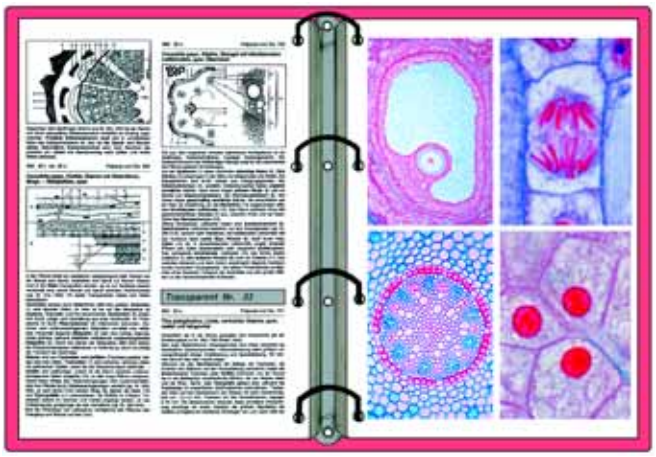
# OVERHEAD TRANSPARENCY ATLASES

Color Overhead Transparencies as modern visual aids become more and more part of biology, physics and chemistry teaching programs. Therefore we have created a new and comprehensive range of Transparency Atlases of outstanding quality.
The atlases consist of large-format transparency sheets (size 22 x 28 cm) comprising a great variety of beautiful drawings, diagrams, tables, anatomical pictures, brilliant micro- and macrophotographs, electron and X-ray photographs, impressive life cycles, human photographs, landscape photographs, scenes, test data and results, etc.



- Each Transparency atlas is accompanied by a comprehensive interpretation text giving a detailed description of all pictures, based on the latest scientific findings (available in different languages).
- Our multi-colored transparencies are printed by a special process and excel by reason of their high projection quality.
- Transparencies and texts are held in a strong plastic file with ring mechanism.
- **NEW in 2011:** Sketch and work-sheets with semidiagrammatic designs and texts. Teacher may take photocopies from the sheets and use for classroom work and tests.

## PROGRAM OF OVERHEAD TRANSPARENCIES

**8201E** **Anatomy and Physiology of the Human Body. Volume I**. The skeleton - The muscular system - The respiratory system - The circulatory system - Digestive system. - Urinary organs. Atlas 36 Overhead-Transparencies, size 22 x 28 cm, comprising 110 color pictures, mostly with several component figures. Sketch and work-sheets with semidiagrammatic designs and texts. Manual with depictured explanatory comments for the teacher. All in strong plastic file with ring-mechanism ***NEW***

**8202E** **Anatomy and Physiology of the Human Body. Volume II.** Reproduction, sex education and genetics - The nervous tissue - The human spinal cord - The human brain and the transmission of information - The autonomic nervous system – Atlas 36 Overhead-Transparencies, size 22 x 28 cm, comprising 110 color pictures, mostly with several component figures. Sketch and work-sheets with semidiagrammatic designs and texts. Manual with depictured explanatory comments for the teacher. All in strong plastic file with ring-mechanism ***NEW***

**8203E** **Anatomy and Physiology of the Human Body. Volume III.** Eye and vision - Ear and auditory mechanism, sense of equilibrium - Sensory perception: Smell, taste, touch, perception of temperature and movement. - Hormones and hormone systems – Atlas of 27 Overhead-Transparencies, size 22 x 28 cm, comprising 75 color pictures, mostly with several component figures. Sketch and work-sheets with semidiagrammatic designs and texts. Manual with depictured explanatory comments for the teacher. All in strong plastic file with ring-mechanism ***NEW***

**8211E** **The Human Apparatus of Movement.** Connective and supporting tissues. The human skeleton and its parts. The human muscular system. – Atlas of 30 transparencies with 87 pictures

**8212E** **The Human Organs of Digestion.** Digestive and excretory systems. Structure and function of human mouth, pharynx, stomach, intestine, liver and pancreas, kidney and urinary organs. The metabolism. – Atlas of 30 transparencies with 88 pictures

**8213E** **The Human Respiratory and Circulatory Systems.** Nose, trachea, lungs, heart, blood and blood vessels, lymphatic system. Respiration, circulation, blood pressure, blood groups. The immune system. – Atlas of 42 transparencies with 110 pictures

**8217E** **Reproduction and Germ Development of Human and Animals**. Atlas valuable for teaching sex instruction. Reproductive systems. Human sexual organs, egg and sperm development, growth of fetus, birth. – Atlas of 30 transparencies with 104 pictures

**8214E** **Nervous System Part I.** The nervous cells and tissues. The nervous systems of invertebrates and vertebrates. – Atlas of 30 transparencies with 76 pictures

**8215E** **Nervous System Part II.** The human spinal cord. The human brain as a control organ. Reception, conduction and transmission of information. The autonomic nervous system. – Atlas of 36 transparencies with 82 pictures

**8218E** **Hormones and Hormone Systems Part I and II**. The function and interaction of hormones. Thyroxin, adrenalin, and insulin. Sexual hormones and hypophysis. Releasing and gonadotrope hormones, feedback control, gene activity and protein synthesis, neurosecretion, second messenger and cascade mechanism, inhibiting and stimulating factors, anabolica, hormonal contraception. – Atlas of 42 transparencies with 116 pictures

**8216E** **The Organs of Sense**. Eye and vision, ear and hearing, sense of equilibrium, senses of smell, taste, touch, temperature and proprioception. – Atlas of 36 transparencies with 90 pictures

**8220E** **Cytology and Molecular Genetics.** Cell nuclei, chromosomes, genes, crossover, self-replication, germ-line. DNA as a carrier of hereditary information. Structure and replication of DNA and RNA. Genetic code and mutation. Synthesis, structure and function of proteins. The double helix. – Atlas of 46 transparencies with 172 pictures

**8224E** **Mitosis and Meiosis in Animals and Plants.** Outstanding color photomicrographs of cell division, reduction division, fertilization, and cleavage. – Atlas of 25 transparencies with 90 pictures ***NEW***

**8248E** **Cytology and Genetics.** Short version (TE). – Atlas of 10 transparencies with 67 pictures. ***NEW***

**8222E** **Transmission Electron Micrographs.** Cells and tissues of man, animals and plants. Greatly enlarged electron micrographs (50000 up to 100000 x) show the ultra-structures of the cell organelles. Pictures of lower magnification (5000 up to 30000 x) give an impression of the microstructure of the tissues and organs. – Atlas of 24 transparencies with 120 pictures

**8225E** **Mendelian Inheritance and Variability.** Types of crossings, modifications and mutations in plants and animals, adaptation, genotype and phenotype. – Atlas of 32 transparencies with 95 pictures

**8226E** **Human Genetics Part I.** Basic knowledge of formal genetics, modes of inheritance, chromosomal aberrations, cytogenetics, tumorgenetics, examples of medical genetics. – Atlas of 32 transparencies with 94 pictures

**8227E** **Human Genetics Part II**. Molecular genetics, statistic genetics, population genetics, mutations, blood groups. Genetic counseling and prenatal diagnosis, teratogenous injury of the fetus, estimated risk, behavior genetics, twin research. – Atlas of 42 transparencies with 116 pictures

**8228E** **Origin and Evolution of Life Part I.** Comprehensive edition. Stellar, chemical and organic evolution. Formation of procaryonts. – Atlas of 24 transparencies with 60 pictures

**8229E** **Origin and Evolution of Life Part II**. Comprehensive edition. The biological evolution from the procaryonts to the vegetable and animal kingdom. – Atlas of 24 transparencies with 45 pictures

**8230E** **Origin and Evolution of Life Part III.** Comprehensive edition. Basis, mechanisms and ways of evolution of the vegetable and animal kingdom. – Atlas of 30 transparencies with 60 pictures

**8204E** **The Origin and Evolution of Life.** Short Version. – Stellar, Chemical, and Organic Evolution. Development of Prokaryotes - The Biological Evolution from the Prokaryotes to the Vegetable and Animal Kingdom - Basis, Mechanisms, and Ways of Evolution of the Vegetable and Animal Kingdom - Atlas of 39 Overhead-Transparencies, size 22 x 28 cm, comprising 105 color pictures, mostly with several component figures. Sketch and work-sheets with semidiagrammatic designs and texts. Manual with depictured explanatory comments for the teacher. All in strong plastic file with ring-mechanism ***NEW***

**8232E** **Our Environment - Threats and Protection.** Typical examples show which processes are changing the natural structure of our environment and how the dangers arising from this can be counteracted. It consists of three parts: I. The Landscape. II. Ground and Water. III. The Air. – Atlas of 36 transparencies with 73 pictures

**8233E** **Our Waters, Problems of Pollution, Methods of Protection and Recycling.** Water courses in cultivated areas. Examination and supervision of the water. Levels of water purity. Water pollution, sewage water, eutrophication, acidification, biocides. Methods for cleaning and protection. – Atlas of 42 transparencies with 114 pictures

**8234E** **The Forest - Essential to Life.** The forest as an ecological system. Plants and animals of the wood. The multifarious functions of the forest. Threats caused by air pollution and acid rain. – Atlas of 30 transparencies with 81 pictures

**8235E** **Protecting Crops from Damage and Diseases.** Plant diseases of economic importance, plant pests, destructive weeds and animals. Plant protection: mechanical, chemical, biological and biotechnical treatments. – Atlas of 30 transparencies with 101 pictures

**8238E** **Ecosystems.** Natural biological communities become rarer and rarer. Their abundance of species, the problems of their preservation as well as their importance for the whole ecological structure are treated in these atlas on hand and documented by characteristic examples. – Atlas of 42 transparencies with 205 pictures

**8250E** **Environmental Damages to Animals and Plants**. Short version (TH). – Atlas of 18 transparencies with 80 pictures. ***NEW***

**8236 E** **Color Atlas of Photomicrographs of General Biology.** Atlas of Transparencies to Accompany the Multimedia Program for Biology (Series A, B, C and D). Color photomicrographs for General Biology: Human Science, Zoology, Botany, Cytology, Genetics, Parasitology, Bacteriology, Ecology. – Atlas of 45 transparencies with 252 pictures. ***7th Edition!***

**72303E** **Histology** (former no. 172303), NEW enlarged and revised Comprehensive Edition. Types of cells. Epithelial, connective, muscular and nervous tissues. Digestive organs. Glands. Respiratory organs. Blood and lymphatic system. Urinary and genital organs. Endocrine glands. Scalp and hair. Organs of sense. Central nervous system. With 228 photomicrographs, histological and anatomical designs and graphs on 41 color transparencies. Plus NEW Sketch- and worksheets with semidiagrammatic designs and texts. ***NEW PUBLICATION***

**8245E** **Histology and Human Science.** Short version (TA). – Atlas of 30 transparencies with 171 pictures. ***NEW***

**8237E** **Zoology (Microscopic Anatomy of Invertebrates).** New comprehensive edition (TB). Atlas of 26 transparencies with 165 pictures. Microscopic anatomy and histology of the invertebrates. Protozoa, Mesozoa, Porifera, Coelenterata, Platyhelminthes, Nemathelminthes, Annelida, Crustacea, Arachnida, Mollusca, Echinodermata, Acrania. –***NEW***

**72306E** **Parasitology** (former no. 172303). NEW enlarged and revised Comprehensive Edition. Humoral and cellular reactions. Parasitic protozoa, Malaria, Trematodes, Cestodes, Nemathelminthes, Roundworms. Mosquitoes, Ticks, Lice, Bugs and Fleas. Helminth eggs and larvae. Protozoan cysts. With 228 color photomicrographs, habit photographs, designs and life-cycles of the parasites on 35 transparencies. Plus NEW Sketch- and worksheets with semidiagrammatic designs and texts. ***NEW PUBLICATION***

**8249E** **Bacteria, Parasites and Human Diseases. (TG).** Comprehensive edition. Bacteria as causative agents of diseases. Ecto- and Endoparasites of man and animals. Pathological changing in diseased human organs. – Atlas of 32 transpar. with 230 pictures. ***NEW***

**8231NE** **Embryology.** New enlarged edition. Embryological development of Ascaris, Sea-urchin, Frog, Chicken, Mammals and Human. – Atlas of 21 transparencies with 122 pictures. ***NEW***

**72304E** **Plant Anatomy Part I: Phanerogams. The Flowering Plants** (former no. 172304). NEW enlarged and revised Comprehensive Edition. Microscopic anatomy and physiology of flowering plants. Cytology and tissues. Construction and function of roots, stems and leaves. Flowers, fruits and reproduction. With 270 photomicrographs, designs, graphs and life-cycles on 43 color transparencies. Plus NEW Sketch- and worksheets with semidiagrammatic designs and texts. ***NEW PUBLICATION***

**72305E** **Plant Anatomy Part II: Cryptogams. The Non-Flowering Plants** (former no. 172305). NEW enlarged and revised Comprehensive Edition. Morphology of Thallophyta and Archegoniatae. Non-pathogenic Bacteria. Fungi and Lichenes. Algae. Bryophyta. Pteridophyta. With 194 photomicrographs, designs, graphs and life-cycles on 32 color transparencies. Plus NEW Sketch- and worksheets with semidiagrammatic designs and texts. ***NEW PUBLICATION***

**8246E** **Botany Part I. The Cryptogames.** Short version (TC) – Atlas of 18 transparencies with 116 pictures. ***NEW***

**8247E** **Botany Part II. The Phanerogames.** Short version (TD) – Atlas of 20 transparencies with 142 pictures. ***NEW***

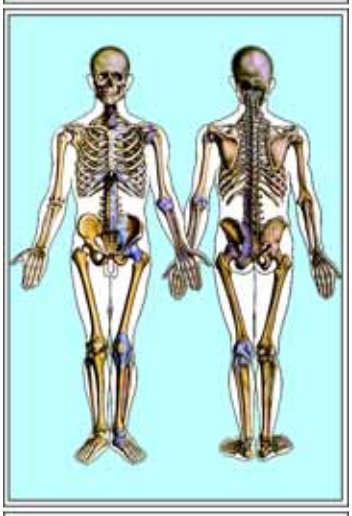
**8253E** **Atlas of Oral and Dental Histology.** Atlas of 40 Transparencies size 22 x 28 cm, with over 150 pictures and 20 sketch- and worksheets. With detailed explanatory textbook. - Comprising the following themes: General and foodstuffs. Human mouth, tongue and throat. Human teeth and teeth development. Dental hygiene. Salivary glands, esophagus and stomach. Cells and tissues. Examples of histopathology.

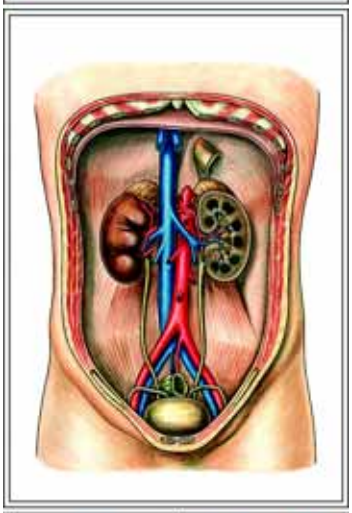
**8255E** **Basic Medicine and First Aid.** Atlas of 18 Transparencies size 22 x 28 cm, with over 76 pictures and 20 sketch- and worksheets. With detailed explanatory textbook. - Comprising the following themes: The use of the microscope, bacteria and hygiene, medical instruments, first aid and assistance.

**8240E** **The Structure of Matter Part I.** Elementary particles, atomic nuclei, structure of the atomic shell. Energy, matter, interactions. Classes of matter, chemical bonding. Symmetry of crystals, properties of minerals, research into the structure. – Atlas of 35 transparencies with 110 pictures

**8241E** **The Structure of Matter Part II**. Morphology of the most important minerals: elements and bonds, silicates, rocks, gems and precious stones. – Atlas of 27 transparencies with 204 pictures

## No. 8201E Anatomy and Physiology of the Human Body. Volume I





*A comprehensive presentation of the construction, biology and function of the human body in three volumes.*
*Volume I comprises the human skeleton, the muscular system, the respiratory organs, circulatory system, blood and lymphatic organs, heart and blood vessels, the digestive system, and the urinary organs.*
*These atlases of human biology and life science are of great value for teaching in schools, colleges and universities, in the training of nurses, medical technicians and for the students of physiotherapy and physical education.*

***Contents:***

- *36 Overhead-Transparencies, size 22 x 28 cm, comprising 110 color pictures, mostly with several component figures (anatomical pictures, photomicro- and macrographs, nature photographs, human photographs, electron micrographs, X-ray photographs, drawings, diagrams, tables, scenes, test data and results). The color pictures were prepared by university illustrators specializing in this field.*
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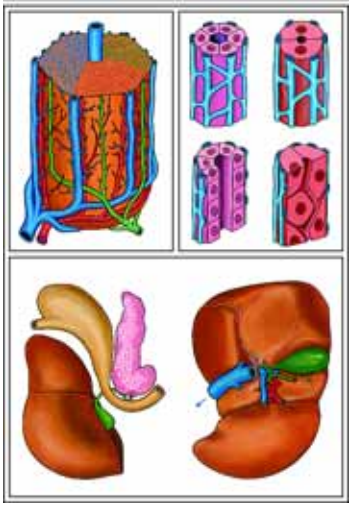
- *Manual with depictured explanatory comments for the teacher. All in strong plastic file with ring-mechanism.*

**The human skeleton -** The human skeleton, front and rear view - Fine structure of bone, diagram - Structure of a long bone - Joints: diagram, hinge, ball-and-socket joint - Spinal column, cervical and thoracic vertebrae - Lumbar vertebrae, sacrum and coccyx - Articulations of the skull: skull, atlas, axis - Thorax and shoulder girdle - Skeleton of the arm, pronation and supination of the hand - The elbow joint - The skeleton of the hand - The skeleton of the foot - The pelvic girdle with and without its ligaments - The knee joint, menisci - The skull, anterior and lateral view - Skull with separated bones - X-ray of a dislocation - X-ray of a fracture - **The human muscular system -** Human body showing the skeletal muscles, front and rear views - The structure of a skeletal muscle - The sensory and motor innervation of a muscle - The muscles of the head and the neck - The muscles of the trunk - The superficial and the deeper muscles of the back - The muscles of the shoulder, pairs of antagonists - Pronating and supinating muscles of the forearm - The muscles of the hand - The muscles of the leg and foot - The muscles of the pelvis - Flexors and extensors of the leg - Muscles for lifting and lowering the arm - Example of a complex muscular action - **The human respiratory system -** General view - Position of the lungs in the thorax. Thorax with trachea, bronchi, and lungs - X-ray of human thorax, inspirated and expirated position - The larynx; front view, dorsal view, l.s. - Swallowing and breathing - Function of the arytenoid cartilages, glottis and vocal cords - Respiratory duct and air passages - Nasal cavity with its sinuses - Intercostal muscles during inspiration and expiration - Detailed structure of the lungs - Comparison of inspired and expired air - Diagram of gaseous exchange in the pulmonary alveoli - Volume of air respirated - Connection between work and respiration per minute - Regulation of respiration- Absorption of carbon monoxide and oxygen by hemoglobin - Smoke and sulphur dioxide-content of the air - **The circulatory system I: Blood and lymphatic Organs -** Shape and size of an erythrocyte - Serum reactions to show hereditary relationship - Leucocytes with phagocyted bacteria - Composition of the blood - The steps of blood clotting, diagram - The AB0 blood group determination - Positive and negative reactions - Diagram to understand agglutination of the AB0-blood groups - Diagram to understand Rh-incompatibility - The human lymphatic system - Human immune system - Structure of a lymph node - The vascular system of the human spleen - Exchange of substances between blood capillaries, tissue, and lymph capillaries - Development of lymphocytes. Memory cells, plasma cells - **The circulatory system II: Heart and blood Vessels -** The heart and the big vessels - Human heart, l.s. - Arterio-ventricular and semilunar valves - Endocardium, myocardium, epicardium - The cardiac cycle - Cycle of pressure and volume of the left ventricle. Blood pressure in the aorta, cardiac sounds - Heart, pulmonary and systemic loop - Stimulation and coordination of the heart. Sinoatrial node, atrioventricular node - Human electrocardiogram - Diagram of human blood circulation. Big vessels and capillary networks - Arrangement for taking the human blood pressure - Diagram to explain the pulse during reduction of the pressure in the bag - The heart in the circulatory system of vertebrates - Artery and vein, three-dimensional designs - **Digestive system. Mouth, esophagus and stomach** - The human organs of nutrition - The deciduous and the permanent set of teeth - The types of teeth - Position and structure of the salivary glands - Human esophagus, spatial diagram and section - Position and fixation of the human abdominal digestive organs. - Human stomach, spatial diagram, sections, gastric glands - **The intestine -** Small intestine, sections, mucous glands, principle of peristaltic movement - Structure of an intestinal villus - Human colon, l.s., low magnification - Human colon, spatial color design and transverse section - **The liver and the pancreas** - General structure of a liver lobule- Structure of a hepatic cord - Vascular systems of a liver lobule - Liver, t.s. showing liver lobules, bile ducts, diagram - Blood supply, exchange of substances of liver and small intestine - The venous system of the liver, portal vein and hepatic vein - **The urinary organs** - The urinary organs, situs - Kidney, l.s., diagram - The blood vessels of the kidney - Nephron and glomerulus - Function of the kidney, the course of renal tubules, renal corpuscle.

