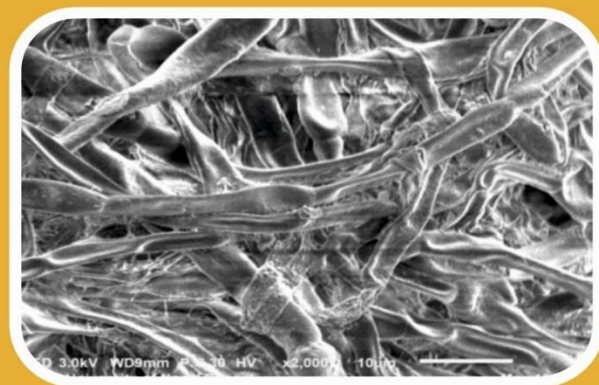
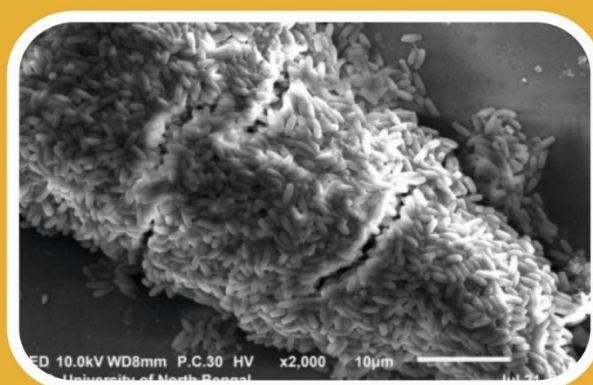
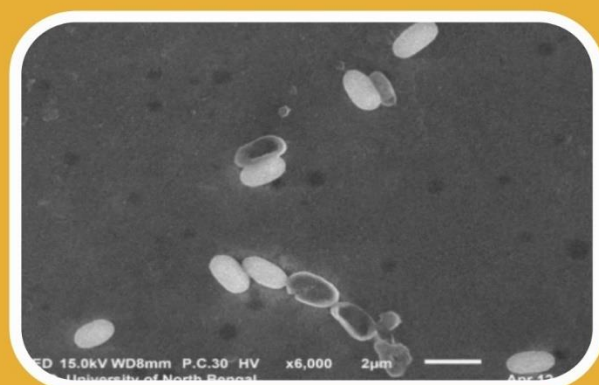
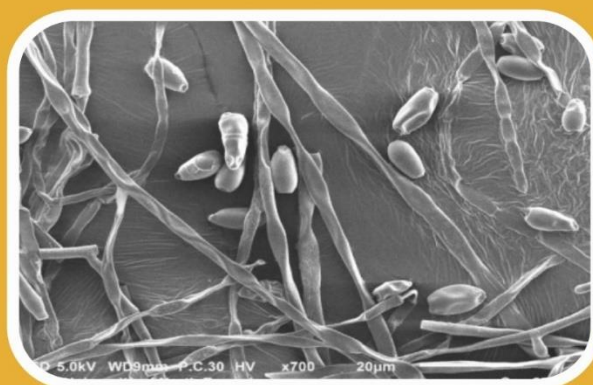
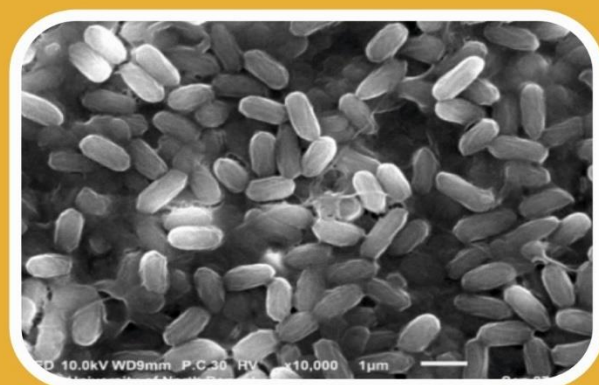


A LABORATORY MANUAL ON SCANNING AND TRANSMISSION ELECTRON MICROSCOPY



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Kripa Drishti Publications, Pune.

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PREFACE

The Laboratory Manual is a simple collection of methods/procedures to conduct research in laboratories by using scanning and transmission electron microscopes that occurred in the mind of the author. The Lab-manual has been designed to give a preliminary idea about the working principles, procedures and techniques related to electron microscopy. The authors try to cover specific laboratory electron microscopy techniques that may be helpful for researchers, working in the field of Biological, Medical, Biomedical and Life Sciences. In the Lab-manual, the subject matter has been presented in a step-by-step systematic manner. Easy, simple and clear understandable illustrations, correct and latest information are the main features of the manual.

