

**Three FIE Scholars external candidates are working for
FIE. Their areas of work are :-**

- a) Ergonomic application for vehicle design
of medium capacity truck.**
- b) Man-Machine system designs for control
display aspects.**
- c) An Ergonomic study of quality of working
environment in Indian Industry.**

PGDIE(R) Scholar

**One PGDIE (R) Scholar is working. His area of
work is Ergonomic applications to village
Industry.**

5. Laboratory Facilities

**Area 300 sqmetre presently being used another
200 sq. metre can be made available for
laboratory work if necessary.**

Equipment :

- 1. Tread mill - Venkey (India) with
angular speed adjustment.**
- 2. Bicycle Ergometer, Venkey (India).**
- 3. Vitatograph Vitatograph Inc (U.K)**
- 4. KM respirometer - FRG
Wright's respirometer
(upto 10 litres only) (U.K)**

5. OM 14 Oxygen Analyser (Beckman) USA
6. Telemetric Pulse rate recorder - Siemens
(FRG)
7. Colour Pannels with mixing
facilities for Colour dynamics
tests - Developed by the Institute
8. Simple reaction Timer - India
9. Sound Level Meter - B & K, Denmark
10. Lux meter - Aplab (India)
11. Globe Thermo meter - Cassella (U.K)
12. Kats Thermometer - Cassella (U.K)
Vane
13. Anemometer - (Japan)
14. Whirling hygrometer - Lawrence & Mayo
(India)

Instrument for which orders have been plan.

1. Video timer for micromotion
analysis (Telrad & Sony)
2. Oxylog for getting direct
recording of Oxygen consumption. (P.K.
Morgan U.K)
3. Anthropometer (Siber Hegner, Sweden)
4. Dose meter - (B & K, Denmark)
5. Audiometer - (Maico, USA)

§ 51 Advanced Topics in Human Factors Engineering (4)

COT

Emphasis in this Course will be for acquiring an understanding of the recent advances in the field of Human Factors Engineering.

Topics covered in this Course include: Human Engineering applications in product and process design, Human Engineering in Equipment design, study of controls, displays and layouts, Human Engineering application in low cost automation, Analysis of case studies in Human Engineering design as applied to material handling, Work System design, transport, industrial safety, etc. Laboratory exercises, field work, term paper and seminar will be part of the above course in addition to lecture sessions.

S 52 Human Engineering in the Design of Transport and Traffic Systems (4) COT

Analysis of the characteristics of transportation systems in urban and rural areas from the Human Engineering point of view. Human Engineering applied to vehicle design and driver workspace design for surface transport and aircraft; Environmental control in transport and traffic engineering; Accident analysis and safety in transportation; Fatigue in driving; Driver task simulation, driver information system, driver selection, education and training.

Laboratory exercises, field work, term paper and seminar will be part of the above course in addition to lecture sessions.

**E 53 Human Engineering in the Design and Control of the
Physical Working Environment (4) COT**

Assessment and control of occupational health hazards. Evaluation of the stress and strain from physical working environment. Measurement and control of heat, noise, vibration, dust, fumes and gases in the work environment. Industrial hygiene and safety factors in the design of work environment. Protective clothing, Heating, ventilation and air-conditioning. Colour dynamics. Natural and artificial lighting. Laboratory exercises, field work, term paper and seminar will be part of the above course in addition to lecture sessions.

aanw.0070(2)

25 October 1985

Mr Registrar
University of Calcutta
Senate House
CALCUTTA - 700073
(Inde)

Dear Mr Registrar,

I am ashamed not to have answered earlier to your letter of 22.8.85 about your very honourable proposal to take part to the group of professors who will examine the D. Sc Thesis of M. Pranab Kumar Nag Ph.D. and to your letter of 19.8.85 about your other kind proposal to take part to the jury who will examine Ph. D. Thesis of M. Asis Goswani.

The only reason of this delay has been the convergence of a very heavy professional load and a difficult period of my family life. I have great respect and consideration for your University and more specially for Professor Rabindranath Sen, my colleague and friend who has trained these two researchers.

I accept with pleasure these proposals. I will send you my reports after I will have received the thesis. Of course, the best would be that I travel to Calcutta at this occasion but I am not sure to be able to find the ressources in time and money to do it.

Truly yours.

Alain Wisner

M.D., Sc D, Dipl.psych.(University of Paris)
Professor of ergonomics and work neuro-
physiology,
Conservatoire National des Arts et Métiers.

Double : Pr. Sen
Dr Nag

No. 1125 /D.Sc.



When replying please quote
Number, Date and Subject

UNIVERSITY OF CALCUTTA
SENATE HOUSE,
CALCUTTA—700073
INDIA

The 22. 8. 85 19

To

Prof. A. Wisner,
Wone Physiology and Ergonomics,
Conservatoire Nationale des,
Arts and Metiers,
41, Rue Gay Lussac,
75005 Paris, France.

Dear Sir,

In inviting your kind attention to this office letter No. ~~2062~~ 2663/D.Sc. dt. 28.8.84
I am to inform you that no letter conveying your consent to examine the undernoted thesis
has reached this office till now.

I shall be obliged if you kindly treat the matter as urgent and let me know at
your earliest, if you agree to examine the thesis. The thesis will be sent to you on receipt
of your letter of acceptance of the examinership.

Yours faithfully,

A. K. Chakrabarty
Registrar.

Title of the thesis : " Ergonomics a new perspective of work organisation
in traditional agriculture."

Submitted by Sri/Sr. ~~Dr.~~ Pranab Kumar Nag, M.Sc., Class-I, Ph.D.

for ~~B.Sc.~~ ()/D.Sc./~~B.Sc.~~ degree of this University.

SCUP—90R—3-1-80—3,000.

No...1092/Ph.D.(Sc.)



When replying please quote
Number, Date and Subject

UNIVERSITY OF CALCUTTA
SENATE HOUSE,
CALCUTTA—700073
INDIA

The..19th..August....1985

To

Dr. A. Wisner
Prof. of Work Physiology and Ergonomics
Department des Sciences de l'Homme au Travail
Conservatoire National Des Arts Et Metiers
41, Rue Gay - Lussac-75005
Paris.

Dear Sir,

In inviting your kind attention to this office letter No..4543/Ph.D.(Sc.)..dt.3.1.85
I am to inform you that no letter conveying your consent to examine the undernoted thesis
has reached this office till now.

I shall be obliged if you kindly treat the matter as urgent and let me know at
your earliest, if you agree to examine the thesis. The thesis will be sent to you on receipt
of your letter of acceptance of the examinership.

Yours faithfully,

~~Registrar~~ Registrar.

Title of the thesis : Bioengineering/Ergonomic Evaluation of Different
types of Mobility Aids for Lower Extremity
Handicapped.

Submitted by Sri ~~SM~~. Asis Goswami, M.Sc., Class II

for Ph.D. (Sc.) ~~D.S.C. degree~~ degree of this University.

SCUP—90R—3-1-80—3,000.

INTERNATIONAL SYMPOSIUM ON
OCCUPATIONAL HEALTH PROBLEMS
IN DEVELOPING COUNTRIES

1 INDEX
→
Phone : 66842
Telegram : NIOHEALTH
Telex : 012-471 NIOH IN

National Institute of Occupational Health
Meghanagar,
Ahmedabad-380016
Gujarat, INDIA

Dr. S. K. Chatterjee,
Chairman
Executive Committee

Our Ref. No.

7/PC-AH/02/1664

Date : 1 JAN 1982

To,

Prof. A. Wisner,
Prof. of Work Physiology &
Ergonomics,
Conservatoire National Des Arts
et Metiers,
41 Rue Gay-Lussac,
Paris 75005,
FRANCE.

Dear Sir,

We extremely regret to inform you that due to certain unavoidable circumstances the International Symposium on "Occupational Health Problems in Developing Countries" scheduled for 20-23 February 1982 has been postponed. The new dates for the Symposium will be communicated to you in due course. The inconvenience caused to you in this regard is highly regretted.

We highly appreciate your help, co-operation and encouragement given for the Symposium, and we also expect the same in future too.

Thanking you.

wish for a happy new year
Yours faithfully,

[Signature]
EXECUTIVE CHAIRMAN

aanw. 0070(3)

23 Janvier 1981

Professor R.B. Sen
Department of physiology
University Colleges of Science
and Technology
92 Acharyya Prafullachandra Road
CALCUTTA 700 009 (Indes)

Dr Professor Sen,

I thank you heartily for your nice card. In fact, I think a lot to you and I give you frequently as an example of the most brilliant physiologist and ergonomist having an excellent scientific production through using modest facilities.

We have worked a lot at ILO, WHO and IEA to prepare a colloquium of ergonomists of industrially developing countries. It will be organized some time but there is a lot of problems which are not all scientific.

Will you attend the Tokyo congress of IEA in 1982 ?

With my best regards for you and your family.

Truly yours,

A. Wisner





HAWAII

Airmail

PASAR KUMBASARI (JL GAJAH MADA)
TEL PON (0361) 8411 DENPASAR - BALI

**ART & BATIK
SUPER MARKET**

June 4/6-79

POST



My dearest brother,
I am looking very much
to see you again after
our last meeting in the
Phillipina. I am now in
Geneve; they go to Germany,
Wageningen (Symposium on
tropical agriculture & forestry)
and then back to Geneva on
24th of May. On 24th I am
leaving for Bali again.
My best regards to you and
the whole family.

PROF A. WISNER

41, Rue Gay Lussac.

75005 Paris (France)

Tari Oleg, Bali

Oleg Dance, Bali

A. Manuaba 

PS - A149

From:

Dr. P.K. Nag
National Institute of Occ. Health,
Meghani Nagar,
Ahmedabad-380 016, India.

4th May, 1979.

To :

Prof. A. Wisner,
Prof. of Work Physiology & Ergonomics,
Conservatoire National des Arts et Metiers,
41, Rue Gay-Lussac,
75,005
PARIS, FRANCE.

Dear Dr. Wisner,

I am sorry that I could not contact with you earlier. I got a chance to visit Europe during this month. You may be aware that International Institute of Agriculture in Netherlands is organising a symposium on Ergonomics in tropical agriculture and forestry. Government of India permitted me to attend the Conference, which will be held from 14 to 18 May, 1979. I do not know whether you are also attending the same symposium.

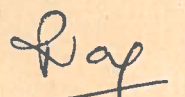
As I have got this opportunity, I would like to spent few days in your laboratory after the symposium, so that my long desire may be partially fulfilled. I do not know whether I shall get your reply within this short time before my leaving. In any case, after going over there, I will contact you for my subsequent programme.

For this travel, I will get some financial assistance from Govt. of India only for the conference period. So I would kindly request you if you could get me some lecture series like holiday teaching in applied physiology at under-graduate and graduate level, I will be very much benefitted. Beside this, I will be interested to see some good laboratories relating applied physiology and ergonomics. Kindly arrange some of these visits. Address of the conference is given below:

International Agricultural Centre, PB No.88,6700AB
Wageningen, NETHERLANDS.

With profound personal regards,

Yours sincerely,


(P.K. NAG)

1_90_40.

19/31.83.70.

23 Février 1979

Professor B. B. Chatterjee
Physiological and Industrial Hygiene
All India Institute of Hygiene
CALCUTTA 700 073 (Indes)

Dear Professor Chatterjee,

It is a great honour for me to be again considered as able to be an adjudicator of a thesis of work physiology submitted to the Calcutta University.

I know personally the very high level of knowledge, the precise experimental orientation and the quality of discussion among the indian work physiologists but specially among those of the principal school, that of the University of Calcutta.

It is a pleasure to accept your highly honourable proposal and to be invited by this way to take a very small part in your so interesting intellectual and scientific movement.

With my best consideration.

Truly yours,

A. Wisner
M.D., Sc D., Dipl. Psych.
Professor of work physiology
and ergonomics at the C.N.A.M.



Dr. B. B. Chatterjee,
BSc, MBBS, DPH, DIH, MD,
Professor of Physiological & Industrial Hygiene,
All India Institute of Hygiene & Public Health,
Calcutta-700 073, INDIA.

D. O. No. PIH/7984

भारत सरकार
GOVERNMENT OF INDIA

16 February 1979.

Dear Professor Wisner,

I must be quite unknown to yourself, but you are well known to all subscribing to the speciality of Occupational Health all over the world.

I am an humble practitioner of the speciality and am writing this letter on behalf of one of my students, Sri A. Samanta who has recently submitted a thesis to the Calcutta University based on certain physiological studies on the manual carriage and lifting of loads for his Ph.D. Degree. Such dissertations are required to be evaluated by two experts from foreign universities, belonging to the speciality concerned and holding teaching designations.

I am therefore to request you to kindly agree to be an adjudicator of the above thesis. You would be approached officially by the Calcutta University for this purpose. But you may kindly intimate me your willingness to me in advance so that I am fully assured that the University may not go on searching for suitable experts in this field, agreeable to perform this onerous task, wasting in this process a great deal of valuable time.

With my best regards and greetings,

Yours sincerely,


(B. B. CHATTERJEE)

Professor A. Wisner,
Department des Sciences de l'Homme an
Travail,
Conservatoire National des Arts et Metiers,
41 rue Gay-Lussac, 75005 Paris.

9 Mai 1978

Monsieur le Professeur Sunil Abrol
Department of psychology
University of Delhi
DELHI 110007 (Indes)

Mon cher collègue,

Je vous remercie de votre aimable proposition de venir travailler dans notre laboratoire. Toutefois, cette offre se heurte à plusieurs difficultés, la première étant que nous ne disposons d'aucuns fonds pour recevoir des scientifiques étrangers, et qu'il vous faudrait pour cela faire des démarches auprès de l'Ambassade de France aux Indes.

Un autre problème est celui de la langue. En effet, si certains membres du laboratoire parlent anglais, ce qui leur permet de recevoir les hôtes étrangers anglophones, il n'est guère possible de faire un travail efficace dans notre laboratoire sans parler le français.

Le troisième point est lié à celui-ci, notre conception de la recherche en psychologie du travail et en ergonomie est qu'il faut - dans la mesure du possible - étudier des travailleurs en situation réelle de travail et non pas des sujets d'expérience en laboratoire, aussi je ne suis pas sûr que cela corresponde à vos vues.

J'espère que vous voudrez bien examiner ces difficultés et que nous pourrons les résoudre ensemble et bénéficier de votre présence.

Veillez agréer, mon cher collègue, l'expression de mes sentiments dévoués.

A. Wisner

Copie : Pr Leplat

Prof. A. Wisner
Department des Sciences
De l'Homme et du Travail,
Conservatoire National des Arts et Metiers,
41 rue Gay - Lussac
75005 - Paris
FRANCE

Dear Prof. Wisner

I am interested in the field of Human Factors Engineering for the last three years or so. I have been working on the problem of "A Study of relationship between body posture and work efficiency", the findings of the study have been incorporated in a doctoral dissertation, submitted to the University of Delhi for the award of Ph.D degree. An abstract of the said thesis is being enclosed herewith for your kind perusal.

I am keen to work with you on some research project of mutual interest, and would like to know, therefore, your reaction to such a venture. Will it be possible to obtain some financial assistance from your institute in order to cover my stay in your country.

Hoping for a favourable reply,

With best regards,

Sincerely yours,

Sunil Abrol

(SUNIL ABROL)

DEPARTMENT OF PSYCHOLOGY

UNIVERSITY OF DELHI

DELHI-110007

(INDIA)

A STUDY OF RELATIONSHIP BETWEEN BODY POSTURE AND WORK EFFICIENCY

A B S T R A C T

The relationship between body posture and work efficiency has been investigated in three job situations. The jobs were those of the Typists, the Telegraphists, and the Telephone Operators. Body posture was defined in terms of a number of anthropometric measurements taken while the task was being performed. The work efficiency was also similarly defined in terms of a number of psychological and physiological parameters. Thirty operators from each of the three jobs served as subjects. Each subject carried out his normal task for a period of one hour, under each of the three seat heights selected for each job. Each subject was pre- and post-tested on various parameters of work efficiency under study, for each of the three seat heights.

Considering the contribution of different anthropometric measurements to the various parameters of work efficiency, collectively, no definite trend has emerged for any of the three seat heights, under the three job situations.

In case of Typists, three of the eight parameters of work efficiency, viz. Pulse Rate, Respiratory Rate, and Choice Reaction Time, have been observed to be significantly affected by the change in posture, while four of these, viz. Choice Reaction Time, Finger Fatigue, Respiratory Rate, and Number of Error, in the study on Telegraphists. In case of Telephone Operators, six of the parameters of work efficiency, viz. Choice Reaction Time, Hearing Loss, Finger Dexterity, Pulse Rate, Respiratory Rate, and Operation Time, have been significantly affected by postural changes.

Looking at the contribution of individual anthropometric measurements to the various parameters of work efficiency, the general conclusion appears to be that the same anthropometric measurements affect different parameters differently under the three seat heights for each of the three job situations.

Both Age and Stature, have been observed to have a limited role in determining the relationship between body posture and work efficiency. In case of both, work efficiency decrement has been expressed in isolated and scattered parameters, varying from one job to another, the decrement being, generally, higher for the lower aged and short statured subjects.

Findings also include recommendations for an optimum seat height for each of the three jobs for Indian population.

Considerable the correlation of body posture and work efficiency in the various parameters of work efficiency, no definite trend has emerged for any of the parameters. In case of typists, most of the parameters of work efficiency, viz. Pulse Rate, Respiratory Rate, and Reaction Time, have been observed to be significantly affected by the change in posture. In case of clerks, viz. Reaction Time, Higher Fatigue, Respiratory Rate, and number of errors, in the study on letter-writers, in case of typists, six of the parameters of work efficiency, viz. Reaction Time, Reaction Time, Reaction Time, Reaction Time, Reaction Time, and Reaction Time, are significantly affected by postural change. In case of the clerks, six of the parameters of work efficiency, viz. Reaction Time, Reaction Time, Reaction Time, Reaction Time, Reaction Time, and Reaction Time, are significantly affected by postural change. In case of the typists, six of the parameters of work efficiency, viz. Reaction Time, Reaction Time, Reaction Time, Reaction Time, Reaction Time, and Reaction Time, are significantly affected by postural change.

Dr. J. Leplat,
Directeur,
Laboratoire de Psychologie du Travail,
Ecole Pratique des Hautes Etudes,
41, Rte. Gay Lussac,
75005, Paris
FRANCE.

*Leplat en la
transmission cette
de car de
Tu que a -
etc dans un
region --
St. P. problem
finances ?
Sun travail a -
pour un...
...*

Dear Dr. Leplat,

I have been referred to you by Prof. I.D. Brown of Applied Psychology Unit, Medical Research Council, London, who has very kindly introduced me to the kind of research in progress at your institute. I am working in the field of Human Factors Engineering for the last three years or so. I have recently submitted my doctoral thesis entitled "A Study of the relationship between body posture and work efficiency", to the University of Delhi for the award of Ph.D degree. An abstract of the said thesis is enclosed herewith for your kind perusal.

I am keen to work with you on some project of mutual interest and would, therefore, like to know your reaction to such a venture. Will it be possible to obtain some financial assistance from your institute in form of fellowship or research/teaching assistantship in order to cover my stay in your country.

... or a favourable re

Thanking you.

Sincerely yours,

Junil Abrol

JUNIL ABROL
Department of Psychology
University of Delhi
Delhi-110007
India.

- regardes à ABROL

- famille
qui annonce cette lettre
pour moi pas favorable

- orgueil indien + orgueil anglais

+ texte de la lettre (mutual interest - recherche
nude a'outre)

- anglophobie

- et surtout conception y expi la tarage bien
expresse dans ses papiers sur les "sisties" retro

A STUDY OF RELATIONSHIP BETWEEN BODY POSTURE AND WORK EFFICIENCY

A B S T R A C T

The relationship between body posture and work efficiency has been investigated in three job situations. The jobs were those of the Typists, the Telegraphists, and the Telephone Operators. Body posture was defined in terms of a number of anthropometric measurements taken while the task was being performed. The work efficiency was also similarly defined in terms of a number of psychological and physiological parameters. Thirty operators from each of the three jobs served as subjects. Each subject carried out his normal task for a period of one hour, under each of the three seat heights selected for each job. Each subject was pre- and post-tested on various parameters of work efficiency under study, for each of the three seat heights.