## No. 8202E Anatomy and Physiology of the Human Body. Volume II



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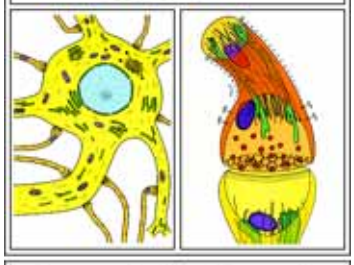
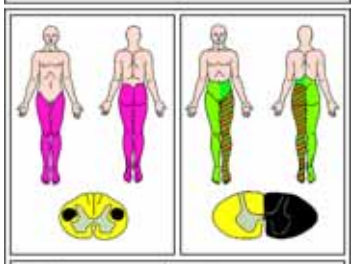
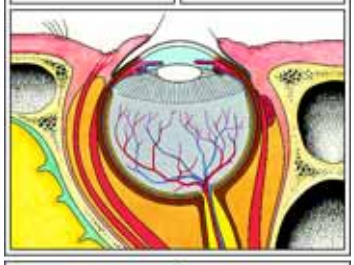
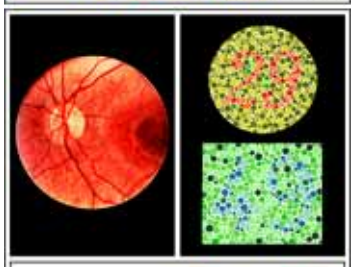
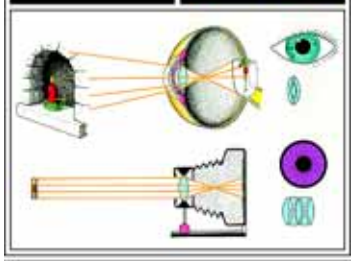
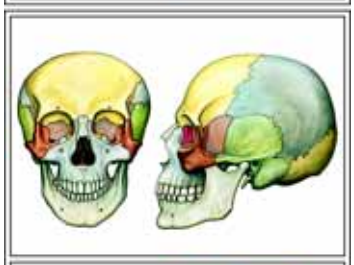
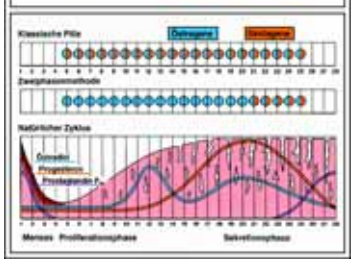
**Reproduction, sex education and genetics -** Asexual reproduction of Amoeba - Sexual reproduction of Hydra - Reproduction of the sea urchin - Reproduction in fishes - The reproductive organs of the human male; lateral view of situs and diagram - Testis, epididymis, spermatogenesis - Spermatozoa - Human hair, egg, and spermatozoa; comparison of sizes - The reproductive organs of the human female; lateral and front view of situs and diagram - The maturation of the oocyte - Oogenesis, ovulation, fertilization, cleavage of fertilized egg, and implantation of blastocyst in the uterine wall - Changes of the endometrium during menstrual cycle and after fertilization - The menstrual cycle of the woman - The fertilization of the egg, first development in the fallopian tube and imbedding in the uterus - Hereditary transmission of the sex and sex-linked inheritance - The human chromosomes - Normal karyotype with banding pattern - Growth of embryo and fetus in the uterus - Full term baby in maternal abdomen - Beginning of birth, entrance of amniotic sac into the birth canal - The chromosomes as carriers of the hereditary factors - Oogenesis, spermatogenesis fertilization and cleavages in animals - Fertilization and maturation divisions in Ascaris - Fertilization of the sea urchin egg and development - Development of the central nervous systems of Branchiostoma (Amphioxus) and frog, from. Closing of neural groove to neural tube - Chicken embryo, 48 hour, t.s. with neural tube and chorda - Development of the human heart - Graduation of vertebrate hearts - Graduation of the vertebrate lungs - Development of the human eye - **The nervous tissue -** Human nervous system, entire view - Motor nerve cells of the gray matter, cell body, dendrites, axon - Nerve

fibers, t.s. Axons and myelin sheaths - Various shapes of human neurons - Diagram of a neuron - Various neurons from human nervous system - Medullated nerve fibers, showing Ranvier's nodes - The nervous systems - The evolution of the nervous system in worms - The nervous system of the earthworm - Concentration of ganglia in insects - The head of a locust l.s. - Position of the brain - The nervous system in arthropods: lobster, crab, spider, scorpion - The nervous system of a freshwater mussel, a snail and a starfish - Embryonic development of the spinal cord in frog and human - Human vertebra. Superior and lateral view of three vertebrae with intervertebral discs - Brains of vertebrates (shark, bony fish, amphibian, reptile, bird, mammal), dorsal views and sagittal sections - Human central nervous system, lateral view. Position of the dura sac in the spinal canal - Human spinal cord in the spinal canal, lateral view. Opened dural sac, surface view with segments - Human spinal cord and medulla oblongata. Lateral, dorsal and ventral view with spinal nerves - Comparison of the masses of brain and spinal cord in Branchiostoma, frog, rabbit, cat, ape, human - Cranial nerves of frog and sheep - Human brain, ventral view with cranial nerves - Proportion between brain and head in vertebrates and in mammals - **The human spinal cord -** Position of the spinal cord in the spinal canal, transection - Spinal cord of mammal, t.s. silver stained, photomicrograph - Portion of the spinal cord with roots, ganglia, and branches of spinal nerves, three-dimensional diagram - Simple reflex arc - Tactile corpuscle, spinal cord, motor end plate on muscle fiber - Polio: syndrome of the ventral gray matter - Tabes, tertiary syphilis: syndrome of the dorsal white matter - Sclerosis of the pyramidal tracts - Complete section of the spinal cord: Paraplegia - **The human brain and the transmission of information -** The human brain, lateral view - Sagittal section of the human brain, view on the right half showing cut surfaces - Frontal section of human brain - The hierarchic structure of the brain, archipallium and neopallium - Electrotonic or resting potential and action potential - Receptors receive various types of sensory input and transduce them into action potentials of equal magnitude - Intensity of stimulus is reported by impulse frequency - Propagation of action potential along unmyelinated axon - Fine structure of a Ranvier's node (after Krstic) - Nerve cell body from the cerebrum with dendrites, axon, and synapses - Exciting and inhibiting synapses, their location and structure - Synapsis, spatial picture - Synaptic transmission, diagram - Brain stem, ventral and dorsal view - The blood supply of the brain, ventral and lateral view - Lesion caused by diving accident - Lesion caused by hemorrhage (stroke) - Cerebral cortex, t.s. silver stained to show the pyramidal cells and their connections - The lobes and areas of the left cerebral hemisphere - Areas and tracts of the cerebrum, diagram - Views of the cerebellum from various sides, and sagittal section - Fine structure of the cerebellar cortex, neuronal connections, diagram - Tracts connecting the cerebrum with the cerebellum - **The autonomic nervous system -** Effect of atropine on one eye, both eyes exposed to equal incidence of light - Innervation of the iris muscles. Antagonism of sympathetic and parasympathetic nervous system - Antagonistic effect of the sympathetic and parasympathetic system on glands and involuntary muscle - The location of the spinal cord, spinal nerves, sympathetic trunk, and sympathetic ganglion II - Transmitter and inhibiting substances of synapses and motor end plates in the somatic, sympathetic, and parasympathetic nervous system - Typical courses of sensory and motor tracts of the autonomic nervous system - Regulation of the body temperature - Location of the receptors and controlling centers in the body, negative feedback system

## No. 8203E **Anatomy and Physiology of the Human Body. Volume III**

NEW!

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- *Sketch and work-sheets with semidiagrammatic designs and texts. Teacher may take photocopies from the sheets and use for classroom work and tests.*
- *Manual with depictured explanatory comments for the teacher. All in strong plastic file with ring-mechanism.*

**Eye and vision -** Range of visible light in the electromagnetic spectrum - The human eye. Eyeball, eye muscles, eyelid, sagittal section - Human retina, t.s. detail view. Rods, cones, bipolar cells, ganglion cells, photomicrograph - Human retina. Chief synaptic connections, diagram - Retina, t.s. for detail of rods and cones - Orbital muscles of the eyeball - Optic pathways, optic chiasm, diagram - Retina seen through the ophthalmoscope. Central fovea, optic disc - Formation of an image in a normal eye - The eye as a camera - Accommodation for distant and near vision - Pupillary light reflex - Image produced by "normal" and astigmatic glasses - Eye with pathological turbidity of the lens (cataract) - Defects of vision: short-sighted and far-sighted eye - Image produced by an astigmatic cornea - Tests for color-blindness. Red-green deficiency and blue weakness - Optical illusions by ambiguous information - Optical illusions caused by the influence of the surrounding areas - Optical illusions caused by non-conformity of rational interpretation and optical perception - Trichromatic triangle. Different combinations of three primary colors give all other colors - Spectral sensitivity of rods and cones (dominator system), three pigment color vision (modulator system) - **Ear and auditory mechanism, sense of equilibrium -** The formation of sound waves. Areas of rarefaction and areas of compression caused by a tuning fork. - Anatomy of the human ear. Ear concha, external auditory canal, middle ear, internal ear - Movement of the eardrum, auditory ossicles, oval window and round window - Position of epithelia of the internal ear - Organ of Corti, diagram - Movement of Reissner's membrane and basilar membrane. Stimulation of the hair cells by the hairs in the tectorial membrane - Broadening of the basilar membrane from the base of the cochlea to the helicotrema - Formation of damped waves in the membranous labyrinth - Displacement of the membranous labyrinth by the waves generated by sound vibrations - Amplitude pattern of vibration of the membranous labyrinth for high and low frequencies - Detection of sound direction by the time difference between the entry of sound into the ears - Diagram of main auditory pathways. Acoustic centers in the brain - Function of the vestibular system - **Sensory perception: Smell, taste, touch, perception of temperature and movement -** Section through nasal cavity and pharyngeal cavity - Location of the olfactory mucous membrane and respiratory pathway - Nasal conchae of human and deer. Microsmates, macrosmates - Olfactory and respiratory mucous membrane t.s. - Detail view of olfactory epithelium with sensory cilia - Tongue of rabbit, t.s. of papilla foliata with taste buds - Human skin from palm, v.s. showing cornified epidermis, germinative zone, sweat glands, diagram - Human scalp, vertical section showing l.s. of hair follicles, sebaceous glands, epidermis - Human skin with cutaneous receptors of touch, pressure and thermal sensation - Tactile hair, median l.s. and t.s. - Ruffini's warmth receptor - Krause's corpuscle, cold receptor - Meissner's corpuscle from human finger - Back of human hand marked with warmth and cold spots - Sensitivity differences caused by touch-stimulation: excitation nearby or far away, weak or strong - Proprioceptors: muscle spindle and Golgi tendon apparatus. Conscious awareness of the position and movements of the joints - **Hormones and hormone systems** - The human hormone glands, position, shape, size - The human thyroid gland, situs - Exocrine and endocrine glands, diagram - Thyroid gland, sec. showing glandular epithelium and colloid - Acceleration of tadpole development caused by thyroxin - Effect of thyroxin therapy on a child - Cretinism caused by insufficiency of thyroid gland - Relation between iodine and goiter - The parathyroid glands - Pancreas showing islets of Langerhans - Regulation of blood sugar level by A- and B-cells of the islands of Langerhans - Control of the blood sugar level by insulin and glucagon - Human kidney and adrenal gland - Adrenal gland, t.s. through cortex and medulla - Interstitial cells of Leydig, t.s., high magnification photomicrograph - Corpus luteum, t.s., photomicrograph - Castrated fowl, effect of castration on rooster and hen - Secondary sex characters in humans - Processes during the menstrual cycle - The antibaby pill, hormonal contraception - Relations between endocrine glands, diagram - Location of pituitary gland and pineal body - Thymus of juvenile and adult person

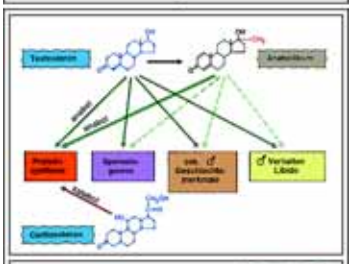
## No. 8211E **The Human Apparatus of Movement**

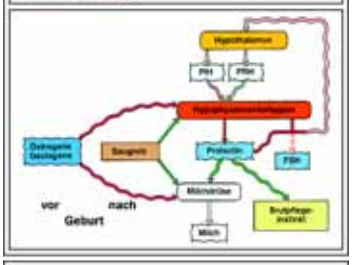
*Atlas of 30 OHP Transparencies size 22 x 28 cm, comprising 66 color pictures, mostly with several component figures (drawings, diagrams, anatomical pictures, photomicrographs and macrographs, X-ray photographs). - Sketch and work-sheets with semidiagrammatic designs and texts - Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. - Compilation and text: Prof. Walter Mergenthaler*

**Connective and supporting tissues. -** Embryonic connective tissue - Areolar connective tissue - White fibrous tissue, l.s. of tendon - Yellow elastic fibrous tissue, l.s. of ligamentum nuchae - Hyaline cartilage of frog - Costal cartilage of man - Yellow elastic cartilage - Fibrocartilage from intervertebral disc - Bone cells and canaliculi - Tibia of man, t.s. showing general structure: fundamental lamellae, Haversian lamellae, interstitial lamellae - Compact bone, t.s. showing systems of lamellae, medium magnification - Long hollow bone, entire epiphysis for general study - Compact bone, l.s. showing Haversian canals - Haversian system, t.s. for finer detail - Structure of bone, schematic figure - Finger of human embryo, l.s. cartilaginous predisposition of finger bones - Finger of human embryo, beginning ossification - Bone development, l.s. details of intracartilaginous ossification - Bone development, t.s. - Osteoblasts, high magnification - Red bone marrow showing megakaryocytes

**The skeleton. -** The skeleton, entire front and entire back view - Division of the skeleton in its functional parts - Joints: hinge joint, ball-and-socket joint - Finger joint, sagittal l.s. low magnification - Vertebral column, cervical and thoracic vertebrae - Lumbar vertebra, sacrum, coccygeal bone - Skull, atlas, axis - Thorax and shoulder girdle, front and back views - Construction of a long bone, 3 schematic figures - Skeleton of the arm showing supination and pronation - The elbow joint, entire view and longitudinal section - The skeleton of the hand - The pelvis, 2 figures, one showing the ligaments - The knee joint, 4 figures: long. section, front view, back view, and menisci - The skeleton of the foot: side view, frontal view, ankle joint - The skull, front view and side view - The skull dissected in its different bones - X-ray photograph of a dislocation (luxation) - X-ray photograph of a bone fracture

**The muscular system. -** The skeletal musculature of man, general view of front side and back side - Structure of the muscle, 4 schematic figures - Striated muscle, electron micrograph - Striated muscle, t.s. showing fascia, connective tissue, muscle bundles and muscle fibers - Striated muscle, l.s. muscle fibers and nuclei - Striated muscle fibers, l.s. showing the striations, high magnification - Striated muscle fibers, t.s. showing the fibrillae, high magnification - Capillary blood vessels in the muscle, injected preparation - The sensory and motor innervation of the muscle (muscle spindles and motor end plates), 4 schematic figures - Motor nerve end plates - Neuromuscular synapses in skeletal muscle, electron micrograph - Motor innervation of muscle, low magnification - Muscle spindle - The muscles of head and neck, front view and side view - The muscles of the trunk, front view - The superficial muscles of the back - The deeper muscles of the back - The muscles of the shoulder (antagonism) - The muscles of the arm - The pronation and supination muscles of the arm - The muscles of the hand, front view and back view - The muscles of the pelvis - The muscles of the leg, front view and side view - Extensor and flexor muscles of the leg - The muscles of the shank and the foot - Example of a complex muscular efficiency.






## No. 8212 E **The Human Organs of Digestion**

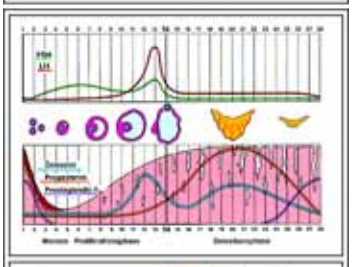
*Atlas of 30 OHP Transparencies size 22 x 28 cm, comprising 77 color pictures, mostly with several component figures (drawings, diagrams, anatomical pictures, photomicro- and macrographs) - Sketch and work-sheets with semidiagrammatic designs and texts - Compilation and text: Prof. W. Mergenthaler*

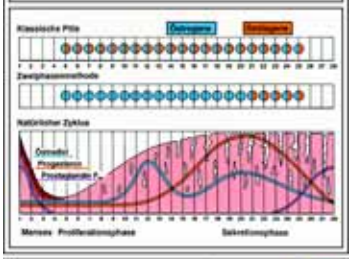
**Mouth, pharynx and stomach. -** Milk teeth and permanent teeth - The different kinds of teeth: incisor tooth, canine tooth, premolar tooth - Gum with milk tooth and permanent tooth, l.s. - Incisor tooth and gum, l.s. - Gum with root of tooth, t.s. - Head of mammalian embryo showing primordia of teeth, frontal section - Tooth development: dental lamina and young dental sac - Older dental sac - Dental sac with primordium of tooth - Primordium of tooth, upper part showing the crown - Primordium of tooth, high magnification shows dentine, enamel, enamal organ, odontoblastic cells - Human tooth, ground thin to show enamel, dentine and pulp - Bacteria of caries in l.s. of diseased human tooth - Bacteria from human mouth, smear - Bacteria from human intestine - Human tongue, section shows muscles and papillae - Tongue of cat, sec. with cornified papillae - Wallate papilla of human tongue with taste buds - Location of the salivary glands in the head - Part of the salivary gland, low magnification - Submaxillary gland, a predominating serous gland - Submaxillary gland, high magnification showing detail of acini - The structure of a salivary gland, schematic figure - Sublingual gland, a predominating mucous gland - Parotid gland, a pure serous gland - Esophagus of man, t.s. low magnification - Esophagus of man, t.s. medium magnification shows muscular layers and mucous membrane - Stomach of man, sagittal l.s. shows cardiac, fundic and pyloric region - Stomach, l.s. medium magnification shows muscular layers and mucous membrane - Mucous membrane of stomach, t.s. - Mucous membrane of stomach, t.s. high magnification - shows detailed structures of gastric glands

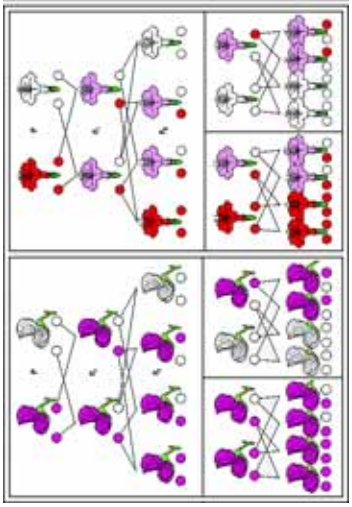
**Intestine. -** Location of the abdominal viscera of man - Small intestine of newborn child, t.s. entire view and detail view with suspensory ligamentum - Duodenum of man, l.s. showing intestinal wall, folds, and villi - Duodenum, l.s. of a fold with Brunner's glands - Duodenum, l.s. showing villi, crypts, and glands - Jejunum of man, l.s. showing intestinal wall, folds, and villi - Jejunum, l.s. of intestinal villi medium magnification - Epithelium of intestine with mucous cells - Intestinal loop with injected blood vessels - Small intestine of cat, t.s. injected to show the blood vessels - Intestinal villi injected to show the blood vessels, surface view - Detailed structure of an intestinal villus, 3 schematic figures - Large intestine (colon) of man, l.s. - Tubular glands of colon, l.s. - Tubular glands of colon, t.s.

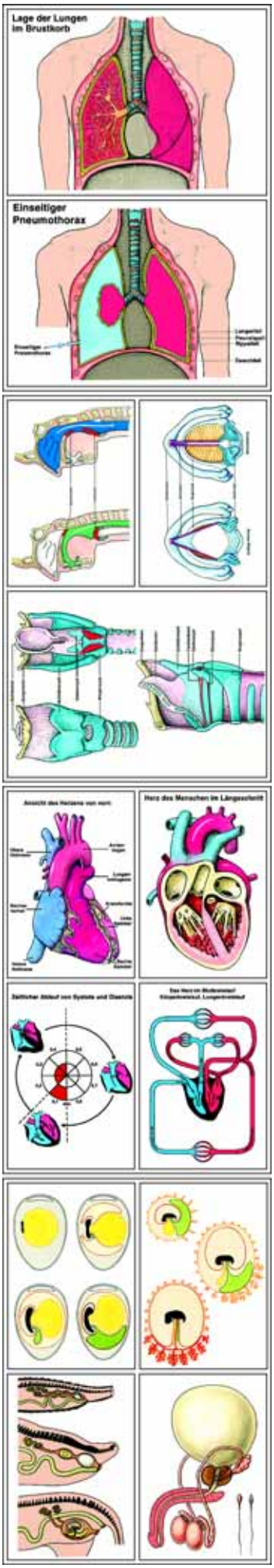
**Liver and pancreas. -** Liver and pancreas, general view - Liver of pig, t.s. shows liver lobules, low magnification - Liver lobule, schematic figure to show the glandular structure of the liver - Trabecula of liver cells, 2 schematic figures - Liver lobule, schematic figures to show the construction and the vascular systems - Capillary vessels of liver, central veins and collecting vein, schematic figure - The venous vascular system of the liver; portal vein and liver vein, schematic figure - Liver of pig, t.s. medium magnification for finer details - Liver lobule, t.s. showing the structure of the liver cells, high magnification

**The excretory system of man. -** The urinary organs: kidney, ureter, urinary bladder - The kidney, l.s. schematic figure - Kidney of mouse, sag. sec. of complete organ - Kidney of human fetus, entire sagittal l.s., low magnification - The blood vessels of kidney, schematic figure - Human kidney, l.s. shows cortex, medulla, and pelvis, low magnification - Human kidney, t.s. of cortex, medium magnification - Malpighian corpuscle, showing Bowman's capsule, glomerular loop of afferent and efferent arteries, convoluted tubules - Cortex of kidney, l.s. with injected blood vessels - Medulla of kidney, l.s. with renal tubules and collecting tubes - Kidney, injected with trypane blue to demonstrate storage in the convoluted tubules - Nephron and glomerulus, 2 schematic figures - Ureter, t.s. - Urinary bladder, t.s. of the wall










## No. 8213 E **The Human Respiratory and Circulatory Systems**

*Atlas of 42 OHP Transparencies size 22 x 28 cm, comprising approx. 110 color pictures, mostly with several component figures (drawings, diagrams, tables, graphs, anatomical pictures, photomicrographs and macrographs, human photographs, electron micrographs, X-ray photographs). - Sketch and work-sheets with semidiagrammatic designs and texts - Compilation and text: OStR Michael Duenckmann*

**The respiratory system of man. -** The human respiratory organs, general view - Longitudinal section through head and neck. Air passages marked - Frontal section through the facial part of the skull showing the nasal cavity with its sinuses - Frontal section through the nasal septum and the hard palate - Diagram of the processes of swallowing and breathing - Frontal and dorsal view and longitudinal section of the larynx - Functions of the arytenoid cartilage and the shape of the glottis in various voices. - Human trachea, l.s. - Ciliated epithelium of the trachea - Structure of ciliated epithelial cells, electron micrograph - Position of the lungs in the thorax - Inner lining of the thorax. Visceral pleura, parietal pleura, pleural gap, pneumothorax of one lung - X-ray of human thorax, inspirated and expirated - Longitudinal section through thorax, inspirated and expirated position - Intercostal muscles during in- and expiration - Structure of the lungs, two steps of enlargement - Human lung, t.s. low magnification for general view - Human lung, t.s. showing bronchioles and alveoli - Lung of cat. Blood vessels injected - Alveolar septum, electron micrograph - Lung of cat, t.s. stained for elastic fibers - Comparison of inspired and expired air, diagram - Diagram of gaseous exchange in the pulmonary alveoli - Volume of air respirated, diagram - Connection between work and respiration per minute - Lung of salamander, t.s. - Lung of frog, t.s. - Lung of lizard, t.s. - Enlargement of pulmonary respiratory surface of various vertebrates - Influence of varying composition of the air on respiratory frequency - Frequency of nervous impulses due to $O_2$- and C $O_2$-contents in the blood - Regulation of respiration - Feedback system explaining the regulation of respiration - Miliary tuberculosis of human lung - Deposition of dust in human lung - Dust concentration depending on the number of inhabitants in towns - Absorption of carbon monoxide and oxygen by hemoglobin - The London smog catastrophe of December 1952. Smoke and sulphur dioxide-content of the air

