

Tribhuvan University
Institute of Science and Technology
M. Sc. Zoology (Semester System)
SEMESTER II
PARASITOLOGY

Course Title: General Parasitology
Course No: Zoo 566
Nature of the Course: Theory

Credits: 3
Lecture hrs: 48
Full Marks: 75
Pass Marks: 37.5

Course Objective

- To introduce general parasitology and impart advanced knowledge on parasitological research methods.

Course Contents

General Parasitology: History and scope of parasitology. Evolution of parasites. Zoogeography of parasites. Niches, habitats and environments. Parasite fauna in different phyla. Parasitism. Phoresis. Hyperparasitism. Parasitoides. Mechanism of parasitic invasion. Ecology of parasitism - Relation of parasite fauna with food, age and migration of the host and seasons of the year. Host specificity. Present status of parasitic diseases in Nepal. Emerging and re-emerging parasitic diseases. Parasitology as an academic and applied science. Diagnostic parasitology: Sampling techniques (blood, stool, urine, sputum, biopsy, skin scrapping, swabs, ectoparasites, soil), sample preservation, processing, observation and identification of various parasitic forms. **24 hrs**

Research Methodology: Characteristics and significance of a good research. Developing a research proposal. Selection and formulation of the research problem. Literature review. Formulation of research objectives. Development of workable hypothesis. Research design. Sampling and sample size. Data sources and collection techniques. Data analysis. Data presentation. Formats for references. Writing a research report/thesis. Writing a research paper for a journal of international repute. Ethics of research and publication. Epidemiological research: Types, objectives, aim, use and design of epidemiological studies. Case control studies. Cohort study and longitudinal studies. Measurements of Burden of disease (DALY, HALY, QALY). **24 hrs**

Tribhuvan University
Institute of Science and Technology
M. Sc. Zoology (Semester System)
SEMESTER II
PARASITOLOGY

Course Title: Public Health and Vector Biology
Course No: Zoo 567
Nature of the Course: Theory

Credits: 3
Lecture hrs: 48
Full Marks: 75
Pass Marks: 37.5

Course Objectives

- To provide wider knowledge on the current national and international public health problems and issues.
- To impart a general approach on role of vectors and reservoirs in public health.

Course Contents

Public health: Concepts of health and diseases. Dimensions of health. Determinants of health. Responsibility for health. Indicator of health. Concept of disease: Modes of intervention, Health communication, Practice of health education, Brief account of national and International agencies working for health and diseases in Nepal. Introduction to Public health: Concept, definition, philosophy, scope, history (global and national), Public health problems and issues in Nepal (communicable, non-communicable, trauma and injuries), Public health planning and program in Nepal. Health status and health problems with reference to Nepal. Health Planning and Management. Health programs in Nepal for AIDS, leprosy, tuberculosis, malaria, visceral leishmaniasis and filariasis. Water-related diseases. Water quality-criteria and standards emphasizing microbiological aspects. Surveillance of drinking water quality. Disposal of excreta. Bio-medical waste management. Milk Hygiene and milk-borne diseases. Food hygiene and food-borne infections. Disasters and communicable diseases. Socio-economic consequences and prospects for the control and prevention of parasitic diseases. Ecological management and preventive measures of parasitic diseases. Influence of human activity on the parasitic fauna of animals. Occupational disease with reference to Nepal. Climate change and emerging of infectious and vector diseases. **32 hrs**

Vector Biology: Introduction to vector fauna (arthropods and molluscs). Systematics, identification and epidemiological importance. Importance of entomology in public health. Identification of insect vectors and its epidemiological importance. General account, morphology, mouth parts and feeding mechanism, method of pathogen transmission, causal organisms, remedies and prevention with reference to bugs, lice (Anoplura and Mallophaga), flea, mosquitoes, sandfly, tsetse fly, house fly, black flies, ticks and mites, aquatic snails. Methods of vector controls (integrated, chemical, biological). Rodents as reservoirs of pathogens: Introduction to rodents. Classification of rodent with special reference to disease transmission. Disease, health hazard and control measures of rodents.