Considering the contribution of different anthropometric measurements to the various parameters of work efficiency, collectively, no definite trend has emerged for any of the three seat heights, under the three job situations.

In case of Typists, three of the eight parameters of work efficiency, viz. Pulse Rate, Respiratory Rate, and Choice Reaction Time, have been observed to be significantly affected by the change in posture, while four of these, viz. Choice Reaction Time, Finger Fatigue, Respiratory Rate, and Number of Error, in the study on Telegraphists. In case of Telephone Operators, six of the parameters of work efficiency, viz. Choice Reaction Time, Hearing Loss, Finger Dexterity, Pulse Rate, Respiratory Rate, and Operation Time, have been significantly affected by postural changes.

Looking at the contribution of individual anthropometric measurements to the various parameters of work efficiency, the general conclusion appears to be that the same anthropometric measurements affect different parameters differently under the three seat heights for each of the three job situations.

Both Age and Stature, have been observed to have a limited role in determining the relationship between body posture and work efficiency. In case of both, work efficiency decrement has been expressed in isolated and scattered parameters, varying from one job to another, the decrement being, generally, higher for the lower aged and short statured subjects.

Findings also include recommendations for an optimum seat height for each of the three jobs for Indian population.

24 Janvier 1978

Monsieur le Docteur J.D. Brooke
Chairman, Human Kinetics
University of Guelph
GUELPH ONTARIO N1G 2W1
(Canada)

Mon cher collègue,

Je me souviens très bien de notre rencontre et suis heureux que vous envisagiez de recruter le Docteur P.K. Nag. Je connais bien son Directeur, le Docteur Sen, et j'ai connu le Docteur Nag en visitant le laboratoire du Dr Sen il y a trois ans.

C'est un homme très intelligent, travailleur, ingénieux dans ses dispositifs expérimentaux et très prudent dans son interprétation. Je ne l'ai jamais entendu enseigner mais le Dr Sen le considérait comme son meilleur assistant.

J'ai une opinion si favorable du Dr Nag que j'avais entrepris des démarches en 1976 pour qu'il vienne travailler un an dans notre laboratoire, mais nous avons rencontré des difficultés dans les démarches d'attribution de bourse de la part du Gouvernement Indien.

J'ai fait partie du jury de thèse du Dr Nag en Avril 1977 et je vous adresse ci-jointe une copie de mon rapport, qui a l'avantage d'être en anglais.

Le Dr Nag est maintenant physiologiste à l'Institut du Travail d'Ahmedabad où il a entrepris un programme de recherche fort intéressant. Il me semble que le caractère du Dr Nag lui permettra de s'adapter à des conditions très différentes de celles qu'il a connues jusqu'ici. Je recommande donc fortement la candidature du Docteur Nag.

Veuillez agréer, Mon cher Collègue, l'expression de mes sentiments dévoués.

Copie : Dr P.K. Nag

A. Wisner
M.D., D.Sc., Dipl.Psych.
Professeur au Conservatoire
National des Arts et Métiers



University of Guelph

COLLEGE OF BIOLOGICAL SCIENCE
DEPARTMENT OF HUMAN KINETICS

78 01 12

Prof. A. Wisner, D.Sc.,
Physiologie du travail Ergonomie,
Département des Sciences de l'Homme au travail.
41, Rue Gay-Lussac, 75005,
PARIS, France

Dear Prof. Wisner:

In response to an advertisement for a faculty position in Ergonomics, we have received application from Dr. Pranab Kumar Nag, who quotes you as one of his referees.

I wonder therefore, if you could furnish me with a reference indicating his suitability for the research and teaching aspects of the position. For your guidance, I enclose a copy of the original advertisement.

My thanks in advance for the time I'm asking of you.

Kind regards,

Yours sincerely,

Dr. J. D. Brooke,
Chairman, Human Kinetics

JDB/cb

P.S. Best Wishes for the New Year. We last met
in Paris, 1969!
f.

UNIVERSITY OF GUELPH

COLLEGE OF BIOLOGICAL SCIENCE

Faculty Position In Ergonomics/Human Factors.

Starting at the latest in Fall 1978, a faculty person is required to teach in the B.Sc. program in Human Biology and the B.Sc.(H.K.) program in Human Kinetics at the University of Guelph and to research in the field of Ergonomics and Human Factors. Primary teaching responsibility will be for two new senior undergraduate courses offered in these fields within the academic department of Human Kinetics, which already enjoys faculty specialists in a wide range of human sciences-human biology, bio-mechanics, anthropology, physiology and related physical activity sciences. There is a need now to advance research and teaching to a biological focus of human issues in industrial and technological society.

If the successful applicant has specialist capabilities in human sciences, ability to contribute teaching in the areas of human growth and aging or environmental survival or human psycho-biology would be attractive. Applicants with specialization in engineering who can contribute to the bio-mechanics domain will be considered if they have background to approach the teaching of some of the auxiliary material identified above.

The position may be offered as a probationary or contractually limited appointment.

For further information, contact Dr. J.D. Brooke, Chairman, Department of Human Kinetics, University of Guelph, telephone, 519-824-4120, extension 3869 or 3870.

BY AIR MAIL



भारत सरकार, श्रम मंत्रालय
कारखाना सलाह सेवा और श्रम विज्ञान केन्द्र महानिदेशालय
Govt. of India, Ministry of Labour
DIRECTORATE GENERAL FACTORY
ADVICE SERVICE AND LABOUR INSTITUTES
(Bharat Sarkar, Shram Mantralaya)
(Karkhana Salah Seva Aur Shram Vigyan Kendra Mahanideshalaya)

टेलीफोन / Phone: 482203
तार: सेलावीन्स, माटुंगा, बम्बई-400 019
Gram: 'CELABINS' Matunga, Bombay-400 019

Dr. S. S. Ramaswamy
Deputy Director General

राष्ट्रीय श्रम विज्ञान केन्द्र भवन
इस्टर्न एक्सप्रेस हायवे, शीव, बम्बई-४०० ०२२
Central Labour Institute Bldg.
Eastern Express Highway
Sion, Bombay-400 022

No. 94/III/11-76/CLI-Tech.

24th August 1977

Dear Prof Wisner,

You may kindly recall your visit to the Central Labour Institute, Bombay in February 1976 in connection with the Seminar on "Quality of Working Life" organised by us and in which we had the privilege of having your Keynote Address. Due to certain unavoidable circumstances the proceedings of this Seminar could be brought out only now. I am enclosing a copy of the same for your perusal and retention.

With personal regards,

Yours sincerely,

M. Ramaswamy

Prof. A. Wisner
Director-cum-Professor of
Work Physiology & Ergonomics
Conservatoire National des Arts et Metiers
PARIS - France

Encl: Seminar Proceedings

Professeur SÉN

Part le 26.10.90 de Calcutta
arrive à Paris le 27. (5^h05)

- Avec copie écrite nomination, ouvrir un compte bancaire.
- Doit aller au CNAR (Place de la République) avec fiche de renseignements remplie.

FIRST ANNOUNCEMENT

**SECOND
INTERNATIONAL SYMPOSIUM ON
ERGONOMICS, OCCUPATIONAL HEALTH,
SAFETY AND ENVIRONMENT
(ISE-OH-SE)**

**NEW DELHI, INDIA
25-28 NOVEMBER, 1996**

With

**PRE-SYMPOSIUM WORKSHOP
FROM 21-23 NOVEMBER, 1996.**



**Under the Auspices of the
INDIAN SOCIETY FOR ERGONOMICS (ISE)**

**Federated with the
INTERNATIONAL ERGONOMICS ASSOCIATION (IEA)**

In Collaboration with

**DEFENCE INSTITUTE OF PHYSIOLOGY AND
ALLIED SCIENCES (DIPAS), DELHI**

AND

Other National and International Organizations

Indian Society for Ergonomics (ISE) :

The Indian Society for Ergonomics (ISE) was established in 1987 and was registered as a scientific body in 1988. The Society consists of scientists, experts and interested persons of different disciplines. The aims of the Society are to promote Ergonomics (Human Factors) and allied studies in India for the benefit of the people at work and to improve their welfare and quality of life. The Society is federated with the International Ergonomics Association (IEA) since 1993.

Defence Institute of Physiology and Allied Sciences (DIPAS) :

The Defence Institute of Physiology and Allied Sciences (DIPAS) is one of the premier institutions of India, which has significantly contributed to the studies in the areas of Environmental Physiology, Ergonomics, Occupational Health and Defence Sciences.

Aims of the Symposium :

1. To apply knowledge of Ergonomics, Occupational Health, Safety and Environmental Sciences in India and other developing countries for greater productivity and cost-effectiveness in Industries, Agriculture, and other areas (Organized and Unorganized Sectors).
2. To improve occupational health and safety and to reduce illness and injuries caused by occupational and environmental hazards.
3. The Symposium will be a forum for exchange of ideas and shared experiences by specialists and research workers in Agriculture, Industries, Universities, Trade Unions and Public Sector Undertakings of India and other industrially developing countries.

Provisional Scientific Themes for the Symposium :

- I Ergonomics of** * Industry, Agriculture, Mines, Household, Office, Sports and Recreation
 - * Work-space Design
 - * Anthropometry, Product Design and Low-cost Improvements
 - * Manual Materials Handling
 - * Methods in Ergonomics
 - * Robotics
 - * Training and Awareness
 - * Industrial Hygiene
- II Occupational Health and Safety relating to** * Industrial Psychology
 - * Accidents and their Prevention including PPD
 - * Rehabilitation and Health Care
 - * Chronobiology and Shift Work
- III Human and Animal Environmental System** * Environmental Ergonomics
 - * Musculo-skeletal Disorders
 - * High Altitude Physiology
 - * Underwater Physiology

Pre-Symposium Workshop :

Ergonomics and related problems of industrial participants would be tackled by the National and International Faculties.

Official Language : English

Preliminary Registration by 30th Mar , 1995

Abstract (300 words) by 31st January, 1996

Acceptance of Abstract 30th September, 1996

More details will be mailed on receipt of the Preliminary Registration Form.

Please Contact : Prof. Dr. R. N. Sen (ISE-OH-SE)
Ergonomics Laboratory, Cal. Univ.
HB-260, Sector 3, Salt Lake City,
Calcutta-700 091, India
Fax : 91-33-241-3222
Telex : 021-2752 UNIV IN

Preliminary Registration Form (use Block letters) :
Please complete and return before 30th
Mar, 1995

Title.....Surname.....

Name.....
(First) (Middle)

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and

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E. Mail:.....

- I intend to participate in : (Please ✓)
- Pre-symposium Workshop
 - Demonstration in Exhibition
 - Video Session
 - Poster Interactive Session
 - Oral Presentation
 - Technical Visits
 - Sight-seeing Tours

I would be accompanied by.....person(s)
as participant/observer(s)

Are you a member of ISE? Yes/No

Provisional title of the Paper.....
.....
.....

Author(s).....
.....

Please also send information to.....
.....
.....

(Xerox copies are also acceptable). Signature....

Prof. Dr. R. N. Sen

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My E-mail No. through the university;
rsen@cubmb.ernet.in

Prof. Dr. R. N. Sen
HB-260, Sector-3, Salt Lake City
Calcutta-700 091, INDIA

To : Prof. Dr. A. Wisner, family
and colleagues

Season's Greetings

&

all Good Wishes

for a happy &

Prosperous New Year

From : R. N. Sen, family
and colleagues



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ERGONOMICS LABORATORY
DEPARTMENT OF PHYSIOLOGY
UNIVERSITY OF CALCUTTA

From :
Prof. Dr. R. N. Sen, D.Sc.
Professor and Head,
Ergonomics Laboratory
Please Reply to :
HB-260, Sector-3, Salt Lake City,
Calcutta - 700 091, INDIA

University Colleges of Science,
Technology & Agriculture
92, Acharyya Prafulla Chandra Road
Calcutta - 700 009
INDIA

Ref. No. PHY/ERG/RNS/ ISE-OH-SE/94

Dated.....21st December 94.....19.....

Dear Professor Wisner,

Thank you very much for your letter dated 20th October, 1994.

You would be very happy to know that after nearly 25 years of unsuccessful efforts now I have got an IBM Computer purchased from the grant of the new project on PPD. I have now also an E-mail no.: rnsen@cubmb.ernet.in through the university. I find that your blessings are becoming very effective in teaching and research work at this university in the field of Ergonomics. There is a possibility of getting another project on non-motorised transport(Cycle-rickshaw). Now three of my research student who were unemployed for the last three years have got research fellowships in the project(PPD).

In the last Executive Committee Meeting of the Indian Society of Ergonomics (ISE) it was decided that we would have an yearly issue of a Journal of Ergonomics, the first issue of which should be brought out in January 1996. May I earnestly request you kindly to write a paper for the Journal ?

With kindest personal regards, with best wishes for the Seasons and wish you, your family and colleagues a very happy and prosperous New Year,

Yours sincerely,

Prof. Dr. Alain Wisner
Laboratoire
D'Ergonomie
Conservatoire National Desarts ET Metiers
41, Rue Gay-Lussac
75005 Paris.


(R. N. SEN)

Paris, 20th October 1994

Prof. Dr. R.N. SEN, D. Sc.
Professor and Head,
Ergonomics Laboratory
HB - 260, Sector - 3, Salt Lake City,
Calcutta, 700 091
India

Dear Professor Sen,

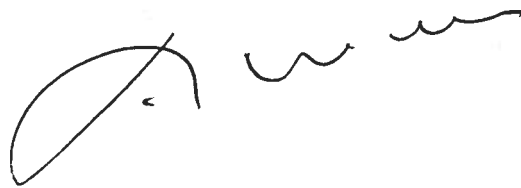
Thank you for your letter of September 5th and the kind appreciation you always give to my efforts. This friendly attitude is very helpful during the unavoidable period of doubt about our own production.

There is a big point on which I am sure of, is the importance of Asia and specially India in the future of sciences and particularly in Ergonomics. I am sure that there is at least one aspect of my activity that has been useful : it is my effort to try and understand all the power and originality of Asian Ergonomics, particularly the Indian ones of which you are the father.

I am sorry you have to retire so early in 1996 but I am sure that your numerous and excellent former students will call on you many times.

With my best regards,

Yours sincerely,



Alain WISNER

LABORATOIRE
D'ERGONOMIE

41, RUE
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From: Prof. Dr. R. N. Sen
HB-260, Sector-3, Salt Lake City
Calcutta - 700 091, India.

5 SEPTEMBER 1994

Dear Prof. Dr. Wisner,

Many thanks for your kind letter dated 22.7.94 written so kindly by hand, when you were having holiday with your family. I feel so honoured to have your favour and affection.

I am very happy to learn that you would be actively working as an Emeritus Professor up to Sept'96 and would kindly Chair a session in the 2nd ISE-OH-SE and also act as a Foreign Faculty in the Pre-symposium International Workshop for the industrial participants from the developing countries. They would be mostly benefited by your vast experience and expertise.

We are very much grateful that all the time you were fully supporting and encouraging the teaching and research on Ergonomics in India. Because of this only the present status and development of Ergonomics in India ~~has~~ could be attained, and also in other developing countries.

I am sure that because of continuous activity you and your wife would keep good health and would be able to come to the Capital of India in Nov'96. This is possibly the last International Conference on Ergonomics that I would have the opportunity to organise since I would be retiring from the University in 1996. So, we strongly desire your presence in the 2nd ISE-OH-SE and guidance to make it a grand success.

With kindest personal regards to you and Mrs.
Wisner,

Yours sincerely,


(R. N. Sen)

PS : As my hand-writing is very bad and not very legible, kindly excuse me for this typed letter.

हवाई पत्र
Aerogramme

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Prof. Dr. A. Wisner

Emeritus Professor
Laboratoire d' Ergonomie
Conservatoire national des arts
41, Rue Gay Lussac
F-75005 Paris
FRANCE.

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92, ACHARYYA PRAFULLACHANDRA ROAD
CALCUTTA-700009
INDIA

Ref. No. PHY/ERG/RNS/FV/90

Dated...27..November....., 1990

Professor A. Wisner
Laboratoire d'Ergonomie
C N A M
41 rue Gay-Lussac
75005 PARIS

(France)

Dear Prof. Dr. Wisner,

I hereby express my deep and sincere gratitude to you for giving me the opportunity to go to Paris and visit your world renowned Institute to learn a great deal of recent advances and researches on Ergonomics being at present undertaken by you and your doctoral students.

The most interesting discussions I had with you and with most of your colleagues throw much light on many of the problems of Ergonomics specially as being practiced by the Industrially Developing Countries (IDC) like India. I learnt a lot from these discussions and exchanges of ideas and experiences.

Several of your recommendations specially on Anthropotechnology to the industrially developed countries, which sale machines and equipment to the IDC's, are very pertinent and, if implemented, would go a long way in eliminating or minimizing the failures in the transfer of technology to the IDC's.

I am very much grateful to you for the constant encouragement you had been giving and also are continuing to extend to our humble research on low-cost ergonomic improvements in both the organized and unorganized sectors in India. It would be our great privilege if there is any possibility of some joint collaborative research work in these lines in the near future.

On behalf of the University of Calcutta and on my behalf, may I thank you very much for the financial support to make my visit possible, for your excellent local hospitality and for all the troubles you have so kindly taken to make my stay in Paris academically most fruitful, and culturally and socially most enjoyable.

With kindest personal regards,

Yours sincerely,

R.N. Sen

26 Novembre 1990

NATURALIA ET BIOLOGIA

Subvention de 6.500 francs accordée au Professeur R. Sen

- factures avion	4.990 + 170 =	5.160
- facture hôtel Daguerre		650 Fr
- espèces remises au Pr Sen		690
TOTAL		6.500 francs

T. Rebiffé

P.J. : justificatifs

19 Octobre 1990

NOTEL DAGUERRE
94 rue Daguerre
75014 PARIS

Madame,

Comme suite à notre entretien téléphonique de ce jour, je vous prie de trouver ci-joint un chèque de 650 francs à valoir sur le séjour du Professeur R. SEN qui arrivera à votre hôtel le 27 Octobre au matin, pour une durée vraisemblable de quatre semaines.

Rezevez, Madame, avec mes remerciements, mes sincères salutations.

T. Rebiffé

P. S. Je vous suis reconnaissant
de bien vouloir m'adresser
un reçu.

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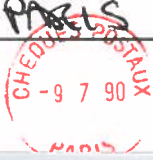
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List of Papers, Monographs and Books of Prof. Dr. Rabindra Nath Sen, B.Sc(Hons), M.Sc., D.Sc., FIIST, Professor, Department of Physiology & Head, Ergonomics Laboratory, University Colleges of Science, Technology & Agriculture, Calcutta University, 92, A.P.C. Roy Road, Calcutta - 700 009.