**The circulatory system of man: blood and lymphatic organs. -** Cylinders with precipitated structural components and clotted blood - Composition of the blood. Precipitated and coagulated blood - Human blood smear, low magnification - Human blood smear, high magnification. Erythrocytes and various forms of leucocytes - Shape and size of an erythrocyte - Relation between partial pressure of oxygen and oxygen-saturated hemoglobin - Red bone marrow of mammal. Giant cells, blood forming cells - Mature erythrocyte and erythroblast, electron micrograph - Blood smears of frog and chicken. Nucleated red blood corpuscles - Various types of leucocytes. Granulocytes, lymphocytes, monocytes - Blood smear from leukemic person compared with normal blood smear - The steps of blood clotting - Electophoresis of protein fractions in human blood - Human leucocytes with phagocyted bacteria - Leucocyte, moving through the capillary wall - Structure of antibodies with antigen binding sites - Serum reactions to show hereditary relationship - The AB0 blood groups - Positive and negative reactions in determination of AB0-blood group - Diagram to understand agglutination of the AB0-blood groups - Diagram to understand Rh-incompatibility in second and further child - The human lymphatic system with lymph nodes - Exchange of substances between blood capillaries, tissue, and lymph capillaries - Human lymph node, t.s. - Follicle in human lymph node, t.s. - Structure of a lymph node with afferent and efferent blood and lymph vessels. Diagram - The human immune system - Development of lymphocytes. Memory cells, plasma cells - Fine structure of a plasma cell of bone marrow, electron micrograph - Human spleen t.s. Red and white pulp, capsule, trabeculae - The vascular system of the human spleen - Fine structure of a splenic sinus, electron micrograph - Human palatine tonsil, t.s. - Thymus gland of young cat, t.s. Hassall's corpuscles - Human pharyngeal tonsil, t.s. epithelium interspersed with lymphocytes

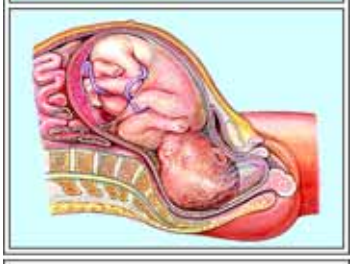
**The circulatory system of man: heart and blood vessels. -** Position of the heart in the body - Front view of the heart and big vessels - Human heart, semidiagrammatic longitudinal section - View of the cardiac valvular plane. Arterioventricular and semilunar valves - Transverse section of the two cardiac ventricles. Endocardium, myocardium, epicardium - Structure of the cardiac muscle. Interlacing network of fibers, intercalated discs, striation, nuclei - Activity of the heart, papillary muscles, shift of the valvular plane, opening and closing of cusps - Cardiac cycle. Diagram - Cycle of pressure and volume of the left ventricle. Blood pressure in the aorta, cardiac sounds - The human circulatory system. Heart, pulmonary and systemic loop - Stimulation and coordination of the heart - Human electrocardiogram - Diagram of human blood circulation. Big vessels and capillary networks - Catchment areas of the hepatic portal vein. Stomach, small and large intestine, pancreas, spleen - Blood share of the different organs - The heart in the circulatory system of vertebrates. Fishes, amphibians, reptiles, birds, mammals - Human artery and vein, t.s. - Artery of muscular type, t.s. - Artery of the elastic type, t.s. - Carotid artery, t.s. showing the elastic elements - Bagpipe function of the aorta. Diagram - Arrangement for taking the human blood pressure - Diagram to explain the pulse during reduction of pressure in the bag - Blood capillaries in the mesenteries - Ultrastructure of the capillary wall, electron micrograph - Interchange of substances between capillary and tissue - Pressure and volume in human circulation. Diagram - Human vein, t.s. - Transport of blood in the veins by pulse waves of neighboring artery and by contraction of neighboring muscles - Position of the main baroreceptors for regulation of the blood pressure - Analysis of manipulated blood pressure. Diagram - Regulation of arterial blood pressure. Negative feedback system

## No. 8217E **Reproduction and Germ Development of Human and Animals**

*Atlas of 30 OHP Transparencies size 22 x 28 cm, comprising 104 color pictures, mostly with several component figures (drawings, diagrams, tables, anatomical pictures, photomicrographs and macrographs, human photographs). In strong plastic file with ring-mechanism. - Sketch and work-sheets with semidiagrammatic designs and texts - Compilation and text: Prof. Walter Mergenthaler and Dipl. Biol. Christine Himmelein*

**Reproduction of man and animals. -** A series illustrating reproduction from protozoa to man. It will therefore not only be an invaluable aids in biology classes but equally valuable for teaching sex instruction. The beautiful anatomical picture plates have been made by university illustrators specializing in this field. - Asexual reproduction (division) of Amoeba - Asexual reproduction (budding) of Hydra - Sexual reproduction of Hydra - Reproduction of the sea urchin (Echinus) - Fertilization of the sea urchin egg - Reproduction in fishes - Reproduction in salamanders - The female reproductive organs of reptiles, birds, and mammals - The reproductive organs of the human male; lateral view of situs - Ditto; diagram - Testis, t.s., low magnification - Seminiferous tubules showing spermatogenesis; t.s. - Testis, epididymis, spermatogenesis; diagrams - Sperm smear of bull - Human hair, egg, and spermatozoa; comparison of sizes - The reproductive organs of the human female; lateral view of situs - Ditto; front view of situs - Ovary; t.s., low magnification - Egg development: primary follicle - Egg development: secondary follicle - Egg development: early stage of Graafian follicle - Egg development: mature Graafian follicle with germ hillock and egg cell - Egg development: mature ovulated egg with corona radiata - Corpus luteum - Human fallopian tube t.s. - Ciliated epithelium of the Fallopian tube; t.s., high magnification - The yolk sac and the embryonic development of fishes - The embryonic membranes of chicken - The embryonic membranes of mammals and humans - Wall of human uterus, t.s. - Changes of the endometrium during menstrual cycle and after fertilization - Oogenesis, ovulation, fertilization, cleavage of fertilized egg, and implantation of blastocyst in the uterine wall - Growth of embryo and fetus in the uterus, 4 stages - Structure and function of the

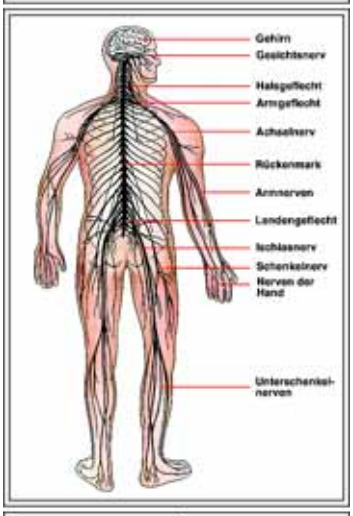
placenta, diagram - Fetus in uterus showing placenta, umbilical cord, and amniotic cavity - Full term baby in maternal abdomen, normal cephalic presentation - Beginning of birth, entrance of amniotic sac into the birth canal
**Germ development of man and animals. -** Starting with the fertilization of the egg and the fusion of the two haploid nuclei, the various types of egg and corresponding types of cleavage are shown. The gastrulation, neurulation and formation of germ layers in Branchiostoma, frog and human beings are then illustrated. - Fertilization of the Ascaris egg, entering of a sperm *I. The beginning of embryonic development - fertilization* - Fertilization of Ascaris egg, entrance of spermatozoon in the oocyte - Mature oocyte of Ascaris with male and female pronuclei, each nucleus contains two chromosomes. - *II. Cleavage* - Metaphase of the first cleavage of Ascaris, equatorial plate in side view shows chromosomes, spindle fibers, centrioles - Telophase of the first cleavage of Ascaris, division of the cell body - Total equal cleavage: 2-, 4-, 8-cell stage, morula - Types of eggs and patterns of cleavage I: as far as the 8-cell stage - Types of eggs and patterns of cleavage II: morula and blastula - Blastula of sea urchin (Echinus), after total equal cleavage - Blastula of frog (Rana), after total unequal cleavage - Insect, blastula after superficial cleavage - *III. Gastrulation* - Gastrulation of sea urchin, Echinus, diagram - Gastrula of sea urchin, Echinus, photomicrograph - *IV. Neurulation - Organogenesis in frog and chicken* - Neurulation in Amphioxus, t.s. diagram - Neurulation in frog, antero-lateral and dorsal view, diagram - Neurulation in frog, t.s. - Neurula of frog, t.s. - Neurula of frog, mid-dorsal region, t.s., detail - Neurula of chicken, t.s. - Chicken embryo 33 hours of incubation, l.s. - Frog embryo, tail bud stage, l.s. - Frog embryo, tail bud stage, t.s. - Frog larva, 3 days after hatching, l.s. - Frog larva after hatching, t.s. - Frog larva, t.s. of heart region - Chicken embryo, 48-hours, t.s. - Chicken embryo, 72-hours, l.s. - Chicken embryo, 72-hours chick, embryonic disc with circular system injected - Chicken, older embryo, l.s. - *V. Organogenesis in humans, Summary* - Median l.s. through a human embryo - Development of the human heart, t.s. of three stages - External changes in the human heart, ventral view - Development of human lungs, t.s. of 6 weeks old embryo - Stages of human pulmonary development - Development of the human eyes, four stages - Head of mammalian embryo, sagittal section showing eyes - Mammalian embryo, median sagittal section of whole body with primordia of organs

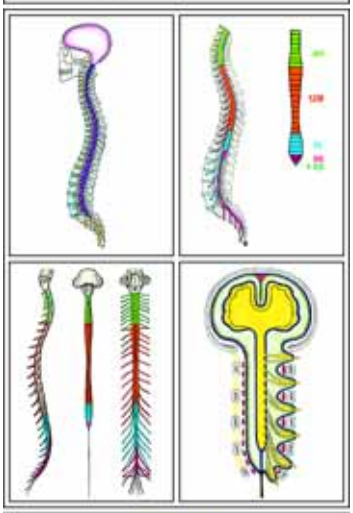


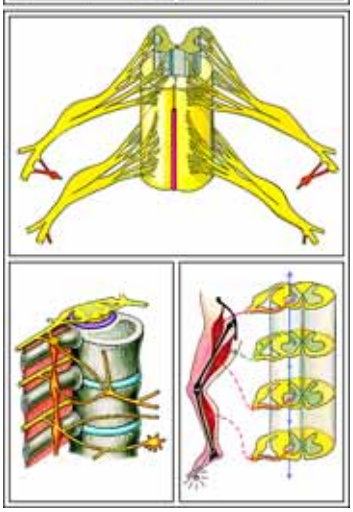
## No. 8214 E **The Nervous System Part I**

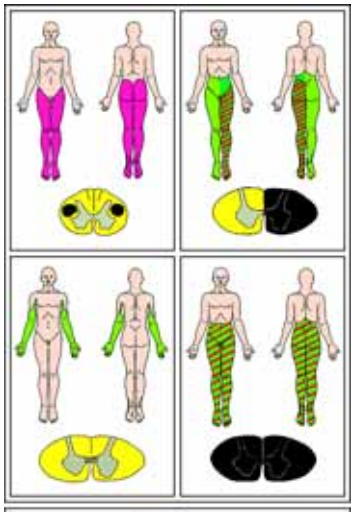
*Atlas of 30 OHP Transparencies size 22 x 28 cm, comprising 76 color pictures, mostly with several component figures (drawings, diagrams, tables, graphs, anatomical pictures, photomicro- and macrographs, electron micrographs). In strong plastic file with ring-mechanism. - Sketch and work-sheets with semidiagrammatic designs and texts - Compilation and text: Dr. K.-H. Meyer, BS)*

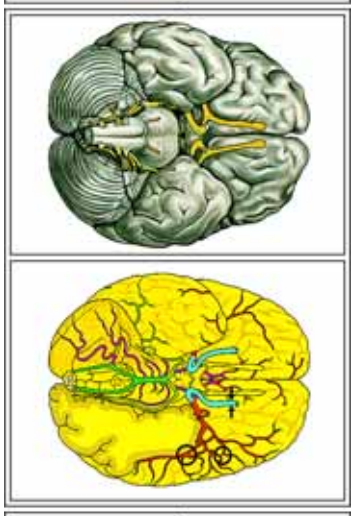
**The nervous tissue. Introduction to the total complex of the nervous system. -** Introduction to the total complex nervous system. It shows the occurrence of typical nerve cells in the human nervous system, the structure of the neuron, the composition of a nerve, motor end plates, glia cells etc. - Human nervous system, entire view - Sagittal section of human cerebellum - Spinal ganglion, t.s. - Spinal cord of cat, t.s. silver stained - Gray matter of spinal cord, t.s. showing nerve cell bodies - White matter of spinal cord, t.s. showing nerve fibers - Motor nerve cell from spinal cord. - Purkinje cells from human cerebellum - Pyramidal cells from cortex of human cerebrum - Pseudounipolar neuron (T-cell) from spinal ganglion - Bipolar neurons in the retina of the eye, diagram - Various shapes of human neurons, 5 figures - Nerve cell showing neurofibrils - Nissl substance in neurons from the spinal ganglion - Diagram of a neuron - Various neurons from human nervous system, 4 figures - Human sciatic nerve, t.s., low magnification - Bundle from sciatic nerve, t.s., medium magnification - Nerve fibers, t.s., high magnification, axons and medullary sheaths - Nerve fibers, l.s. high magnification shows the Ranvier's nodes - Structure of myelinated nerve fiber, diagram, 2 figures - Neuromuscular junction, motor end plate - Motor end plates, diagram, 2 figures - Glial cells from brain
**The nervous systems of the invertebrates. -** The study of the evolution of the nervous system beginning with primitive animals is necessary for a more profound understanding of the human nervous system. The series shows the net-like nervous system of the coelenterates, the rope-ladder-like systems of the arthropods, and the nervous systems of mollusks and echinoderms; progressive concentration and differentiation; structural elements as neuron, ganglion, centers, reflex-arcs, automatisms, etc. - Reactions of single cells to stimuli: pore-cell of a sponge, nematocysts - The nervous system of Hydra - Reaction of Hydra to stimuli. Type of reaction depending upon strength of stimulus - The nervous system of a jellyfish (Scyphozoa) - The nervous system of Planaria (Platyhelminthes) - The nervous system of a roundworm (Nematoda) - The evolution of the nervous system in worms - The nervous system of the earthworm - Reflex arcs in the earth worm. Corresponding nervous connections between sensory and muscular cells - Reactions of the earthworm to stimuli - The nervous system of insects - Concentration of ganglia in insects - Development of the nervous system of a beetle, larval instars, pupa, and beetle - Brain of a worker honey-bee, structure. Forebrain with optic lobes, mid- and hindbrain - Frontal section of an insect brain, diagram - Longitudinal section through the head of a locust - Head of a worker honey-bee, t.s. Midbrain, optic lobes, compound eyes - Unisegmental reflex arcs in insects. Connections of sensory and motor cells - Intersegmental reflexes in insects. Connections between sensory and motor cells and brain centers - Antenna cleaning reflex of the cricket. Complex reflex action involving a chain of linked reflexes - The nervous system in arthropods: lobster, crab, spider, scorpion - The nervous system of Chiton. Nervous ring surrounding esophagus - The nervous system of a freshwater mussel. Cerebral, pedal and visceral ganglion - The nervous system of a freshwater snail, lateral view. Concentration of the ganglia towards the head - The nervous system of a freshwater snail, dorsal view - The nervous system of a terrestrial snail (Helix pomatia). Advanced concentration of the ganglia in the head. - The nervous system of a cuttlefish - The brain of the cuttlefish. Consisting of three pairs of ganglia - The nervous system of a starfish - General structure of echinoderms (starfish, sea urchin, sea cucumber)
**The nervous system of the vertebrates. -** The central idea of the series is the evolution of the nervous system from primitive forms to complicated ones. It shows the progressive differentiation of the brain, the construction of its parts in the different classes of vertebrates and their relation to each other. The purpose of the series is to render the human nervous system more understandable. - The nervous system of Branchiostoma (Amphioxus), frog, and human - Embryonic development of the central nervous system of Branchiostoma (Amphioxus) - Ditto. of frog, from the side and from above. Closing of neural groove to neural tube - Ditto. of frog, corresponding transverse sections - Ditto. in humans - Development of the neural tube in humans - Development of the neural tube into the brain, frontal sections - Mammalian embryo. Formation of the central nervous system and other organs - The spinal cord of Branchiostoma, lamprey, and bony fish; t.s. showing differentiation of grey and white matter - Spinal cord of a salamander larva, t.s. with notochord - Spinal cord of a cow, t.s. - Comparison of the masses of brain and spinal cord in Branchiostoma, frog, rabbit, cat, ape, human - Brains of vertebrates (shark, bony fish, amphibian, reptile, bird, mammal), dorsal view - Brains of vertebrates, corresponding sagittal sections. Increase of the size of the forebrain, variation of the cerebellum depending upon the mobility of the animal - Shift of the optic pathways to the endbrain. Development of the thalamus into a relay station - Formation of the neopallium from concentric growth rings - Pattern of mammalian cerebral convolutions, phylogenetic tree - Cranial nerves of frog and sheep, ventral view - Human brain, ventral view with cranial nerves - Innervation of body regions by sensory and motor cranial nerves - Proportion between brain and head in vertebrates. Increase of relative size of the brain from shark to frog, reptile, bird, cat - Proportion between brain and head in mammals. Ditto dog, chimpanzee, man

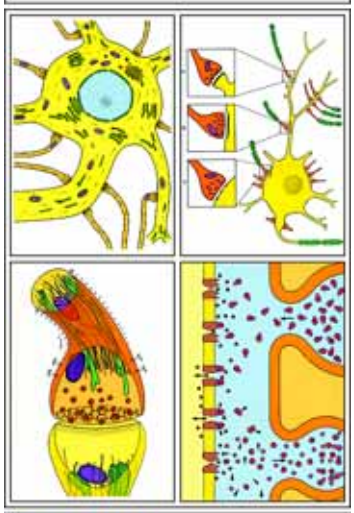


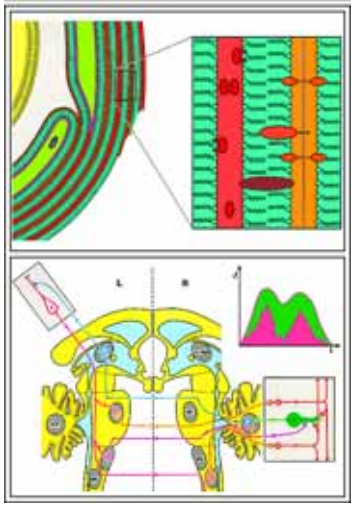













## No. 8215 E **The Nervous System Part II**

*Atlas of 36 OHP Transparencies size 22 x 28 cm, comprising 82 color pictures, mostly with several component figures (drawings, diagrams, tables, graphs, anatomical pictures, photomicro- and macrographs, electron micrographs). - Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. - Compilation and text: Dr. K.-H. Meyer, BS*

**The human spinal cord. -** The study of development, general and microscopic structure of the spinal cord forms the basis on which the function of the grey and the white matter can be worked out by analyzing reflexes and diseases of man - The human nervous system. Central, peripheral, and autonomic nervous system - Embryonic development of the spinal cord in frog and human - *A. External structure of the spinal cord* - Human vertebra. Superior view, left, lateral view of three vertebrae with intervertebral discs, right. - Human central nervous system, lateral view. Position of the dura sac in the spinal canal - Human spinal cord in the spinal canal, lateral view. Opened dural sac, surface view with segments. - Human spinal cord and medulla oblongata. Lateral and dorsal view with spinal nerves, ventral view without nerves. - The membranes of the brain and the spinal cord, diagram - Position of the spinal cord in the spinal canal, t.s. - *B. Internal structure of the spinal cord* - Spinal cord of cow, t.s. - The gray matter, motor neuron, dendrites, axon - The white matter, myelinated axons - Evolution of the spinal cord. Branchiostoma, lamprey, bony fish - Proportion of gray to white matter. A series of t.s. of human spinal cord - Entrance of dorsal root of spinal nerve into the dorsal column - Spinal ganglion, l.s. - Portion of the spinal cord with roots, ganglia, and spinal nerves, three-dimensional diagram - *C. Function of the spinal cord* - Simple reflex arc, diagram. Tactile corpuscle - spinal cord - motor end plate on muscle fiber - Knee jerk reflex. Stimulated organ responds - Stepping on a nail. Not stimulated organ responds - Somatic dermatomes supplied by segments of the spinal cord - Polio: syndrome of the ventral gray matter - Tabes, tertiary syphilis: syndrome of the dorsal white matter - Sclerosis of the pyramidal tracts - Hemisection of the spinal cord - Where do the tracts of somatic sensibility cross? - Complete section of the spinal cord - Course of typical sensory tracts: conscious and unconscious deep pressure sensibility, conscious dermal sensibility - Course of typical motor tracts: volitional and involuntary control of movement

**The human brain. An introduction to the reception, conduction and transmission of information. -** Starting from the external structure, the embryonic development of the brain is treated and its hierarchic structure. As the brain is a connecting and conducting organ, reception, conduction, and transmission of information is treated in a separate chapter. As controlling organ of our body, the brain is its biggest consumer of energy. To introduce into the structure and function of the brain parts, similar to series „The Human Spinal Cord“, we shall start from lesions of the medulla oblongata and then follow the course of the typical sensory and motor tracts introduced in the last chapter through the medulla oblongata, pons, mid- and interbrain, to the cortex and cerebellum. - *A. External structure of the brain* - The human brain, lateral view - Sagittal section of the human brain, view on the right half - Frontal section of human brain - Visual and hidden part of the cerebral surface - *B. Development of the brain* - Hierarchic structure of the human brain, embryonic development - The hierarchic structure of the brain, archipallium and neopallium, sagittal section - *C. Reception, conduction, and transmission of information* - Electrotonic or resting and action potential - Receptors receive various types of sensory input and transduce them into action potentials of equal magnitude - Intensity of stimulus is reported by impulse frequency - Propagation of action potential along unmyelinated axon - The myelin sheath of peripheral nerve fibers (Schwann cells) - Fine structure of a Ranvier's node - Composition of myelin compared with liver cell membrane - The myelin sheath in the brain, after Krstic - Fine structure of the myelin sheath - Nerve cell body from the cerebrum with dendrites, axon, and synapses. Diagram - Exciting and inhibiting synapses, location and structure - Synapsis, spatial picture - Synaptic transmission, diagram - *D. Blood supply of the brain* - The blood supply of the brain, ventral view - The blood supply of the brain, lateral view - Meninges and glia, spatial diagram (after Krstic) - The blood-brain-barrier - The drainage of the brain - The reflections of the dura mater - The ventricles (liquor spaces) of the brain - *E. Structure and function of the brain parts - 1. The brain stem* - Brain stem, ventral and dorsal view - *a. Medulla oblongata* - Lesion caused by diving accident - Lesion caused by hemorrhage (stroke) - The course of sensory tracts through the medulla - The course of motor tracts through the medulla - *b. Pons* - The course of sensory tracts through the pons - The course of motor tracts through the pons. - *c. Midbrain and interbrain* - The course of sensory tracts through the mid- and interbrain - The course of motor tracts through the mid- and interbrain - *2. Cerebrum* - Pyramidal cells of the cerebral cortex - Areas and tracts of the cerebrum, diagram - The lobes and areas of the left cerebral hemisphere - Sensomotor homunculus - Severed corpus callosum: differing functions in cerebral hemispheres - *3. Cerebellum* - Views of the cerebellum from various sides - Purkinje cells of cerebellar cortex - Fine structure of the cerebellar cortex, neuronal connections - The most important neuronal arcs of the cerebellar cortex - Tracts connecting the cerebrum with the cerebellum

**The autonomic nervous system. -** Starting from the simple pupillary reflex and from emptying the urinary bladder by reflex action, this series introduces into the autonomic nervous system. It widens the knowledge about the antagonistic effect of the sympathetic and parasympathetic part of the autonomic nervous system (ANS). The structural and physiological differences between the somatic and autonomic nervous system are studied as well as the connections between the sympathetic ganglia and the central nervous system. The reflex arcs linking both systems to each other and regulating the body temperature. - Effect of atropine on one eye, eyes exposed to equal incidence of light - Innervation of the iris muscles. Antagonism of sympathetic and parasympathetic nervous system - Control of urinary bladder. Innervation by somatic and autonomic nervous system. - Antagonistic effect of the sympathetic and parasympathetic system on glands and involuntary muscles - Tracts of somatic and autonomic nervous system - Transmitter and inhibiting substances of synapses and motor end plates in the somatic, sympathetic, and parasympathetic system. - The location of the spinal cord, spinal nerves, sympathetic trunk, and ganglion II - Courses of sensory and motor tracts of the autonomic nervous system through the spinal cord, sympathetic trunk, and ganglion II - Regulation of the body temperature. Location of the receptors and controlling centers in the body, negative feedback system