16 hrs

Tribhuvan University
Institute of Science and Technology
M. Sc. Zoology (Semester System)
SEMESTER II
PARASITOLOGY

Course Title: General Parasitology & Vector Biology

Course No: Zoo 568

Nature of the Course: Practical

Credit: 2

Lecture hrs: 90

Full Marks: 50

Pass Marks: 25

Course Objectives

- To provide practical knowledge of various techniques used in examination of living hosts, collection, preservation, permanent slides preparation and identification of arthropod vectors.
- To contribute on prevention of parasitic diseases of public health importance through field work.

Course Contents

1. Preparation of different stains and stock solutions.
2. Collection and preservation techniques of samples (stool, urine, blood, sputum, biopsy, soil, and cestodes, trematodes, ectoparasites and vectors).
3. Laboratory methods of examination (macroscopic and microscopic examination, saline wet mount, iodine wet mount, concentration techniques – floatation and sedimentation, Stoll's methods for counting eggs).
4. General methods of microscopic preparations (killing, fixing, washing, dehydration, staining, destaining, mounting).
5. Preparation of blood film.
6. Field survey on public health and issue in Nepal on communicable and non-communicable disease.
7. Field survey on status of medical and veterinary important vectors and reservoirs.
8. Examination of different living animal hosts (domestic and wild) for collection, preservation, mounting and identification of arthropod vectors.
9. Study of permanent slides of protozoan parasites and arthropod vectors.
10. Use of taxonomic keys for the identification of arthropod vectors.
11. Examination of microbiological quality of drinking water and milk.
12. Use of oculomicrometer and stagemicrometer for measurement of different parts of arthropods.
13. Field visit (Primary or secondary data), report writing and presentation.

Tribhuvan University
Institute of Science and Technology
M. Sc. Zoology (Semester System)
SEMESTER III
PARASITOLOGY

Course Title: Medical Parasitology and Microbiology
Course No: Zoo 619
Nature of the Course: Theory

Credits: 3
Lecture hrs: 48
Full Marks: 75
Pass Marks: 37.5

Course Objective

- To provide advanced knowledge on some important microbial and medically important parasites.

Course Contents

Medical Parasitology **32 hrs**

1. **Protozoa:** Classification, general morphology, biology, mode of transmission, pathogenicity, laboratory diagnosis and prophylaxis of protozoan parasites: *Naegleria fowleri*, *Giardia lamblia*, *Trypanosoma* spp, *Plasmodium* spp, *Cryptosporidium parvum*, *Cyclospora cayetanensis*. **9hrs**
2. **Trematodes:** Classification, general account, primary and secondary host of trematodes, egg hatching, variation of life cycle in Monogenea and Digenea with examples. Morphology, biology, mode of transmission, pathogenicity, laboratory diagnosis and prophylaxis of *Fasciolopsis buski*, *Clonorchis sinensis*, *Paragonimus westermani*. **8hrs**
3. **Cestodes:** Classification, general account, larval form of cestodes, comparative study of scolices in cestodes. Life cycle pattern of cestodes. Morphology, biology, mode of transmission, pathogenicity, laboratory diagnosis and prophylaxis of *Hymenolepis nana*, *Taeniasaginata*. . **9hrs**
4. **Nematodes:** Classification, general account, biology, mode of transmission, pathogenicity, laboratory diagnosis and prophylaxis of *Trichuris trichura*, *Strongyloides stercoralis*, *Dracunculus medinensis*, *Brugia malayi*. **6 hrs**

Microbiology **16 hrs**

1. **Virus:** Introduction, classification, replication and cultivation. Viral diseases of public health concern (Hepatitis A, B & C, Dengue, Mumps, Influenza and AIDS). General Introduction, seasonal outbreak of bird flu, global and national burden. **6 hrs**
2. **Bacteria:** Introduction, historical aspects, morphology and infection. Scope and public health importance of bacteria, bacterial flora on the body and opportunistic and pathogenic organisms. Bacterial staining. General characteristics, cultural characters, pathogenesis, laboratory diagnosis and control measures of human bacterial diseases – meningitis, tuberculosis and leprosy. Biological warfare: Bioterrorism. **6 hrs**
3. **Fungus:** Introduction, classification and methods of identification of pathogenic fungi and fungal diseases of public concern. Dermatomycoses (*Trichophyton rubrum*). Opportunistic mycoses (*Candida albicans*) **4 hrs**

Tribhuvan University
Institute of Science and Technology
M. Sc. Zoology (Semester System)
SEMESTER III
PARASITOLOGY

Course Title: Veterinary Parasitology and Phytonematology
Course No: Zoo 620
Nature of the Course: Theory

Credits: 3
Lecture hrs: 48
Full Marks: 75
Pass Marks: 37.5

Course Objective

- To provide advanced knowledge on major veterinary parasites and phynematodes of agricultural importance.