(Mailing Address : 11A, Mohan Bagan Lane, Calcutta-700 004, INDIA)

1. Sen, R. N. :
Should your surface area be measured?
Presidency College Physiology Institute Journal, 3:15-19, 1953.
2. Sen, R. N. :
Studies on energy metabolism, Thesis in lieu of Special Paper in MSc (Physiology) degree, Calcutta University, 101, Pp, 1954.
3. Banerjee, S. & Sen, R. N. :
Determination of the surface area of the body of Indians.
Journal of Applied Physiology (USA), 7:585-588, 1955.
4. Sen, R. N. :
Fatigue and how to avoid it.
Presidency College Physiology Institute Journal, 5:28-32, 1955.
5. Banerjee, S., Sen, R.N., Chakraborti, B.K. & Mandal, A. :
Blood gasses in cholera patients and in normal subjects.
Proceedings of the Society of Experimental Biology & Medicine (USA), 92 : 444-445, 1956.
6. Banerjee, S. & Sen, R. N. :
A nomogram for calculating the surface area of the body of Indians. Indian Journal of Medical Research, 45 : 33-34, 1957.
7. Banerjee, S. & Sen, R.N. :
Studies on the determination of body fat in Indians.
Indian Journal of Medical Research, 46 : 556-560, 1958.
8. Banerjee, S. & Sen, R. N. :
Body composition of Indians and its relation to basal metabolic rate. Journal Applied Physiology (USA), 12 : 29-33, 1958.
9. Banerjee, S., Rohatgi, K.S., Mukherjee, M. & Sen, R.N. :
Determination of the surface area of the body of Indian females.
Indian Journal of Medical Research, 46 : 669-673, 1958.
10. Sen, R.N. & Banerjee, S. :
Determination of basal metabolic rate and blood concentrations of protein bound indine, cholesterol and glucose in Indians.
Indian Journal of Medical Research, 46 : 759-765, 1958.
11. Banerjee, S., Sen, R.N. & Acharya, K.N. :
Energy metabolism in Laboratory workers.
Journal of Applied Physiology (USA), 14 : 625-628, 1959.
12. Banerjee, S., Sen, R.N., Acharya, K.N. & Chattopadhyay, D.P. :
Studies on energy metabolism of labourers in a Spinning Mill.
Indian Journal of Medical Research, 47:657-662, 1959.
13. Sen, R.N. :
Studies on some aspects of energy metabolism in Indians.
Thesis for D.Sc. (Physiology) degree of the Calcutta University, 347 pp, 1960.
14. Sen, R. N. :
Some anthropometric studies on Indians in a tropical climate.
Proceedings of the Symposium on Environmental Physiology and

15. Sengupta, A. & Sen, R.N. :
Body measurements of male workers in Textile Mills in Bombay. Report No.1 of the Industrial Physiology Division, Central Labour Institute, Sion, Bombay, Issued by the Chief Adviser Factories, Ministry of Labour & Employment, Government of India, New Delhi, 12, Pp, 1964.
16. Sen, R.N., Chatterjee, S.K., Saha, P.N. & Subramanian, A. :
Assessment of work load and thermal stress in relation to physiological responses of workers in a cotton textile mill in Bombay. Report No. 3 of the Industrial Physiology Division, Central Labour Institute, Sion, Bombay, Issued by the Chief Adviser Factories, Ministry of Labour & Employment, Government of India, New Delhi, 27 Pp, 1964.
17. Sen, R.N., Saha, P.N. & Subramanian, A. :
Assessment of work load and thermal stress in relation to physiological responses of workers in a soap factory in Bombay. Report No.4 of the Industrial Physiology Division, Central Labour Institute, Sion, Bombay, Issued by the Chief Adviser Factories, Ministry of Labour & Employment, Government of India, New Delhi, 28 pp, 1964.
18. Gupta, M.N., Sen, R.N. & Singh, H. :
Investigation of Occupational hearing impairment and noise in a nitric acid plant. Report No. 24 of the Chief Adviser Factories, Ministry of Labour & Employment, Govt. of India, New Delhi, 54 pp, 1965.
19. Chatterjee, S.K., Sen, R.N. & Saha, P.N. :
Determination of the level of noise originating from room air conditioners. Journal of the Heating & Ventilating Engineer and Journal of Air Conditioning (London), 38, 429-433, 1965.
20. Sen, R. N. :
Physical Environmental Factors affecting health of workers in industry. Indian Labour Journal, 6, 735-746, 1965.
21. Sen, R.N. :
Studies on tolerance to dry and wet heat on industrial occupations in India. Paper presented at the International Symposium on 'Human Adaptability to Environmental Conditions and Physical Fitness' under the auspices of International Biological Programme, New Delhi, 1965, Proceedings of the Symposium, Defence Institute of Physiology & Allied Sciences, Madras - 3, P. 73-81, 1966.
22. Sen, R.N., Chatterjee, S.K., Saha, P.N. & Fletcher, J.G. :
Rationalisation of work period and rest pause in a steel rolling mill in Bombay. Report No.6 of the Industrial Physiology Division, Central Labour Institute, Sion, Bombay, Issued by the Directorate General, Factory Advice service & Labour Institutes, Government of India, New Delhi, 22 Pp, 1966.
23. Sen, R.N. :
Common laboratory investigation methods for physical environmental hazards in occupational diseases. In : A Guide to Recognition and Notification. Issued by the Chief Adviser Factories, Ministry of Labour and Employment, Government of India, New Delhi, P.97-105, 1965.
24. Sen, R.N. :

25. Sen, R.N. :
Some studies on the physiological effects of noise. Proceedings of the Seminar on 'Higher Productivity through Building Insulation' held in Bombay on 6th April 1967 under the auspices of IMDACA (Insulation Manufacturers, Distributors and Contractors' Association) and Bombay Productivity Council, P. 53-69, 1967).
26. Hamley, E. J. & Sen, R.N. :
Physiological evaluation of tolerance to heavy work. Proceedings of the International Conference of Muscular Exercise and Training. Dermstadt, Germany, Feb. 1968. Arbeitsmedizin, Sozialmedizin, Arbeitshgiene, A.W. Gentner, Verlag, Stuttgart, West Germany, Band 22, P. 43-45, 1968.
27. Harding, R. H & Sen, R.N.
A simple continuous pedalling rate indicator for use with a bicycle ergometer. Proceedings of the Physiological Society, 13th - 14th December, 1968. Journal of Physiology (U.K.), 201, P.14-15, 1969.
28. Harding, R.H. & Sen, R.N. :
A new simple method of quantifying the electromyogram to evaluate total muscular activity. Proceedings of the Physiological Society, 18th - 19th July, 1969. Journal of Physiology (U.K.), 204 : 66p - 68p, 1969.
29. Sen, R.N., Roy, B.S. & Sarkar, D.N. :
Maximal physical work capacity of Indian industrial workers in relation to age and heaviness of job, Proceedings of the International Conference of the Human Factors Society, Philadelphia, Pennsylvania, USA, 6th to 9th October, 1969, 13 pp.
30. Harding, R.H. & Sen, R.N. :
A new digital heart rate printer for monitoring purposes. Proceedings of the Physiological Society, 16th - 17th January, 1970. Journal of Physiology (U.K.), 207, 44P - 45P, 1970.
31. Sharman, I.M., Down, M.G. & Sen, R.N. :
Vitamin E, training and performance in adolescent swimmers. Proceedings of the Nutrition Society, (U.K.) 20th February, 1970. Proceedings of Nutrition Society, 29:36A, 1970.
32. Harding, R.H. & Sen, R.N. :
Evaluation of total muscular activity by quantification of electromyograms through a summing amplifier. Journal of Medical & Biological Engineering (U.K.), 8, 343-356, 1970.
33. Jones, P.R.M., Sen, R.N. & Harding, R.H. :
The ergonomic evaluation of carrying a postbag weighing 15 kg (33 lbs) during walking on a treadmill at 3mph in men aged 42 to 57 years. Energy Expenditure Reference Data for the General Post Office - PMD specification - P.E. 5088 Report No.1 - Department of Ergonomics & Cybernetics, University of Technology, Loughborough, Leicestershire, U.K., 10 Pp, 1970.
34. Jones, P.R.M., Sen, R.N. & Harding, R.H. :
The ergonomic evaluation of carrying a postbag weighing 15.88 Kg (35 lbs) during working on a treadmill at 3 mph in men aged 42 to 57 years, Ibid, Report No.2, Department of Ergonomics & Cybernetics, University of Technology, Loughborough, Leicestershire, U.K., 10 Pp, 1970.

35. Sharman, L.M., Down, M.G. & Sen, R.N. :
The effects of vitamin E and training on physiological function and athletic performance in adolescent swimmers, British Journal of Nutrition (U.K.), 26 : 265-276, 1971.
36. Sen, R.N. & Harding, R.H. :
A continuous time sampling printing system for recording heart rate, Indian Journal of Physiology & Allied Sciences, 25. 61-68, 1971.
37. Jones, P.R.M., Harding, R.H., Sen, R.N. & Griffiths, J.D. :
The Ergonomic evaluation of the optimal loading height of a parcel container platform - Report, No.4, Project No.103, Department of Ergonomics & Cybernetics, University of Technology, Loughborough, Leicestershire, England, 28 Pp, 1971.
38. Jones, P.R.M., Wyness, J., Harding, R.H. & Sen, R.N. :
The Ergonomics of parcel filling of containers, Report No.5, Project No.103, Department of Ergonomics & Cybernetics, University of Technology, Loughborough, Leicestershire, England, 35, Pp, December, 1971.
39. Sen, R.N. :
Shroma Samasyar Samadhane Shareerbidya (Application of Physiology in solving the problems in the Science of Labour) Shareerbritta, The Physiological Society of India, 1:93-98, 1971.
40. Sen, R.N. & Sarkar, D.N. :
Effects of thermal stress on maximal work capacity of Indian Industrial workers. Proceedings of the "ICMR Symposium on health in relation to work and heat stress in place of work" held at the National Institute of Occupational Health, Ahmedabad, 27th to 29th January, 1972, ICMR Technical Report Series No.15, Division of Publications & Information, New Delhi, P.159, 1972.
41. Sen, R.N. & Sarkar, D.N. :
Occupational work capacity of Indian adult male industrial workers in relation to age. Proceedings of the seminar on 'Man at Work' organised by the Central Labour Institute, Ministry of Labour, Employment & Rehabilitation, Govt. of India, Sion, Bombay, 11th-14th April, 1972.
42. Sen, R.N. :
Chapters on (i) 'Vision', (ii) 'Hearing', (iii) 'Bio-mathematics and Bio-statistics'. In : Modern Human Physiology, Ed. Ghosh, H.N., New Book Stall, Calcutta, Pp. 1375-1435, Pp 1435-1454, P.1582-1632, 1972.
43. Sen, R.N., Harding, R.H. & Jones, P.R.M. :
A new electromyographic technique for objective evaluation of muscular effort during exercise. Proceedings of the World Congress of Sports Medicine held in Oxford on 6th-11th September, 1970, British Journal of Sports Medicine (UK), 7, 135, 1973.
44. Sen, R.N., Chakraborty, D. & Kar, M.R. :
Assessment of Physical Fitness in a group of young Bengalee students, Indian Journal of Physiology & Allied Sciences 27:165-166, 1973.
45. Sen, R.N. & Nag, P.K.
Are the Calcutta public buses ergonomically designed?
Indian Journal of Physiology & Allied Sciences 27 : 156-157, 1973.

47. Sharman, I.M., Down, M.G. & Sen, R.N. :
The effects of training and vitamin E supplementation on the performance of adolescent swimmers - British Journal of Sports Medicine (UK), 7;27, 1973.
48. Chakraborti, D., Sen, R.N. and Nag, P.K. :
Effect of hypothermic shock on the morphology of Amphibian erythrocytes, Vet. Ani. Sci., Bidhan Krishi Viswavidyalay, 1:2-3, 1975.
49. Sen, R.N. & Nag, P.K. :
Work organisation of heavy load handling in India, Journal of Human Ergology (Japan), 4 : 103-113, 1975.
50. Sen, R.N. :
Edesha Shrama - Sharerbritta O Shrama - Proyuktibiddar Proyog (Application of Work Physiology and Ergonomics in this country), Jnan O Bignan, 28:485-488, 1975.
51. Mitra, T.K., A.k.Roy and Sen, R.N.
Model of heart and its application to ECG, Journal of Medical and Biological Engineering and Computing (UK), 15:140-148, 1977.
52. Sen, R.N. :
Ergonomics in *x Industry - Paper presented at the Seminar on Humanising Work Environment, held in the Central Labour Institute Sion, Bombay, 9th - 10th Feb. 1977, Proceedings, P.44-47, 1977.
53. Sen, R.N., Nag, P.K. and Ray, G.G. :
Some anthropometry of the people of Eastern India, Journal of Indian Anthropological Society, 12:201-208, 1977.
54. Mitra, T.K., Roy, A.K. & Sen, R.N. :
A model of the heart and its application to determine the effect of the external resistors on the electro-cardiographic potential of the Wilson Central terminal. Proc. of the International Symposium on Instrumentation held at Calcutta (from 14th to 17th January, 1978), p. 23-24, 1978.
55. Sen, R.N., Ray, G.G. and Nag, P.K. :
Relationship between segmental and whole body weights of some Indian subjects. In : Shephard, R.J. and Lavalle, H. (Ed.) Physical fitness assessment, C.C. Thomas, Springfield, Chapter 37, Pp 384-391, 1978.
56. Mitra, T.K., Roy, A.K. & Sen, R.N. :
A model of the heart and an optimisation in the number of standard electrodes - Proc. of the International Symposium on Biomedical Engineering held in New Delhi from 15 to 17th February, 1978, P.98-99, 1978. Medical and Life Science Engineering, 3: 135, 1978.
57. Sen, R.N. & Nag, P.K. :
Residual carry over of acclimatization of sub-Himalayan natives during graded workload at High altitude - Journal of Human Ergology (Japan), 7: 55-63, 1978.
58. Nag, P.K., Sen, R.N. & Roy, U.S. :
Optimal rate of work for Mountainers - Journal of Applied Physiology, (USA), 44 : 952-955, 1978.
59. Nag, P.K., Sen, R.N., Ray, G.G. & Chakraborty, D. :
Nutritional and energy metabolic status of the Indian workers performing heavy manual jobs, Journal of Medurai University, 7:47-50, 1978.

61. Pickford, R.W., Pickford, R., Bose, J., Joardar, B.S.; Nag, P.K., Roy, G.G. and Sen, R.N. :
Incomplete Achromatopsia in Bishnupur: Modern Problems in Ophthalmology (Karger, Basel, Switzerland, 19:232-235, 1978.
62. Sen, R.N. and Roy, G.G.:
Determination of densities of body tissues in Indians, Ind. Journal, Physiol. & Allied Sci. 32:152-157; 1978.
63. Sen, R.N. :
Ergonomics - Science and Technology of Man at Work - its role in our national development - Presidential address of the Section of Physiology, 66th Session of the Indian Science Congress held at Hyderabad - Proceedings - Part II, P.53-77, 1979.
64. Harding, R.N., Jones, P.R.M., Sen, R.N. and Wyness, J. :
An investigation of the electromyographic responses in Man at Work. Paper presented at the International Symposium on Work Physiology & Ergonomics held at Calcutta from 1-3 November, 1974, Indian Journal of Physiology & Allied Sciences, 33, 11-17, 1979.
65. Pickford, R.W., Bose, J., Joardar, B.S. and Sen, R.N. :
Colour vision tests and colour naming by thirteen incomplete achromate in Bishnupur, British Journal of Physiological Optics (UK), 33:1-10, 1979.
66. Sen, R.N. and Nag, P.K.:
Optimal work load for Indians performing different repetitive heavy manual work. Proceedings of the International Symposium on Work Physiology and Ergonomics held at Calcutta from 1-3 November, 1974 - Indian Journal of Physiology & Allied Sciences, 33 : 18-25, 1979.
67. Nag, P.K., Sen, R.N., and Ray, U.S.:
Cardio-respiratory performance of porters carrying loads on a treadmill, Ergonomics (UK) 22:897-907, 1979.
68. Sen, R.N. and Kar, M.R.:
Circadian rhythms and adaptation in some Indian shift workers and control subjects. Paper presented at the International Symposium on Work Physiology & Ergonomics held at Calcutta from 1-3 November, 1974, Indian Journal of Physiology & Allied Sciences, 33 : 66-75, 1979.
69. Sen, R.N., Pradhan, C.F., Basu, S. & Ganguli, A. :
An Ergonomic evaluation of Designs of Spades (Kodali)-paper presented at the Symposium (Focal theme) on Application of Physiological Researches in the National Welfare in the coming decade - Section of Physiology, 66th Session of the Indian Science Congress, Hyderabad, Proceedings, P.6-7, 1979.
70. Sen, R.N. and Sarkar, D.N.:
Occupational daily work load for Indian industrial workers at three different thermal conditions. Paper presented at the International Symposium on Work Physiology & Ergonomics held at Calcutta from 1-3 November, 1974, Indian Journal of Physiology & Allied Sciences, 33 : 78-83, 1979.
71. Sen, R.N., Basu, S. and Goswami, A. :
An Ergonomic design of hand-pulled Rickshaw-paper presented at the Symposium (Focal theme) on Application of Physiological Researches in the National Welfare in the coming decade - Section of Physiology, 66th Session of the Indian Science Congress, Hyderabad, Proceedings, P.6-7, 1979.

72. Nag, P.K. and Sen, R.N. :
Ergonomic cost of some heavy manual work in Bengal. Paper presented at the International Symposium on Work Physiology & Ergonomics held at Calcutta from 1-3 November, 1974, Indian Journal of Physiology & Allied Sciences, 33 : 122-127, 1979.
73. Pickford, R.W., Pickford, R., Bose, J. Joardar, B.B., Nag, P.K., Ray, G.G. and Sen, R.N. :
Incomplete achromatopsia in Bishnupur : genetics and heterozygote problems, In : Colour vision Deficiencies, vol.5, Ed.: G. Verriest, Chapter 5, Adam, Hilger Ltd., Bristol, Pp 251-255, 1980.
74. Sen, R.N. :
The transfer of technology and ergonomics - Part IV of the Report to the Government of Iraq on the work of the ILO/WHO Multidisciplinary Mission (17 November-14 December, 1978), for International Programme for the Improvement of working conditions (PIACT) - PIACT/MDT/11, International Labour Office, Geneva, P.69-78, 1980.
75. Sen, R.N., Ganguli, A.K., Roy, G.G., De, A. and Chakraborty, D. :
A preliminary ergonomic study on tea plucking operations, Two and a Bud, TRA Journal, 27:74-80, 1980.
76. Sen, R.N., Ganguli, A.K., Roy, G.G., De, A. and Chakraborty, D. :
Ergonomics studies of tea-leaf plucking operations. Criteria for selection and categorisation, Applied Ergonomics(UK), 12:83-85, 1981.
77. Roy, G.G., Sen, R.N., Nag, P.K., De, A. and Basu, S. :
Relationship between segmental and whole body weight and volumes of Indians, Journal of Human Ergology(Japan), 10, 35-48, 1981.
78. Sen, R.N. :
Ergonomic study of different tasks performed by Indian agricultural workers for improvement of productivity, International Bulletin of Current Research in Anthropometry, Ed. Danish Thomposon, University of Aston, England, P.44, 1981.
79. Sen, R.N. :
Ergonomic evaluation and design of Railway locomotive driver's cabins in India. International Bulletin of Current Research in Anthropometry, Ed. Dennis Thomposon, University of Aston, England, P.45, 1981.
80. Sen, R.N. and Ganguli, A.K. :
Preliminary Investigations into the Loco-man factor on the Indian Railways, Applied Ergonomics (UK), 13:107-117, 1982.
81. Sen, R.N. and Ganguli, A. :
An Ergonomics analysis of Railway Locomotive driver functions in India. Journal of Human Ergology (Japan), 11:187-202, 1982.
82. Sen, R.N. :
Certain Ergonomic principles in the design of factories in hot climates, Proceedings of the International Symposium on Occupational Safety, Health and Working Conditions, Specifications in relation to Transfer of Technology to the Developing Countries (held from 23-27 November, 1981), International Labour Office, Geneva, p.123-147, 1982.
83. Sen, R.N. : Anthropometry in relation to Ergonomics of walking for work study application in Indian agricultural workers - Paper presented at the session of 'Motion & Gait' of the 8th