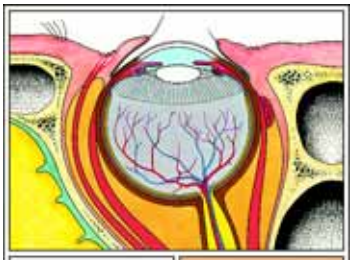
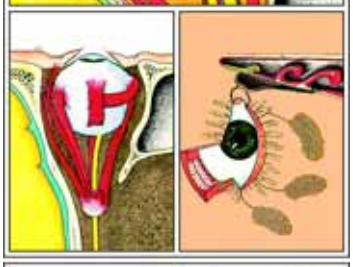
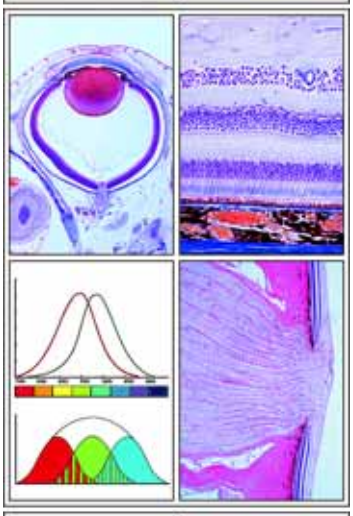
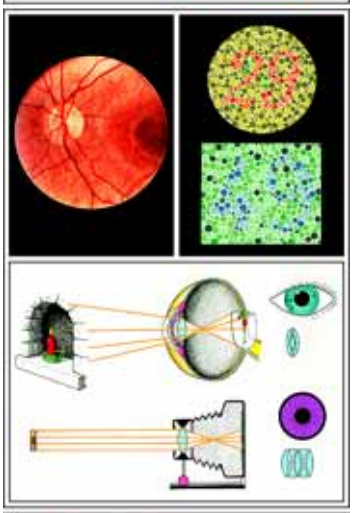
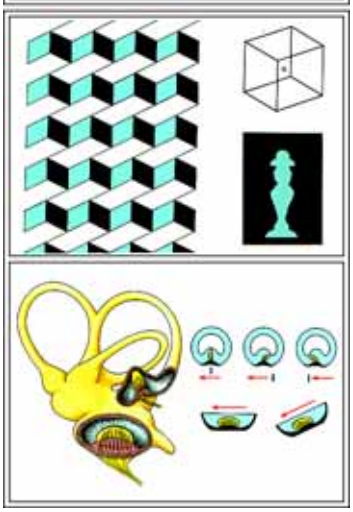
## No. 8218 E **Hormones and Hormone Systems Part I and II**

*Atlas of 42 OHP Transparencies size 22 x 28 cm, comprising 116 color pictures, mostly with several component figures (drawings, diagrams, tables, anatomical pictures, photomicrographs and macrographs, portraits, human photographs, test results). Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. - Compilation and text: Prof. Walter Mergenthaler and Dr. Karl-Heinrich Meyer, BS*

**Part I:** Giving the basic insights in the nature and function of hormones, and shows the collaboration of hormones as well as their relation to the autonomic nervous system. - Effect of thyroxin therapy on a child, 2 figures - Effect of thyroxin therapy on a child - The human thyroid gland, situs - Exocrine and endocrine glands, diagrams - The human hormone glands, position, shape, size - Human thyroid gland, t.s. - Effect of thyroxin on Ambystoma: Development from aquatic to terrestrial form - Acceleration of tadpole development caused by thyroxin - Inhibition of growth of rabbits caused by thyroxin deficiency - Myxedema before and after thyroxin treatment - Cretinism caused by insufficiency of thyroid gland - Cretin with goiter - Endemic cretinism - Relation between iodine and goiter - Control of goiter by treatment with iodides - Basedow's or Graves' disease - The parathyroid glands, situs - The pancreas, situs - Islands of Langerhans, t.s. - Control of the blood sugar level by insulin and glucagon - Kidney and adrenal gland, sagittal l. s. - Kidneys and adrenal glands of a rabbit, situs - Human kidney and adrenal gland, entire view and section - Adrenal gland, t.s. - The control of blood sugar level by adrenalin - Child with „moonface“ due to cortical tumor - Bull and ox,

effect of castration - Castrated fowl, effect of castration on rooster and hen - Castrated rooster before and after treatment with sex hormone - Testis of mammal, t.s., showing details - Interstitial cells of Leydig, t.s. - Human ovary, diagram - Ovary with follicles in different stages, t.s. - Corpus luteum, t.s. - Effect of follicle hormone on growth of uterus - Location of pituitary gland and pineal body, sagittal l.s. of head - Human pituitary gland, l.s. showing the anterior and posterior lobe - Human pituitary gland, t.s. of anterior lobe, high magnification - Inhibition of growth of a dog caused by pituitary removal - Pituitary dwarfism in humans caused by hormone deficiency - Gigantism in humans caused by pituitary overactivity - Acromegaly of human - Adiposogenital dystrophy (Froehlich's syndrome) - Gonadotropic pituitary effects on ovary - Relations between endocrine glands - Thymus of juvenile and adult person - Thymus with Hassall's bodies, t.s. - Delayed development of tadpoles caused by feeding thymus - Comparison of feeding thyroid with feeding thymus

**Part II:** It demonstrates the development of hormone glands, the interaction of releasing and gonadotropic hormone as well as the feedback control of the peripheral hormones. Influence on the gene activity and protein synthesis, neurosecretion, second messenger and cascade mechanism. Dovetailed operation of different hormones, inhibiting and stimulating factors, animal production, anabolica, hormonal contraception, insect hormones and auxines. - Feedback on thyroid hormones, loop scheme - Feedback on thyroid hormones, hierarchic scheme - General diagram of feedback circuit - Feedback circuit for blood thyroxin level - Neurosecretory cells in hypothalamus produce thyrotropin-releasing hormone (TRH) - Hypothalamus and pituitary gland l.s. - Hypothalamus and pituitary gland with neurosecretory cells and vessels for TRH and TSH - Development of pituitary gland and primordium of thyroid gland - Thyroid follicles (three-dimensional) and functional states - Effect of TSH on thyroid gland - Biosynthesis, storage, transportation, and effect of thyroxin - Effect of inhibitors on secretion of thyroid gland - Blood calcium level and release of parathormone resp. calcitonin - Regulation of the blood calcium level, scheme - Synthesis of human insulin - Island of Langerhans, three-dimensional picture - Regulation of blood sugar level by A- and B-cells of the islands of Langerhans - Homeostatic regulating mechanism of the blood glucose level - Phylogenetic and embryonic development of the adrenal gland - The function of the adrenal medulla based on its origin from the sympathetic nervous system. - Biosynthesis of adrenaline, a beta-receptor blocker - Effect of noradrenalin and adrenaline on heart and vascular muscles - Second messenger and cascade mechanism at glycogenolysis - Catecholamines give special efficiency to the body in case of emergency - Daily stress and lack of exercise may cause angina pectoris and cardiac infarction - Structure and nomenclature of cortical hormones - Effects of the renal hormone renine and of the mineral corticosteroid aldosterone - The feedback mechanism on the secretion of aldosterone (hierarchic and loop scheme) - The feedback mechanism on the secretion of corticosterone (hierarchic scheme) - The feedback mechanism on the production of corticosterone (loop scheme) - Corticosterone affects gene activity - Effects of corticosterone - Increasing population density inhibits reproduction - Stress and animal breeding - The effect of nicotine and caffeine on the endocrine system - Adrenal androgens, relation between adreno-cortical and sexual hormones - Development of the gonads - Leydig's cells and Sertoli's cells - Control of the secretory action of male gonads (hierarchic scheme) - Secondary sex characters in humans - Recessive hereditary receptor defect causes female phenotype - The effect of anabolica - Control of ovarian functions (hierarchic scheme) - Processes during the menstrual cycle - Pregnancy: hormonal control by the blastocyst - Pregnancy: hormonal control by the placenta - The antibaby pill - hormonal contraception - Stimulation and maintenance of milk production - Long bones with epiphyseal line - Growth in length of a long bone - Hormonal control of growth (hierarchic scheme) - Hormone release in the posterior pituitary - Structure and effect of oxytocin - Effects of vasopressin (antidiuretic hormone) - Hormone production in head and thorax of an insect - Juvenile hormone (neotenin) and moulting hormone (ecdysone) - The cooperation of hormones during moulting (hierarchic scheme) - Moulting hormone ecdysone influences pattern of puffs - Quantitative analysis of hormones by bonding to proteins - Gibberellines promote growth - Germinating grain, drawing - Germinating grain, photograph - Growth of animal and plant cells - The coleoptile tip produces somatotropic hormone indolacetic acid - Polar movement of auxin in the coleoptile tip - Positive phototropism of coleoptile tip - Lateral illumination causes redistribution of auxin in the coleoptile tip - Action spectrum of phototropism and absorption spectrum indicate a flavoprotein to function as photoreceptor

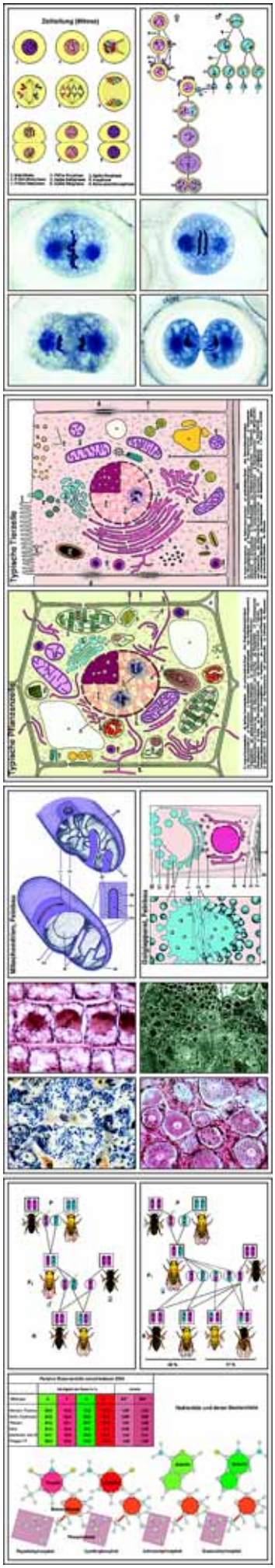






## No. 8216 E **The Organs of Sense**

*Atlas of 36 OHP Transparencies size 22 x 28 cm, comprising 90 color pictures, mostly with several component figures (drawings, diagrams, tables, graphs, anatomical pictures, photomicrographs and macrographs, electron micrographs, human photographs). Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. - Compilation and text: Dr. Bernd Zucht*

**Eye and vision. -** Range of visible light in the electromagnetic spectrum - Sagittal section through the human eye. Cornea, iris, lens, ciliary body, retina with entrance of optic nerve, muscles - Cornea of the human eye, t.s. detail view with epithelium and connective tissue - Wall of the human eye ball, t.s. detail view. Retina, choroid, and sclera - Human retina, detail view. Rods and cones, bipolar cells, ganglion cells - Human retina. Chief synaptic connections, schematic figure - Retina, detail view of the rods l.s. - Central fovea of retina - Papilla of optic nerve - Retina seen through the ophthalmoscope - Developing eyes of young and elder mammalian embryos, sections - Ocular muscles that moves the eyeball - Front view of the eye with lachrymal glands and lachrymal duct - Visual pathways, optic chiasm, schematic figure - Accommodation for distant and near vision - Mechanism of pupillary light reflex - Vision of moving objects. Depth perception, caused by convergence of the optical axes, identical and disparate points of the retina - Vision of motion explained by the principles of reafference - Formation of an image on the retina of a normal eye. The eye as a camera - Defects of the image-forming mechanism, nearsightedness, farsightedness - Formation of an image by an astigmatic cornea - Image seen through normal glasses and glasses correcting astigmatism - Eye with pathological turbidity of the lens (cataract) - Physiological contrast, simultaneous contrast. Influence of horizontal cells on neighbor cells in the retina for the improvement of clearness of vision - Optical illusions by ambiguous information: cubes of Necker and picture-puzzle - Optical illusions caused by the influence of the surrounding areas: converging and diverging lines, oblique hatching, surrounding area of different size, simultaneous contrast - Basis for the arrow illusion - Optical illusions caused by the nonconformist of rational interpretation and optical perception: round bars coming out of a square, twisted triangle, endless stairs, modern picture - Trichromatic triangle. Different combinations of three primary colors lead to all other color. Color vision - Spectral sensitivity of rods and cones (dominator system), three pigment color vision (modulator system) - Tests for color-blindness. Red-green deficiency and blue weakness - Color perception and emotion

**Ear and Hearing, Sense of Equilibrium. -** The formation of sound waves - Areas of rarefaction and areas of compression caused by a tuning fork - Characteristics and mutual influence of sound waves - Eardrum of the frog - Auditory ossicles at the skull of a frog - Auditory ossicles of man and cat compared with the size of a pin - Transformation of jawbone articulation into auditory ossicles during evolution - Development of the inner ear (labyrinth) and the perilymphatic space in vertebrates - Morphology of the human ear. Ear conch, external auditory canal, middle ear, inner ear - Ear drum with healed up fissure - Middle ear and inner ear. Movement of the eardrum, auditory ossicles, oval window and round window - Section through the auditory canal, eardrum and cochlea - Cochlea l.s. showing auditory nerve and organ of Corti - Organ of Corti, detail view shows sensory and supporting cells, tectorial membrane - Organ of Corti, schematic figure - Movement of Reissner's membrane and basilar membrane. Stimulation of the hair cells by the to-and-fro movement of the hairs in the tectorial membrane - Broadening of the basilar membrane from the base of the cochlea to the helicotrema - Formation of damped waves in the membranous labyrinth, depending on volume pressure of the inner ear, different elasticity of the windows and asymmetric perilymph masses - Displacement of the membranous labyrinth by the waves generated by sound vibrations - Amplitude pattern of vibration of the membranous labyrinth



for high and low frequencies - Detection of sound direction by the time lack between the entry of sound into the ears - Diagram of main auditory pathways. Centers of sound in the brain - Relationship of the two sets of the semicircular canals arranged in perpendicular plains - Semicircular canals, section - Ampullar crista, t.s. - Otolithic organ (macula), t.s. - Function of the vestibular system

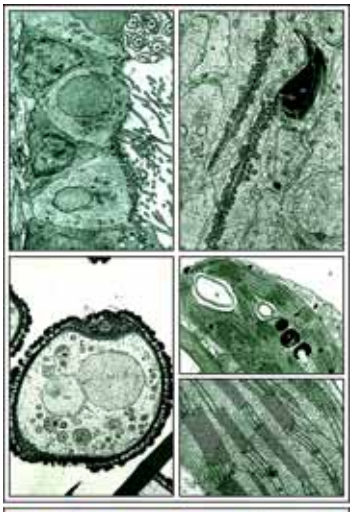
**Senses of Smell, Taste, Touch, Temperature and Proprioception. -** Section through nasal cavity and pharyngeal cavity - Location of the olfactory mucous membrane and air stream of the breath - Olfactory and respiratory mucous membrane of mammal t.s. - Detail view of olfactory epithelium with sensory cilia - Olfactory epithelium, electron micrograph of an ultrathin section - Nasal conchae of man and deer - Tongue of man with areas of taste - Tongue of rabbit, t.s. of papilla foliata with taste buds - Papilla foliata t.s., detail view of taste bud - Vallate papilla t.s. - Fungiform papilla t.s. - Human skin with cutaneous receptors of touch, pressure and thermal sensation - Sinus hair, l.s. and t.s. - Pacinian corpuscle - Meissner's corpuscle from human finger - Eimer's corpuscle from mouth of mole - Grandry's and Herbst's touch corpuscles from beak of duck - Sensitivity differences caused by touch-stimulation: excitation nearby or far away, weak or strong - Ruffini's warmth receptor - Krause's corpuscle, cold receptor - Back of human hand marked with warmth and cold reception points - Thermoreceptors of the infrared detector of rattle snake - Proprioceptors: muscle spindle and Golgi tendon apparatus. Conscious awareness of the position and movements of the joints - Muscle spindle in muscle, t.s.

## No. 8220 E **Cytology and Molecular Genetics**

*Atlas of 46 OHP Transparencies size 22 x 28 cm, comprising 172 color pictures, often with several component figures (drawings, diagrams, tables, anatomical pictures, photomicrographs and macrographs, electron micrographs, autoradiographs, test data and results). - Sketch and work-sheets with semidiagrammatic designs and texts - Compilation and text: Dr. Heinz Streble and Dr. Horst Boehnke*

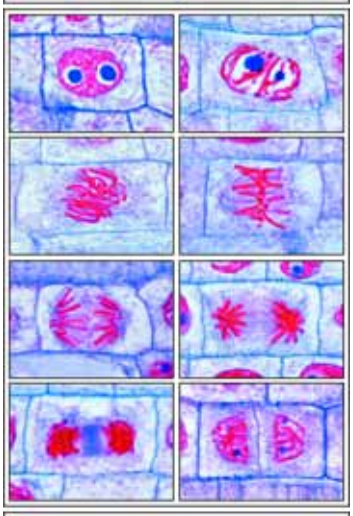
**Cell nucleus and chromosomes. -** This series illustrates the various structures of nuclei and chromosomes, pictures of mitosis and polyploidy, living nuclei, shape of nuclei and function, giant chromosomes, polyploidy, fine structure of nuclei, chromosome structure, mitosis, individuality of chromosomes. - Typical animal cell, all details visible by light and electron microscope - Typical plant cell, all details visible by light and electron microscope - Nuclei of alga Spirogyra and of amoeba, live - Position of nucleus in plant cell, live (phase contrast) - Nucleus fixed and stained - Nuclear membrane of a plant cell, fluorescence - Simple animal cells in sec. of salamander liver - Nuclear equivalents in bacteria, fluorescence - Chromato- and centroplasm in blue-green algae, fluorescence - Metabolically active nucleus of Vicia faba. Chromocentres, chromonemata, centromeres - Lampbrush chromosomes in living egg cell of salamander (phase contrast) - Polytene giant chromosomes: nucleus from salivary gland of Chironomus larva, live - Sex chromosomes: spermatozoa without and with X-chromosomes - Arrangement and shape of nuclei due to tissue functions - Nuclear volume and size due to activity - Nuclear shape in cancer cells not due to function - Polynucleate cells: giant cells of Langerhans - Giant cell of a sarcoma - Syncytium, an undivided mass of protoplasm with many nuclei - Position of nuclei in animal cells, classes of nuclear size - Polyploid nuclei - Chromosomes during mitosis, DNA stained by Feulgen - Polyploid chromosome sets of cultivated plants - Enlargement of nuclear surface: giant nuclei in endocrine organs - Pigment cells in the skin - Motor nerve cell shows nucleus, nucleolus, Nissl's granules - Glandular epithelium, t.s. goblet cells - Nuclear membrane, nuclear content, nucleoli, RNA exit, fibrillar structure of chromosomes, electron micrographs - Rearrangement of nuclei in spermatozoa, electron micrograph - Mitochondria in thin sec of animal and plant cells - Mitochondria, diagram - Golgi apparatus in epithelial cells, section and diagram - Golgi apparatus, electron micrograph: endoplasmatic reticulum and dictyosomes - Chloroplasts with grana from cells of Tradescantia, bright field and fluorescence - Chloroplasts, 3 electron micrograph in different magnifications, mesophyll cell: cell walls, vacuole, chloroplasts, grana, thylakoids, ribosomes - Chloroplasts, diagram - Amitosis, direct division without appearance of chromosomes, t.s. of liver - Amitotic division of the nucleus of Amoeba proteus - Paramaecium in binary fission and in conjugation (exchange of nuclear material) - Paramaecium, anatomy, diagram - Amoeba proteus, habit, cyst, feeding, division, diagram - Mitosis in animals, 9 stages, diagram - Mitosis in root tips of onion, 8 stages, diagram - Mitosis: root tip of Allium cepa; all stages in one picture - Mitosis: root tip of Hyacinth; high magnification photomicrographs. Metabolically active nucleus and early prophase, prophase and early metaphase, equatorial plate and early anaphase, telophase and reconstruction - Chromatid bridges with fragment during anaphase - Centrioles, centrospheres, spindle fibers: meiosis of an egg cell - Spindle apparatus and chromosomes, electron micrograph - Comparison of haploid and diploid chromosome sets of various plants and animals - Human chromosomes during metaphase - Normal karyotype with GAG banding pattern - Individuality of chromosomes I and II - Development of follicles in mammalian ovary: Young and older primary follicles, secondary follicle, young and older Graafian follicle, discus proligerus and mature oocyte with membrana pellucida and corona radiata t.s. - Sea-urchin development: Uncleaved egg, before and after fertilization, two-cell stage and four-cell stage, polar view - **Chromosomes and genes. -** Nuclei and chromosomes are conspicuous structures of cells. The part they play in cellular activities, their function and importance in heredity and cell division, as well as their molecular-biological aspects are treated in part II and III of this atlas. - Structure of chromosome as seen under the light microscope - Giant chromosomes of Chironomus, diagram - Structure and activity of chromosomes: loop complex of a chromosomal puff in polytene chromosome - Giant chromosomes of Chironomus, DNA-RNA-staining with orceine and light green - Inheritance of two linked genes in Drosophila: cross, backcross, linkage groups - Gene exchange between two corresponding linkage groups of Drosophila, chromosomal interpretation - Oogenesis, spermatogenesis, fertilization and cleavage in animals, diagram - Map of loci on chromosomes of Drosophila - Meiosis: t.s. and squash preparation of mammalian testis. Spermatogonia, meiosis of spermatocytes I and II, spermatids, spermatozoa - Maturation divisions in mammals, diagram - Maturation divisions in plants (Lilium), 18 stages, diagrams - Meiosis and mitosis in microspore cells of Lilium, 18 high magnification photomicrographs. Microspore mother cells, leptotene, pachytene, diplotene, diakinesis, metaphase of the first (heterotypic) division, formation of the equatorial plate, metaphase stage, ring- and cross-shape of chromosomes, anaphase stage, telophase, metaphase of the second (homeotypic) division, pollen tetrads, uninuclear microspores after the separation of the daughter cell, telophase of the third division, mature two-nucleate pollen grain at the time of shedding with tube cell and generative cell - Causal relations between crossing-over and chiasmata; separation of chromatid tetrads - The crossing-over: breakages, healing - Fine structure of genes: crosses of mutants of the coli phage T4 - Localization of genes in chromosomes: chromosome aberrations - Chromosome mutations: ring-chromosomes, deletions, duplications, inversions, translocations - Extra chromosomes: karyotype of a human with Down's syndrome - Sex chromatin: Barr bodies (sex chromatin) in human female epithelial and nerve cells - Replication: macronucleus before division - Replication of chromosomes: introduction of radioactively labeled thymidine distribution by mitoses - Equatorial plate showing four large chromosomes of Ascaris - Chromosome diminuition - **Gene and molecule**. - This series was conceived to not only present the results of research, but also to show the experimental basis. - Topics: Providing the material structure of the gene. Structural characteristics of DNA. Identical replication as a cause of hereditary constancy. DNA, RNA and protein synthesis as causes of character formation. Genetic code and molecular mechanisms in mutations. - Specialized didactic guiding ideas: Relations between structure and function on a molecular level. Explanation of genetic observations by means of characteristics and reactions of molecules. Problematization of the results by illustration of the hypotheses, methods and experiments. - *I. DNA, the hereditary substance* - Transformation in Streptococcus pneumoniae - DNA-content of various cells - Hereditary substances of bacteriophages (phages) - Electron micrograph of T2 phages - Reproduction of the phage T2 - Transmission of DNA into human cells - *II. Structure of DNA* - Nucleotides and their components - Relative components of bases in various DNA - Hydrogen bonding between bases - Structure of the double helix - Electron micrograph of phage-DNA - Electron micrograph of sections through bacterial cells (E. coli) - *III. Replication of DNA* - Models of replication - Prediction of density of replicated DNA - Density gradient centrifugation - Replicating DNA molecule I. -

Replicating DNA molecule II. - *IV. DNA and RNA* - Differences between DNA and RNA - Fractionation of cell components by centrifugation - Synthesizing ability of components - Function of ribosomes - Structure of ribosomes - Amino acid-tRNA-complexes - Specifity of tRNA - Kinds of RNA in the cell - Experiments with artificial messengers - Polysomes on bacterial DNA - Electron micrograph of RNA-phages - Coat protein-gene of an RNA-phage - Summary: replication, transcription, translation - *V. Genetic code and mutation* - Colinearity between nucleotide- and amino-acid sequence - Frame shift mutations - Triplet-binding test - The genetic code - Relations between codon and anticodon - Begin of protein synthesis - Section of phage RNA - Chemical mutagenesis - Effect of mutations - *VI. Synthesis, structure, and function of proteins* - Protein-synthesizing complex I - Protein-synthesizing complex II - Secondary structure of proteins: a-helix - Secondary structure of proteins: b-pleated sheath - Tertiary structure of a protein: b-chain of hemoglobin - Sickle cell anemia, erythrocytes - Molecular interpretation.