Course Contents

Veterinary Parasitology

36 hrs

1. **Parasites of Domestic animals:** Classification, morphology, biology, mode of transmission, pathogenicity, laboratory diagnosis and prophylaxis of protozoans and helminthic diseases. **Protozoans** – *Trypanosoma, Eimeria, Babesia and Endolimax*; **Flukes** – *Gastrothylax, Dicrocoelium dendriticum, Paragonimus*; Introduction and general characteristics with suitable examples of Diplostomatidae, Prohemistomidae and Strigeidae); **Cestodes**–*Diphyllobothrium latum, Dipylidium caninum* and *Moniezia expansa* and **Nematodes** – *Oxyuris, Ostertagia, Dictyocaulus and Trichostrongylus*. **16 hrs**
2. Classification and identification of common ecto- and endo-parasites of sheep, goat, cattle, swine, horse, fowl, ducks, dog, cats, rabbits, mice. **4 hrs**
3. **Parasites of wild animals:** Introduction and brief ecology of wild animals. Study of major endoparasites of tiger, elephant, red panda, monkey and wild boar. **4 hrs**
4. **Parasitic Zoonosis:** Introduction, types, geographical distribution, nature, epidemiology, global burden and challenges, pathogenesis, diagnosis, treatment and prophylaxis of zoonotic viral (Rabies, Japanese encephalitis), bacterial (brucellosis, plague), protozoan (toxoplasmosis, trypanosomiasis, leishmaniasis and babesiosis) and helminthes (Clonorchis, Fasciolopsiasis, Echinococcosis, Taeniasis and Trichinellosis) diseases. **12 hrs**

Phytonematology

12 hrs

Introduction, damage to plants and overall agronomy. Biology and pathogenicity of *Paratylenchus, Anguina, Pratylenchus, Heterodera, Xiphinema and Tylenchulus*. Biology of non-parasitic soil nematodes (*Tylenchus, Rhaditis and Mononchus*). Nematodes of citrus and rice plants. Control of plant nematodes. **12 hrs**

.....

Tribhuvan University
Institute of Science and Technology
M. Sc. Zoology (Semester System)
SEMESTER III
PARASITOLOGY

Course Title: Molecular Parasitology and Immunology
Course No: Zoo 621
Nature of the Course: Theory

Credits: 3
Lecture hrs: 48
Full Marks: 75
Pass Marks: 37.5

Course Objectives

- To develop understanding of the molecular biology of parasites.
- To develop understanding of the current trends in molecular parasitology
- To develop understanding of the basic principles of host immunity to infection against the pathogens.

Course Contents

Molecular Parasitology **24 hrs**

1. **Parasitic genomics:** The parasites and their genome- trypanosomatids, apicomplexan, other protozoans, nematodes and platyhelminths. **4 hrs**
2. **RNA processing in parasitic organisms:** Trans-splicing- phylogenic distribution, mechanism, biological function; RNA editing- Characterization, mechanisms, development of in-vitro editing systems. **3 hrs**
3. **Transcription:** Class I transcription in trypanosomatids- transcription regulation, DNA-protein interactions in promoter domains, transcription termination; ClassII transcription of protein coding genes- *Trichomonas vaginalis*, *Giardia lamblia*, *Entamoeba histolytica*, trypanosomatids. **5 hrs**
4. **Post transcriptional regulation:** General mechanism, post transcriptional regulation in kinetoplastids and other parasites. **4 hrs**
5. **Invasion mechanism:** Invasion into cells. Invasion by helminthes.
6. **Drug resistance in parasites:** Apicomplexan parasites, kinetoplastids, helminthes. **3 hrs**
7. **Implications of molecular parasitology:** Molecular diagnostics- blood parasites, tissue parasites, intestinal and urogenital parasites. Principles of antiparasitic chemotherapy-treatment of apicomplexan, kinetoplastids, intestinal helminthes, platyhelminths. **5 hrs**