- 84 (contd)
Proceedings - Journal of Human Ergology 11, Suppl.:57-65, 1982.
85. Sen, R.N. & Majumder, D:
Ergonomics in relation to Occupational Safety & Health in Jute Industries in Eastern India -Proceedings of the 10th Asian Conference of Occupational Health (held from 5th to 10th September, 1982, at Singapore) Pp, 289-298, 1982.
86. Sen, R.N.:
Application of Ergonomics in the design of factory and equipment for tropical conditions - Paper presented at the ILO Asian Workshop on the Role and Potential of Ergonomics for the Improvement of Working Conditions & Environment held from 13th to 16th September, 1982, at Singapore.
87. Sen, R.N.:
Physiological adaptation of people in tropical countries in some of their anthropometric dimensions in relation to thermoregulation, Proceedings of the International Conference on Human Genetics and Adaptation held from 1st to 5th February, 1982, at the Indian Statistical Institute, Calcutta, Volume 2, pp.149-156, 1983.
88. Sen, R.N., Ganguli, A.K., Ray, G.G., De, A. and Chakraborty, D.:
Tea-leaf plucking - workloads and environmental studies , Ergonomics (UK), 26; 887-193, 1983.
89. Sen, R.N. and Ray, G.G.:
Determination of whole body centre of gravity in Indians, Journal of Human Ergology (Japan), 12 : 3-14, 1983.
90. Sen, R.N.:
Application of Ergonomics to Industrially developing countries- The Ergonomics Society Lecture 1983 delivered at the Churchill College, University of Cambridge, England, on 24th March, 1983, Ergonomics (UK), 27:1021-1032, 1984.
91. Sen, R.N.:
Ergonomics Research and Application in India - Paper presented at the First International Conference on Ergonomics of Developing countries held on June 16-17, 1983 at Lulea University, Sweden, Proceedings of the Symposium, CEDC, Pp. 28-29, 1983.
92. Sen, R.N., De, A., Ganguly, A. and Chakraborty, D.:
Anthropometry in Relation to Ergonomics of Walking for Work Study Application in Indian Agricultural workers, Ergonomics (UK), 1984.
93. Sen, R.N. & Roy, J.K.:
Portable Solar Radiometer for field studies in Ergonomics- Proceedings of the International Symposium on Applied Physiology & Ergonomics, Ind.J.Physiol.& Allied Sci. 38:11-22, 1984.
94. Sen, R.N., Bakshi, D.P. & Roy, J.K. :
Evaluation of mechanical properties of total elbow prosthesis- Proceedings of the International Symposium on Applied Physiology & Ergonomics, Ind.J.Physiol.& Allied Sci. 38: 23-27, 1984.
95. Crockford, G.W., Sen, R.N. & Spencer, J.:
The design of work wear and protective clothing for use in the tropics, Ibid. 135-143, 1984.
96. Sen, R.N. and Ghoshthakur, D.:

97. Sen, R.N. and Kar, A. :
An ergonomic study on bamboo handicraft workers, In :
Proceedings of the International Symposium on Applied
Physiology & Ergonomics, Ind.J.Physiol.&Allied Sci.,
38 : 69-77, 1984.
98. Sen, R. N. and De, A. :
Ergonomics study on sheafing in paddy cultivation in
India, Proceedings of the International Symposium on
Applied Physiology & Ergonomics, Ind.J.Physiol. & Allied
Sci. 38 : 85-94, 1984.
99. Sen, R.N. and Chakraborti, D. :
A new ergonomic design of a 'Desi' plough. In : Proceedings
of the International Symposium on Applied Physiology &
Ergonomics, Ind.J.Physiol. & Allied Sci., 38:97-105, 1984.
100. Sen, R.N. and Chakraborty, D. :
A new ergonomic 'float-seat' for improvement of paddy
cultivation in India. In : Proceedings of the
International Symposium on Ergonomics in Developing
Countries, Jakarta, 18 - 21st Nov. 1985
(Geneva : International Labour Office).
101. Sen, R.N. and Dutta, N.C. :
An Ergonomic design of low-cost protective work-clothing
for furnace workers. In : Proceedings of the International
Symposium on Ergonomics in Developing Countries, Jakarta,
18 - 21st Nov. 1985 (Geneva:International Labour Office).
102. De, A. and Sen, R.N. :
Ergonomic Evaluation of ploughing process of paddy culti-
vation in India, J. Human Ergology, 15 : 103-112, 1986.
103. Kogi, K. and Sen, R.N. :
Third World Ergonomics, International Reviews of
1:77-118, 1987. Ergonomics Review (UK),
104. Sen, R.N. and Dutta, N.C. :
An Ergonomic design of low-cost protective work clothing for
furnace workers, In: Ergonomics in Developing countries: An
International Symposium, Occupational Safety & Health Series
No.58, International Labour Office, Geneva, Pp 222-223, 1987.
105. Sen, R.N. and Chakraborti, D :
A new ergonomic float-seat for improvement of paddy culti-
vation in India. In : Ergonomics in Developing countries:
An International Symposium, Occupational Safety and Health
Series No.58, International Labour Office, Geneva, Pp 419-427, '87.
106. Sen, R.N. :
Ergonomics design of some tools for manual maintenance of
railway tracks in India, Proceedings of the 10th Inter-
national Ergonomics Congress, held at Sydney, Australia
~~19~~ (1-5 August, 1988), Volume 1, Ergonomics in
Developing countries, Pp 227-229, 1988.
107. Sen, R.N. :
Research focus and perspectives on Work-related neck and
upper-limb disorders in India / Pp 402, 1988. / Ibid. Vol.2
108. Sen, R.N. and Pal, D. :
A new Ergonomic method for postural analysis. In : Bio-
mechanics (Ed.K.B.Sahay & R.K.Saxena), Wiley Eastern Ltd
(New Delhi), Pp 262-270, 1989.
109. Sen, R.N. and Gangopadhyay, S. :

MINISTÈRE
DE L'ÉDUCATION NATIONALE.
DE LA JEUNESSE ET DES SPORTS

PARIS, LE

DIRECTION DES PERSONNELS
D'ENSEIGNEMENT SUPÉRIEUR

LE MINISTRE D'ÉTAT, MINISTRE DE L'ÉDUCATION
NATIONALE, DE LA JEUNESSE ET DES SPORTS,

Sous-Direction des Personnels
enseignants

VU la loi n° 84-52 du 26 janvier 1984 sur
l'enseignement supérieur ;

Bureau des Personnels
des Grands Établissements
et des Personnels à Statuts
Spécifiques

VU le décret n° 85-733 du 17 juillet 1985
(articles 3 et 4) ;

Bureau D. P. E. S. 11

VU les rapports et sur propositions du
Directeur du Conservatoire national des
arts et métiers ;

MM

N° 5 93

ARRETE

ARTICLE 1 - Monsieur Rabindra Nath SEN, Professeur chercheur à l'Université de Calcutta, est invité en qualité de professeur à temps partiel (50%) au Conservatoire national des arts et métiers, du 1er au 31 octobre 1990 (PRGE 0170).

ARTICLE 2

.....

ARTICLE 3 - Pendant ces périodes, les intéressés percevront une rémunération non soumise à retenue pour pension civile, calculée ainsi qu'il suit :

50% du groupe hors échelle B2 afférent au 2ème échelon des professeurs du Conservatoire national des arts et métiers :

- M. SEN

.....

.../...

.....

ARTICLE 4. - Le Directeur des Personnels d'Enseignement supérieur est chargé de l'exécution du présent arrêté.

Fait à PARIS, le 08 JUIN 1990

Pour le Ministre et par délégation :
Par empêchement du Directeur des
Personnels d'Enseignement Supérieur
Le Sous-Directeur des Personnels Enseignants

D. MOURAIN

Visé au Contrôle financier
le : 23.5.90
sous le n° : 42782.
Le Contrôleur financier.

Pour ampliation
Le Chef du Bureau DPES 11


Michel PERROS

PR. EXTRAIT CERTIFIE CONFORME,
LE CHEF DU SERVICE DU PERSONNEL DU CNAM


J. ANTOINE

DESTINATAIRES :
- Chef de Service
- Intéressé
- Comptabilité
- Engagements
- Contrôle Financier
- Dossier

28 JUIN 1990



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SOCIETE ANONYME R.C.S. PARIS B 552 120 222

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M. SEN Rabenda Nath

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RELEVÉ D'IDENTITÉ BANCAIRE

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TITULAIRE DU COMPTE

DOMICILIATION

SG PARIS GAY LUSSAC

banque

agence

numéro de compte

clé RIB

30003 03081 00036565436 25

bilign. in anglais → ~~42332111~~
08 33 44 11

Professor SEN

Your return ticket Calcutta/Paris will be handed over to you through Air Fr. in Calcutta which should get in touch with you at the University. Your departure is 26th October.

Labo Ergonomie CNAM

Ref. TTJ 103. le 27.09.90



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DEPARTMENT OF PHYSIOLOGY
UNIVERSITY OF CALCUTTA

University Colleges of Science & Technology
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TEL 43.22.43.54. BEST REGARDS

T.S.C. 069

A. WISNER

Vendu 19 Oct. 1969
A 12^h

Prof. Dr. R.N. Sen
11A Mohan Bagan Lane
Calcutta 700 004.

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PHY/ERG/RNS/ISE-OH-SE

10 SEPTEMBER 1990

Dear Prof. Dr. Wisner,

I hope you have already received the 2nd Announcement and other materials for ISE-OH-SE.

We would be extremely delighted if you could kindly let us know about the possibility of coming to Bombay in January 1991 and grace the occasion by your kind presence and guide us to make the Symposium a grand success.

I went to French Consulate to arrange for my Visa to Paris and they wanted to have the return ticket (Calcutta-Paris-Calcutta) for the acceptance of my Visa application. Is it possible to get some details of my air-ticket or the name of the travel-agent in Calcutta whom I could contact for necessary information?

As I have applied for two more weeks of leave either before or after the Visiting Professorship to Paris to spend sometimes in research and discussions with Prof. Monod, Profs. A. Laville and Bernard Pavard, my exact departure date from Calcutta is to be finalised.

the name of

If you require, my travel-agent through whom I usually book my air-tickets for travel abroad, is given below :

Marshall International
25, Camac Street
Calcutta 700 016
Cable : MARSJET
Telex : 021 4386 JETS IN.

An early reply would be very much appreciated.

With kindest personal regards,

Yours sincerely,


(Prof. Dr. R.N. Sen)

हवाई पत्र
Aerogramme

भारत-89, विश्व फिलेटलि प्रदर्शनी-नई दिल्ली, 20-29 जनवरी 1989
INDIA-89, WORLD PHILATELIC EXHIBITION-NEW DELHI, 20-29 JANUARY 1989



Under Certificate of Posting



Prof. Dr. A. Wisner
Directeur du Laboratoire d'Ergonomie
et Neurophysiologie du Travail
41, Rue Gay-Lussac - 75005
PARISH.

हॉल ऑफ नेशन्स प्रगति मैदान-नई दिल्ली.
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CONSERVATOIRE NATIONAL DES ARTS ET MÉTIERS

ERGONOMIE ET NEUROPHYSIOLOGIE DU TRAVAIL

Paris, le 3 July 1990

Professor Dr. R.N. Sen
11A Mohan Banan Lane
Calcutta 700 004
India

Dear Dr. Sen.

Among the different aspects of Ergonomics we are studying and teaching in Paris, Technology Transfer and Work Conditions in difficult physiological situations are privileged. Students coming from twenty countries prepared or are preparing theses on this subject in relation with our Laboratory.

I think that it is a great loss for them and for us not to have yet any teaching from you who are the founder of the Indian Ergonomics School and a researcher who has enlightened so many fields in work physiology and ergonomics.

It is my privilege to ask you to spend two weeks at the Conservatoire National des Arts et Métiers (Paris Technical University) as an Invited Professor, from 28th October to 11th November 1990. As such, you will receive a free round trip air ticket for Calcutta/Paris/Calcutta and also a per diem allowance that will be adequate for your housing, meals and out-of-pocket living expenses.

During this period, we expect you to give us two Conferences or Seminars and to advise some of our Ph.D. students. We shall be available to describe what we are doing in the Laboratory of Ergonomics and Work Neurophysiology and to arrange meetings with Physiologists and Ergonomists you could wish to meet whilst in Paris.

I hope that the University of Calcutta will kindly accept to let us benefit from your high competence for these two weeks.

I look forward to great pleasure to the perspective of your visit.

Sincerely yours,

Professor A. Wisner
Directeur du Laboratoire
d'Ergonomie
et Neurophysiologie du Travail

Prof. Dr. R. N. Sen
11A Mohan Bagan Lane
Calcutta 700 004, INDIA.

Under Certificate of Posting

18 JUNE 1990

Dear Prof. Dr. Wisner,

Many thanks for your kind letter dated 9th May 1990 enclosing an official letter to help me to apply to the Vice-Chancellor for leave in connection with visiting Professorship in your Institute from 28th Oct. to 11th Nov. 1990.


It would have been much easier for me to get the leave if the financial commitment of my air-travel and stay at Paris (local hospitality) were mentioned in your above-mentioned letter. I do not know whether it would be possible for you to kindly issue a subsequent official letter informing me the travel and stay arrangements that would be made by your Institute.

I am also grateful to you for your kind letter dated 31st May 1990, regarding my participation in the 11th IEA Congress in Paris from 15th to 20th July, 1991. Since our University has no ~~providing~~ fund for my travel and stay during the Congress, I would request you kindly to let me know the sources to whom I could apply for travel-assistance, for the Congress.

It would be very much appreciated if you could kindly let me know the topics and the ~~periods~~ duration of each of the two Conferences or Seminars you expect me to give during the Visiting Professorship.

With kindest personal regards,

Yours sincerely,


(Prof. Dr. R. N. Sen)

हवाई पत्र
Aerogramme

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Prof. Dr. A. Wisner
Directeur du laboratoire d' Ergonomie
et Neurophysiologie du Travail
Conservatoire National Des Arts et Metiers

41, Rue Gay-Lussac -
75005 PARIS.

दूसरा मोड़ SECOND FOLD



In
india
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never ends



Department of Tourism
Government of India

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MINISTÈRE DE L'ÉDUCATION NATIONALE
CONSERVATOIRE NATIONAL DES ARTS ET MÉTIERS

ERGONOMIE ET NEUROPHYSIOLOGIE DU TRAVAIL

Paris, le 9th May 1990

Prof. Dr. R.N. SEN
11A Mohan Bagan Lane
CALCUTTA 700 004
India

Dear Prof. Sen,

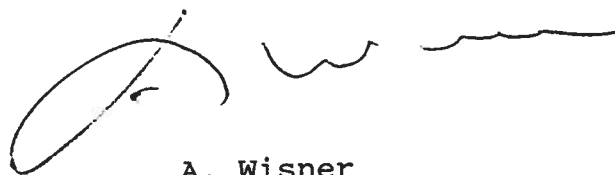
Thank you for your letter of April 23rd.

I am sending under the same cover the official letter you asked for. It is a real joy to receive you in the laboratory.

You are kindly asking the title of my keynote address in Bombay. I am afraid I am not yet sure to attend this Meeting. In fact, the load of the preparation of the IEA 91 is growing every day and as I am old I am a little afraid not to be able to travel extensively during this period.

With my best regards,

Yours sincerely,



A. Wisner



Paris, le ^{3 July}~~9th May~~ 1990

Prof. Dr. R.N. SEN
11A Mohan Bagan Lane
CALCUTTA 700 004

Dear Professor Sen,

Among the different aspects of Ergonomics we are studying and teaching in Paris, Technology Transfer and Work Conditions in difficult physiological situations are privileged. Students coming from twenty countries prepared or are preparing thesis on this subject in relation with our Laboratory.

I think that it is a great loss for them and for us not have yet any teaching from you who are the founder of the Indian Ergonomics School and a researcher who has enlightened so many fields in work physiology and ergonomics.

It is my privilege to ask you to spend two weeks at the Conservatoire National des Arts et Métiers (Paris Technical University) as an Invited Professor, from 28th October to 11th November 1990. *As such you will receive a free air ticket for Calcutta to Paris and return and a per diem allowance with travel be adequate for housing and meals.* During this period we expect you to give us two Conferences or Seminars and to advise some of our Ph. D. students. We shall be available to describe what we are doing in the laboratory of Ergonomics and Work Neurophysiology and to arrange meetings with Physiologists and Ergonomists you could wish to meet whilst in Paris.

I hope that the University of Calcutta will kindly accept to let us benefit from your high competence for these two weeks.

I enjoy the perspective of your visit.

Sincerely Yours,

Professeur A. WISNER
Directeur du Laboratoire
d'Ergonomie
et Neurophysiologie du Travail

NATURALIA ET BIOLOGIA

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Adresser la Correspondance à
M. le Secrétaire Général

de N. E. B.
COLLÈGE DE FRANCE

PARIS, le 20 décembre 1989

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Objet : Subventions décembre 1989
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(2 mandats)

WISNER

STAGES/MISSIONS

Cher(e) Collègue,

J'ai le plaisir de vous informer que le Bureau de notre Association a décidé de donner une suite favorable à votre demande de subvention concernant :

- Monsieur Kiti Intaranon (Stage Paris)
- Monsieur Rabindra Nath Sen (Stage Paris)

et de vous accorder ~~la somme de~~ les sommes respectives de 7.500 F. et 6.500 F.
=====

Vous voudrez bien prendre contact avec le Service Gestion de notre Association (tél. 45.44.02.50) afin de l'informer des modalités de versement de cette subvention.

Lorsque la mission aura été effectuée, nous vous demandons de nous adresser un rapport en deux parties (sur deux feuilles distinctes) :

- Compte-rendu scientifique
- Compte-rendu financier avec les pièces justificatives originales des dépenses et, notamment, l'original du talon du billet de transport si ce dernier est pris en charge par N.E.B. ; dans le cas où le billet est financé par un autre organisme, une photocopie du billet devra nous être envoyée.

Le rapport doit nous être adressé par vous-même et non par le chercheur de votre laboratoire ayant bénéficié de cette subvention.

Je vous prie d'agréer, Cher Collègue, l'expression de mes sentiments les meilleurs.

cc M. PORTET, Trésorier

P./ Bernard SALVAT
Secrétaire Général

NATURALIA ET BIOLOGIA

Association déclarée sous le numéro 58/1033 - Loi de 1901

7.500
- 305

7.195

Adresser la Correspondance à
M. le Secrétaire Général

de N. E. B.

COLLÈGE DE FRANCE

II, PLACE MARCELIN-BERTHELOT
75231 PARIS CEDEX 05

PARIS, le 20 décembre 1989

Objet : Subventions décembre 1989
=====

Monsieur le Professeur A. WISNER

STAGES/MISSIONS

Cher(e) Collègue,

J'ai le plaisir de vous informer que le Bureau de notre Association a décidé de donner une suite favorable à votre demande de subvention concernant :

- Monsieur Kiti Intaranon (Stage Paris)
- Monsieur Rabindra Nath Sen (Stage Paris)

et de vous accorder ~~la somme de xx~~ les sommes respectives de 7.500 F. et 6.500 F.
=====

Vous voudrez bien prendre contact avec le Service Gestion de notre Association (tél. 45.44.02.50) afin de l'informer des modalités de versement de cette subvention.

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P./ Bernard SALVAT
Secrétaire Général

cc M. PORTET, Trésorier

360

nets

6.850 nets

423

8.522

CONSERVATOIRE NATIONAL DES ARTS ET METIERS

292, rue Saint-Martin - Paris 3ème

8^{es} - du Conservatoire -

Tel. 40 - 27. 22. 30

Transmis à Mme T. REBIFFÉ
C. fait la grille indiciaire du personnel enseignant
demandée ce matin par téléphone.

De la part de M. Dubi TRAVAILLÉ

~~Avec ses compliments~~ Cordialement.

Paris, le 09. 11. 89.