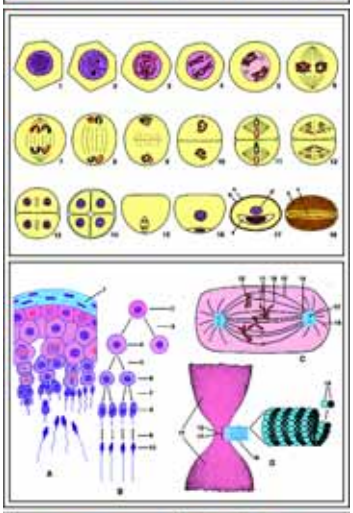


## No. 8224 E **Mitosis and Meiosis**

*Atlas of 25 OHP Transparencies size 22 x 28 cm, comprising over 95 color pictures. Specially selected and beautiful multicolored photomicrographs are presented on this atlas. Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism.*



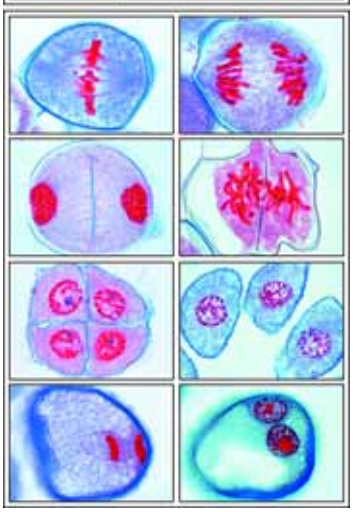
**Typical Cell Division in the Root Tip of the Hyacinth**. - An unique series to illustrate the normal sequence of mitosis. The photomicrographs show each stage in a high degree of magnification. The cell components are differentiated in contrasting colors by a special staining technique. - Interphase, the resting nucleus shows the chromatin in the form of a fine network, nuclear membrane and nucleoli are present - Early prophase, the chromosomes appear as fine threads - Late prophase, the chromosome threads shorten by contraction - Early metaphase, duplicate daughter chromosomes are formed - Metaphase, the chromosomes are arranged on the equatorial plate - Early anaphase, the daughter chromosomes move away from the equator - Late anaphase, the chromosomes reach the opposite cell poles - Early telophase, chromosomes become reorganized to form the daughter nuclei, primary cell wall - Late telophase, new cell wall is formed and the nucleoli are reformed - Reconstruction. Complete separation of the daughter cells - **Development of the Microspore Mother Cells of Lilium (Anthers). -** New combination of hereditary traits and reduction of the number of chromosomes are the aim of meiotic division. - Young anther of lily. t.s. - Microspore mother cells, resting stage - Leptotene, the chromosomes appear as fine threads - Zygotene, the homologous chromosomes associate in pairs - Pachytene, complete pairing of the chromosomes - Diplotene, bivalent chromosomes split, chiasmata, interchange of genetic material - Diakinesis, contraction of the bivalents - Metaphase of the first (heterotypic) division showing the equatorial plate - Equatorial plate, surface view with duplicated chromosomes - Metaphase, side view, a spindle is formed - Anaphase, two haploid sets of chromosomes are separated - Telophase, new cell wall between the daughter cells - Prophase of the second (homeotypic) division - Metaphase of the second division - Pollen tetrads. Four nuclei are formed after the second division - Uninuclear microspores - Prophase, metaphase, anaphase and telophase of the third division - Mature two-nucleate pollen grain. Each pollen grain possesses a tube cell and a generative cell - Mature pollen grain with surface structure - Growing pollen grain showing pollen tube - Growing pollen tube, l.s. showing the division of the generative cell into two sperm nuclei - **Development of the Megaspore Mother Cells of Lilium (Embryosac). -** Thousands of sections had to be prepared in order to produce this series - Ovary of lily, t.s. low magnification - Very young ovary before the formation of the megaspore mother cell. Abundant mitotic figures in the tissue - Developing embryosac mother cell - Megaspore mother cell, pachytene stage of prophase - Anaphase and telophase of the first (heterotypic) division. Spindle fibers - Two-nucleate embryosac, prophase of the second division - Anaphase and telophase of the second (homeotypic) division. Two division figures - Primary or first four-nucleate stage - Primary four-nucleate stage, three nuclei migrate to the chalazal end of the embryosac, one nucleus remains in the micropylar end - Prophase and metaphase of the third division after the three chalazal nuclei have fused - Telophase of the third division - Second four-nucleate stage, consisting of two haploid and two triploid nuclei. A vacuole can be observed - Metaphase and anaphase of the fourth division - Eight-nucleate stage, the mature embryosac. Egg nucleus, synergid nuclei, polar nuclei, and antipodal nuclei - Double fertilization by the two sperm nuclei of the pollen tube - Formation of the embryo, early and later stage. Many mitotic figures in the endosperm cells - Young embryo with suspensor cells, l.s. - Older embryo, l.s. formation of cotyledons - **Maturation and Cleavage of Ascaris megalocephala bivalens. -** Due to its low number of chromosomes (only four), Ascaris megalocephala bivalens is an ideal zoological example to demonstrate the complex phenomena of reduction divisions, fertilization and early cleavage in animals - Primary germ cells - Entrance of spermatozoon in the oocyte - Oocyte before the reduction divisions. The genetic substance appears in form of two tetrads - First maturation division. Eight chromosomes and the spindle visible. The male pronucleus in the middle of the oocyte - Formation of the first polar body - Second maturation division. Four chromosomes visible - Formation of the second polar body. Only two chromosomes remain in the oocyte, subsequently they change to the female pronucleus - Mature oocyte with male and female pronuclei, each nucleus contains two chromosomes - The nuclear membranes of the pronuclei disappear, and the maternal and paternal chromosomes become visible (fertilization) - Metaphase of the first cleavage. The somatic number of chromosomes is now restored - Metaphase, equatorial plate in side view shows chromosomes, spindle fibers, centrioles - Anaphase, beginning movement of the daughter chromosomes towards the poles - Early telophase, beginning constriction of the cell - Telophase, further division of the cell - Late telophase, complete division of the cell - Second cleavage with two division figures - Later stage of fetal development showing young embryo - **Development of the Female Gametophyte of Pinus. -** The ovules of pine mature within two vegetation periods. In the first year pollination and growth of the female gametophytes. In the following spring the formation of archegonia and the fertilization take place. - Young female cone, median l.s. for general view - Bract scale, ovuliferous scale and ovule, median l.s. - Young ovule before pollination, l.s. with megaspore mother cell - Growing ovule at free nuclear stage, after repeated division of the megaspore mother cell without formation of cell walls - Growing ovule, later stage with young macroprothallium - Mature archegonium, median l.s. showing neck canal cells, ventral canal cell, egg nucleus, layer of jacket cells, paranuclei - Fertilization of the archegonium by entrance of the pollen tube - First division of fertilized egg nucleus, anaphase - Four-nucleate stage, all nuclei in the centre of the archegonium - Four-nucleate stage, the nuclei migrate towards the base of the archegonium - Sixteen-nucleate stage, the nuclei lie in four tiers of four. Rosette cells, suspensor cells, embryonic cells - Young proembryo with short suspensor cells - Older proembryo with elongated suspensor cells and four young embryos - Mature embryo with endosperm, median l.s. showing cotyledons, radicle, hypocotyl, plumule, and t.s. showing the eight cotyledons.



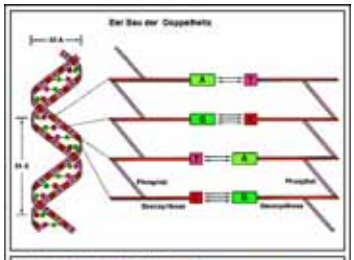
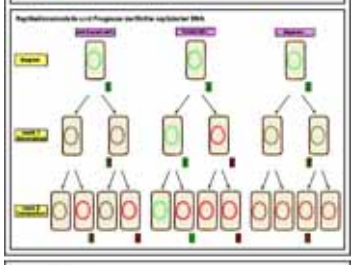
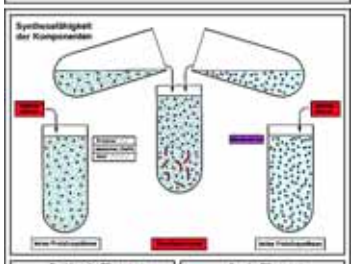
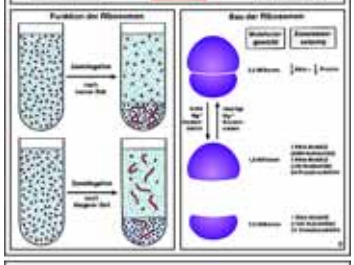
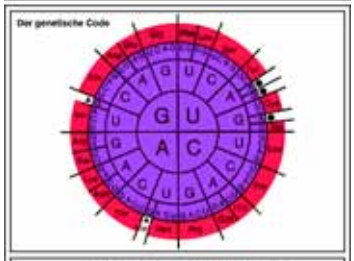
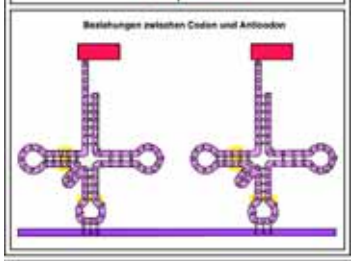
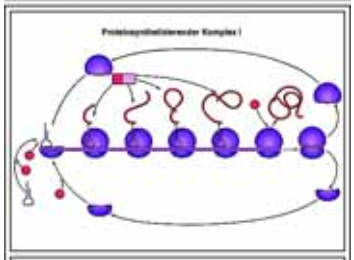
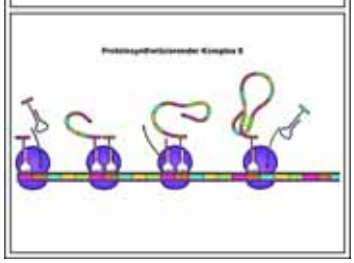
NEW!

## No. 8248 E **Cytology and Genetics** (Short Version TE)

*Atlas of 10 Overhead-Transparencies size 22 x 28 cm, comprising 67 pictures (anatomical pictures, photomicro- and macrographs, nature photographs, electron micrographs, drawings, diagrams, tables, scenes, test data and results). With comprehensive interpretation text. - Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. - Compilation and text: Dr. Dieter Gerlach and Johannes Lieder.*



***Animal Cells and Genetics: -*** Typical Animal Cell, showing all details visible by light and electron microscope in different color - Squamous epithelium, isolated cells. Nuclei and cytoplasm are shown - Striated muscle l.s. showing nuclei, striations, myofibrils - Compact bone, human t.s. showing cells and canaliculi - Hyaline cartilage, human t.s. - Nerve

fibers isolated, showing myeline sheaths and Ranvier's nodes - Simple animal cells in liver, t.s. with cellular membranes, nuclei, and cytoplasm - Electron micrograph of a liver cell showing nucleus, mitochondria, cytosomes, lysosomes, dictyosomes, glycogen - Phagocytosis in Kupffer's star cells of the liver, t.s. - Ovary of cat, t.s. showing primary, secondary, and Graafian follicles - Fallopian tube with embedded egg (oocyte), t.s. high magnification detail - Testis of frog, t.s. showing spermatogenesis. Spermatogonia, spermatocytes, spermatids, and mature spermatozoa - Testis of crayfish, t.s. showing meiosis and spermatogenesis - Animal mitosis, color graphic design with 9 different stages - Reduction division during spermatogenesis in human and animals, all stages, color graphic design - Giant chromosomes in the salivary gland of Chironomus larva, with large chromomeres. Stained for DNA - Giant chromosomes of Chironomus, color graphic design - Human chromosomes in smear from culture of blood - Karytype of human chromosomes - Lampbrush chromosomes of diplotene stage in living egg cell of salamander (phase contrast) - Uteri of Ascaris megalocephala, t.s. to show details of meiosis with chromosomes and nuclear spindles - Barr bodies (sex chromatin) in female squamous epithelium - Pigment cells in skin - Storage of glycogen in liver cells, sec. - Nucleus of an amoeba, live microphotograph - Mitochondria in thin sec. of kidney or liver, specially prepared and stained - Mitochondria, fine structure, color schematic design - Golgi apparatus in sec. of spinal ganglion - Golgi apparatus, fine structure, color schematic design - Ova from Psammechinus (sea urchin). Fertilized ovum - Ova from Psammechinus (sea urchin). Two-cell stage - Ova from Psammechinus (sea urchin). Four-cell stage - Ova from Psammechinus (sea urchin). Eight-cell stage - Inheritance of two linked genes in Drosophila: cross, backcross, linkage groups - Gene exchange between two corresponding linkage groups of Drosophila, chromosomal interpretation - Drosophila genetics, adult wild type, w.m. - Drosophila, "barr eye" mutant, w.m. - Drosophila, "brown eye" mutant, w.m. - Drosophila, "vestigial wing" mutant, w.m. - Drosophila, "white eye" mutant, w.m.

***Plant Cells and Genetics: -*** Typical Plant Cell, showing all details visible by light and electron microscope in different colors - Electron micrograph of a plant cell with nucleus, cell walls, vacuoles, mitochondria, endoplasmatic reticulum, plasmodesma and chloroplasts - Epidermis of Allium (onion), w.m. showing simple plant cells with cell walls, nuclei and cytoplasm - Stem apex and meristematic tissue of Elodea, l.s. showing growing zone and leaf origin - Wood of Tilia macerated and w.m. showing wood cells, vessels and fibers - Root tips of Allium l.s. showing cell division (mitosis) in all stages: - Mitosis: root tip; interphase (resting stage) - Mitosis: root tip; early prophase - Mitosis: root tip; late prophase - Mitosis: root tip; early metaphase - Mitosis: root tip; equatorial plate of metaphase - Mitosis: root tip; early anaphase - Mitosis: root tip; telophase - Mitosis: root tip; reconstruction - Maturation divisions (meiosis and mitosis) in the pollen mother cells of Lilium, 18 stages, color design - Pollen mother cells of Lilium. Early prophase (leptotene) first division (meiosis) showing chromosomes as fine threads - Pollen mother cells of Lilium. Later prophase (diakinesis) of first division (meiosis) Shortening of chromosomes - Pollen mother cells. Metaphase and anaphase of first division (meiosis) showing nuclear spindles and contracted chromosomes - Pollen mother cells. Second division, interkinesis, four cells stage - Plasmodesmata, in t.s. of palm seed - Mitochondria, thin l.s. of Allium root tips stained to show the mitochondria - Fruit of Pyrus (pear) t.s. showing stone cells (scelerenchyma) - Tuber of Solanum (potato) t.s. shows cork and starch grains - Cucurbita (pumpkin) l.s. of stem showing vascular bundles with sieve tubes, spiral and annular vessels, sclerenchyma fibers - Ricinus endosperm t.s. showing aleurone grains - Ovary of Lilium (lily), t.s. showing arrangement of ovules and embryosac - Spirogyra, green alga, showing conjugation stages and formation of zygotes.

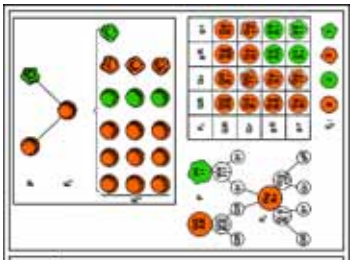
## No. 8222 E **Transmission Electron Micrographs**

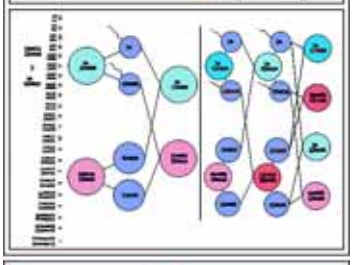
*Atlas of 24 OHP Transparencies size 22 x 28 cm, comprising over 120 individual pictures. They are made from extremely high quality, faultless and instructive transmission electron micrographs. All micrographs are marked with letters facilitating the location and interpretation of the important or special structures. Greatly enlarged electron micrographs - magnification 50000 up to 100000 x - show the ultra-structures of the cell organelles as far as the range of macromolecules. Electron micrographs of lower magnification - 5000 up to 30000 x - give an impression of the microstructure of the tissues and organs, their specific performance and functions. The resolution capability of a modern electron microscope is approximately 1000 times greater than that of the optical microscope. In strong plastic file with ring-mechanism. - Compilation: Dr. Heinz Streble*

**Electron Micrographs of Animal Cells and Tissues**. - Techniques: production of ultra-thin sections for electron microscopy - Electron microscope: composition and function, refraction and lenses - Liver cell: distinctive marks of fine structure; nucleus, mitochondria, cytosomes, lysosomes, dictyosomes, glycogen, gall capillaries - Liver cell: fine structure of an animal cell - Liver cell: details of cell organelles and endoplasmatic reticulum - Skin: desmosomes, tonofilaments, microvilli and fissures for lymph in stratum spinosum cells of epidermis - Ciliated epithelium of trachea: t.s. and l.s. of cilia - Cilia, flagella and their structures: t.s. of a group of cilia; three cilia are constructed divergently - Secretory cells: exocrine cells of pancreas, endoplasmatic reticulum and dictyosomes as origin-structures of digestion enzymes - Ribosomes: fixed on membranes or free floating in cytoplasm the ribosomes form designs - Resorption: simple columnar epithelium of intestine showing microvilli - Resorption: cells of proximal tubule of kidney; the highly active cells with numerous long microvilli, basal invaginations and mitochondria - Glomerulus of kidney, details: capillary loops and podocytes; the barrier between blood and primary urine - Lung: epithelial layer of pneumocytes, basement membrane capillary epithelium and erythrocytes - Collagenous connective tissue: fibroblasts and matrix bundles of banded collagen fibrils - Cartilage: cartilage cells in matrix of cartilage - Bone, osteocytes: long cytoplasmatic processes, collagen fibrils and mineralized matrix - Smooth muscle: elongated units showing two kinds of filaments - Skeletal muscle, striated: plasma membrane, sarcoplasm, myofibrils, T-tubules, segments and bands, actin and myosin filaments - Cardiac muscle, striated: segmentation and bands, mitochondria, intercalated discs - Nervous tissue: t.s. of myelinated axons and non-myelated axons within grooves of Schwann's cells - Nervous tissue: l.s. of axon, neurofilaments, microtubules, vesicles, mitochondria, Schwann's cell with node of Ranvier - Neuro-muscular synapses in skeletal muscle: the junction shows vesicles in presynaptic component and junctional folds that reach the myofibrils in postsynaptic component - Blood: mature erythrocytes including homogeneous mass of hemoglobin, and erythroblast with large nucleus and polyribosomes - Blood: granular leukocytes, eosinophils: lobulated nucleus and disc-shaped cytoplasmatic granules - Olfactory epithelium: sensory cells with cilia, mucous cells w. microvilli - Retina: rod cells in longitudinal view; the outer segment and banded rootlet of each cell is a highly specialized cilium - Ovary: details of ovum, zona pellucida and follicular epithelium. - Testicles; spermatogenic epithelium: in longitudinal view an early spermatid and an matured spermatozoon

**Electron Micrographs of Plant Cells and Tissues**. - Typical plant cells: electron micrograph of low magnification with nucleus, cell walls, vacuoles, mitochondria, dictyosomes, endoplasmatic reticulum, plasmodesma and chloroplasts - Meristematic plant cell: representation of the membrane systems - Plant cell: three dimensional reconstruction - Meristematic plant cell: fine structures of organelles; high magnified - Cell of root tip: very high magnified cut-out showing cell wall, plasma membrane, clusters of ribosomes and microtubules - Plasmodesmata: high magnified electron micrograph showing details - Cytokinesis and mitosis in early telophase stage: cell plate formation and phragmoplast - Mesophyll cell: cell walls, large vacuole, chloroplasts, grana of plastids, starch and nucleotides - Mesophyll cell: chloroplast showing starch, grana and thylakoids - Mesophyll cell: chloroplast; highly magnified cut-out with details in grana, thylakoids, and ribosomes in stroma - Cuticle: epidermal cuticle of petiole, cutin layer with residual wax on the surface and primary cell wall - Leaf stoma: section cut parallel to surface of a leaf, with two guard cells and two subsidiary cells - Leaf stoma: transverse sections through stoma cells - Gland cells: section through a gland from leaf of privet showing gland cells and a stalk cell - Root: central cylinder, transverse section showing Casparian strips, endodermis, cortex, gas spaces, pericycle, sieve tubes and tracheids - Root: high magnified section through a Casparian strip - Primary xylem: longitudinal section through a primitive xylem element with secondary, ring-shaped thickenings of the wall - Vascular cambium: t.s. through cambium of a woody stem; low magnification - Vascular cambium, detail: cambial initial

cells showing large vacuoles, phragmoplast, proplastids - Primary phloem: l.s. showing living companion cells and almost dead sieve elements with a sieve plate - Fibers: t.s. of fibers with thick layering in the walls - Secondary xylem: Ray cells in longitudinal view and tracheids with bordered pits and half bordered pits in t.s. - Bordered pit: high magnified section; middle lamella, torus, membrane of pit, layers of the wall - Pit membrane and torus: surface relief of torus and microfibrils of cellulose; plastic replica shadowed by subliming metal - Collenchyma: cell of angular collenchyma with thickened corners; intercellular spaces filled with pectins - Stone cell: section with plasmodesmata, primary and secondary cell walls, nucleus, plastids, mitochondria, and endoplasmatic reticulum - Raphid cell: cell with innumerable vesicles in cytoplasm, raphidosomes and crystals of calcium oxalate - Sporogenous cells of anther: nuclei of cells with meiotic chromosomes in t.s. and l.s.; synaptic association of homologous chromosomes - Pollen grain: section of a pollen grain showing exine, intine, pollen grain pore, vegetative nucleus and sperm nucleus