Immunology **24 hrs**

1. **Cells and tissues involve in immune response:** Cells of immune system, lymphoid tissues and organs of immune response. **2 hrs**
2. **Cells and tissues involve in immune response:** Cells of immune system, lymphoid tissues and organs of immune response. **1hr**
3. **Major Histocompatibility complex:** MHC complex and immune response, MHC- disease associations. **1hr**

4. **Immune response:** Antigenicity and immunogenicity, antigenic determinants, characteristics of immunogenicity, Induction of an immune response, immune response to bacterial, viral and parasitic infection. **3 hrs**
5. **Infection and host immune regulation:** Immune downregulation in human parasitic infection, Dampening by stander responses in humans, cellular basis of immunomodulation, **3 hrs**
6. **Immunoglobulin structures:** Immunoglobulin G (IgG)- structure and antigenic heterogeneity of heavy and light chains, Immunoglobulin region and domain, antibody combining site, other Immunoglobulin (Ig M, Ig A, Ig D and IgE). **3 hrs**
7. **Antigen- antibody reactions:** General characteristics, specific types of reaction, biological consequences. **2 hrs**
8. **Infections and immunity:** Cell mediated immunity – T-cell activation, T-helper cell subsets and their regulatory roles, activation and differentiation of CD8+ cytotoxic T cells. Protective role of cell mediated immunity, **3 hrs**
9. **Active immunization and induction of humoral immune response:** Humoral immune response to an immunogen, fate of antigens on the primary and secondary responses, immunization. **3 hrs**
10. **Diagnostic immunology:** Immunoserology, agglutination, compliment fixation, immunofluorescence, Enzyme immunoassay. **3 hrs**

Tribhuvan University
Institute of Science and Technology
M. Sc. Zoology (Semester System)
SEMESTER III
PARASITOLOGY

Course Title: Epidemiology, Pharmacology and Toxicology
Course No: Zoo 622
Nature of the Course: Theory

Credits: 3
Lecture hrs: 48
Full Marks: 75
Pass Marks: 37.5

Course Objective

- To impart basic and advanced knowledge of epidemiology, pharmacology and toxicology in relation to prevention and control of parasites to upgrade the quality of life.

Course Contents

Epidemiology: Introduction to Epidemiology: Definition, scope, and purpose of scientific method for studying diseases and health problems and uses. Definition of different terminologies used in epidemiology. Concept of cause and effect association. Basic measurements in epidemiology-Counts, proportions, rates, ratio, OR, RR, likelihood ratio, prevalence, incidence, cumulative incidence, incidence density, and inter relationship between CI and ID and use of incidence and prevalence in disease control. Standardization – rationale, direct and indirect standardization. Natural history and progress of the disease. Disease prevention. Disease surveillance (locally endemic diseases and diseases of public health importance).Chance, bias, and confounding -Definitions, major forms of

bias and their solutions, Confounding management, Validity and Precision. Outbreak investigation. Recent advances in epidemiology (Journals/Seminars/Internet). **20 hrs**

Pharmacology: Introduction to pharmacology, clinical pharmacology and pharmaco-epidemiology. Classification of drugs. Sources of drugs and dosage forms. Principles of pharmacokinetics and pharmacodynamics. Concepts on adverse drug reaction, side effects, drug reaction and compliance. Antiviral agents: General aspects, agents interfering with nucleic acid replication including those with modification with bases sugars and phosphate, and neuraminidase inhibitors. Antiretroviral drugs. Antibacterial agents: Beta-lactam antibiotics, antimycobacterial agents, antitubercular and antileprotic agents. Antifungal agents. Antiparasitic agents: antiamoebics, antimalarials and anthelmintics. Antibiotic resistance: Mechanism of antibiotic action and resistance. Genetic basis of resistance. Relationship between the genetic mechanism of resistance and degree of spread. Resistance to antehelminthics. Concept on essential drugs of Nepal. Handling and drug storage. Concept of drug policy and GMP. **16 hrs**

Toxicology : Definition, scope and application of toxicology. Basic principles of toxicity - toxic and toxicity, toxicity value, acute and chronic toxicity, toxicity categories. Occupational toxicology and implication in human health. Environmental toxicology - concept of ecotoxicology, evolution of pathogen resistance antimicrobial resistance and fate of pollutants. Environmental toxicity management, impact of pesticides on human health. Vesication, urtication and venenation caused by insects. **12 hrs**