ECHELONNEMENT INDICIAIRE DU PERSONNEL ENSEIGNANT

CATEGORIE		1er échelon	2ème échelon	3ème échelon	4ème échelon	5ème échelon	6ème échelon	7ème échelon						
PRGE CNAM <i>pas de stage</i>	classe normale	815	H.éch. B I-II-III	H.éch. C I-II-III	promotion à l'ancienneté : 5 ans promotion au choix : 3 ans 30% des promouvables									
	classe except.	H.éch. D I-II-III	(ch oix) H.éch. E I-II	18 mois d'ancienneté en classe normale - 18 mois d'ancienneté en D pour passer en E D = 10% des effectifs E = 10% des effectifs										
CHCO		échelon unique : 364												
PROF. DES UNIV - PR <i>pas de stage</i>	2ème classe	652	1 an	690	1 an	728	1 an	770	1 an	815	5 ans	H.éch. A I-II-III		
	1ère classe	815	4a 4m	H.éch. B I-II-III	4a 4m	H.éch. C I-II-III	passage 2ème à 1ère classe : au choix exclusivement							
	classe except.	H.éch. D I-II-III	(ch oix)	H.éch. E I-II	passage de la 1ère à classe exceptionnelle : au choix exclusivement - 18 mois en 1ère classe									
SDCM <i>pas de stage</i>	classe normale	652	2 ans	728	2 ans	815	passage classe exceptionnelle au choix : 4 ans d'ancienneté au 3ème échelon 20% des effectifs							
	classe except.	H. éch. A I-II-III												
Maître Ass. M. A. <i>2 ans de stage</i>	2ème classe	410	3 ans	481	3 ans	548	10 ans	spé : 652	passage en 1ère classe : - inscription sur la liste d'aptitude +3a anc ou 2a 6 m au 3ème échel					
	1ère classe	443	2a 6m	617	3 ans	667	4 ans	713	4 ans	743	3 ans	777	3 ans	815
Maître de conf. MCF <i>2 ans de stage</i>	classe	617	2a 6m	667	2a 6m	713	3 ans	743	2a 6m	777	2a 6m	815	passage en 1ère en classe : sur emploi vacant	
	1ère classe	410	2 ans	481	2a 10m	548								
	hors classe	617	2a 10m	667	2a 10m	713	3a 6m	743	2a 10m	777	2a 10m	815	H. C. = 8% de l'effectif total de ce corps	
Chefs de tr. CFEC <i>1 an de stage</i>		652	1 an	690	1 an	728	1 an	770	1 an	815	5 ans	H.éch. A I-II-III	2 ans	652
Assistants:ASCM <i>1 an de stage</i>		340	2 ans	380	2 ans	423	2 ans	469	2 ans	522	2 ans	591	2 ans	652
		340	1a 6m	368	1a 6m	405	1a 6m	435	1a 6m	469	2 ans	508	2 ans	538

Les indices mentionnés sont des indices majorés

"novembre 1989"

Under Certificate of Posting

Prof. Dr. R. N. Sen
11A Mohan Bagan Lane
Calcutta 700 004.

23 APRIL 1990

Dear Prof. Dr. Wisner,

Many thanks for your kind letter dated 19.2.90 received by me after my return from USA & UK, Paris and Zurich.

I am grateful to you for giving the opportunity to talk to you in Paris, in spite of your very busy schedule. I am unlucky that I could not make a preliminary visit to the laboratories in Paris.


I am glad to learn that the time between 15th Oct.-15th Nov. is suitable for you. I would prefer the last week of ~~week~~ October and 1st week of Nov.

May I request you to kindly write an official letter for the offer of the two-week visiting Professorship so that I can apply to the Vice-chancellor for the duty ~~leave~~ leave.

With kindest personal regards,

Wish you all a Happy Bengali New Year,

Yours sincerely,


(Prof. Dr. R. N. Sen)

PS : May I request you to kindly send me the title of your Keynote address for ISE-OH-SE at Bombay

हवाई पत्र
Aerogramme

Under Certificate of Posting



Prof. Dr.A. Wisner

Director

Ergonomie et Neurophysiologie De Travail

Conservatoire National Des Arts et
Metiers

41, Rue Gay-Lussac - 75005

PARIS.

दूसरा मोड़ SECOND FOLD

भेजने वाले का नाम और पता:-

Sender's Name and Address:-

इस पत्र के अन्दर कुछ न रखिये

No Enclosures Allowed

19 February 1990

Professor R.N. Sen
University Colleges of Science & Technology
92 Acharyya Prafullachandra Road
CALCUTTA 700009
(Inde)

Dear Professor Sen,

I have received with great pleasure your letter of February 5th in which you are giving precise periods convenient for you to visit us.

I am very sorry not to be in Paris during the first period you suggest. At the end of September and beginning of October, I will be in Montreal for two meetings and may be later in Orlando (Florida) at the HFS annual conference.

On the contrary, the period between 15 October to 15 November is excellent. The best for the students would be the first two weeks of November : 5th to 16th November.

I hope that you would be able to give us a 2 hours conference, Friday 9th November, to inaugurate the Anthropotechnology Seminar 1990/91.

I send a copy of this letter and a copy of yours to professors Monod, Laville and Pavard.

I enjoy to have you soon in Paris as invited colleague.

With best regards.

Truly yours,

A. Wisner

Copie : A. Laville
H. Monod
B. Pavard



Under Certificate of Posting

TELEGRAM : SCIENCE, CAL-700009

PHONE : 35-9186/89

DEPARTMENT OF PHYSIOLOGY
UNIVERSITY OF CALCUTTA

University Colleges of Science & Technology
92, ACHARYYA PRAFULLACHANDRA ROAD
CALCUTTA-700009

Ref. No. PHY/ERG/RNS/FV/90

Dated... 5 FEBRUARY....., 1990...

Dear Prof. Dr. Wisner,

Many thanks for your kind letter dated 26th January 1990. I hope you have received my letter dated mentioning the possibility of meeting you in Paris in March '90.

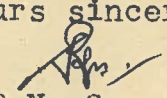
We feel highly honoured that you have so kindly accepted our invitation to act as a Member of the International Advisory Committee of ISE-OH-SE and we are extremely happy to you would whole-heartedly participate and help us ~~ix~~ with your wise advice to make the Symposium a grand success. In the world, there are very few scientists like you who have a very soft corner for helping industrially developing countries to apply Ergonomics for progress and improvement, thus we are very fortunate.

The time which is very convenient for my visit to your laboratory is from 18th Sept. to 3rd Oct. '90. However if this is not convenient for you I would prefer the time between 15th Oct. to 15th Nov '90, so that last one and a half month is completely free for me to work for the ISE-OH-SE. Since there is a possibility to meet you in March '90, if this is convenient for you, I may discuss in details. If ~~xxxx~~ the meeting is not possible, I may contact you over phone. I would also ~~take~~ like to take this opportunity to meet Prof. H. Monod, Prof. A. Laville and Prof. Bernard Pavard if it suits them. Hope to meet you thrice in 1990.

With kindest personal regards,

Yours sincerely,

Prof. Dr. Alain Wisner
Director
Ergonomie et Neurophysiologie
Du Travail, 41, Rue Gay-Lussac 75005
PARIS.


(R.N. Sen)

19 Février 1990

Monsieur le Directeur
à l'attention du Service du Personnel
C N A M

Monsieur le Directeur,

Le Conseil de Perfectionnement (séance restreinte au personnel enseignant) du 12 Décembre 1989 a adopté à l'unanimité la proposition de nomination du Professeur Rabindra Nath Sen comme professeur-associé-invité à mi-temps pour un mois.

Compte tenu de l'emploi du temps du Professeur Sen et de l'organisation de nos enseignements, je propose que le Professeur Sen soit nommé pour le mois d'Octobre 1990.

Veillez agréer, Monsieur le Directeur, l'expression de mes sentiments dévoués.

A. Wisner

à novembre pour
Octobre 90

Feil. le 15.2.90

000 008 263 2595

Dear Professor Sen,

I have received with pleasure, February 6th, your letter of January 25th. A part of the questions you raise in this letter have their answer in a letter I have written to you January 26th. You shall receive a copy of this letter by FAX.

The idea of staying in Paris when returning from United States is reducing. As far as I am concerned, the realization looks difficult. I will come back from Thailand only March 12 and I will afterwards be in a very difficult academic period where I will be very little available to you. But, of course, I am not able to receive you, you may stay at Pr Monod or Pr Laville laboratories.

Another question is related to your expenses (travel from London to Paris and return, living expenses in Paris that are very high). It has been in fact very difficult for me to obtain 11.000 F.F. (about 1.800 US \$) for your future travel to Paris and I am not in a position to obtain more for the same person even eminent. I cannot use this money freely, the travel money (6.500 FF) is only for a travel from Calcutta to Paris and return.

The administrative preparation for your employment as Invited Professor (about 4.500 FF) needs 2 or 3 months to be taken even if the principle has been accepted. A little more than a month is a too short period for this preparation.

I send a copy of my two letters to Pr Monod and Pr Laville so that they can explore any possibility to receive you and subsidize your travel from London and expenses in Paris from 6 to 18th March.

I am very sorry not to be able to follow your suggestions but I hope you shall be able to visit us either May-June or in October-December 1990 for two weeks.

With kind regards

Copie : Pr Laville
Pr Monod

A. Wisner

12 Février 1990

Professor R.N. Sen
c/o Professor George Hagglund
School for Workers
University of Wisconsin-Exten
422 Lowell Hall 610 Langdon Street
MADISON Wisconsin 53703
(USA)

FAX 608 263 2595

Dear Professor Sen,

I have received with pleasure, February 6th, your letter of January 25th. A part of the questions you raise in this letter have their answer in a letter I have written to you January 26th. You shall receive a copy of this letter by FAX.

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With kind regards

Copie : Pr Laville
Pr Monod

A. Wisner



11/A, Mohan Bagan Lane, Calcutta 700 004 India. Regd No S/58750 of 1988-1989 Under W.B. Act XXVI of 1961

Prof. Dr. A. Wisner
Director
Dept. des Sciences de l'Homme au Travail
22 Rue Emile Dubois
75014 Paris
FRANCE.

Our Ref PHY/ERG/RNS/ISE-OH-SE Date

25 JANUARY 1990

Dear Prof. Dr. Wisner,

I hope you have already received the First Announcement of the International Symposium on Ergonomics, Occupational Health, Safety and Environment (ISE-OH-SE) to be held in Bombay from 2nd to 6th January 1991 and also our Greeting Card.

You would be glad to know that I have been invited by the University of Wisconsin, USA to participate in the Seminar on Ergonomics to be held in February '90 and to deliver lectures on different aspects of Ergonomics for two weeks.


for a few days/ On my return journey from USA and Canada, I wish to pay a very quick visit to your Laboratory/Department including those of Prof. Laville and Prof. Monod and to discuss on various aspects of Ergonomics and also to seek your kind advice for the grand success of ISE-OH-SE, between 6th and 18th March, 1990. If you wish, I may also have discussions on the programme of my visit which you so kindly suggested earlier.

The University of Wisconsin would only bear my air travel from Calcutta to Madison and back via London and also the local hospitality from 10th to 22nd February 1990. The extra expenses for my travel and stay after 22nd February will have to be borne by me, out of meagre F.T.S. only. I wonder whether any local hospitality or cheap accommodation for a few days in Paris could be provided to me. I would highly appreciate if you could kindly confirm my visit in the following address between 10th and 22nd February 1990 :

Prof. Dr. R.N. Sen C/o. Prof. Dr. George Hagglund, Director/
Professor, School for Workers, University of Wisconsin-Exten.,
422, Lowell Hall, 610 Langdon Street, Madison, Wisconsin
53703, USA, Tel. No. (608) 262-2111, FAX No. (608) 263-2595.
Between 23rd Feb. and 4th March, I propose to be in USA and
Canada when I could get information from Dr. Hagglund over phone.

With kindest personal regards to you and your family
and Seasons' Greetings,

Yours sincerely,


(R.N. Sen)

Univ. Prof. & Head, Erg. Lab.
Secretary General, ISE-OH-SE.



MINISTÈRE DE L'ÉDUCATION NATIONALE

CONSERVATOIRE NATIONAL DES ARTS ET MÉTIERS

ERGONOMIE ET NEUROPHYSIOLOGIE DU TRAVAIL

Paris, le 26th January 1990

Prof. Dr R.N. SEN,
Indian Society of Ergonomics
11/A, Mohan Bagan Lane,
Calcutta 700 004
India

Dear Professor Sen.

I am writing to you about two important matters we have in common.

The first question is related to your kind invitation of October 15th to be a Member of the International Advisory Committee of the International Symposium on Ergonomics, Occupational Health, Safety and Environment to be held in Bombay at IIT, from 2nd to 6th January, 1991. You are quite right to think that I will be honoured with this proposal and that I will agree.

Though I am living a very difficult time at present at the laboratory with the promotion of A. Laville and Bernard Pavard who became Professors and with the preparation of the 11th Congress of the International Ergonomics Association, to be held in Paris, in 1991, I will try to take part in this Symposium. It is a long time since I was in India and the progress of Indian Ergonomics is fascinating. You had so many scientific children that now you have been able to organise the Indian Society of Ergonomics.

The second important question is related to your visit to our laboratory. I have obtained a double support for your visit for the year 1990. First the Conservatoire National des Arts et Métiers offer you to be an Invited Professor. The salary will be decent for your living expenses in Paris. The Association Naturalia et Biologia offers you the sum of 6,500 frs for the payment of a return air ticket Calcutta-Paris which, according to the information we obtained here, covers the return air ticket Calcutta-Paris.

The choice of the period is also rather difficult. It could be either from 7th May to 16th June, or between the 15th October and the 15th December for a period of two weeks. I am afraid the second proposal may be very near to the Bombay Conference. Would you kindly let me know at your earliest convenience the period which you think would be more convenient for your visit to Paris.

I have therefore, a strong hope to see you twice in 1990, once in Paris and the other in Bombay. Professeur Hugues MONOD will be also very happy to receive you in his laboratory.

With kind regards,

Yours sincerely,


Alain WISNER



CONSERVATOIRE NATIONAL DES ARTS ET MÉTIERS

ERGONOMIE ET NEUROPHYSIOLOGIE DU TRAVAIL

Paris, le 30 Novembre 1989

Notice sur le Professeur Rabindra Nath Sen

1 - *idem* 8.000 rds
2 - " ~ 9.500

Le Professeur Rabindra Nath Sen, âgé maintenant de 58 ans, a déjà une longue carrière qui se confond avec l'histoire et la physiologie du travail et de l'ergonomie en Inde.

Il est issu de la remarquable école de physiologie indienne qui existe à Calcutta depuis 100 ans.

Il a été formé à l'Université de Calcutta où il obtient sa licence en 1952, puis sa maîtrise en 1954, et le doctorat d'Etat en 1961. Il a été enseignant de physiologie à Calcutta de 1958 à 1962. Puis, il fut nommé chef de la division de physiologie industrielle au sein de l'Institut Central du Travail à Bombay où il travailla de 1962 à 1967.

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Ce laboratoire vit son activité et son nom transformés en laboratoire de physiologie du travail et d'Ergonomie (1976) et en laboratoire d'Ergonomie en 1980.

Les travaux du Pr Sen ont fait l'objet de plus de 100 publications dont la majorité dans des revues internationales à comité de lecture. Ces articles portent sur l'anthropométrie de la population indienne, ses capacités physiques, les effets du travail à la chaleur et les applications ergonomiques de ces connaissances.

Un des aspects les plus remarquables des publications du Pr Sen est le fait que beaucoup d'études ont été réalisées en situation de travail et sont accompagnées d'une véritable étude ethnologique.

En 1974, R.N. Sen organise à Calcutta, avec le plus grand succès, un symposium international de physiologie du travail et d'ergonomie. Les travaux de ce séminaire sont publiés ensuite dans l'Indian Journal of Physiology sous forme d'un numéro spécial dont R.N. Sen est l'éditeur avec S. Banerjee.

En 1981, R.N. Sen est expert auprès du Bureau International du Travail (B.I.T.) dans le cadre du Programme International pour l'Amélioration des Conditions de Travail (P.I.A.C.T.) et présente un remarquable rapport sur "les principes ergonomiques de conception des usines en climat chaud".

En 1983, le Pr Sen est invité à donner la "Society's lecture" par l'Ergonomics Society, de Grande-Bretagne, la plus ancienne et la plus exigeante des Sociétés d'Ergonomie mondiales. Sa conférence porte sur "l'application de l'ergonomie dans les pays en développement industriel" et est publiée dans le journal "Ergonomics".

En 1987, R.N. Sen publie avec K. Kogi dans "International Review of Ergonomics" un rapport très important sur "l'Ergonomie du tiers Monde".

Après avoir participé à la création de la Société d'Ergonomie d'Asie du Sud-Est au début des années 80, R.N. Sen devient le créateur et le premier président de la Société Indienne d'Ergonomie qui sera bientôt admise au sein de l'Association Internationale d'Ergonomie.

La plupart des physiologistes du travail et des ergonomistes indiens sont ses anciens élèves.



Paris, le 27.11.89

Notice sur le Professeur Rabindra Nath Sen

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A. Wisner



Paris, le 27.11.89

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En 1974, R.N. Sen organise à Calcutta, avec le plus grand succès, un symposium international de physiologie du travail et d'ergonomie. Les travaux de ce séminaire sont publiés ensuite dans l'Indian Journal of Physiology sous forme d'un numéro spécial dont R.N. Sen est l'éditeur avec S. Banerjee.

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Après avoir participé à la création de la Société d'Ergonomie d'Asie du Sud-Est au début des années 80, R.N. Sen devient le créateur et le premier président de la Société Indienne d'Ergonomie qui sera bientôt admise au sein de l'Association Internationale d'Ergonomie.

La plupart des physiologistes du travail et des ergonomistes indiens sont ses anciens élèves.



A. Wisner



Paris, le

Notice sur le Professeur Rabindra Nath Sen

Le Professeur Rabindra Nath Sen, âgé maintenant de 58 ans, a déjà une longue carrière qui se confond avec l'histoire et la physiologie du travail et de l'ergonomie en Inde.

Il est issu de la remarquable école de physiologie indienne qui existe à Calcutta depuis 100 ans.

Il a été formé à l'Université de Calcutta où il obtient sa licence en 1952, puis sa maîtrise en 1954, et le doctorat d'Etat en 1961. Il a été enseignant de physiologie à Calcutta de 1958 à 1962. Puis, il fut nommé chef de la division de physiologie industrielle au sein de l'Institut Central du Travail à Bombay où il travailla de 1962 à 1967.

Il devint, ensuite, enseignant-chercheur dans le département d'Ergonomie et Cybernétique de l'Université de Technologie de Loughborough (U.K.) de 1967 à 1970. Il revint ensuite à Calcutta en 1970 où il a dirigé de nombreux étudiants pour leur maîtrise et leurs doctorats en physiologie jusqu'à maintenant au sein du laboratoire de physiologie du travail qu'il a créé et qu'il dirige depuis 1972.

Ce laboratoire vit son activité et son nom transformés en laboratoire de physiologie du travail et d'Ergonomie (1976) et en laboratoire d'Ergonomie en 1980.

Les travaux du Pr Sen ont fait l'objet de plus de 100 publications dont la majorité dans des revues internationales à comité de lecture. Ces articles portent sur l'anthropométrie de la population indienne, ses capacités physiques, les effets du travail à la chaleur et les applications ergonomiques de ces connaissances.

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La plupart des physiologistes du travail et des ergonomistes indiens sont ses anciens élèves.

20 Octobre 1989

Monsieur le Professeur Saint-Paul
Directeur
CNAM

Monsieur le Directeur,

Le Professeur R.N. Sen, Directeur du Laboratoire de Physiologie du Travail de l'Université de Calcutta et Président de la Société Indienne d'Ergonomie, a répondu favorablement à mon invitation de venir visiter notre laboratoire et donner deux conférences, au cours du premier semestre 1990.

Le Professeur Sen est l'un des plus remarquables physiologistes du travail actuels, si ce n'est le plus remarquable. Il est le père de l'école indienne de physiologie du travail qui a produit de nombreux chercheurs de haut niveau travaillant actuellement en Inde ou aux Etats-Unis. J'ai moi-même été membre par correspondance du jury de plusieurs Ph. D. et thèses d'Etat pour des travaux qu'il avait dirigés.