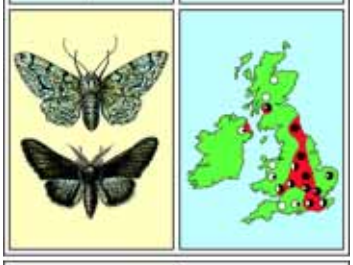


## No. 8225 E **Mendelian Inheritance and Variability**

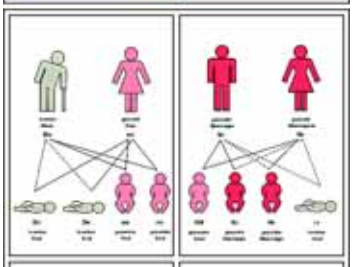
*Atlas of 32 OHP Transparencies size 22 x 28 cm, comprising 95 color pictures, mostly with several component figures (drawings, diagrams, anatomical pictures, photomicro- and macrographs, nature photographs, life cycles, scenes of landscape, fossils, test data and results). Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. - Compilation: Prof. Walter Mergenthaler and OStR Heribert Schmid*

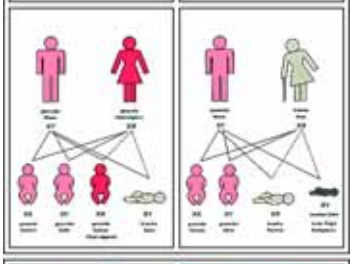
**The Mendelian Laws**. - This series introduces into classical genetics and is intended for use in all types of schools, especially high schools. The rich material allows the teacher to select according to the special situation. - Johann Gregor Mendel - Similarity of father and son - Identical (uniovular) twins - Intermediary inheritance in Mirabilis jalapa (Marvel of Peru) - Backcross in Mirabilis jalapa - Intermediary inheritance in chicken - Dominant inheritance of color in pea flowers - Dominant inheritance of color in pea seeds - Yields of Mendelians monohybrid crosses of peas - Dominant inheritance in stinging nettles - Dominant inheritance in corn (Zea mays) - Dominant inheritance in the snail Cepaea hortensis - Dominant inheritance in guinea pigs - Backcross of F1 in dominant inheritance - Backcross of F2 in dominant inheritance - Yields of pea crosses performed by various scientists - Dihybrid cross of peas - Distribution of characters in dihybrid cross of peas - Punnett square for dihybrid cross of peas - Backcross of dihybrid peas - Dihybrid inheritance in the snail Cepaea hortensis - Dihybrid inheritance in guinea pigs - Dihybrid inheritance in snapdragons - Punnett square for dihybrid cross - Distribution of characters in trihybrid crosses - Ratio of numbers in polyhybrid crosses - Distributing of parental genetic makeup to children - Genetic makeup common to a family - Additive factors - Supplementary factors in Lathyrus odoratus (Spanish vetch) - Polygeny in mammalian fur color - Lethal factor in canary (Serinus canaria) - Lethal factor in yellow mice

**Variability Part I: The Modifications**. - Modifiability is the changeability of the appearance or the ability of the whole genetic makeup (of the idiotype) to be expressed in the phenotype under the various developmental conditions, as well as internal and external influences. This is limited by the range of variation which itself is determined genetically. Modifications are changes of the phenotype which do not influence the idiotype. - Development of dandelion (Taraxacum officinale) in mountains and lowlands (experiments of Bonnier) - Different shape of plantain (Plantago) growing on track across the field and on forest margin - Different shape of pine growing singly and within the forest - Modifications of leaves on one branch - Modifications of leaves of a ginkgo tree - Gentiana plants from various sea levels - Stimulating and inhibiting effects on plants - Table of binomials and Pascal's triangle - Binomial distribution or normal curve of variation for $(a+b)^4$ and $(a+b)^{10}$ - Variation curve for number of tail fin rays and lateral scales in two species of fish - Variation curve of the size in the identical progeny of a single Paramaecium - Unsuccessful selection in culturing Paramecia - Fingerprints of identical twins - Starvation and mast form in sheep of the same age - Length of tadpole intestine depending on type of food - Growth speed of plaice depending on population density - Queen and worker bee, nutritional modifications - Changing modifications: biastrepsic and normal Dipsacus plants - Spring and summer form in the butterfly Araschnia levana - Cooling the pupa effects the color of butterfly wings - Change of temperature modifies color and size of an ichneumon wasp - Temperature and light modify the color of petunia flowers - Temperature modification in Russian rabbit - Forms transitional between submersed and floating leaves - Leaves of young and old English ivy - Sex change depending on body length of a marine annelid - Phenotypic sex determination in the worm Bonellia - Transplantation of frog tissue to salamander tadpole - Mossy rose gall - Pine galls produced by aphids



**Variability Part II: The Mutations**. - Sudden changes in animals and plants which later proved to be hereditary are called mutations. They are either spontaneous or caused by mutagens, e.g. radiation, chemical substances, or change of temperature. Mutations are highly important for the further development of life, for breeding animals and culturing plants. The possibility of curing defective genes or purposefully changing intact or defective genes means total genetic manipulation of humans and organisms. This opens a both promising and shocking, but also utopian perspective. - Normal celandine (Chelidonium majus) and its laciniate mutant - Leaves of various plants and their laciniate mutant - Wild-type sheep and short-legged ancon mutant - Goldfish and its mutant - Wild-type carp and its mutants - Shape and skeleton of a normal and a brachydactylous human hand - Wild-type moth (Biston betularia) and its carbonaria mutant. Protective color - Industry melanism of Biston betularia in Great Britain - Tailless mutant of domestic cat - Beetle with duplicated legs - Biastrepsis in Dipsacus and fasciation in Japanese spindle tree - Normal corn plants and gravitation-blind mutants - Normal snapdragon (Antirrhinum majus) and its cupuliformic mutant - Factor mutation of snapdragon. Shape and color of flowers. Multiple alleles - Progressive reduction of wings in the fruit fly Drosophila. Multiple alleles - Fur color of guinea-pig (black, brown, white). Multiple alleles - Diagram showing various types of gene mutations - Chromosome mutation in a female fruit fly Drosophila. Normal and mutated set of chromosomes - Relation between mutated chromosomes and eye size of fruit flies - Types of chromosome mutations - Inversion of chromosome segment in Drosophila. Inversion loop during chromosome pairing - Chromosome mutations in two varieties of peas. Karyograms and chromosome pairing during meiosis - Chromosome sets of epidermal cells and pigment pattern of the heads of haploid, diploid, and triploid salamander larvae - Haploid, diploid, triploid, and tetraploid plants of Solanum (nightshade) - Genome mutations in Drosophila - Leaf shape of stock (Matthiola) due to various surplus chromosomes - Normal shoot growing from the variegated leaf of Sansevieria nobilis. Proof of development of a chimera and of somatic mutation - Mutagenic effect of nitrous acid on DNA. Change of nucleic acid bases - Selection of deficiency mutants in bacteria - Metabolic block and accumulation of products. Tracing of metabolic chains



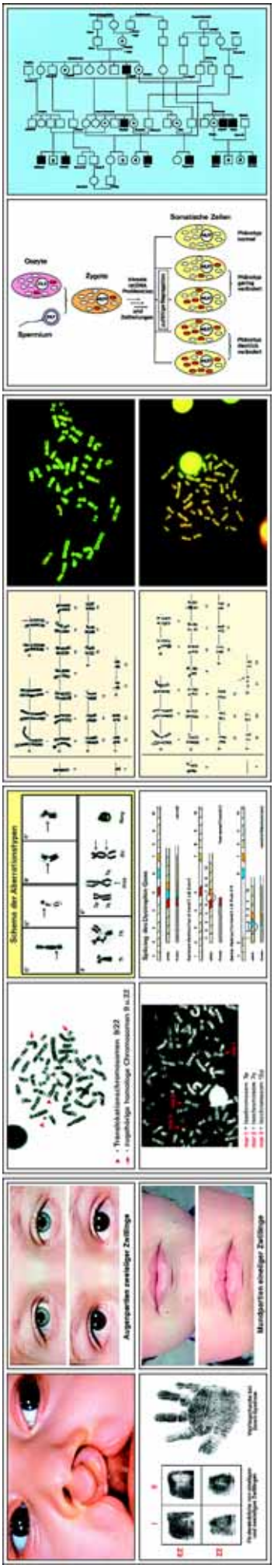


## No. 8226 E **Human Genetics Part I**

*Atlas of 32 OHP Transparencies size 22 x 28 cm, comprising 88 color pictures, some with several component figures (drawings, diagrams, tables, graphs, anatomical pictures, photomicro- and macrographs, electron micrographs, clinical appearance of patients, pedigrees, karyotypes). Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism.*

Recent new developments in all fields of human genetics made a completely revised edition of this subject necessary. The four series of color transparencies covering human genetics incorporate the latest developments in research. The new brilliant visual material is highly informative. The detailed explanatory texts fulfill the didactic requirements of modern teaching.

**Modes of inheritance**. - The series of transparencies covers the basic knowledge of formal genetics, illustrated with examples of medical genetics. Compilation and text: Prof. Dr. med. Klaus Zerres (Institut für Humangenetik, Universität Bonn) and Prof. Dr. med. Tiemo Grimm (Institut für Humangenetik, Universität Würzburg).



*A. Autosomal dominant inheritance* - Autosomal dominant inheritance - Clinical appearance of neurofibromatosis, multiple fibromas - Ditto., cafe au lait spots - Pedigree of a family with neurofibromatosis - Clinical appearance of cleft hand - Pedigree of a family with cleft hand - Pedigree of a family with achondroplasia - Codominant mode of inheritance (AB0 blood groups) - *B. Autosomal recessive mode of inheritance* - Autosomal recessive mode of inheritance - Probability of being heterozygous for the relatives of a homozygous individual - Clinical appearance of albinism - Albinism in animals - Pedigree of a family with albinism - The decomposition of phenylalanine - Pedigree of a family with phenylketonuria (pseudodominance) - Pedigree of a family with deafmutism (genetic heterogeneity) - Heterozygosity-effects - *C. X-chromosomal inheritance* - X-chromosomal recessive inheritance - Color plate for testing red-green-blindness - Pedigree of a family with red-green-blindness - Clinical appearance of muscular dystrophy of Duchenne type - Structure of the gene of muscular dystrophy - Examples of changing on deletions in the dystrophin gene - Pedigree of families with muscular dystrophy - Clinical appearance of hemophilia - Hemophilia A in the European aristocracy - X-chromosomal dominant inheritance - Clinical appearance of incontinentia pigmenti (Bloch-Sulzberger syndrome) - Pedigree of a family with incontinentia pigmenti - *D. Multifactorial inheritance* - Multifactorial inheritance (effect of threshold value) - Recurrence risks of multifactorial inheritance - Clinical appearance of harelip and cleft palate - Harelip and cleft palate due to amniotic bands - Different causes of harelip and cleft palate - Clinical appearance of the van der Woude syndrome - Pedigree of a family with van der Woude syndrome - Clinical appearance of neural tube defects, spina bifida - Ditto. anencephalus - Clinical appearance of clubfoot - Ditto. of psoriasis - Example of pyloric stenosis illustrating the so-called „Carter-effect" - *E. Mitochondrial inheritance* - Mitochondrial inheritance - Pedigree of a family with Leber's optic atrophy

**Cytogenetics**. - Part II illustrates various types of human cell cultures, the preparation of sex-chromatin (X- and Y-chromatin) in normal and pathological states through analysis of Barr-bodies, drumsticks and F-bodies. It also includes the analysis of metaphase chromosomes by various banding techniques, including NOR- and SCE-methods, and the most common types of chromosomal aberrations and the phenotypic consequences. Secondary chromosomal aberrations following exposure to clastogens and illustrating repair defects are shown. The series ends with examples from the field of tumorcytogenetics: leukemias and solid tumors. - Compilation and text: Dr. rer. nat. Ulrike Gamerdinger, Dipl.-Biol. Katja Weiske and Prof. Dr. Gesa Schwanitz (Institut für Humangenetik, Universität Bonn). - *A. Cell cultures* - Lymphocyte culture - Tissue culture - Clones in tissue culture - Mitotic activity in tissue culture - *B. Sex chromatin* - Barr bodies in cells of the hair bulb - Drumstick in a mature segmented granulocyte - Two Barr bodies; karyotype 47,XXX - F-body in a human lymphocyte - Two F-bodies; karyotype 47,XYY - *C. Chromosome staining and banding techniques* - Uniform staining - GTG-banding pattern - QFQ-banding pattern - RBA-banding pattern - C-banding pattern - SCE (sister-chromatid-exchange) - Nucleolus organizing region (NOR), silver staining - Normal karyotype with GAG banding pattern - Paris nomenclature of chromosomes - *D. Chromosomal aberrations* - Trisomy 21; karyotype - Boy with Down's syndrome - Simian crease in a boy with Down's syndrome - Karyotype of a patient with translocation trisomy 21 - Trisomy 13; karyotype - Trisomy 18; karyotype - Ring chromosome 18; karyotype - Isochromosome X; karyotype - Inversion 2; karyotype - Karyotype of a girl with „cri-du-chat" syndrome - Child with „cri-du-chat" syndrome - Pedigree of a family showing segregation of a reciprocal translocation - Monosomy X; karyotype - Patient with Turner's syndrome (monosomy X) - Klinefelter's syndrome; karyotype - Risk for the birth of a child with chromosome aneuploidy - Chromosomal findings in spontaneous abortions - Triploidy; karyotype - Alterations of chorionic villi due to triploidy - *E. Mutagenesis, clastogenes, tumor cytogenetics* - Increased SCE rate - Mitosis with multiple aberrations - Diagram of aberration types - Micronuclei - Unspecific chromosome aberrations - Table of chromosome breakage syndromes - Philadelphia chromosome in chronic myeloic leukemia - Marker chromosomes in solid tumors

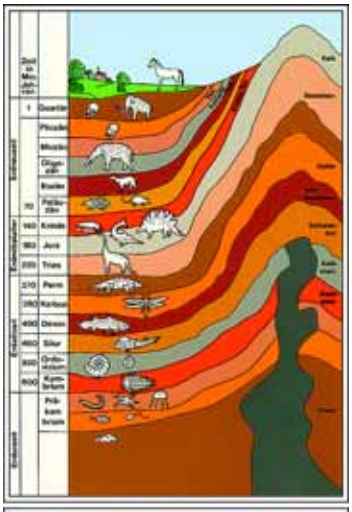
## No. 8227 E **Human Genetics Part II**

*Atlas of 42 OHP Transparencies size 22 x 28 cm, comprising 116 color pictures, some with several component figures (drawings, diagrams, tables, graphs, anatomical pictures, photomicro- and macrographs, electron micrographs, clinical appearance of patients, pedigrees, karyotypes) - Sketch and work-sheets with semidiagrammatic designs and texts.*

**Molecular genetics, statistic genetics**. - Part III starts with an introduction into the principles of molecular genetics. Main emphasis is put on the application of the new molecular techniques in medical genetics and genetic counseling. Aspects of population genetics, mutations and blood groups are furthermore described. - Compilation and text: Prof. Dr. med. Klaus Zerres (Institut für Humangenetik, Universität Bonn) and Prof. Dr. med. Tiemo Grimm (Institut für Humangenetik, Universität Würzburg). - *A. Molecular genetics, statistic genetics* - From DNA to chromosomes - Genetic code - Restriction enzymes - Evidence of DNA sequences by Southern-blots - Polymorphisms of restriction fragments (RFLP) in Southern-blots - Ditto. and CA-repeats as molecular markers - Polymerase chain reaction (PCR) - Indirect diagnosis of genotypes. Example: muscular dystrophy of Duchenne type - Direct diagnosis of genotypes. Example: Ditto. - Erythrocytes in sickle cell anemia - Indirect diagnosis of genotypes. Example: sickle cell anemia - Ditto. Example: spinal muscular atrophy - Direct diagnosis of genotypes. Example: mucoviscidosis - Gene map of the X-chromosome - Diagram of fluorescence-in-situ-hybridization - Proof of a deletion in the elastin-gene on Williams-Beuren-Syndrom by FISH - Mode of operation and therapy of hereditary diseases - Therapy of mucoviscidosis - Germ line therapy and somatic gene therapy - Problems and risks on gene transfer - Principles of somatic gene therapy - *B. Population genetics, mutations* - Crossing over - Linkage analysis, segregation of two loci with independent inheritance - Ditto. with dependent inheritance - Ditto. with possible crossing-over - Calculation of lodscore-data for linkage analysis - Linkage analysis, example Chorea Huntington - Law of Hardy and Weinberg - IQ of couples, an example of assortative mating - Rate of frequency of homozygotes and heterozygotes - Types of mutation - Mutation rates of autosomal dominant inheritance and X-chromosomal recessive inheritance - Role of paternal age in case of new mutations - Newborn with Apert's syndrome - Pedigree with autosomal dominant mutation (aniridia) - Congenital lack of the iris (aniridia) - Diagram of oogenesis - Diagram of spermatogenesis - Molecular genetic evidence for germ cell mosaicism in case of muscular dystrophy (Duchenne type) - Unstable trinucleotid-mutations, a new type of mutations - Imprinting, parent-specific loss of gene function causing hereditary diseases - Origin of tumors according to Knudson's two hit model - *C. Blood groups* - Determination of AB0 blood groups - Positive and negative reactions in AB0 blood group determination - Genotypes and phenotypes in AB0 blood groups - Inheritance of AB0 blood groups - Exclusion of paternity by AB0 blood groups - DNA fingerprints as evidence of paternity - Importance of Rh-incompatibility for blood-donors and during pregnancy - The HLA gene complex on chromosome 6 - HLA linkage with the adreno-genital syndrome (AGS) in a family - HLA associations in various diseases

**Genetic counseling and prenatal diagnosis**. - The subject of this series includes principles of genetic counseling and prenatal diagnostic, effects of damage to the fetus, calculation of risks, genetics of behavior, twin research. - Compilation and text: Prof. Dr. med. K. Zerres (Institut für Humangenetik, Universität Bonn) and Prof. Dr. med. T. Grimm (Institut für Humangenetik, Universität Würzburg). - *A. Genetic counseling and prenatal diagnosis* - Indications for genetic counseling - Concepts of genetic counseling - Recurrence risk in a family, if only one child is affected - Potential consequences after genetic counseling - Neural tube defect as seen with ultrasound - Maternal serum-AFP-level during normal pregnancy and with a neural tube defect - Indications for prenatal diagnosis - Biopsy of chorionic villi - Amniocentesis, fetal blood sampling - Diagram of germ cell development of a balanced 14;21 translocation - Ditto. 12;21 translocation - *B. Teratogenetic injury to the fetus* - Appearance of alcohol embryopathy - Characteristics of alcohol embryopathy - Appearance of hydantoin-barbiturate embryopathy - Appearance of thalidomide embryopathy - Influence of maternal PKU to the fetus - Appearance of rubella embryopathy - Time-table of the development of organs and sensitivity teratogens - *C. Estimated risk* - Everyday risks - Bayes' theorem in case of incomplete penetrance - Balance between mutation and selection in case of lethal X-chromosomal inheritance - Estimated risk in case of lethal X-

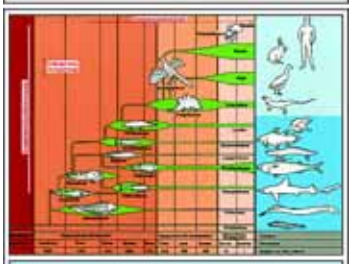
chromosomal inheritance - Consanguinity (inbreeding coefficient) - Frequency of homozygotes and heterozygotes in autosomal-recessive inheritance - Estimated risk on consanguinity and autosomal-recessive inheritance - *D. Behavior genetics - Twin research* - Pedigree of the Bach family - Pedigree of the Darwin-Galton family - What is intelligence? - Frequency distribution of I.Q. values - Frequency distribution of I.Q. values in siblings of persons with different degrees of mental defects - Cytogenetics and clinical appearance of the fragile-X-syndrome - Correlation of I.Q. depending on the degree of relationship - Heritability - I.Q. test data of identical (monozygotic) twins - Twin data depending on school performance - I.Q. test data of female twins above 60 years of age - Position of twins in the uterus - Typical adult identical (monozygotic) twins, front view - Typical adult identical (monozygotic) twins, profile - Oral aspect of the identical (monozygotic) twins - Atypical adult identical (monozygotic) twins, front view - Atypical adult identical (monozygotic) twins, profile - Eye regions of identical (monozygotic) twins - Structure of the iris of identical (monozygotic) twins - Noses of identical (monozygotic) twins, view from the bottom - Siamese twins - Incomplete conjoined twins - Experimental production of complete and incomplete uniovular twins during the early development of amphibians - Fraternal (dizygotic) twins, front view - Fraternal (dizygotic) twins, profile - Eye regions of fraternal (dizygotic) twins - Structure of the iris of fraternal (dizygotic) twins - Ears of fraternal (dizygotic) twins - Hands of fraternal twins - Dermatoglyphics of identical and fraternal twins - DNA-fingerprints of identical and fraternal twins - Identical (monozygotic) triplets - Eye regions of the identical (monozygotic) triplets - Ears of identical (monozygotic) triplets - Twin findings in endogenous psychosis - Family findings in schizophrenia depending on the proportion of common genes - Comparison of concordance rates in manic-depressive twins - Family findings in manic-depressive psychosis depending on the share of common genes - Reasons for and frequency of twin pregnancy

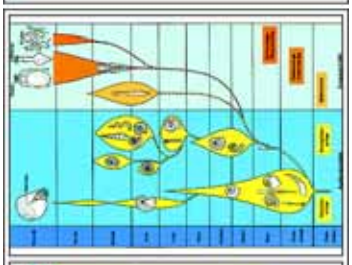


## No. 8228 E **Origin and Evolution of Life Part I** (Comprehensive Version)

*Atlas of 24 OHP Transparencies size 22 x 28 cm, containing 60 color pictures, mostly with several component figures (drawings, diagrams, tables, anatomical pictures, photomicro- and macrographs, fossils, test data and results). -Sketch and work-sheets with semidiagrammatic designs and texts - Compilation and text: Dr. B. Zucht*