Tribhuvan University
Institute of Science and Technology
M. Sc. Zoology (Semester System)
SEMESTER III
PARASITOLOGY

Course Title: Medical & Veterinary Parasitology
Course No: Zoo 623
Nature of the Course: Practical

Credits: 2
Lecture hrs: 90
Full Marks: 50
Pass Marks: 25

Course Objective

- To impart practical knowledge on various techniques used for the collection, preservation, slide preparation, observation and identification of microbial parasites, protozoan and helminthes from hosts (invertebrate and vertebrate) and vectors of pathogens.

Course Contents

1. Examination of different living animal hosts (domestic and wild) for collection, preservation, mounting and identification of protozoan and helminth parasites.
2. Study of permanent slides of protozoan parasites, microscopic examination of blood smears for protozoan parasites, isolation and identification of protozoan cysts and eggs of Helminth parasites from fecal samples.

3. Use of oculomicrometer and stagemicrometer for measurement of different stages of protozoans and helminthes (trophozoite, cysts, eggs, larva).
4. Studies of different sections (transverse, longitudinal, sagittal) of parasites by using microtomy method and histopathological studies of different types of infected tissues of the host.
5. Microscopic examination of blood smears for microfilaria.
6. Sputum smear preparation for identification of mycobacteria.
7. Microphotography of parasites and identification of photographs of different stages of parasites and diseases.
8. Preparation of media for bacteria, protozoa and helminthes culture.
9. Culture of bacteria, protozoa and helminthes.
10. Study of different stages of protozoan and 81elminthes (comparative study of trophozoite, cyst, and eggs).
11. Study on different zoonotic disease.
12. Examination of living animal hosts (definitive and intermediate: earthworm, cockroach, bony fish, toad, wall lizard, garden lizard, pigeon, fowl, rat etc.) for collection, preservation, and identification of different helminth parasites.
13. Identification of helminth parasites of man.
14. Extraction and slide preparation of nematodes from different habitats including the isolation of the entomopathogenic nematodes and sampling and estimation of population of nematodes from soil and plant tissues.
15. Production of *Fasciola metacercariae* from egg, and collection of larval trematodes from infected snails and preparation of their mount.
16. Morphomatric study of different stages of parasites of domestic, pet and wild animals.
17. Preparation of field survey report (general survey and status of veterinary and agricultural importance parasites and parasitic diseases in Nepal or case report) and practical class-record.

Tribhuvan University
Institute of Science and Technology
M. Sc. Zoology (Semester System)
SEMESTER III
PARASITOLOGY

Course Title: Mol. Para., Immunology & Pharmacology
Course No: Zoo 624
Nature of the Course: Practical

Credits: 2
Lecture hrs: 90
Full Marks: 50
Pass Marks: 25

Course Objectives

- To develop knowledge, understanding and practical skills of molecular techniques used in the study of parasites.
- To develop the practical skills of using bioinformatics in analysis of parasite genome.
- To develop the practical skills of using immunodiagnostic techniques in diagnosis of parasitic diseases.

- To impart basic and advanced knowledge of epidemiology, pharmacology and toxicology to apply it in research methodology of various parasites so as to obtain relevant findings and implement them for prevention and control of parasites to upgrade the quality of life.

Course Contents

Molecular biology

1. Introduction to basic molecular biology techniques and laboratory safety, including chemical safety issues.
2. Isolation of plasmid DNA
3. Isolation of genomic DNA of parasites.
4. PCR with gene specific primers.
5. Analysis of DNA fragments by agarose gel electrophoresis.
6. Restriction enzyme digestion of DNA.
7. RFLP analysis of PCR product.
8. Computational analysis of the DNA sequences obtained using BLAST search.
9. Comparison of DNA and amino acid sequence of parasite species using multiple sequence alignment.

Immunology

10. Blood grouping experiment.
11. Immunodiagnostic experiments using commercial kits e.g. ELISA.

Epidemiology, Pharmacology and Toxicology

12. Measurement of mortality and morbidity.
13. Field survey for the analysis of impact of drugs for the control of parasitic disease.
14. To study the impact of toxin in animal model.
15. Preparation of field survey report on different pharmaceutical companies of Nepal.
16. Study of drug resistance in microorganism / parasite model.
17. Field survey (teaching hospitals, medical institutions, health camps, etc.) to gather information regarding drug resistivity.