Je serais très heureux que le Professeur Sen puisse être nommé Professeur invité pour un mois à mi-temps, le mois de Mai me paraissant être le plus souhaitable.

Veillez agréer, Monsieur le Directeur, l'expression de mes sentiments dévoués.

A. Wisner

Copie : Pr R. Ribette
Mme Mansour

Prof. Dr. R. N. Sen
11A Mohan Bagan Lane
Calcutta 700 004, INDIA

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15 MAY 1989

Dear Prof. Dr. Wisner,

I am extremely grateful for your kind letter dated 24th April 1989 and for ~~your~~ sincere efforts to obtain a travel grant for me to attend the Bali meeting; which unfortunately did not materialise; due to my bad luck.

I am very happy to know about some possibility of my working with you before you retire as Head of the Laboratory next year. Obviously, as per your advice, I must consider the project at much greater depth, which could be finalised during my short visit, during the period 1 January 1990 to 30 June, for a period of two weeks.

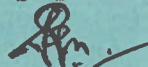
You may be glad to know that I had the fortune to visit the Laboratories of Dr. Laville and Prof. Monod. Prof. Monod was also kind enough to come to Calcutta to attend the International Symposium on Work Physiology and Ergonomics. They may remember me.

I would eagerly wait for the discussions ^{(you may have with} about the study programme with Prof. Dr. Laville and ~~Monod~~ Prof. Monod and advise me on the topic of research, such as ergonomics methodology in which I am also interested.

I hereby confirm that two weeks, which would be convenient ~~you~~ for you, between 1st January to 30 June 1990 would be suitable for me also.

With kind regards to you and your family and to Prof. Laville and Prof. Monod,

Yours sincerely,


(R.N. Sen)

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Prof. Dr. A. Wisner
Director
Conservatoire National Des Arts Et
Metiers
Ergonomie Et Neurophysiologie Du Travail
41, Rue Gay-Lussac 7
75005 Paris
FRANCE.

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MINISTÈRE DE L'ÉDUCATION NATIONALE
CONSERVATOIRE NATIONAL DES ARTS ET MÉTIERS

ERGONOMIE ET NEUROPHYSIOLOGIE DU TRAVAIL

Paris, le 29 May 1989

Professor Dr. R.N. Sen
11A Mohan Bagan Lane
Calcutta 700 004
INDE

Dear Professor Dr. Sen:

I have received with very great pleasure your letter of 15 May and your agreement to my suggestion. I will request money from a funding organism for your travel and stay in Paris. I am afraid that the accommodations will not be luxurious but they will be decent.

We shall arrange this two-week period in such a way that you will be able to have useful discussions not only at our Laboratory but also with Professor Monod and with Dr. Laville.

Dr. Laville is always a member of our Laboratory but it is highly likely that he will become head of his own Laboratory (Ergonomics, Work Physiology and Psychology) in the same building but under the cover of another organization, the EPHE (Ecole Pratique des Hautes Etudes).

Professor Monod is one of the three persons who are organizing the next IEA Congress with me, and he is also very active in research and teaching.

As soon as I am sure of the funding for your travel (I will know around 15 December 1989), I will ask you, Professor Laville and Professor Monod to determine what will be the best period for your trip.

The perspective of your visit gives me much pleasure. With best regards to you and your family, I remain,

Very truly yours,

A. Wisner



MINISTÈRE DE L'ÉDUCATION NATIONALE
CONSERVATOIRE NATIONAL DES ARTS ET MÉTIERS
ERGONOMIE ET NEUROPHYSIOLOGIE DU TRAVAIL

Paris, le 24 April 1989

Professor Dr. R.N. Sen
11A Mohan Bagan Lane
Calcutta 700 004
INDE

Dear Professor Dr. Sen:

I received your letter of 27 February quite some time ago and was just discouraged from answering after learning that you have faced so much disappointment; in fact, there is less and less money for international relations in the United Nations agencies and in a marginal way, the relations with industrially developing countries is increasingly businesslike. So I am not surprised about all the negative answers you have received concerning travel grants. When we meet, I will tell you why you had no money for the Bali meeting, although I had fought a lot to obtain it.

I am very flattered to learn that you are ready to work for one year at our Laboratory during a sabbatical leave. But I think we must consider this project in a little more depth for I am supposed to retire as head of the Laboratory next year; although I will remain for a few years as a full professor, I am a little reluctant to make such an important decision without the agreement of the new head, who will be elected in a few months.

There are also technical problems: if the researchers usually speak English, the technical staff does not.

Another question is certainly that we are no longer really a work physiology laboratory but are, rather, much more involved in ergonomics methodology and cognitive psychology in computer systems, and I am not sure that this type of research would be of interest to you.

So I therefore think that we have to study this important program in greater detail, in the first instance with Dr. Laville, who will soon be head of a laboratory under the title of Ergonomics, Work Physiology and Psychology which is on friendly terms with our own as well as being located in the same building; and perhaps also with Professor Monod.

A good solution for you could be to pay us a short visit soon. It is rather easy for me to find money to pay your roundtrip Calcutta/Paris/Calcutta travel as well as modest accommodations for a two-week stay in Paris. I would suggest that such a visit could

.../2

take place during the first half of 1990, some time between 1 January and 30 June. It would be possible for me to arrange for such funding if you were to give me your answer before 1 December 1989.

Maybe you could on this occasion also travel elsewhere in Europe, at least to London, although I can not pay travel from Paris to other European cities or accommodations besides those for the two-week stay in Paris. But I suppose that this might be arranged with our British colleagues.

I am very happy to learn that you are organizing an International Symposium on Ergonomics, Occupational Health, Safety & Environment in Bombay in 1991 under the auspices of ISE. However, I am not sure that I will be able to attend it for, as you know, I am the organizer of the IEA 91 Congress in Paris and will therefore be very busy.

Hoping to see you soon in Paris, and sending you my best regards for yourself and your family, I remain,

Very truly yours,

A. Wisner

Prof. Dr. R. N. Sen
11A Mohan Bagan Lane
Calcutta 700004.

Under Certificate of Position

27 FEBRUARY 1989

Dear Prof. Dr. Wisner,

It was so kind of you to remember me and send a note through one of my students, Dr. Deb Kumar Chakraborti, who met you at the IEA Congress at Sydney, Australia. It was very unfortunate for me that though I tried for more than one and a half years to get a travel grant through any of four organisations, I came to know from Prof. Manuaba only on the previous day of departure for the SEAES Conference and the IEA Congress that there was a possibility of my travel support. It was then too late to take any action. Thus I missed the opportunity of attending the conferences and could not have the great pleasure of meeting you all.

3rd/ You will be glad to know that my paper on "Incidence of Raynaud's phenomenon in working using vibrating tools" has been accepted for oral presentation in Theme B2: Effects of Hand-Arm Vibration of the International Symposium on Vibration at work arranged by ISSA at Vienna, Austria from 19 - 21 April 1989. As suggested by Prof. Mocelon, I applied for travel grant to four different organisations, but received only regret letters from them. My paper on sickle design has also been accepted for presentation at the Ergonomics Society Annual Conference, UK to be held at the Reading University, England from 3rd to 7th April '89. But it appears that due to nonavailability of financial support, I would not be able to attend both the conferences.

I have a strong desire to work with you in France taking Sabbatical leave from the Calcutta University for a period of a year or two, but I do not know whether any support in this regard could be made available for travel expenses and local hospitality. Your valuable and kind advice in this regard would be very much appreciated.

With kindest personal regards,

Yours sincerely,

PS: Under the auspices of ISE, we would be organising an Int. Symp. on Erg, Occp. Hlth, Safety & Env. (ISE-OH-SE) in 1991 (2nd to 6th Jan) in Bombay. I wish you would come to support the Indian Society of Ergonomics (ISE).


(Prof. Dr. R. N. Sen)

हवाई पत्र
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Prof. Dr. Alain Wisner
Director & Professor of
Work Physiology & Ergonomics

Conservatoire National des Arts et Metiers
41, Rue Gay-Lussac, Paris 75005

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- PRÉNOM RABINDRANATH
- NUMÉRO DE SÉCURITÉ SOCIALE
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- SITUATION DE FAMILLE Marié NATIONALITÉ Indienne N° TEL
- DATE ET LIEU DE NAISSANCE 1.02.1931 CALCUTTA
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- DIPLOMES ET TITRES UNIVERSITAIRES : Docteur s. sciences
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A Paris , le 29.10.80

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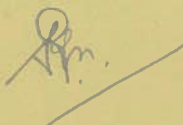
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Signature


A Paris, le 29.10.80

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Signature [Handwritten Signature]

A Paris, le 29.12.83

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20th March, 1984

Prof. Dr. R.N. SEN
11A, Mohan Bagan Lane,
CALCUTTA 700004, INDIA

Dear Pr Sen,

Thank you very much for your kind letter of February 13th. I have found coming back from BANGKOK where I met Dr KOGI and Pr WONGPHANICH and MANILA where I had to teach and discuss with two doctorate students.

You shall find under the same cover the information note I have written for all correspondants about the ILO, WHO, I.E.A. symposium on Ergonomics in developing countries. In fact, the last hope is to have it organized in BANGKOK with the help of SEAES and ILO BANGKOK with KOGI. But the situation is difficult even in GENEVA. I have received a lot of mail about this symposium mainly from ASIA.

I know that your symposium last summer was a success but your report shows how much it is true. I enjoy the idea of receiving soon the abstracts book and later the proceeding.

Our researches in Anthropotechnology are progressing very well with the thesis of SAHBI (you met him in LULEA), MECKASSOUA (CENTER AFRICA) and DOS SANTOS (BRAZIL). They will be published before the end of 84. Two others are in preparation by Brazilian researchers in transfer of technology inside a country (BRAZIL) and ergotoxicology in agriculture.

I would like to meet you soon.

Truly yours.

A. Wisner



DEPARTMENT OF PHYSIOLOGY
UNIVERSITY OF CALCUTTA

Please reply to:-
Prof. Dr. R.N. Sen
11A, Mohan Bagan Lane, Calcutta 700004, INDIA.

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Dated..... 13 FEBRUARY 1984

~~Dear~~ Prof. Dr. Wisner,

I hope you have received our Christmass and New Year's Greeting Cards.

* I am glad to inform you that the International Symposium on Applied Physiology & Ergonomics held in August '83 was a grand success and I am enclosing herewith a brief report of the Symposium. The abstracts of the papers presented in the Symposium has already been published ^{and} is being sent to you by separate post. The publication of the proceedings containing the full papers is in progress and we hope to complete the printing within a few months.

I learn from the Ergonomics diary published in the Journal of Ergonomics that in November 1984, an International Symposium on Ergonomics in Developing Countries will be held at Sao Paulo, Brazil & ~~is~~ being organised by ILO & WHO & Govt. of Brazil. I will be extremely grateful if you could kindly send me further details at your earliest.

I am to inform you that the Project proposal ~~for~~ on Protective clothing design for hot Industries in hot tropical climate, which I submitted to ILO sometimes in 1972 has now a chance to be materialised as during our two weeks' visit to USSR, AUCCTU has agreed to act as a Donor country for supporting the project in collaboration with the laboratories at Moscow, Ivaneva and Tbilisi. Now we are waiting for the approval of ILO.

With kind regards to you, family and colleagues,

Yours sincerely,

Prof. A. Wisner
Laboratoire de Physiologie du Travail et
Ergonomie,
41 rue Gay-Lussac,
F75 005 Paris, France.

(Prof. Dr. R.N. Sen)

* Encls: as above

A BRIEF REPORT
ON
INTERNATIONAL SYMPOSIUM ON APPLIED PHYSIOLOGY AND ERGONOMICS

HELD AT CALCUTTA FROM 17TH TO 19TH AUGUST,

1983

The International Symposium on Applied Physiology and Ergonomics was held between the 17th to 19th August 1983, at the Regional Labour Institute, Calcutta. The Symposium was jointly organised by the Physiological Society of India, the Department of Physiology (University of Calcutta), the Directorate of Factories (Government of West Bengal), and the Regional Labour Institute (Government of India).

The Symposium was inaugurated in the morning of the 17th of August by His Excellency, Shri P.D. Pande, the Governor of West Bengal. The Vice-Chancellor of Calcutta University, Dr. R. K. Poddar, presided over the inaugural session. Addresses were also delivered by Dr. S.S. Ramaswamy (Director-General, Factories Advisory Service & Labour Institute, Govt. of India), Prof. P.K. Panerjee (President, Physiological Society of India), Shri N. Krishnamoorthi (Labour Secretary to the Govt. of West Bengal), and Dr. R.N. Sen (Hony. Secretary General of the Organising Committee).

The inaugural session was followed by the Prof. S.C. Mahalanobis Memorial Oration. The oration was delivered by Prof. G.W. Crockford, of the London School of Hygiene and Tropical Medicine, who spoke on current research in the field of thermal comfort, and the design of protective clothing for use in extreme thermal environments.

The scientific transactions of the Symposium started from the afternoon of 17th August and continued till the evening of 19th August. Ninety six papers were presented in the different sessions on Endocrinology, Reproductive Physiology, Applied Nutrition, Respiratory Physiology, Applied Biochemistry, Applied Pharmacology, Applied Neuroscience, Industrial Ergonomics, Design Ergonomics, Work Physiology, Environmental Physiology (Thermal), Environmental Physiology (Altitude), Sports Physiology, Occupational Health, and Industrial Safety.

Apart from these, papers on instrumentation and Bio-Technology were presented at a Special Session on instrumentation on the 18th August. The second Special Session, on the Teaching of Physiology, was held on 19th August. On the same day (19th August), the Amulya Ratan Memorial Oration was delivered by Prof. Dr. Sachchidananda Banerjee.

One hundred and thirty delegates participated in the Symposium. These delegates represented five countries, and also the International Labour Organisation. Apart from the scientific and academic institutions (All India Institute of Medical Sciences, Indian Council of Medical Research, Indian Institute of Technology, Central Mining Research Station, National Institute of Occupational Health, All India Institute of Hygiene and Public Health, Indian Institute of Chemical Biology, National Institute of Design, Central Labour Institute, Institute of Child Health, Aligarh University, Central Arid Zone Research Institute, Indian Veterinary Research Institute, Indian Institute of Science, Forest Research Institute, Chittaranjan National Cancer Research Centre, Bose Institute, Calcutta University) and the Defence organisations (Defence Institute of Physiology and Allied Sciences, Institute of Nuclear Medicine and Allied Sciences, Physiology Research Cell), delegates from Industry (Bharat Heavy Electricals, Tata Engineering and Locomotive Co., Remington Rand, Fort Gloster Ltd., Tractors India Ltd., Dey's Medical Stores (Manufacturing) Ltd., Central Coalfields Ltd.), also participated in the Symposium, which is a new and welcome trend in our country.

The Symposium received widespread publicity from Doordarshan, and All India Radio, which broadcast interviews with the delegates over and above the usual news coverage. Reports of the Symposium were carried by the major newspapers. A volume containing the Abstracts of the papers submitted for presentation was published and distributed. The proceedings of the Symposium is being published. According to the opinions of the delegates, the Symposium was a grand success. An excellent exhibition of books on Ergonomics, Occupational Health and Safety was also organised.

- ECCLES, J. D., and POWELL, M., 1967, The health of dentists. *British Dental Journal*, **121**, 379-387.
- GREEN, E. G., and BROWN, M. E., 1963, Body mechanics applied to the practice of dentistry. *Journal of American Dental Association*, **67**, 679-697.
- GREEN, E. S., and LYNAM, A. W., 1958, Work simplification: an application to dentistry. *Journal of American Dental Association*, **57**, 242-252.
- HOFFMAN, D. A., 1957, Time and motion study in dentistry. *Bulletin of Greater Milwaukee Dental Association*, **23**, 117-120.
- INTERNATIONAL ORGANIZATION FOR STANDARDIZATION, 1977, International Standard No. ISO 3246.
- KHALIL, T. M., 1974, Dentistry: a growing domain for ergonomics. *Ergonomics*, **17**, 75-86.
- KIMMEL, K., 1974, Lernziele in der zahnärztlichen Ergonomie. *Zahnärztliche Mitteilung*, **64**, 225-226.
- MURTOMAA, H., 1982, Work-related complaints of dentists and dental assistants. *International Archives of Occupational and Environmental Health*, **50**, 231-236.
- NIXON, G. S., 1971, Chairside ergonomics. *International Dental Journal*, **21**, 270-277.
- NUNNALLY, J. C., 1967, *Psychometric Theory* (New York: McGRAW-HILL).

Manuscript received 10 September 1981.

Revised manuscript received 4 January 1983.

Tea-leaf plucking—workloads and environmental studies

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Heart rates and energy costs of female tea-leaf pluckers in India were studied while at rest, during walking (with and without basket loads) and during plucking. Walking with loaded baskets was the most strenuous job. The 'fast' category of pluckers had higher cardiac and gross energy costs than the 'slow' category. When the energy costs were linked to productivity, the 'fast' pluckers had lower costs per unit of productivity. The thermal load was found to be high, and the effectiveness of protective equipment such as indigenous hats has been discussed.

1. Introduction

In 1978, the 145 year old Indian tea industry produced a total of 571 000 000 kg of tea, accounting for 30% of the global tea exports. The ergonomic aspects of tea-plucking operations have never been studied in depth, and only two preliminary studies (Sen *et al.* 1976, Venkatakrishnan, 1977) have been reported.

The present study was undertaken with the following objectives:

- (1) To evaluate the workloads of tea-leaf plucking and to grade the work in terms of job heaviness,
- (2) To investigate the relation between energy costs and productivity,
- (3) To assess the environmental stress imposed on the workers (especially the thermal stress), and to observe the protection afforded by indigenous hats.

2. Job description

Tea bushes are plucked between April and November each year, June-August being the peak period. During the plucking season, a plucker works 8 hours each day from 8 a.m. to 4 p.m., with a $\frac{1}{2}$ hour lunch break at noon and three $\frac{1}{2}$ hour work-stoppages at 9 a.m. 11.30 a.m. and 2.30 p.m. for weighing and depositing the shoots plucked, and drinking tea.

A plucker reports for work with two baskets—one small and one large. The large basket is kept beside the plot and the worker starts plucking, walking along a row of tea bushes and storing the shoots she has plucked in the small basket which she carries on her back. When this is full, she walks over to the large basket and empties the small one into it. This continues until the weighing break, when the shoots in the large basket (irrespective of how full it may be) are weighed and deposited.

The plucking operation consists of detaching the terminal bud along with the nodal leaf pair immediately below the bud, with the minimum of superfluous stem. The plucker uses the thumb and forefinger (or thumb, forefinger and middle finger) of either hand, and transfers the shoots to the basket. There are numerous combinations of arm and finger movements and their use varies with the skill, experience and degree of fatigue of the worker.

3. Materials and methods

The study was conducted in the Jorhat area of Assam, India. Twelve subjects were chosen from volunteers among the medically fit employees of the tea-gardens. Their average age, height, weight and body-fat were 26.0 years, 149.1 cm, 40.1 kg and 13.5%, respectively. As the majority of the pluckers are female, all the subjects chosen were females. 'Fast' and 'slow' workers were identified among this group on the basis of their average daily productivity.

Body-fat was estimated from the measurement of the triceps skinfold with Harpenden skinfold calipers, and from the formulae of Sen and Banerjee (1958).

Heart rate and energy expenditure were measured in the steady-state conditions while the subjects were at rest, walking without loads, walking with a basket full of shoots and plucking with a full basket. The average weight of a full basket was 5.5 kg.

Heart rate was calculated from the time taken for 30 beats (during rest) or 10 beats (during work) measured, by a 30 s stop watch, by palpation of the radial pulse (during rest) or the carotid pulse (during work). Oxygen consumption was measured using a polyvinyl Douglas bag and a low resistance high velocity respiratory valve. The inspired volume was measured by a Wright respirometer. Aliquot samples of the expired gas were analysed using a Beckmann portable oxygen analyser and checked by duplicate analysis of some of the expired gas samples using Scholander's microgas analyser. The average length of time over which the gas was collected was 15 min at rest and 3 min during work. Energy expenditure was calculated using the method of Consolazio *et al.* (1963), after suitable ventilation corrections based on the Scholander analyses.