**Stellar, chemical and organic evolution. Formation of procaryonts**
The temporal course of evolution: nomenclature - The temporal course of evolution: events and epochs - Origin of the celestial bodies - Origin of the solar system - Rise of light chemical elements - Rise of heavy chemical elements - Landscape of the earth in prehistoric times, scene - The prehistorical landscape as a chemical cooking-pot - Apparatus of MILLER for generation of amino acids in simulated primary atmospheres - Molecular structures of primary spheres - List of authors: Formation of organic compounds in simulated primary atmospheres - Abiotic formation of amino acids - Abiotic formation of oligopeptids - Abiotic formation of polypeptides (proteinoids) - Abiotic formation of purine and pyrimidine bases - Abiotic formation of important bio-molecules by means of hydrocyanic acid as a result of simulated experiments - Simulated polycondensation of amino acids to proteinoids I: heated lave - Simulated polycondensation of amino acids to proteinoids II: melting, formation of steam - Simulated polycondensation of amino acids to proteinoids III: condensation reaction - Simulated polycondensation of amino acids to proteinoids IV: removing of the polymerizates - Abiotic formed proteinoid-microspheres - Formation of co-acervates, simple 'metabolism' of co-acervates - Formation of lipid bilayer, schematic diagram - Formation of longer nucleic acid sequences - Stages of formation and decomposition of polynucleotides - Formation of polynucleotide aggregates - Concentration and formation of specific polynucleotide aggregates - Catalytic reaction net of protein molecules - Complementary reproduction and evolution of nucleic acids - Catalytic circle of protein and nucleic acid molecules. The hyper cycle according to EIGEN - Protobiotics originated from random proteins - Hypothetic propagation of protobiotics - Hypothetic evolutionary stages of reproduction of protobiotics - Early metabolic processes of eobiotics - Basic life forms of eobiotics - Evolutionary stages of metabolism I: Beginning to protobiotics - Evolutionary stages of metabolism II: Protobiotics to procaryotes - Evolutionary stages of metabolism III: Fermenting, respiring, photosynthetic protobiotics - Metabolic processes of the cell, basic scheme - Precambrian evidences of life, scheme - Itabitite. Sedimentation in reducing atmosphere - Precambrian microfossils I: Unicellular organisms of South African Precambrian (about 3 000 000 000 years old) - Precambrian microfossils II: Spherical, filiform, umbrella-shaped organisms of North American gunflint formation (about 2 000 000 000 years old) and cell aggregates and cell colonies of the Australian bitterspring formation (about 1 000 000 000 years old) - Precambrian stromatolithe blue-green algae with azurite as a medium of petrifaction - Stromatolithe algal reefs from the museum of St. Petersburg - Simple present organisms I: Blue-green algae - Simple present organisms II: Bacteria - Evolution course of the living beings, diagram

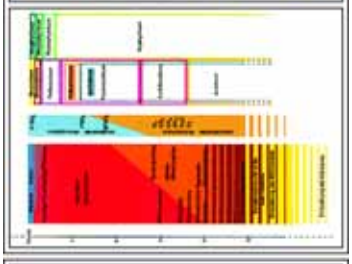


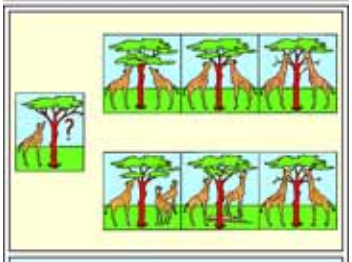


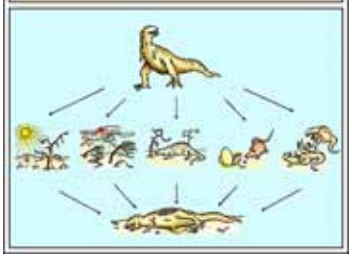
## No. 8229 E **Origin and Evolution of Life Part II** ( Comprehensive Version)

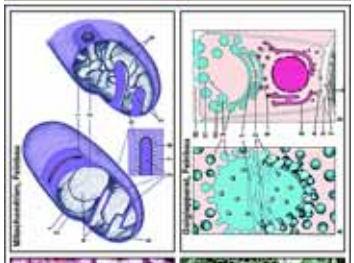
*Atlas of 24 OHP Transparencies size 22 x 28 cm, comprising 45 color pictures, mostly with several component figures (drawings, diagrams, anatomical pictures, nature photographs, photomicro- and macrographs, life cycles, scenes of landscape, fossils, test data and results). - Sketch and work-sheets with semidiagrammatic designs and texts - Compilation and text: Dr. B. Zucht*

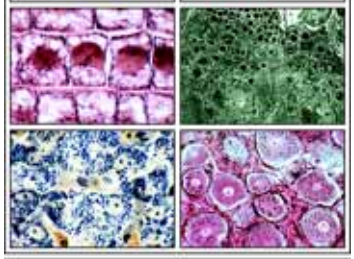
**The biological evolution from the procaryonts to the vegetable and animal kingdom**
Theory of spontaneous generation and realization - Tapestry with a presentation of the Christian Genesis (12th cent.) - Pattern of the descent and ramification of the five phyla of organisms - Rise of the eucyte according to the theory of endosymbiosis — Bacterial endosymbiosis in Amoeba (Pelomyxa) - Development of flagellate eucytes to different algae and other forms of life - Colonial forms of unicellular organisms as a pattern of the development of multicellular organisms - Development of the spore-plants from aquatic to terrestrial forms - Reconstruction of Rhynia (Psilophyta), an early terrestrial primitive fern - Evolutionary lines of terrestrial spore-plants - Evolutionary process according to the telome theory - Phylogeny of leaves according to the telome theory - Positions of sporangia according to the telome theory I - Positions of sporangia according to the telome theory II - Phylogeny of types of vascular bundles according to the stelar theory - Thin section of a fossil actinostele (Lepidodendron) - Psilotum, a present archaic fern. Protostele and actinostele - Selaginella, a moss-fern, fertile stem with sporangia, w.m. - Ginkgo biloba, ginkgo tree, leaves - Dicyema (Mesozoa), a simple animal with body and sexual cells - Gastraea theory according to HAECKEL - Notoneuralia and gastroneuralia theory according to HEIDER - Coelom theory according to REMANE - Hypothetic phylogenetic tree of Deuterostomia - Development of the abdominal cavity in the Coelomates - Evolution of the Chordates I: wormlike animal to lancet-like animal - Amphioxus (Branchiostoma lanceolatum), whole mount - Evolution of the Chordates II: vertebrates - Simplified scheme of ramifications to show the course of evolution in the vertebrates - Morphological variety of an animal group: the evolution of the cephalopoda - Saurians: Ornithischia and Saurischia - Phylogenetic relations among saurians - Comparison of numbers of species of the animals - Course of the earth history. Geological times - Earth history. Table of formations - Cambrian period: Scene of landscape with typical animals and plants - Silurian period: Scene of landscape with typical animals and plants - Devonian period: Scene of landscape with typical animals and plants - Carboniferous period: Scene of landscape with typical animals and plants - Permian period: Scene of landscape with typical animals and plants - Triassic period: Scene of landscape with typical animals and plants - Jurassic period: Scene of landscape with typical animals and plants - Cretaceous period: Scene of landscape with typical animals and plants - Tertiary period: Scene of landscape with typical animals and plants - Quaternary period: Scene of landscape with typical animals and plants

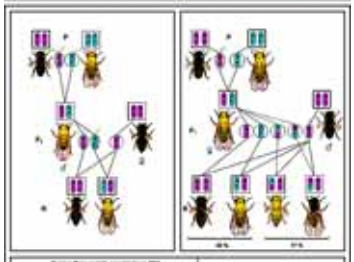


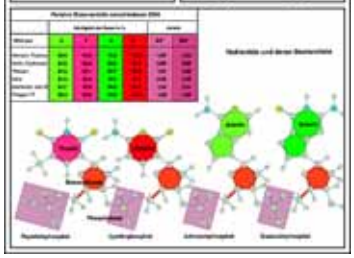












## No. 8230 E **Origin and Evolution of Life Part III** (Comprehensive Version)

*Atlas of 30 OHP Transparencies size 22 x 28 cm, comprising 60 color pictures, mostly with several component figures (drawings, diagrams, anatomical pictures, photomicro- and macrographs, life cycles, scenes of landscape, fossils, test data, results). - Sketch and work-sheets with semidiagrammatic designs and texts - Compilation and text: Dr. B. Zucht*

**Basis, mechanisms and way of evolution of the vegetable and animal kingdom**
Ways of evolution represented for example on the evolution of vertebrates - Morphological homologies I: Cells and cellular structures - Common structure plan of limbs of the vertebrates - Morphological homologies II: Construction plans of mollusks - Morphological homologies III: Formation of notochord and vertebrae - Morphological homologies IV: Graduation of the vertebrate brains - Graduation of the vertebrate heart - The development of vertebrate kidneys - Graduation of the vertebrate lung - Homologies in metabolism I: Adenosine triphosphate (ATP) as an universal energy carrier - Homologies in metabolism II: Comparison between various processes of photosynthesis and chemosynthesis - Homologies in fundamental vital functions: Mitosis in onion root tips - Petrified tree-trunks in the national park 'petrified forest' Arizona USA - Petrified swordtail (Xiphosura) from the Jurassic period (Solnhofen, Germany) - Extinct linking animals: Ichthyostega and Archaeopteryx - Archaeopteryx: Reconstruction and fossil - Living fossil: Swordtail Limulus (Xiphosura) - Important living fossils in invertebrates, vertebrates and vascular plants - Parallelism in the evolution between African and South American animals - Nauplius larvae of various crustacean groups - Embryonic stages of various vertebrate classes - The ancestral development of the horse foot - Foot skeletons of artiodactyla - Embryos with gill clefts. The biogenetic law after HAECKEL - Pelvic rudiments of a whale - Irregular dew-claw of a horse (atavism) - Phylogeny of behavioral pattern in ducks - Biochemical relationship of serum albumins of mammals - Theory of catastrophes according to CUVIER - The Lamarckian theory (inheritance of acquired characteristics) and the Darwinian theory (natural selection) - Modification I: Curves of variation - Different grows of two plantains, one taken from a field, the other taken from a forest - Modification II: Dissimilar growth of parts of a dandelion plant, unsuccessful selection while culturing paramecia - Modification and mutation - Mutation I: Mutagenous effects and mutability - Mutation II: Types of mutation - Mutation III: Various frequency of gene mutations ('hot spots') - Mutation IV: Mutagenic effect by nitrous acid on DNA - Recombination in grass parakeets - Allopolyploidy in wheat - Selection I: Kinds of selection - Selection II: Natural selection and selection by man - Selection III: Cryptic appearance and warning coloration - Selection IV: Quick selection by preadaptation. Industrial melanism of peppered moth (Amphidasys betularia) - Selection V: Extinction of whole animal groups caused by extreme selection - Isolation I: The continental drift theory - Isolation II: Geographical and ecological isolation - The finches of Darwin as an example for endemism - Isolation III: Isolation during reproduction in frogs - Species splitting by separation - Evolution speed. Gene shift - Adaptive radiation of marsupials and mammals - The theory of evolution by synthesis. The co-operation of evolutionary factors in course of time. Genetic landscape - Transspecific evolution. Total view - Principles of the development of forms I: Improvement - Principles of the development of forms II: Gigantism - Principles of the development of forms III: Overdevelopment (hypertely) in a beetle (Lamellicornia) - Spiral lines of ontogeny - Evolutionary history of the horse - Phylogenetic tree based on the structural relationship of cytochrome C - Moss (Bryophytes). Life cycle with all development stages - Fern (Pteridophytes). Life cycle with all development stages - Pine (Gymnospermae). Life cycle with all development stages - The evolution of languages out of the Indo-European primitive language

## No. 8204E **The Origin and Evolution of Life** (Short Version)

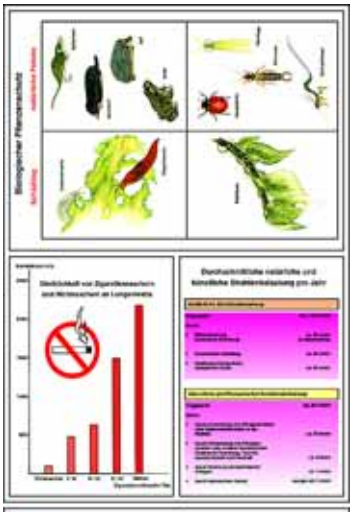
NEW!

*The theory of evolution, that means the history of the descent of organisms, is regarded now as a basic, general and suggestive biological theory. The transparency atlas presents current facts and ideas in order to acquaint the student with the most important views and models of evolution. The arrangement of the series is based on a general conception. The order in principle corresponds to the description of three fundamental subjects of evolution: Problem of the self-organization of bio-systems, the problem of the reconstruction of phylogenies, and the problem of species variation.*
***Contents:***

- *39 Overhead-Transparencies, size 22 x 28 cm, comprising 90 color pictures, mostly with several component figures (drawings, diagrams, anatomical pictures, photomicro- and macrographs, nature photographs, life cycles, scenes of landscape, fossils, test data and results). The color pictures were prepared by university illustrators specializing in this field. The application of a strong, hard-wearing carrier foil warrants great durability.*
- *Sketch and work-sheets with semidiagrammatic designs and texts. Teacher may take photocopies from the sheets and use for classroom work and tests.*
- *Manual with depictured explanatory comments for the teacher. All in strong plastic file with ring-mechanism.*

**Stellar, Chemical, and Organic Evolution. Development of Procaryotes -** The temporal course of evolution: Nomenclature, events and epochs - Origin of the celestial bodies - Origin of the solar system - Landscape in primeval times of the earth - The prehistorical landscape as a chemical cooking pot - Apparatus of MILLER for synthesis of amino acids in simulated primary atmosphere - Simulated polycondensation of amino acids to proteinoids I: Hot lava and amino acids, II: Melting, generation of steam, III: Condensation reaction, IV: Removal of the polymers - Abiogenic production of proteinoid-microspheres - Basic functions of the life of eobionts - Evolutionary stages of metabolism: Primeval mud to protobionts, protobionts to procaryotes, fermenting, breathing, and photosynthesizing procaryotes - Precambrian evidences of life - Precambrian microfossils: Protists from the South African Precambrian, ca. 3 billion years old - Spherical, filiform, umbrella-shaped organisms from the North American Gunflint-formation, and cell filaments from the Australian Bitterspring-formation - The course of evolution of the organisms, diagram - **The Biological Evolution from the Procaryotes to the Vegetable and Animal Kingdom -** Theory of spontaneous generation and realization - Tapestry with a presentation of the Christian Genesis (12th century) - Diagram of the descent and ramification of the five kingdoms of organisms - Possible development of flagellated eucytes to various algae and other life forms - Development of the spore-plants from aquatic to terrestrial forms - Evolutionary lines of terrestrial spore-plants - Hypothetical phylogenetic tree of Deuterostomia - Gastraea theory according to HAECKEL - Evolution of the Chordata: Vertebrata - Simplified scheme of ramifications to show the course of evolution in the vertebrates - Saurians: Ornithischia and Saurischia. Skulls with homologous lower jaw - Phylogenetic relations among saurians - Comparison of numbers of species of the animals - Course of the earth history. Geological times - Earth history. Table of rock formations - Morphological variety of an animal group: Evolution of the Cephalopoda - Cambrian period: Scene of landscape with typical animals and plants - Silurian period: Scene of landscape with typical animals and plants - Devonian period: Scene of landscape with typical animals and plants - Carboniferous period: Scene of landscape with typical animals and plants - Permian period: Scene of landscape with typical animals and plants - Triassic period: Scene of landscape with typical animals and plants - Jurassic period: Scene of landscape with typical animals and plants - Cretaceous period: Scene of landscape with typical animals and plants - Tertiary period: Scene of landscape with typical animals and plants - Quaternary period: Scene of landscape with typical animals and paints - **Basis, Mechanisms, and Ways of Evolution of the Vegetable and Animal Kingdom -** Courses of evolution exemplified by the evolution of vertebrates - Morphological homologies: Formation of notochord and vertebrae, common structural plan of the vertebrate appendages, evolutionary stages of vertebrate brains, hearts, lungs and excretory organs - Extinct intermediate animals: Ichthyostega and Archaeopteryx - Archaeopteryx, fossil and reconstruction - Living fossils: Horseshoe crab Limulus (Xiphosura) - Important living fossils of invertebrates, vertebrates, and vascular plants - Parallel evolution of the African and South American fauna - Nauplius larvae of various crustacean groups - Embryonic stages of various vertebrate classes - The ancestral development

of the horse's foot - Foot skeleton of even-toed ungulates - Embryos with gill clefts, HAECKEL'S biogenetic law - Pelvis rudiments of a whale - Irregular dewclaw of a horse (atavism) - Biochemical relationship of vertebrate serum proteins - Catastrophe theory of CUVIER, documented by "Scheuchzer's skeleton" - Lamarckism (inheritance of acquired characters) and Darwinism (natural selection) - Modification: Curve of modification - Modification: unsuccessful selection in culturing Paramaecium - Mutation: Mutagenous influences and mutability - Mutation: Types of mutation - Selection: Quick selection by preadaptation. Industrial melanism of the peppered moth (Biston betularia) - Selection: Extinction of whole animal groups by extreme selection - Isolation: The continental drift theory - Isolation: Geographic and ecological isolation. Endemism of DARWIN's finches - Speciation by geographic separation - Adaptive radiation of marsupials and mammals - Forming principles: Perfection, gigantism, hypertely of a lamellicorn beetle, individual and ancestral development of stag's antlers - Transspecific evolution, diagram - Ontogenic spirals - Evolution of the horse - Phylogenetic tree based on structural relationship of cytochrome C - Evolution of languages from the primeval Indo-European language.



## No. 8232 E **Our Environment - Threats and Protection**

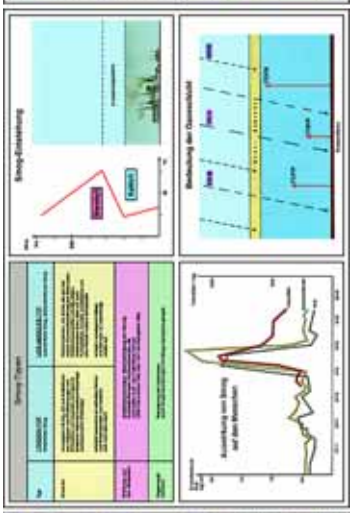
*Atlas of 36 OHP Transparencies size 22 x 28 cm, comprising 74 color pictures, many with several component figures (drawings, diagrams, tables, schemes, landscape photographs and pictures, scenes, nature photographs, photomicrographs and macrographs, diagrammatic designs, test data and results). - Manual with comprehensive interpretation text, drawings and designs. - Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. - Compilation and text: Dr. Joachim Mueller*

Exemplifying dangers to the environment typical of Central Europe and methods of conservation practiced, this series of transparencies shall help the teacher to introduce universal valid and acute fundamentals of ecology and protection of the environment. Not only in Europe, but all over the world, mechanization of all areas of life and its consequences change the structure of nature, destroy our environment, and finally endanger the basis of our life. The newly curricula of all types of schools provide instruction of the subject complex „Environment - threats to environment - protection of environment". This series transparencies offers visual aids to improve this instruction. Typical examples show which processes are changing the natural structure of our environment and how the dangers arising from this can be counteracted.

**I. The Landscape. -** Old type of land developed and cultivated by humans in Central Europe (color photo) - Monoculture (color photo) - Culture steppe (color photo) - Woodland (color photo) - Healthy trees (color photo) - Sick forest (color photo) - Distinctive marks of damaged trees (color photo) - Stages of damaged tree - Natural course of a running water (color photo) - Straightened course of a running water (color photo) - Recultivation of a closed waste disposal site, general view (color photo) - Ditto. diagram of transection - Stag heap (color photo) - Incorporation of stag heap into the landscape (color photo) - Nature reserves (color photo) - Water reservation (color photo) - Drinking water dams (color photo) - Animals extinct or in danger of extinction in the 20th century, selection (table) - Heavily endangered animals, selection (table) - Plants extinct or in danger of extinction in the 20th century, selection (table) - Heavily endangered plants, selection (table)

**II. Soil and Water. -**Average number of small animals in the top layer of meadows, pastures, and forests (table) - Unsightly open dumping (color photo) - Controlled waste disposal site, general view of site (color photo) - Controlled waste disposal site, detail view (color photo) - Controlled waste disposal site (diagram of structure) - Compostable and non-compostable components of waste (graph) - Composting of waste (diagram) - Wild burning of waste in the open country (color photo) - Incinerating plant, function (diagram) - Introduction of sewage into a flowing water (color photo) - Change of oxygen content of a flowing water caused by introduction of sewage (graph) - Full biological sewage plant (diagram) - Primary, mechanical treatment in a sewage plant: grit, sand catch (color photo) - Primary, mechanical treatment in a sewage plant: primary sludge basin (color photo) - Mechanical treatment in a sewage plant: function (diagram) - Biological treatment in a sewage plant: activated sludge basin (color photo) - Ditto: activated sludge basin (color photo) - Ditto: function of activated sludge (diagram) - Ditto: organisms of the activated sludge (drawing) - Ditto: drip towers (color photo) - Ditto: drip towers, function (diagram) - Basin for secondary clarification (color photo) - Chemical clarification of sewage (graph) - Causes for salting of surface- and ground water (graph) - Dangerous concentrations of harmful substances in the water (table) - Chemical pest control (color photo) - Biological chain of pesticides (graph) - Biological pest control, pests and their natural enemies, selection - Biological pest control by plants (table) - Contamination of the environment with heavy metals (graph) - Accumulation of poisonous heavy metals in the food chain (graph)

**III. The Air. -**Structure of the terrestrial atmosphere - Importance of the ozone layer (diagram) - Exposure to natural and human-made radiation (table) - Half-life of radioactive isotopes (table) - Main storage organs for radioactive isotopes (table) - Various radiations (table) - Sensitivity to radiation (table) - Types of smog (table) - Development of smog (diagram) - Effect of smog on humans (graph) - Consumption of air and oxygen by humans and motor vehicles (table) - Dangerous substances in exhausts from combustion motors (table) - Fluctuation of CO-concentration in the air of a main thoroughfare (graph) - Effect of CO on humans (table) - Plants damaged by polluted air (color photo) - Buildings damaged by polluted air (color photo) - Lichens indicate air pollution (color photo) - Harmful substances in tobacco smoke and their effect on humans (table) - Mortality by lung cancer of cigarette-smokers and non-smokers (graph) - Power of various noises (graph) - Noise map of a big town (graph) - Effect of noise on humans (table)



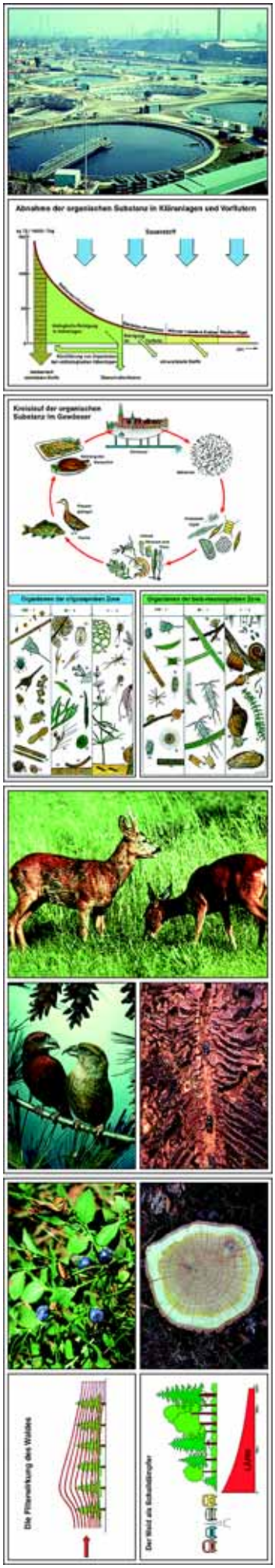
## No. 8233 E **Our Waters, Problems of Pollution, Methods of Protection and Recycling**

*Atlas of 42 OHP Transparencies size 22 x 28 cm, comprising 118 color pictures, some with several component figures (drawings, diagrams, tables, schemes, landscape photographs and pictures, nature photographs, photomicrographs and macrographs, technical photographs, test data and results). - Manual with comprehensive interpretation text, drawings and designs. - Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. - Compilation and text: Prof. Dr. Otto Klee*

**Themes:** Due to progressing pollution, bathing in rivers, ponds, or lakes has become rather risky, drinking their water is dangerous. Technical requirements additionally changed the „water landscape". This atlas of transparencies at hand informs about the dangers to our waters, treats general questions of pollution and clarification of surface waters, shows the importance of analysis and control, describes the methods of clearing sewages, and discusses natural treatment of flowing waters as well as steps to redevelop lakes.

