

Dettner, K., Peters, W., editors**Lehrbuch der Entomologie**

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 imprint of Elsevier: München, 2003. XXIII + 936 pages. Format 200 × 270 mm. Binding hardcover.
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First editor is professor at the Department of animal ecology, University of Bayreuth (Germany). Second editor, an acknowledged German entomologist, unfortunately deceased in 2003 – a short time before occurrence of this book in print. The list of contributors comprises 23 leading experts affiliated with University Institutes for zoology and related biological sciences mostly from Germany and from Austria, too. As declared in the prefaces to the first and second editions, insects present at least 75–80 % of all animal species worldwide, in total about 10–100 millions of species. Several decades have witnessed an enormous growth of knowledge in the field of entomology since the 3rd edition of the classical *Grundriss der Insektenkunde* by Weber and Weidner (1974). Some new insect orders/species have been described. The genome of *Drosophila melanogaster* and of the malarial mosquito *Anopheles gambiae*, together with the genome of the causative agent of malaria have been elucidated. Entomology today incorporates many experimental sciences: biochemistry, endocrinology, genetics, chemical ecology, and new methods and procedural techniques. Association of entomology with medicine, veterinary medicine, agriculture and forestry brings beneficial effects.

Introductory text (numbered by Roman numerals) includes a comprehensive list of textbooks dealing with general entomology, selected journals/periodicals and internet references. The volume is composed of 25 chapters divided into subchapters numbered according to the decimal system. Each chapter is concluded with a comprehensive list of journal and monograph references especially relevant to particular topics. In the initial chapter attention is given to the integument: to the epidermis, cuticle, to external and internal integumentary processes, hairs and scales, to the coloration, and to miscellaneous exocrine glands. Chapter 2 illuminates insect body segments grouped into three tagmata: a head (caput), a thorax and an abdomen, their segmentation and specialized organs. Chapter 3 encompasses an overview of biochemistry and metabolism, namely of nutrition, release of energy from food and energy accumulation, synthesis of reserves, starvation, metabolism of flight and reproduction, metabolism under unfavorable environmental conditions, and regulating hormones. Chapter 4 is devoted to the insect nutrition, notably to food intake and digestion, extracellular digestion, to the architecture of alimentary system: the foregut, midgut and hindgut, Malpighian tubules, the fat body, athrocytes/nephrocytes and pericardial cells. Chapter 5 focuses on water balance, osmo- and ionoregulation and excretion. Chapter 6 deals with the respiratory (ventilatory) system. Pointed up are principal characteristics of the tracheal system, tracheae and air sacs, tracheoles, the filter apparatus of stigmata, mechanisms of the gas flow, ventilation in aquatic environment, and the ventilatory control. Chapter 7 centres attention upon the haemolymph and the circulatory apparatus while describing general characteristics of the open circulatory system, the haemolymphoplasm and haemocytes, immune defenses and healing

of wounds, the heart and dorsal vessel, structure and function of ostia, ventral diaphragma and the perineural sinus, accessory pulsatile organs, and more. Chapter 8 delineates the structure and development of the nervous system: the neurons, glial cells, neurosecretory cells, structure of the brain and suboesophageal ganglion and the visceral nervous system.