Time and motion studies were carried out in three 'fast' and three 'slow' pluckers at the same time as the measurement of the physiological responses. The total number of hand movements (sum of right and left hand movements, which were separately observed) was noted by tally counters. The total number of shoots plucked was physically counted at the end of each work session. The actual work time (effective time) was recorded by a stop-watch. These were used to calculate the average rate of plucking (shoots per minute) and the average number of hand movements per minute.

Another 58 otherwise identical workers were observed while plucking with and without (29 in each group) the use of a locally produced hat ('Jhapi') (the figure). Their heart rates were recorded after 20 and 40 min of work in the afternoon.

The thermal environment was assessed every $\frac{1}{2}$ hour using a whirling hygrometer, black copper globe thermometer and silvered kata thermometer. A lux-meter was used to measure the incident illumination at different surfaces at hourly intervals over the working day.

4. Results

Table 1 shows the thermal environment during the study. Illumination level on the surface of the tea bushes in sunlight was $(2.4 \pm 0.31) \times 10^4$ lx, and fell to levels around 82% of this value under shade trees.

Table 2 shows the physiological responses of the tea-pluckers in different activities. In terms of both heart rate and energy expenditure, the activity of walking with a full basket to the storage points was the most strenuous.

Table 3 shows the energy costs of 'fast' and 'slow' pluckers, and the relationship between energy costs and productivity. The 'fast' pluckers incur mean energy costs of $17.31 \text{ kJ min}^{-1}$ ($0.47 \text{ kJ min}^{-1} \text{ kg}^{-1}$) and the 'slow' pluckers $14.04 \text{ kJ min}^{-1}$



Female tea-leaf plucker at work, wearing locally made hat ('Jhapi').

Table 1. Thermal conditions prevailing in the tea gardens during the study.

		Mean	S.D.	Range (07.30-16.30 hours)
Dry-bulb temperature	(°C)	31.8	2.61	26.5-36.5
Wet-bulb temperature	(°C)	27.6	1.44	25.5-29.0
Relative humidity	(%)	72.2	13.82	68.8-89.0
Globe temperature	(°C)	34.0	3.21	27.7-37.2
Air speed	(ms^{-1})	1.05	0.630	0.21-2.29
Corrected effective temperature (basic)	(°C)	28.4	1.73	25.0-32.1

Table 2. Heart rates and energy expenditures (mean \pm S.D.) of the tea pluckers in different activities.

Activity	Heart rate (beats min^{-1}) ($n=12$)	Energy expenditure ($\text{kJ min}^{-1} \text{ kg}^{-1}$) ($n=10$)
Standing at rest	95.0 \pm 10.37	0.122 \pm 0.031
Walking with no load	107.9 \pm 7.34	0.345 \pm 0.036
Walking with full basket	127.2 \pm 11.89	0.399 \pm 0.079
Plucking with full basket	115.2 \pm 8.75	0.347 \pm 0.132

Table 3. Energy costs of tea plucking in relation to productivity (mean \pm S.D.).

Category of plucker	Heart rate (beats min^{-1})	Energy cost (kJ min^{-1})	Average rate of plucking (shoots min^{-1})	Average no. of hand movements per minute	Energy cost per shoot (J)	Energy cost per hand movement (J)
Fast ($n=3$)	114 \pm 7.8	17.31 \pm 7.467	140.8 \pm 43.56	143.3 \pm 26.77	120.29 \pm 14.536	117.55 \pm 28.400
Slow ($n=3$)	105 \pm 8.1	14.04 \pm 4.168	101.4 \pm 30.91	128.0 \pm 17.18	140.80 \pm 25.159	108.16 \pm 18.960

(0.31 $\text{kJ min}^{-1} \text{kg}^{-1}$). The overall mean value for all categories of pluckers (table 2) is 13.91 kJ min^{-1} (0.35 $\text{kJ min}^{-1} \text{kg}^{-1}$).

The highest cardiac costs (above resting level) were borne by the 'fast' workers (7705 beats over the total working time, or 1263 beats per working hour), compared with those of the 'slow' workers (4385 and 681 beats, respectively).

The 'fast' workers incur the highest energy costs during plucking. When the energy expenditure is linked to productivity, and expressed as 'Joules per shoot', the 'fast' workers have much lower values than the 'slow' ones. Thus, the efficient workers spend less energy to pluck each shoot, and their gross energy expenditure is larger only because of their substantially greater output.

The mean heart rates of the two groups of pluckers, one wearing a 'Jhapi' and the other not, were 93.6 \pm 13.19 (S.D.) and 103.9 \pm 16.03 (S.D.) beats min^{-1} , respectively. These means were significantly different at 0.05 $> p >$ 0.02.

5. Discussion

Plucking may be classified as a 'light' job in terms of energy expenditure, and 'moderately light' in terms of heart rate (Sen *et al.* 1969, Sen and Nag 1975). While Durnin and Passmore (1967) have not cited any specific energy expenditure value for tea-leaf plucking, the present value of 13.9 kJ min^{-1} (3.3 kcal min^{-1}) falls within their range of 'light' work.

Though plucking is 'light' in terms of whole-body energy expenditure during actual plucking, there are two aspects to be considered. First, the workers expend considerable energy while carrying the baskets to the storage and weighing points and hence the whole-day energy expenditure is likely to be higher than what might be expected from the energy costs of the plucking operation alone. One way of reducing the whole-day energy cost would be to reduce the amount of walking (with full basket loads), such as by increasing the number of weighing points.

Secondly, plucking produces severe fatigue of the finger and forearm muscles. This leads to alternation of different plucking methods (onset of fatigue is slower in skilled workers as their repertoire of methods is larger), and later to the involvement of larger muscle groups (even shoulder muscles) resulting in wasteful energy expenditure. Classification of muscle group involvement using electromyography would allow the listing of a proper sequence of plucking methods to be followed in order to alternate muscle groups and delay or prevent fatigue.

Furthermore, the 'fast' workers use more complicated movements, possibly using more muscle groups, to achieve high plucking efficiency ('fast' workers sometimes pluck more than one shoot in a movement, while 'slow' workers pluck less (Sen *et al.* 1980, 1982). Thus, there may be two sources of the additional energy requirements of the 'fast' pluckers: (i) the more complicated movements (they have higher 'cost per movement'—table 3), and (ii) the greater rate of movements (energy cost is directly related to the number of hand movements: $r=0.85$, $p<0.01$, $n=12$).

Similar differences between 'fast' and 'slow' workers may be observed in other industries where the work is repetitive, but where work may or may not be self-paced. In the printing industry, for example, the faster workers incur higher cardiac and energy costs than the slower workers (Sen *et al.* 1975). However, no comparable cost-per-unit-productivity figures have been published for these (or similar) types of work.

Other differences between 'fast' and 'slow' workers may be described on the basis of productivity variables such as 'average weight per shoot' and anthropometric variables

such as body-fat and segmental weights. Such differences between pluckers grouped according to their efficiency is of primary importance in the predictive selection of workers, either for promotion and other job benefits or for limited training programmes (Sen *et al.* 1981).

Though there were substantial variations, the thermal load was generally high. This is borne out by the observation that all the corrected effective temperature (basic) values (even the lowest) were above the optimal comfort level for the people of eastern India (24°C, Sen and Ghosh 1975). Thus the thermal environment adds to the work stress, and is likely to decrease the work capacity (Sen 1982).

In spite of this thermal stress, the workers were seen to drink hot black tea during the breaks; the tea being at a temperature 13°C (on the average) above the ambient. This probably imposes an additional heat load and delays recovery, especially in conditions of high relative humidity, and should be replaced with a cold drink to provide thermal relief and speed up the recovery process.

The physiological effect of the thermal load is apparent when one considers the difference made by the use of a 'Jhapi'. Creation of a microenvironment (even to the extent of that possible by a single 'Jhapi') produces a significant decrease in the heart rates of the protected workers. However, most of the workers dislike wearing these hats unless forced to do so, as the hats fit badly and disturb the plucking rhythm. They also restrict the workers' vision and produce local shading of the bush surface, and this makes it difficult to select shoots. If the 'Jhapi' were redesigned so as to ensure that it fits securely on the head and prevent local shading, it would be more acceptable.

The 'Jhapi' functions as a simple thermal barrier. The steel industry offers evidence of the improvements in worker comfort and productivity that may be obtained with the introduction of similar shields, such as wire meshing worn in front of the face.

6. Conclusion

Two conclusions may be drawn from this study. First, though plucking may be classified as a 'light' job in terms of gross energy expenditure, it involves many types of fast repetitive movements which produce considerable local fatigue. There are, however, several areas where small changes in the job content or job context are likely to reduce significantly the physical demands on the workers. Secondly, pluckers exhibit different characteristic responses according to their efficiency, with respect to both work measurement and physiological variables. These differences may serve as guidelines for the selection, categorization and training of workers.

Acknowledgment

The study was partially financed by the Tea Research Association, Jorhat, Assam.

Les fréquences cardiaques et le coût énergétique ont été déterminés chez des femmes chargées de la cueillette des feuilles de thé, en Inde. Les évaluations ont eu lieu durant la période de repos, pendant la marche (avec et sans port de charge) et pendant la cueillette. Il est apparu que la marche avec des paniers chargés était le travail le plus lourd. Le groupe des femmes 'rapides' présentait des fréquences cardiaques et des coûts énergétiques plus élevés que le groupe des femmes 'lentes'. Lorsque les coûts énergétiques sont mis en rapport avec la productivité, il s'avère que les 'rapides' présente un coût plus bas par unité produite. La charge thermique était importante et l'on argumente l'efficacité d'un type de chapeau indigène en tant que moyen de protection.

Die Herzschlagfrequenz und der Energieumsatz von Teeplückerinnen in Indien wurden in Ruhe, beim Gehen (mit und ohne beladenen Körben) und beim Plücken untersucht. Die anstrengendste Tätigkeit war das Gehen mit beladenen Körben. Die Kategorie der 'schnellen' Plückerinnen hatte im Vergleich zu der der 'langsamen' Plückerinnen höhere Herzschlagfrequenzen und Bruttoenergieumsätze. Bei einer Beziehung der Energieumsätze auf die Produktivität, hatten die 'schnellen' Plückerinnen niedrigere Umsätze pro Produktivitätseinheit. Die thermische Belastung wurde als hoch eingestuft und die Wirksamkeit von Schutzeinrichtungen wie etwa die Hüte der Eingeborenen wurde diskutiert.

インドにおける女子茶摘み作業者の心拍数とエネルギー消費を、休憩中、歩行中（荷かごを持った場合と持たない場合）、それに茶摘み作業中について調べた。荷物を入れたかごを持って歩行する場合が最も骨の折れる仕事であった。「速い」茶摘み作業者に比べ「速い」茶摘み作業の方が、心臓及び全体のエネルギー消費が高かった。エネルギー消費を生産高と結びつけて考えた場合、「速い」茶摘み作業の方が単位生産高当りのエネルギー消費は低かった。熱的負荷は高く、伝統的な帽子などの防護器具の有効性について議論する。

References

- CONSOLAZIO, C. F., JOHNSON, R. E., and PECORA, L. J., 1963, *Physiological Measurements of Metabolic Functions in Man* (New York: MCGRAW-HILL).
- DURNIN, J. V. G. A., and PASSMORE, R., 1967, *Energy, Work and Leisure* (London: HEINEMANN).
- SEN, R. N., 1982, Certain ergonomic principles in the design of factories in hot climates. *Proceedings of the International Symposium on Occupational Safety, Health and Working Conditions—Specifications in Relation to Transfer of Technology to the Developing Countries*, I.L.O., Geneva, 23-27 November 1981, pp. 123-147.
- SEN, R. N., and BANERJEE, S., 1958, Studies in the determination of body fat in Indians. *Indian Journal of Medical Research*, 46, 556-560.
- SEN, R. N., BHATTACHARYA, S. N., DE, A., BHATTACHARYA, D., RAY, G. G., and NAG, P. K., 1976, An ergonomic study of some tea plantation workers at Fulbari. Report No. 28, Ergonomics Laboratory, Department, of Physiology, Calcutta University, 11 pp.
- SEN, R. N., GANGULI, A. K., RAY, G. G., DE, A., and CHAKRABARTI, D., 1980, A preliminary ergonomic study of tea plucking operations, Report No. 71, Ergonomics Laboratory, Department of Physiology, Calcutta University, 65 pp.
- SEN, R. N., GANGULI, A. K., RAY, G. G., DE, A., and CHAKRABARTI, D., 1981, Ergonomics study of tea plucking operations—criteria for selection and categorisation. *Applied Ergonomics*, 12, 83-85.
- SEN, R. N., GANGULI, A. K., RAY, G. G., DE, A., and CHAKRABARTI, D., 1982, Ergonomic study of tea plucking operations. *TRA Journal (Two and a Bud)*, 27, 74-80.
- SEN, R. N., and GHOSH, J. K., 1975, Thermal comfort zone for the people of Bengal. Report No. 14, Ergonomics Laboratory, Department of Physiology, Calcutta University, 15 pp.
- SEN, R. N., and NAG, P. K., 1975, Work organisation of heavy load handling in India. *Journal of Human Ergology*, 4, 103-113.
- SEN, R. N., NAG, P. K., and ROY, G. G., 1975, Some physiological measurements on workmen in a printing shop. *Proceedings of the 62nd Session of the Indian Science Congress, Part-III*, p. 99.
- SEN, R. N., ROY, B. S., and SARKAR, D. N., 1969, Maximum physical work capacity of Indian industrial workers in relation to age and heaviness of job. *Proceedings of the International Conference of the Human Factors Society*, Philadelphia, Pennsylvania, pp. 1-11.
- VENKATKRISHNAN, N. S., 1977, Motion and time studies in plucking. *Proceedings of the 28th Teaklai Biennial Conference*, Tea Research Association, Jorhat, Assam, pp. 51-54.

Manuscript received 21 January 1981.

Revised manuscript received 16 January 1983.

Dear Prof's

10 Mai 1983

Pr R. SEN
Secretary General, Organising Committee,
International Symposium on Applied
Physiology and Ergonomics,
Department of Physiology,
Calcutta University Colleges of
Science, Technology and Agriculture
92, Acharyya Profulla Chandra Road
Calcutta - 700.009. India

Dear Professor Sen,

When you kindly visited me in Paris a few days ago I was so sorry not to be able to attend your symposium in August for I was supposed to visit Brazil in summer. As the economical situation in Brazil is extremely difficult, I have to cancel this travel and I am free to visit you.

I suppose, it is much too late to propose a communication, but if you want me to take part to the discussions, I can speak about one of two neuropsychological questions we have worked on recently :

- 1) cognitive load and sleep
- 2) équilibre ageing and accidents.

Please dont consider yourself as obliged to write my name on the program.

I am happy to meet you again in june at Lulea and in August at Calcutta.

With my best regards.

Truly your.

A. Wisner

BY AIR MAIL

POSTAGE

To
The Secretary General, Organising Committee,
International Symposium on Applied Physiology and Ergonomics,
Department of Physiology,
Calcutta University Colleges of Science, Technology and Agriculture,
92, Acharyya Profulla Chandra Road,
Calcutta - 700 009. India.

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Institution :

Address (Mailing) :

Title of Paper :

Participation in the Conference : Yes / No / Not yet sure.

Signature.

- (Please strike out not applicable and return by 31 st. Oct, 1982)

Date.....

हवाई पत्र
Aerogramme



UNDER CERTIFICATE OF POSTING

Prof. A. Wisner
Director

Conservatoire National Des Arts Et Metiers
Department des Sciences de l'Homme au Tr

Physiologie Du Travail-Ergonomie
41, Rue Gay Lussac - 75005

P A R I S.

दूसरा मोड़ SECOND FOLD

भेजने वाले का नाम और पता:-
Sender's Name and Address:-

इस पत्र के अन्दर कुछ न रखिये
No Enclosures Allowed

UNDER CERTIFICATE OF POSTING

Dr. R.N. Sen
11A, Mohan Bagan Lane
Calcutta 700 004.

28 JUNE 1982

Dear Prof. Dr. Wisner,

Many thanks for your kind letter dated 21st June 1982.

This is the first time that I came to know from you that I.E.A., I.L.O. and W.H.O. are organizing a meeting in Mexico to be held at the end of 1983 or the beginning of 1984 for discussion about Ergonomics in developing countries. In your earlier letter you mentioned that you are trying to organise such Symposium through ILO and WHO help, but without success. Now I am very glad that you have been able to do this.

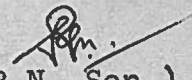
I am sure if you had refused to take part in the symposium on 'Past, Present & Future Ergonomics' - 'Ergonomics in Developing Countries', the important matters would not have been treated, and I am very glad that in your paper you would be dealing with the most important problems and facts about developing countries, and you are very correct that very few governments realise these problems; which are very important for the sake of exporting their machineries and different technologies to developing countries.

I am not quite sure about my attending the IEA'82 Congress in Tokyo and 'Shift-work Symposium' at Kyoto and symposium on Occupational Health at Singapore. So far, out of Rs.17,000/- for the air ticket, I have an assurance of Rs.4,000/- from this University and another Rs.4000/- from the University Grants Commission. I have not yet been able to get any assurance for the rest of the travel expenses including registration fees, board and lodging expenses (estimated to be Rsx another about Rs.25,000/-). Dr. Kogi hopes to procure a travel assistance of Rs.2,000/- (¥ 50,000) for me. However, I am trying my level best to tap all the probable sources for some travel assistance in order to enable me to attend the above meetings.

I look forward, receiving a copy of your book on Ergonomics.

With kindest personal regards,

Yours sincerely,


(R.N. Sen)

Head of the Department
of Physiology
Calcutta University

H^c Wisuel.

three MITAS

Paris, le 16 Janvier 1996

University of Calcutta
The Registrar
Senate House
87/1 College Street
Calcutta 700.073
Inde

Dear M. Registrar,

You will find under the same cover the report I wrote on your invitation about the thesis submitted by M. Samit Kumar Mitra candidate for the Ph.D. (Sc) degree of your University in physiology.

You shall receive later the copy of this thesis I have received.

With my best regards.

Truly yours.

A. Wisner
Professor Emeritus

Paris, January 4, 1996

Prof. S. Chatterjee
Dean, Calcutta University
Dept. of Physiology
University College of Science
92, A.P.C. Road
Calcutta 700009
India

Dear Colleague,

Thank you for your New Year wishes and your kind regards.

I was delighted by your invitation to be part of the examination board for the thesis of your student Mr. S. K. Mitra. It is an interesting work which I greatly appreciated, while mentioning, in my report, a few secondary criticisms which are part of our university rites.

I would also like to thank you for the article you dedicated to this research in the "Industrial Health" publication.

I hope that I will have the opportunity to meet you at the New Delhi Congress next November, to which I was very kindly invited.

Yours truly

A. Wisner

Enclosed: a copy of the report on Mr. Mitra's thesis which I am sending to the Registrar of Calcutta University

Paris, le 16 Janvier 1996

University of Calcutta
The Registrar
Senate House
87/1 College Street
Calcutta 700.073
Inde

Dear M. Registrar,

You will find under the same cover the report I wrote on your invitation about the thesis submitted by M. Samit Kumar Mitra candidate for the Ph.D. (Sc) degree of your University of physiology.

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With my best regards.

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A. Wisner
Professor Emeritus

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UNIVERSITY OF CALCUTTA

Ph.D. EXAMINATION

EXAMINER'S REPORT FROM.....P. WISNER.....

Name of the Candidate.....M^o SAI SAMIT KUMAR JIJA

Subject.....PHYSIOLOGY.....

Title of Thesis.....PHYSIOLOGICAL STUDY OF THE WORKERS ENGAGED
IN BRICK-FIELD.....