The authors have freely consulted various research articles from the various scientific journals in the preparations if the lab-manual in able to make it comprehensive and up to date and to that extent it is not claimed to be an original work.

Any worthwhile criticism and suggestions for improvement would be thankfully acknowledged.

With best wishes

**Shambhu Swarnakar,
Papan Chowhan,
Sumi Paul,
Arka Pratim Chakraborty,
Zerald Tiru,
Parimal Mandal**

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I would like to express my profound gratitude to my guide, Dr. Arka Pratim Chakraborty, Assistant Professor, Department of Botany, Raiganj University sincerely appreciates his ongoing support and encouragement. I want to express my sincere gratitude to him for the chance he offered me to further my education.

I, Mr. Shambhu Swarnakar, am grateful for my guide's fresh insights and viewpoints. I'm thankful to my parents, batchmates - Mr. Subir Ghosh, Kakan Ball, Sumi Paul and well-wishers, especially my son Soumyadeep Swarnakar, who has supported me emotionally while I have been writing this book and has always encouraged me in my life. I would also like to express my gratitude to the faculty members - Dr. Parimal Mandal, the Head, Department of Botany, Dr. Ayon Pal, Dr. Sanjoy Sadhukhan and Mr. Zerald Tiru, Department of Botany, Raiganj University for their ongoing support. I would like to offer my sincere thanks to Sumit Kumar, IPS, Superintendent of Police, for his continuous encouragement and support. I'm so blessed to work with such a supportive superior. I extend my thanks to him for always pushing me to do better. I appreciate his positive, can-do attitude every day. I'm also thankful to my colleagues for their countless cooperation during our hectic schedules which I cannot forget.

Last, but not least, I want to express my sincere gratitude to Madhumita Lala Swarnakar, My supporting, kind, and devoted wife. We sincerely appreciate and suitably thank you for your help when times were tough. It gave me great comfort and a great deal of relief to know that you could take care of our household chores while I finished my work. You have my sincere gratitude.

I apologies to everybody I unintentionally excluded.

I, Dr. Arka Pratim Chakraborty am grateful for my dedicated and sincere scholar like Mr. Shambhu Swarnakar who is doing Ph.D.

work under my supervision. I would like to offer my sincere thanks to Dr. Parimal Mandal, Head, Department of Botany, Dr. Ayon Pal, Dr. Sanjoy Sadhukhan and Mr. Zerald Tiru- faculty members of the Department for their unconditional help and co-operation. I shall be failing in my duty if I do not acknowledge the enormous support and assistance received from my other Ph.D. research scholars- Mr. Papan Chowhan, Miss Sumi Paul, Miss Oindrila Chakraborty who are working under my supervision.

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Last, but not least, I wish to acknowledge my family- Father, Mother, and Father-in-Law and Mother-in-Law for their constant encouragement and being there for me through my thick and thin. I want to express my sincere gratitude to my loving, supportive and caring wife- Mrs. Pinki Bhattacharjee Chakraborty, assistant teacher, Raiganj Ten Class Girls' High School, who constantly encourages me to work for the society through the input of my research.

Dedication

I dedicate this book to my dear guide Dr. Arka Pratim Chakraborty, Assistant Professor in the Department of Botany, Raiganj University, without whom this journey would not have been possible.

Dr. Arka Pratim Chakraborty, who, even in the toughest circumstances, had a mind-set that attracted me.

Mr. Shambhu Swarnakar

Research Scholar, Department of Botany, Raiganj University.

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ABOUT THE BOOK

The Laboratory Manual is a simple collection of methods/procedures for the preparation of biological samples, observation of the surface as well as internal structures of the samples through scanning and transmission electron microscopy. The Lab-manual has been designed to give a preliminary idea about the working principles, procedures and techniques related to Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM). The authors try to cover specific laboratory techniques that may be helpful for researchers, working in the field of microscopy. In the Lab-manual, the subject matter has been presented in a step by step systematic manner. Clear understandable illustrations and latest informations are the main features of the manual. Efforts have been made to avoid the old outdated views and modern findings have been incorporated to make the understanding of techniques used for the operation of electron microscopy.



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