Within the framework of locomotion and sensomotoric integration (chapter 9) analysed are muscle structure and action, mechanisms and control of contraction, terrestrial, aquatic and aerial ways of locomotion, and spatial orientation. Chapter 10 provides a look at learning and memory, nominally at training of feeding and odours perception by honeybees, at categories of learning processes, physiology and cellular basis (neuronal control, cerebral tracts), neurogenetics, and flying orientation. Subsequent chapter 11 on physiology of the sense organs encompasses the mechanoreception, thermo- and hygroreception, chemo- and photoreception including the morphology and function of different sense organs (sensillae). In the context of endocrinology (chapter 12) outlined are various hormones and their functions, neurosecretory cells, the complex of corpora allata/corpora cardiaca, molting glands, and metamorphosis. Chapter 13 moves into the area of reproduction and development, attention is given to the reproductive organs, to developmental forms and copulation, to embryogenesis, postembryonal development, formation of blastoderm and to developmental evolution. Following chapter 14 is concerned with social insects, in particular with basic principles of the social mode of life, social organization in colonies of termites and hymenopterans – wasps, bees and ants, caste formation and the psychophysiological caste determination, communications, homeostasis and social regulation, and the like. Chapters 15 and 16 take account of phytophagous and entomophagous insects. Chapter 17 examines the insects as food for vertebrates and invertebrates (predators and parasitoids), further on the defense mechanisms of insects, comprising the primary defense mechanisms: camouflage, warning (aposematic) coloration, mimicry, and secondary defenses: locomotory behaviour, escape reactions, mechanical, optical and acoustic defenses. Chemical defense includes allelochemicals, allomones, repellents and deterrents, defense fluids, activity of diverse defense glands, hairs and stings, and other defense equipment of insects. In chapter 18 the phenomenon of insect bioluminescence is highlighted. Subsequent chapter 19 gives attention to mutual relationships between insects and microorganisms, nominally to different modes of symbiosis.

Chapter 20 constitutes a highlight into medical entomology. The definition of this border field has been given in 1923 by E. Martini in his classical textbook "*Medical entomology elucidates the relation between arthropods (especially insects) and human health*". Insects are explored here from the viewpoint of their harmful activities: effects of blood-sucking, immune reactions to arthropods and their products, effects of stings. Examined are venomous insects: stinging hymenopterans as are

bees, wasps and ants, lepidopteran caterpillars carrying urticating hairs (setae) and venomous beetles. Moreover, attention is paid to discomfort causing arthropods, to the lice, bedbugs, dipterans, and fleas. Transmission of infectious agents is discussed with special reference to the viruses, bacteria, rickettsiae, spirochaetes, protozoans and helminths. Next coming chapter 21 provides insights into biological, chemical and biotechnical pest control. Paragraphs on biological pest management involve introduction of natural enemies, entomophage organisms and phytophage insects for regulation of weeds. Treatise of chemical control comprises most important types of natural (plant) and synthetic insecticides, repellents and fumigants. Biotechnical procedures cover physical and chemical irritations: optical and acoustical signals, phagodeterrents, pheromones, insect sex attractants, furthermore transgenic insectresistant plants, transgenic insects, and other agents and methods. Chapter 22 is concerned with regulations of population density, in particular principle characteristics of population dynamics, concepts of population growths and environmental factors, natality and mortality, interactions and control systems, abundance dynamics, and the like. Chapter 23 is devoted to the biogeography of insects, while analyzing diverse concepts of chorology, migration behaviour, faunal regions and historical aspects of zoogeography in context of dispersion and distribution. In chapter 24 the principles of zoological systematics are reviewed: the systematic assemblages (taxa), methods of

systematics, encompassing the reconstruction of dendrograms, molecular systematics, cladistic analysis, cladistic and evolutionary classification, and entomological collections management. Concluding, most extensive chapter 25 (134 pages) embraces an overview of 34 insect taxa (orders/classes) starting with the springtails Collembola and concluding with the twisted-wings insects Strepsiptera.

In this second edition, many parts have been revised and updated, some chapters have been newly conceived. The volume is exquisitely illustrated by carefully designed line drawings and black-and-white light and electron micrographs featuring miscellaneous internal and external organs and tissues of the insect body, various stages and developmental forms of the insect life cycle, diverse life activities and events, diagrammatic representations, schemes, geographical maps, and formulae of chemical substances.

This teamwork publication offers an authoritative, most exhaustive and attractive textbook of general entomology - invaluable as a companion volume for readers interested in arthropod-borne infections, pest management and many other branches of science relevant to insects.

Jindřich Jira