I recommend*/~~recommend~~ subject to ~~fulfilment of following~~
~~conditions*/do not recommend*~~ the thesis for the award of the Ph.D.
Degree of the University of Calcutta.

Date.....15.11.96


.....
Signature of the Examiner

(*Please delete the portions inapplicable)

COMMENTS OF THE EXAMINER :

REPORT ENCLOSED



Paris, January 4, 1996

Prof. S. Chatterjee
Dean, Calcutta University
Dept. of Physiology
University College of Science
92, A.P.C. Road
Calcutta 700009
India

Dear Colleague,

Thank you for your New Year wishes and your kind regards.

I was delighted by your invitation to be part of the examination board for the thesis of your student Mr. S. K. Mitra. It is an interesting work which I greatly appreciated, while mentioning, in my report, a few secondary criticisms which are part of our university rites.

I would also like to thank you for the article you dedicated to this research in the "Industrial Health" publication.

I hope that I will have the opportunity to meet you at the New Delhi Congress next November, to which I was very kindly invited.

Yours truly

A. Wisner

Enclosed: a copy of the report on Mr. Mitra's thesis which I am sending to the Registrar of Calcutta University

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To Dr. A. Wimer
Professor of Work Physiology
and Ergonomics, Conservat
National Des Arts et Meti
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U.S.S.A.C - 75005. PARIS

FROM—
OFFICE OF THE REGISTRAR,
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FOR CALCUTTA 31st July 1995



Dear Mister Registrar,

I thank you for your letter of July 7th in which you kindly invite me to be a member of the Board of Examiners for adjudication upon the thesis submitted for Ph.D. degree of the University of CALCUTTA in Physiology by H. SRI SANJIT KUMAR MITRA M.Sc.

It is a great honour to be again a member of a Thesis Board of Examiners in the famous University of CALCUTTA and I confirm with pleasure my acceptance and expect to receive the Thesis as soon as possible. My report of adjudication ^{will} be send ~~to~~ you less than three months ~~before~~ after I have received the Thesis.

With my best regards

Truly yours

D. WISNER M.D., Sc.D.

Emeritus Professor at the
Conservatoire National des Arts et Métiers

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The..... 19. 10. 95 199 .

TO:-

Dr. A. Wisner
Emeritus Professor at the
Conservatoire National Des Arts
Et Metiers

Re Ergonomic Et Neurosciences
Du Travail
Laboratoire D' Ergonomic
41, Rue Gay Lussac
75005 PARIS.

Dear Sir/Madam,

Your letter no.....dated.. 31.7.95..... is thankfully acknowledged. I am sending herewith for favour of your adjudication and report, a copy of the thesis submitted by the undernoted candidate for the Ph.D. (Sc.) ~~D.Sc./D.Litt.~~ degree of this University in physiology.

You are requested to send a detailed report in the enclosed proforma on the merit of the thesis. stating specifically whether you recommend the thesis for the award of the degree or not. Your report may kindly be sent, through the medium of English language, to this office together with the copy of the thesis within three months or earlier, if possible.

Kindly note that the University of Calcutta has been awarding Doctorate Degrees of different standards—Ph.D. (Arts/Science/Medical/Agriculture/Engineering/Veterinary Science/Law/Technology) being the lower degree and the D.Litt. or D.Sc., being the higher Degree.

Yours faithfully,

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Registrar.
30.10.95

Name of the candidate : Sri Samit Kumar Mitra, M.Sc., Class-II.

Title of the thesis : "physiological study of the workers engaged in Brick-Field."

Name of Examiners :

- (1) Dr. A. Wisner
- (2) prof. Balraj Bhatia
- (3) prof. Satipati Chatterjee (Int.)

- Enclosures :—(1) One copy of the thesis.
- (2) Report proforma
 - (3) A remuneration bill.

ISH MITRA

7

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p 52 ^{de l'analyse} ~~de l'analyse~~ ^{Tat} ~~de l'analyse~~ ^{mod. en} ~~de l'analyse~~ ^{recherche}

Auteurs conclusion de la bible 7.524 50 pages

p 57 Dans direction les et sur
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100 pages

- puddles → leppine
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p 107 fig 1 a-tu le chât
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28 p 1/2 de reformes
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p. 108 pas de travail dans la maison

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Paris, le 4 Janvier 1996

Prof. S. Chatterjee
Dean, Calcutta University
Dept. of Physiology
University College of Science
92, A.P.C. Road
Calcutta 700009
Indes

Mon cher collègue,

Je vous remercie de vos voeux pour la nouvelle année et de l'expression de vos sentiments cordiaux.

Je suis très heureux que vous ayez bien voulu me faire participer au jury de la thèse de votre élève Monsieur S.K. Mitra. Il s'agit d'un intéressant travail que j'ai beaucoup apprécié tout en mentionnant dans mon rapport quelques critiques de second ordre qui font partie de notre rite universitaire.

Je vous remercie également de l'article que vous consacrez à cette recherche dans le journal "Industrial Health".

J'espère avoir l'occasion de vous rencontrer au Congrès de New Delhi en Novembre prochain puisque j'y ai été amicalement invité.

Veillez agréer, mon cher collègue, l'expression de mes sentiments dévoués.

A. Wisner

*Ai joint le rapport sur la thèse de M. MITRA, rapport que
j'achève à M. le Recteur de l'Université de Calcutta*

Aerobic Capacity of the Brick-field Workers in Eastern India

**Satipati CHATTERJEE, Samit Kumar MITRA
and Amalendu SAMANTA***

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92, Acharya Prafulla Chandra Road
Calcutta 700009
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With deepest regards to Prof. A. Wisnes

Industrial Health, 1994, 32, 79-84

Schatterjee
79

Aerobic Capacity of the Brick-field Workers in Eastern India

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(Received October 22, 1993 and in revised form May 9, 1994)

Abstract: Forty two male brick-field workers of two age groups, viz. 20-29 and 30-39 yrs were studied with a view to determine their aerobic capacity ($\dot{V}O_{2\max}$). The average values of $\dot{V}O_{2\max}$ in $l \cdot \text{min}^{-1}$ showed only small change between the young and the aged groups, but the values of the $\dot{V}O_{2\max}$ in $\text{ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$ showed significant difference between the groups due to body weight increase in the aged group. The aerobic capacity of the workers engaged in heavy manual work such as puddlers and load carriers were found to be comparatively higher and a positive significant relationship has been established between the aerobic capacity and different occupations in the brick-field workers.

Key words: Aerobic capacity — $\dot{V}O_{2\max}$ — Brick-field workers — Heavy work — Load carriers — Light to moderate work — Ageing

The aerobic capacity or the maximal oxygen uptake ($\dot{V}O_{2\max}$) has been accepted to be the most reliable and efficient measure of one's cardio-respiratory function, physical fitness as well as of maximum work output by large groups of muscle during maximum work of short duration. Investigations in different countries reveal that there is wide variation in aerobic capacity depending upon the physical fitness and the activity of the subjects (Lange-Anderson *et al.*¹⁾, Åstrand²⁾, Epstein *et al.*³⁾). With this respect, however, very limited studies have been done on Indian industrial workers primarily because the manpower in India is easily available and the need for proper use of manpower is not much needed. As the brick-field work involves heavy manual

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work and provides occupation for a large unskilled Indian population, there is need to evaluate the aerobic capacity of the brick-field workers to assess their physical fitness and also to compare their physiological fitness with those of workers working in various categories of the brick-fields.

Selection of Subjects: Bricks, one of the primary materials required for any type of permanent construction in India, are manufactured through systematic process by collective works of various categories of workers engaged in the brick-fields throughout the country. As most of the workers covered the age group 20–39 yrs, for the present study 42 male workers divided into two age groups — the young age group from 20–29 years of age and the aged group from 30–39 years of age were selected from the various categories of the workers engaged in different operations in two brick-fields in Eastern India. The selected workers were healthy subjects with an average physical build having no history of illness. Emphasis was given on the willingness of the workers to volunteer to be the subjects in the present study, the nature of which was explained to them.

Preparation of Subjects: the subjects were requested to take rest for at least two hours before the experiment. After the initial rest period is over, the pre-exercise heart rate of the subjects were determined by counting the palpation of the carotid artery. The physical parameters of the subjects were then measured and summarised in Table 1.

Determination of Aerobic Capacity: The exercise was performed on a magnetic friction type bicycle ergometer (Model of Prof. E.A. Muller, Max Planck Institute For Work Physiology). A preliminary warming up for 5 min at a rate of 600 kg.m.min⁻¹ was given to each subject before the application of the set workload fixed at 720 kg.m.min⁻¹. The pedalling rate was kept constant at 60 r.p.m. following a metronome. The workload was thereafter increased by 120 kg.m.min⁻¹ every three minutes till the subjects terminated their work on the basis of subjective exhaustion. The heart rate was measured by timing 10 beats during the last 30 seconds of each workload. The value for $\dot{V}O_2$ max was considered to be the highest incremental oxygen intake due to the increase in workload which was less than 150 ml.min⁻¹ in comparison to the second highest load. A low resistance, high velocity Collins "Triple J" type plastic valve was used for collection of expired air by open circuit method in Douglas Bag, the volume of which was measured by a wet gasometer. An aliquot of the expired air was analysed by Scholander Micro Gas Analyser following the norms as described by Consolazio *et al.*⁽⁴⁾. The experiments were performed at a room temperature varying

Table 1: Physical characteristics (mean ± S.D) of the brick-field workers selected for the present study

Age Group (yr)	No. of Subjects	Age (yr)	Body weight (kg)	Height (cm)	Body Surface Area (m ²)
20-29	21	24.24 ± 2.72	*49.20 ± 3.95	161.0 ± 6.01	1.49 ± 0.08
30-39	21	35.57 ± 2.84	54.82 ± 2.63	163.81 ± 3.79	1.59 ± 0.05

't'-test *p < 0.001

Table 2: Mean values and standard deviations for pre-exercise heart rate, maximum aerobic capacity and related cardio-respiratory parameters of the brick-field workers of two age groups of irrespective of categories of the workers

Parameters	20-29 yr (n = 21)	30-39 yr (n = 21)
Pre-exercise heart rate (beats min ⁻¹)	70.05 ± 4.10	72.86 ± 3.82
HR _{max} (beats min ⁻¹)	*193.52 ± 9.84	186.48 ± 7.95
VO ₂ max (l.min ⁻¹)	2.20 ± 0.23	2.21 ± 0.19
VO ₂ max (ml.kg. ⁻¹ min ⁻¹)	**44.80 ± 3.65	40.21 ± 2.56
VE _{max} (l.min ⁻¹)	65.41 ± 9.83	63.32 ± 5.64
O ₂ pulse (ml.beat ⁻¹)	11.39 ± 0.85	11.83 ± 0.77
Ventilatory equivalent	29.92 ± 5.05	28.79 ± 2.33

't'-test *p < 0.05
**p < 0.001

from 27-29°C with relative humidity varying from 60-70%.

Table 1 shows the physical characteristics and age of the subjects. The small body weights and heights of the subjects are typical of the average labouring population in Eastern India. Table 2 provides the mean values of the observed physiological parameters. A significant negative correlation is obtained between the age and VO₂ max ml.kg.⁻¹min⁻¹ (r = -0.68 in younger and r = -0.66 in the aged group). When the VO₂ max is expressed in l.min⁻¹, the difference between the two age groups was insignificant. A significant positive correlation is obtained between body weight and VO₂ max l.min⁻¹ in both the age groups (r = 0.68 in young group and r = 0.63 in aged group). A significant positive correlation is found between HRmax and VO₂ max l.min⁻¹ in each group (r = 0.71 in the younger and r = 0.69 in the aged group). The average ventilatory equivalent is lower in the aged group than the younger group and the difference is

Table 3: Comparison of the max. aerobic capacity, pulmonary ventilation and HR_{max} between various categories of the brick-field workers of the age group 20-39 yr

Parameters	20-29 yr			30-39 yr		
	Gr.A	Gr.B	Gr.C	Gr.A ₁	Gr.B ₁	Gr.C ₁
	Puddlers n = 7	Load Carriers n = 7	Firemen & Stackers n = 7 (2 + 5)	Puddlers n = 7	Load Carriers n = 7	Firemen & Stackers n = 7 (2 + 5)
Body weight (kg)	**46.86 ± 2.93	51.11 ± 4.10	*49.64 ± 3.95	55.04 ± 3.02	54.16 ± 2.12	55.27 ± 2.92
VO _{2 max} (l.min ⁻¹)	2.19 ± 0.15	2.33 ± 0.22	2.09 ± 0.28	2.32 ± 0.15	2.18 ± 0.19	2.11 ± 0.19
VO _{2 max} (ml.kg. ⁻¹ min ⁻¹)	**46.81 ± 3.69	**45.56 ± 3.13	*42.02 ± 2.57	42.23 ± 2.00	40.24 ± 2.17	38.15 ± 1.86
VE _{max} (l.min ⁻¹)	64.09 ± 10.91	69.66 ± 5.44	62.49 ± 11.85	67.63 ± 4.79	61.86 ± 5.85	60.48 ± 3.93
HR _{max} (beats min ⁻¹)	197.71 ± 5.09	**198.29 ± 3.90	184.57 ± 11.87	190.86 ± 9.15	186.86 ± 6.41	181.71 ± 6.05

't'-tests compared between Grs. A and A₁, Grs. B and B₁, Grs. C and C₁.

*p < 0.05, **p < 0.01

non-significant. O₂ pulse was almost similar in both the groups.

Table 3 provides a comparative account of the VO_{2 max}, VE_{max} and HR_{max} of various categories of the brick-field workers in the both groups. The HR_{max}, VO_{2 max/Bw}, VE_{max} all are found to decrease accordingly with age in each category of workers.

In the present study the workers of the two age groups in the brick-fields were compared on their physical characteristics. The ageing diminishes the maximum oxygen uptake. Åstrand⁵⁾, Sengupta *et al.*⁶⁾ and William *et al.*⁷⁾ have reported that the maximum oxygen uptake is significantly correlated with body weight. Henschel *et al.*⁸⁾ observed that maximum oxygen uptake increased with rise in body weight. A linear relationship between body weight and oxygen consumption is now well established (Wyndham *et al.*⁹⁾). However, the result of this study reveals that the maximum oxygen uptake is not changed in the two groups though the body weight increase in the aged group is significant.

The higher average values of the aerobic capacity in Indian Dock workers (Saha¹⁰⁾, Railway porters (Samanta *et al.*¹¹⁾) indicate superiority of their physical fitness over those of the brick-field workers. This low value of aerobic capacity in the brick-field workers may be due to their poor physical build, natural endowment besides adverse climatic factors and hazardous job description. On the contrary the average values of the aerobic capacity in the present subjects indicate their superiority in respect of physical fitness over the Indian miners (Chakraborty *et al.*¹²⁾) and this may be due

to relatively better working condition in the brick-fields than those in underground mines.

When the aerobic capacity of the brick-field workers is presented in relation to the heaviness of the job performed in the brick-fields, it is found that VO₂ max is also occupation dependent. Puddlers and Load carriers have been assigned for heavy to very heavy occupations, and Stackers and Firemen for light to moderately heavy occupations. Table 3 shows higher mean value of VO₂ max in Puddlers and Load carriers in comparison to Firemen and Stackers. The values of the total oxygen consumption/minute shows an increase in Puddlers/Firemen and Stackers and decrease in Load carriers in the aged group. This appears to be due to anomalous rise in body weight. As the rise in total oxygen consumption/minute is not consistent with the rise in body weight in the aged workers, there is decrease in oxygen utilisation/kg.body wt./minute, and this may attribute to lower VO₂ max ml.kg.⁻¹min⁻¹ in all sections of aged brick-field workers. The age of maturity of peak VO₂ max ml.kg.⁻¹min⁻¹ is attained at 15-17 years and maintained through 17-20 years of age (Banerjee *et al.*¹³).

The VO₂ max is the major determinants of the severity of the load carrying tasks which can be sustained for a prolonged period (Haisman¹⁴). As VO₂ max is usually correlated with body weight, individual with a high VO₂ max l.min⁻¹ and large load carriage capacity will also tend to have large body weight. The type of fitness required for prolonged muscular work is well correlated to individual aerobic capacity (Åstrand^{15,16}). It is, therefore, assumed that the lower value of VO₂ max ml.kg.⁻¹min⁻¹ in aged brick-field workers is incompatible with the fitness required to perform heavy work in the brick-fields. This is why a limited number of Load carriers and Puddlers are available in the brick-fields beyond 40-45 years of age.

As the capacity to perform light to moderately heavy work is not grossly age dependent, so as to avoid fatigue and to safeguard the health of the workers, proper rehabilitation of workers and restructuring of the job schedule in the brick-field work are very much necessitated.

ACKNOWLEDGEMENT

The authors are grateful to Sri Barun Bikash Pal and Sri Jana for giving permission to work in their Brick-field Industry, Keshpal, Midnapore, West Bengal, for this research purpose. The authors acknowledge the Governing Body, Midnapore College, Midnapore and University Grant Commission, New Delhi for extending fellowship to Sri Mitra to continue the research project as part of his Ph.D. programme. The authors also express their gratitude to the Director, All India Institute of Hygiene and Public Health, Calcutta for rendering necessary facilities for this work. The authors thank Smt. Sumita Ghatak, Research Fellow, for her assistance in this work.

REFERENCES

- 1) Lange-Anderson Hermansen L. Aerobic work capacity in the middle aged Norwegian men. *J Appl Physiol* 1963; 20: 439.
- 2) Åstrand I. Aerobic working capacity in men and women in some professions. *Forsvarsmedian* 1967b; 3: 163.
- 3) Epstein Y, Keren G, Udassin R, Shapiro Y. Way of life as a determinant of physical fitness. *Eur J Appl Physiol* 1981; 47: 1.
- 4) Consolazio CF, Johnson RE, Pecora J. *Physiological measurements of metabolic functions in man.* McGraw Hill Book Company, New York 1963; 60-98.
- 5) Åstrand I. The physical work capacity of workers 50-60 yrs old. *Acta Physiol Scand* 1958; 42: 73.
- 6) Sengupta A, Ferris BG, Rao MN. Oxygen consumption of male Indian jute workers. *A M A Arch Industrial Health* 1959; 20: 96.
- 7) William CG, Wyndham CH, Morrison JP. The influence of weight and structure on the mechanical efficiency of men. *Int Z Angew Physiol Einschel Arbeitsphysiol* 1966; 23: 107-24.
- 8) Henschel A, Neuman E, Margolles L, Doyle T, Strydom NB. Work capacity in coal miners — Proceedings of 2nd International Congress on "Ergonomics" — Dortmund 1964; 421-9.
- 9) Wyndham CH, Strydom NB, Morrison JF, Williams CG, Ridell G, Peter J, Cook HM, Jaffie A. The influence of gross body wt on oxygen consumption and on physical work capacity of manual labourer. *Ergonomics* 1963; 6: 276-86.
- 10) Saha PN. Aerobic capacity of Dock workers in Bombay, *American Industrial Higiene Association Journal* 1975; 36 (4): 311-7.
- 11) Samanta A, Datta SR, Roy BN. Max working capacity of Railway Porters. *Ind J Indust Med* 1985; 31 (4): 161-3.
- 12) Chakraborty MK, Guha Roy AR. Aerobic working capacity of Indian miners, in Surg Cdr, MS Malhotra (ed) "Human Adaptability to Environments and Physical Fitness — Proceedings of a Symposium", New Delhi 1966; 107.
- 13) Banerjee PK, Chatterjee S, Chatterjee P, Maitra SR. Max Oxygen uptake in boys. *Ind Jour Med Res* 1982; 75: 380-6.
- 14) Haisman MP. Determinants of load carrying ability. *Applied Ergonomics* 1988; 19: 2: 111-21.
- 15) Åstrand PO. Experimental studies of physical working capacity in relation to sex and age. *Munksgaard, Copenhagen* 1952; 103-6.
- 16) Åstrand PO. Human physical fitness with special reference to sex and age. *Physiol Rev* 1956; 36: 307-35.

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