Suggested Readings

- Abbas, et al. (2000). Cellular and Molecular Immunology (3rd ed.) W. B. Saunders Company, Wilson Walker Practical Biochemistry, Cambridge Univ. Press.
- Adhikari, R.K. and Miriam E. Krants. (2001). Child Nutrition and Health. Published by Health Learning Materials Centre, T.U., Institute of Medicine. 3rd edition.
- Arora, D.R. and Arora B. (2005). Medical Parasitology. CBS Publishers and Distributors, New Delhi.
- Arora, D.R. (2004). Textbook of Microbiology. CBS Publishers & Distributors, New Delhi.
- Arthur, D.R. (1962). Ticks and Disease. Harper and Row, New York.
- Askew, R.R. (1971). Parasitic Insects. American Elsevier Publication Co. New York.
- Baer, J.G. (1951). The Ecology of Animal parasites. Unvana Unive of Illinois Press.
- Baher, et al. (1956). Manual of Parasitic Mites of Medical or Economic Importance. National Pest Control Assoc., Inc., New York.
- Belding, D. L. Meredith. (1956). Textbook of Parasitology. New York.
- Cameron, T.W.M. and Black A.C. (1934). Internal Parasites of Domestic Animals London.
- Cameron, T.W.M. (1965). Parasites and Parasitism (ELBS) John Wiley, New York.
- Cedric Mims, et al. Medical Microbiology 3rd ed. Pub – Elsevier Musby.

- Chandler, A.C. and Read C.P. (1961). Introduction to Parasitology. John, Wiley and Sons, Inc.
- Chatterji, K.D. Parasitology (Protozoology & Helminthology). Medical Publishers, Calcutta, India.
- Cheng, T.C.W.B. (1964). The Biology of Animal Parasites. Saunders Co. Philadelphia and London.
- Craig and Faust . (1945). Clinical Parasitology. The Macmillan Co., Philadelphia.
- Dawes, B. (1968). The Trematoda. Cambridge University Press. Revised.
- Dawes, B.(1947). The Trematoda of British Fishes. Ray Society, London.
- Dey, N.C., Messrs. (1964). Medical Parasitology, Allied Agency, Calcutta.
- Dhaar, G.M. and Robbani I.(2006). Foundations of Community Medicine. Published by Elsevier, a division of Reed Elsevier India Private Ltd., New Delhi.
- Dogiel, V.A. (1964). General Parasitology. New York Academic Press. Inc. 1966. Oliver and Boyd. Ltd. Translation Edinburgh and London.
- Don, C. Norton. (1978). Ecology of Plant Parasitic Nematodes. Wiley InterScience Publication. J. Wiley and Sons.
- Dubey, R.C. and Maheshwari, D.K. (1999). A text book of Microbiology. S. Chanda & Company Ltd., New Delhi.
- Edward, L. Schneider and John W. Rowe. (1996). Hand Book of the Biology of Ageing, 4th ed. Academic Press.
- Elgert. (1996). Immunology: understanding the immune system. John Willy & Sons, Inc. Publication, New York.
- Faust, E.C. (1930). Human Helminthology. 616pp. Philadelphia.
- Furman, D.P. Palosetp. (1961). Manual of Medical Entomology. The National Press, California.
- Gabriel, Virella, Medical Immunology, 5th edition , Marcel Dekker, Inc. New York, Basel, 2001
- Gaugler, R. and Kaya, H.K. Ed. (1990). Entomopathogenic Nematodes in Biological Control. CRC Press Boca Raton.
- Gupta, R. and Pandey, D.P. (2007). Research Methodology: Fundamentals and Practice. Pub.: Ratna Pustak Bhandar, Kathmandu, Nepal.
- Herws, W.B.(1961). Medical Entomology. Macmillan, New York
- Hokkanan and Lynch Ed. (1994). Benefits and Risks:Biological control. Cambridge University Press.
- Hyman, L. (1940, 1951). The Invertebrates Vol I, II & III, McGraw-Hill Book Company, New York.
- Joshi, A.B. and Banjara, M.R. (2007). Fundamentals of Epidemiology. Published by Institute of Medicine, T.U, Maharajgunj, Kathmandu, Nepal.
- Judith, Bell. (1996). How to complete your research project successfully. UBS Publishers Distributers limited, New Delhi. 4th edition.
- Kuby, R.A., Goldsby Thomas, J., Kindt, Barbara, A Osborne. Immunology, 6th edition, Freeman, 2002
- Lapage, G., Oliver and Boyd. (1956). Veterinary Parasitology. Edinburgh and London.
- Lapage, Monnig's Geoffery. Bailiere, Tindall, and Cox.19 Veterinary Helminthology and Entomology. London.
- Lapage, G. (1963). Animals Parasitic in Man. Dover Publication Inc. New York.
- Luc, M., Sikora R.A. and Bridge J. Plant Parasitic Nematodes in Subtropical and Tropical Agriculture. CAB. International Institute of Parasitology.
- Mart, J. Josheph and Muller, M. Biochemistry and Molecular biology of Parasites, Academic Press Inc.San diego, CA, 1995
- Metcalf and Flint.(1962). Destructive and Useful Insects. McGraw Hill Book Company, Inc.
- Mukherjee, Kanai L. (2005). Medical Laboratory Technology : Vol. I, II & III. Tata McGraw-Hill Publishing Company Ltd, New Delhi.

- Nayar, K.K., Ananthkrishnan, T.N., Davied, B.V. (1976). General and Applied Entomology. Tata McGraw Hill Publishing Co Ltd., New Delhi.
- Noble, E.R. and Noble, G.A. (1976). Parasitology: The Biology of Animal Parasites. Lea and Febiger, Philadelphia.
- Parija, S.C. Review of Parasitic Zoonoses. A.I.T.B.S.Publishers and Distributors, Delhi.
- Park, K. (2003). Text book of Preventive and Social Medicine. Banarsidas Bhanot Publishers Jabalpur, India.
- Poinar, G.O. Jr. (1979). Nematodes for Biological Control of Insects. CRC Press Florida.
- Raymond, S. Greenberg, et al.(2001). Medical Epidemiology. Lange Medical Books/McGraw-Hill, Medical Publishing Dir., New York.
- Read, Clerk P. (1977). Animal Parasitism. Prentice Hall of India PTL. New Delhi.
- Richardson, U.F.(1948). Veterinary Protozoology. Oliver and Boyd, Edinburgh and London.
- Robert, A. Day. (1994). How to write and publish a scientific paper. 4th ed., Cambridge low Price Edition, Cambridge University Press.
- Satyu Yamagute. (1960). Systema Helminthum – 3 volumes – Interscience New York, Vol I, 1575 pp 1958; Vol II Cestodes, 1959, Vol III Nematodes.
- Shetty, Nandini. (2004). Immunology – Introductory Textbook. New Age International (P) Ltd., Publishers, India.
- Smyth, J.D. (1966). The Physiology of Trematodes. Oliver and Boyd Ltd., London.
- Smyth, J.D. (1969). The Physiology of Cestodes. W. HI Freeman and Co. Publisher, San Francisco.
- Snow, K.R. (1974). Insects and Diseases. Halsted Press, Dir. Wiley, New York.
- Soulsby, E.J.L. (1966). Biology of Parasites, Emphasis to Verterinary Parasites.New York Aca.Press.
- Soulsby, E.J.L. (Ed.) (1972). Immunity to Animal Parasites. New York Academic Press.
- Subash, C. (1996). Text Book of Medical Parasitology. Pariya and All India Publishers & Distributions, Madras.
- Thorne, G. (1961). Principles of Nematology. McGraw-Hill Book Company, New York.
- Tripathi, K.D. Essentials of Medical Pharmacology. Jaypee Brothers, Medical Pub. (P) Ltd., New Delhi.
- Wee, D.L. (1966). The Physiology of Nematodes. Oliver and Boyd Ltd, London.
- Woodring and Kaya. (1988). Steinernematid and Heterorhabditid nematodes. A handbook of techniques: Sothern Coop. Ser. Bul. 331 Arkansas.
- Yorde, W., Maplestone, P.A., London, J. and Churchill,A.(1926). The Nematode Parasites of Vertebrates.
- Zumpt, F., Waslujton, D.C. (1965). Myiasis in Man and Animals in the Old World. Dauttercvorth.