**Running and standing waters in land developed and cultivated by humans**. Dynamic hydrosphere, diagram - Natural water cycle, diagram - Natural dynamic of water: waterfall - Clear mountain creek. Natural purification and oxygenation - Big stones on the banks of mountain creek - Creeks and rivers coming from wooded areas ensure steady flow and deep temperature - Correcting of the course and covering the banks with concrete depopulates a river and lowers the neighboring ground water level - Cutting down trees and shrubs on river banks, a wrong step.

**Natural structure of a running water**. Subdivision of a running water into head-waters, creek, river, and brackish water region, diagram - Morphology of a running water with upper, middle, lower reaches including erosion and sedimentation



regions, diagram - Build-ups, weirs protect from high water and serve to raise the ground-water level - Line of water-level duration and profile of bank vegetation - Change of the transverse profile to shade the water and lower its temperature, diagram - Installation of small steps on the bed to raise the water-level - a) steps of local stone, - b) groynes and disturbing stones support the dynamic development of the water - Protected by trees and shrubs, the water gradually runs a natural course with undercut bank and slope. - Fish ladders improve biotope - Measures to protect flat and steep coasts, diagram - Active cliff - Marram grass (*Ammophila arenaria*) fixes shores and dunes

**Water tests and survey**. Test of water quality: determination of temperature - Test of water quality: electrometrical determination of oxygen content, conductivity, and pH - Taking water samples: measuring contents of oxygen, conductivity and pH with electric gauge - Analysis of water in the laboratory - Fully automatic testing of water in laboratory installed close to a river

**Grades of waters**. Grade I: pure water zone of a mountain creek (oligosaprobic zone) - Bioindicators (organisms) of grade I (oligosaprobic zone) - Grade II: moderately polluted surface water (beta-mesosaprobic zone) - Bioindicators (organisms) of grade II = Moderately polluted zone (beta-mesosaprobic zone) - Grade III: heavily, critically polluted surface water (alpha-mesosaprobic zone) - Bioindicators (organisms) of grade III = heavily polluted zone (alpha-mesosaprobic zone) - Grade IV: extremely polluted superficial water (polysaprobic zone) - Bioindicators (organisms) of grade IV = extremely polluted zone (polysaprobic zone) - Extremely polluted water (grade IV, polysaprobic zone) of an oasis - Water grades between source and mouth of a river, graph - Subdivision of a running water according to degree of organic pollution, grades of saproby, saproby index, identifying colors, and oxygen minima - Chemical criteria for grades of biological pollution, table - Classification of running waters according to bacteriological findings

**Pollution of waters by introduction of sewage**. Cycle of organic substances in the water, diagram - Mouth of a sewage drain on the Mediterranean shore - Same place of shore with bathing persons. Extreme danger of infection ((cholera, typhoid, paratyphoid, enteritis) - Introduction of unprocessed sewage of a town with 100 000 inhabitants into a river - Introduction of dairy sewage into a standing water - Introduction of dyes into a brook - Creek, totally destroyed by hot effluents containing stains - Creek, extremely polluted with domestic sewage and waste - Effluents of an iron factory color the water and the bed red-brown - Destruction of natural biocoenosis by deposition of non-ferrous metal sludge - Use of wood for poison dump killed trees by toxic quantities of chromate - Introduction of liquid manure containing proteins causes formation of scum - Highly polluted effluents drawing out of cellulose plant - Ligninsulphonic acid contained in cellulose effluents colors creek dark - Consequence of introducing cellulose effluents: bacteria (*Sphaerotilus natans*) and fungi (*Leptomites lacteus*) produce great quantities of mucilage - Oil floating on water - Physical, chemical, and biological processes decompose oil floating on water, diagram

**Eutrophication of lakes and running water**. Eutrophication of a river by introduction of phosphates and nitrates - Eutrophication (lack of oxygen) and pollution cause death of fish - Completely eutrophicated lake due to introduction of domestic sewage and liquid manure - Odors caused by microorganisms forming alga bloom, diagram - Mass reproduction of algae I: *Euglena viridis* - Mass reproduction of algae II: *Asterionella formosa* - Production of methane and hydrogen sulphide in the marginal zone of an eutrophicated lake - Mass reproduction of jellyfish in the sea indicates unbalanced biological equilibrium - Jellyfish, photograph

**Redevelopment and restoration of lakes**. Unspoiled oligotrophic mountain lake - Polysaprobic lake with extreme alga growth - Phosphorus cycle in a lake, diagram - The lake, a phosphate trap: cause of accelerated refertilization - trophication spiral, diagram - Reoligotrophication of lakes due to external and internal treatment, reduction of nutrient spiral to normal nutrient cycle, diagram - Reoligotrophication I: installation of deep water drain for various zones - Installation of deep water drain - Percentage biomass of the various alga groups after deep water drainage - Reoligotrophication II: addition of oxygen to deep water (hypolimnion), diagram - Reoligotrophication III: injection of nitrates for biochemical oxidation of reduced sediments - Manipulation of food chain: purposeful fishing of zooplankton-eating fish reduces algae-eating zooplankton - Manipulation of food chain: reduction of zooplankton-eating fish increases number of predaceous ones, diagram - Fishing manipulates food chain

**Purification and protection of waters, methods**. Removal of organic substances by mechanical and biological processes in sewage plants and recipients, diagram - Structure and function of a sewage plant - Retention of coarse particles by the grit - *1st Cleaning step* - Size of particles in sewage, diagram - Fluctuations of urban sewage quantity during 24 hours, diagram, - Long sand catch with gauge for water quantity - Basin for primary sedimentation with clearing bridge - *2nd Cleaning step* - Drip tower filled with synthetic elements - Section through a drip tower, diagram - Decrease of biochemical oxygen demand during 5 days indicates biological clarification - Biological clarification of sewage with diving cylinders. - View on a group of drip towers filled with synthetic elements to clear effluents from a paper mill - Drip tower with water circulation and filled with synthetic elements - General view of a modern full biological activated sludge plant - Turbines swirl and aerate - Aeration of activated sludge by bubbles - Aeration of activated sludge by tubes - Organisms in the activated sludge basin, diagram - Organisms in activated sludge I. Vorticella microstoma - Organisms in activated sludge II. Rotaria rotatoria - Clarification of sewage with pure oxygen, diagram - Supply with pure oxygen in closed system by surface aeration (Detroit, USA) - Biocoenosis of activated sludge treated with pure oxygen I: mass reproduction of Carchesium polypinum - Ditto. II: Vorticella convallaria - Basin for secondary sludge in big oxygen treatment sewage plant (Detroit, USA) - Flow over of the purified water - Function test by determination of sludge volume, sludge weight and sludge index, diagram - *3rd Cleaning step* - Phosphate elimination by chemical precipitation in sewage plant - Denitrification eliminates nitrogen - *Anaerobic sludge fermentation* - Fermentation (digestion) of sludge in fermentation towers - Fermentation (digestion) in separate towers, diagram - Efficiency of various clarification steps in a sewage plant

**Acidification of surface waters - Biocides in waters**. Effects of sour rain on aquatic ecosystems, diagram - Lake in Sweden with high acidification - Toxic pH-limit in acid and basic range, diagram - Summary of various contacts of biocides with water, diagram - Accumulation of biocides in the food chain of various aquatic organisms - Direct entry of biocide sprays into the water

**Drinking water - Summary**. Future demand of water in Sweden (industrial, domestic), diagram - Introduction of surface water into a drinking water plant - Precipitation of unwelcome substances - Filtration with sand - Inconsiderate exploitation of water - Good use and processing of water

## No. 8234 E **The Forest - Essential to Life**

*Atlas of 30 OHP Transparencies size 22 x 28 cm, comprising 81 color pictures, some with several component figures (drawings, diagrams, tables, designs and photographs of plants and animals, photomicro- and macrographs, life cycles, scenes, landscape photographs). - Manual with comprehensive interpretation text, drawings and designs. - Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file. - Compilation and text: Hartmut Dietle*

**Themes:** This series of overhead projector transparencies presents plants and animals typical of the various forest types and their margins. The text introduces into the biology of species, informs about various interrelations between plants, animals, and humans in the ecosystem „forest“, and explains the vital functions of the forest. Instructive graphs are added.

Forest, not only in Central Europe, is threatened by excessive lumbering, demand of agricultural areas, construction of houses, roads, ski-lifts etc., as well as by human-made environmental pollution. As forest means life, it is necessary and vital to give information and knowledge about forest and its problems. The forest as an ecological system. Plants and animals of the wood. The multifarious functions of the forest.

**Trees of the Forest. -** Mixed deciduous forest - Spruce (Picea excelsa) monoculture - Silver fir (Abies alba) - Spruce (Picea excelsa) - Pine (Pinus silvestris) - Douglas fir (Pseudotsuga taxifolia) - European larch (Larix decidua) - Common beech (Fagus silvatica) - Stone oak (Quercus sessilis or petraea) - Winter lime (Tilia ulmifolia) - Black alder (Alnus

glutinosa) - Ash (Fraxinus excelsior) - Mountain ash or rowan tree (Sorbus aucuparia) - White or canoe birch (Betula pendula) - European mountain maple (Acer platanoides)

**The layers of the forest. -** Moss cushion (Polytrichum) - Moss (Mnium) with capsules - Horsetail (Equisetum sylvaticum) - Horsetail, spores with hapters - Shield fern (Aspidium), leaflets with sori - Fern gametophyte (Prothallium) with antheridia and archegonia - Mushroom (Xerocomus badius) - Mushroom: basidia and basidiospores of ink-cap (Coprinus) - Flowering plants: anemones (Anemone) and woodruff (Asperula) - Wood sorrel (Oxalis): soil indicator - Mezereum (Daphne): soil indicator - Arum (Arum maculatum) - Blueberry (Vaccinium myrtillus) - Shrub layer: blackthorn (Prunus spinosa), whitethorn (Crataegus) - Shrub layer: hazel (Corylus avellana), wild rose (Rosa) - Step-shaped forest margin - Layers of the forest, graph - Flat and deep rooting plants, graph - Ladies tresses (Neottia), root with endotrophic mycorrhiza, t.s.

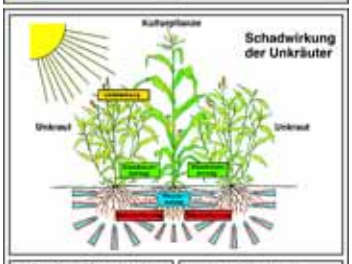
**The forest during the seasons. -** Opening bud - Beech seedling - Maple seedling (Acer platanoides) - Seedling of silver fir (Abies alba) and pine (Pinus silvestris) - Male flower of pine - Female flowers of pine - Cones of silver fir and spruce, comparison - Natural regeneration of forest - Summer aspect of forest - Sun- and shade-leaf of beech, t.s. - Annual rings, t.s. of oak stem - Coloring of leaves in autumn - Dispersal of fruits and seeds, graph - Forest in winter: protection of animals

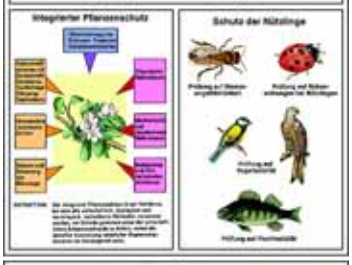
**Animals of the Forest. -** Life on and in the forest floor - Red wood ant (Formica rufa) - Wood snipe (Scolopax rusticola) - European fir titmouse (Parus ater) - Black woodpecker (Dryocopus martius) - Crossbill (Loxia curvirostra) - Pellets of an owl (Strix aluco) - Spruce engraver- or bark-beetle (Cryphalus picea) imago and larva (pests) - Engraving pattern of spruce engraver-beetle - Gypsi moth (Lymantria monacha), imago (pest) - Roebuck and roe (Capreolus) - Fraying roebuck - Silver fir damaged by roes - Red fox (Vulpes vulpes) - European squirrel (Sciurus vulgaris) - Tree marten (Martes martes)

**Functions and endangering of the forest. -** Erosion caused by deforestation - Fireweed (Epilobium angustifolium) growing on clearings - Forest holds the soil on steep slopes - Forest stores water: wood brook - Filter effect of forest, graph - Forest and residential areas, exchange of air, graph - Forests are sound absorbents, graph - Forest improves climate - Forest, a recovering resort - Wild waste disposal at forest margin - Willful destruction of tree bark - Offence against forest law: improper felling of birches - Destruction of forest by ski-lifts - Effects of environmental pollution: yellowed needles - Effects of sour rain: dying spruces - Dying forest („waldsterben") due to air pollution - Lichens on trees are bioindicators for air pollution

## No. 8235 E **Protecting Crops from Damage and Diseases**

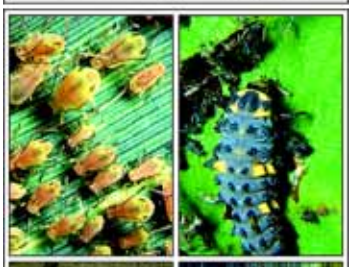
*Atlas of 30 OHP Transparencies size 22 x 28 cm, comprising 101 color pictures, some with several component figures (drawings, diagrams, tables, designs and photographs of plants and animals, photomicro- and macrographs, life cycles, scenes, nature photographs, landscape photographs). - Manual with comprehensive interpretation text, drawings and designs. -Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. - Compilation and text: Hartmut Dietle and Dr. Anton Mittnacht*



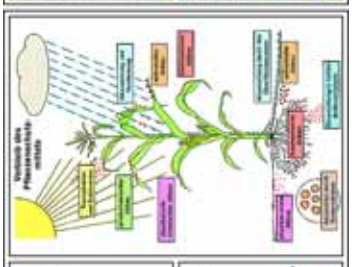
**Themes:** Plants and vegetable products (stocks, store) have to be protected from pests and diseases to avoid economically important parts of plants to be quantitatively and qualitatively damaged. Preventive steps (plant hygiene) and direct protective measures (physical, biochemical, biological, and chemical methods) are used by farmers, gardeners, and hobby gardeners in the defense of harmful plants and animals.

**Economically important diseases of plants. -** Powdery mildew of grain *(Erysiphe graminis)*, ascomycete - Breaking stem of grain *(Pseudocercosporella herpotrichoides)*, fungus imperfectus - Brown spelt of grain *(Septoria nodorum)*, fungus imperfectus - Bunt of wheat *(Tilletia tritici)*, basidiomycete - Ergot on rye *(Claviceps purpurea)*, ascomycete - Reduction disease of potato *(*various viruses) - Rottenness of potato *(Phytophthora infestans)* phycomycete - False mildew on vegetables *(Peronospora sp.)*, phycomycetes - Mildew of cucumber *(Erysiphe cichoriacearum)*, ascomycete - Bean rust *(Uromyces appendiculatus)*, basidiomycete - Scab on fruit *(Venturia inaequalis* resp. *pirina)*, ascomycete - Gray mold on fruit *(Botrytis cinerea)*, fungus imperfectus - Fungus, a heterotrophic plant, graph - Polynucleate sprout of *Botrytis* spore allows gene combination, fungus imperfectus



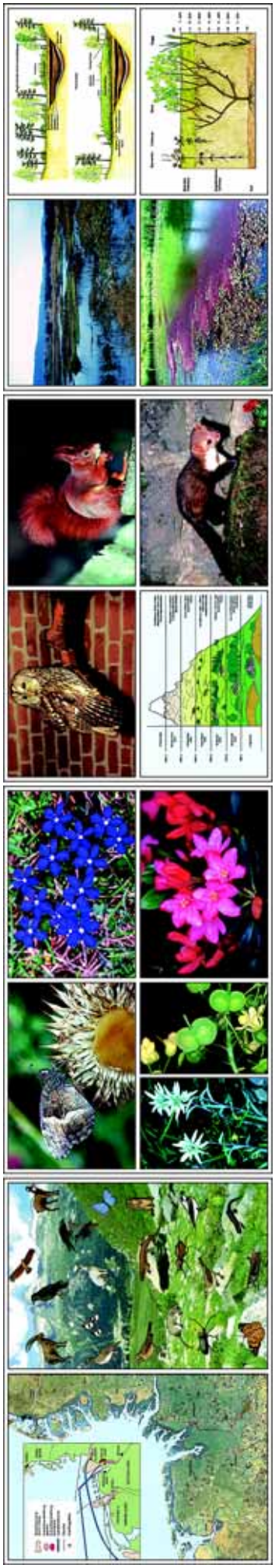
**Photomicrographs of fungi causing plant diseases. -** Potato wart (*Synchytrium endobioticum*), infects tubers, t.s. - False mildew of grapes (*Plasmopara viticola*), leaf with conidiophores, t.s. - Clubroot of cabbage (*Plasmodiophora brassicae*) infected cells with young plasmodia, t.s. - Clubroot of cabbage (*Plasmodiophora brassicae*), host tissue with spores, t.s. - False mildew on cruciferae (*Peronospora parasitica*), t.s. - White smut (*Albugo candida*), mycelium and conidia, t.s. - Head mold (*Mucor mucedo*), zygomycete, sporangia with spores - Mold (*Rhizopus*), zygomycete, formation of zygospore - Disease of plums (*Taphrina pruni*), with asci and ascospores, t.s. - Scab on pears (*Venturia pirina*), conidia, t.s. - Ergot (*Claviceps purpurea*), perithecial head with asci, l.s. - Ergot (*Claviceps purpurea*), sclerotium formed of hyphae, l.s. - *Pilobolus*, sporophorous hypha with sporangium - Mildew on apple (*Podosphaera leucotricha*), conidiophores on leaf - *Penicillium*, mycelium and brush-shaped conidiophores - *Aspergillus*, mycelium and conidiophores - *Sclerotina fructigena*, conidia on surface of fruit - Gray mold on onions (*Botrytis allii*), t.s of leaf. - Tar spot on maple leave (*Rhytisma acerinum*), t.s. of sclerotium - Yeast (*Saccharomyces*), spore formation - Corn smut (*Ustilago maydis*), spores in tissue - Black stem rust of wheat (*Puccinia graminis*), urediniospores (yellow rust), on leaf of wheat t.s. - Black stem rust of wheat (*Puccinia graminis*), teliospores (black rust) on leaf of wheat, t.s. - Black stem rust of wheat (*Puccinia graminis*), aecidia on leaf of barberry.

**Vegetable pests: weeds. -** Table of weeds - Some common weeds - Four grasses competing with cultivated plants - Chalky soil loving plant: Charlock *(Sinapis arvensis)* - Acid soil loving plant: Wild radish *(Raphanus raphanistrum)* - Nitrogen loving plant: Common chickweed *(Stellaria media)* - Indicator of wetness: Horsetail *(Equisetum arvense)* - Weed in meadowland: Common dandelion *(Taraxacum officinale)* - Weed germinating in spring *(Avena fatua)* - Weeds germinating in summer: many seeded goosefoot or pigweed *(Chenopodium polyspermum)* - Weed germinating in autumn: chamomile *(Matricaria chamomilla)* - Weeds damage by deprivation of light, water, nutrients, space; graph - Erosion



**Economically important animal pests. -** Piercing-sucking mouth parts of a bug, photomicrograph - Red spiders, Tetranychidae, on leaf of fruit tree - Codlin moth *(Laspeyresia = Carpocapsa pomonella)* - Apple weevil *(Anthonomus pomorum)*, a snout beetle, Curculionidae - White fly *(Trialeurodes)*, Aleyrodidae - Scale insect *(Coccidae)* on salad - Grain aphid *(Sitobium granarium)*, Aphidae - Biting-chewing mouth parts of cockroach *(Periplaneta)* - Radish-root maggot *(Phorbia floralis)*, Anthonomyiidae - Beet leaf-miner *(Pegomyia betae)*, Anthonomyiidae - Rape beetle *(Meligethes aeneus)*, Nitidulidae - Flea-beetle *(Phyllotreta vittata)*, Chrysomelidae - European corn-borer *(Ostrinia = Pyrausta nubilalis)*, Pyraustinae - Frit-fly *(Oscinella frit)*, Chloropidae - Caterpillar of *Pieris brassicae*, Pieridae - Colorado potato beetle *(Leptinotarsa decemlineata)* Chrysomelidae - Radula of the slug *Deroceras*, Limacidae - Common garden slug *(Deroceras agreste)*, Limacidae - Field mouse *(Microtus arvalis)*, Muridae - Vole *(Arvicola terrestris)*, Muridae - Sparrow, pheasant - Muskrat *(Ondrata cibethica)*, Muridae

**Measures and methods of plant protection. -** Cultivating the soil (plowing, harrowing), protective measure - Preparation of the seed bed, protective measure - Selection of type, protective measure - Disinfection, treatment of seed, protective measures - Rotation of crops: sugar beets, winter wheat, summer grain, corn, field forage - Physical method of weeding - Mechanical method of weeding - Chemical methods of weeding - Steaming of the soil - Chemical measures: Distribution of the total quantity of active substance - Legal requirements: Law of plant protection; procedure of authorization - Legal requirements: Permissible consumer level - Importance of plant protection for business management and work - What happens with pesticides in nature? - Legal requirements: Protection of environment and bees -



Research on metabolites in laboratory, gas chromatography - Biological measures: Ichneumon fly in greenhouse - Biological measures: Predative mites in greenhouse - Biological measures: Ladybird beetles against aphids - Biotechnical methods: Frightening by bang

**Integrated protection of plants. -** What is integrated protection of plants? - Integrated protection of plants in apple plantations - Economic damage limit - Light trap - Knocking method - Pheromone trap - Electronic scab warning instrument - Conventional method: Mills' table - Protection of useful animals

## No. 8238 E **Ecosystems**

NEW!

*Atlas of 42 OHP Transparencies size 22 x 28 cm, comprising over 210 color pictures, mostly with several component figures (drawings, diagrams, tables, schemes, landscape photographs and pictures, nature photographs, photomicrographs and -macrographs, scenes, diagrammatic designs, test data and results). The series is designated for use in all types of schools, secondary schools, colleges and adult education. - Manual with comprehensive interpretation text - Sketch and work-sheets with semidiagrammatic designs and texts - Compilation: Dr. Rainer Ertel and Dr. Bernd Zucht*

**Themes:** Natural biological communities become rarer and rarer. Their abundance of species, the problems of their preservation as well as their importance for the whole ecological structure, even for inconspicuous microbiotopes, are treated in these series on hand and documented by characteristic examples. Almost all of the details are photographed in their natural site to secure the greatest possible authenticity. The included texts give detail information on the biology of the species as well as on the development and ecology of the biotope.

**Ecosystem Pond. Plant Society. -** Pond on working days - Pond on weekends - Zone of warping (picture) - Zone of warping (diagram) - Plant living submerged: Chara sp. - Plant with submersed leaves: water buttercup (Ranunculus aquatilis) - Plant with submersed leaves: water milfoil (Myriophyllum sp.) - Plant with submersed leaves: water pest (Elodea canadensis) - Plant with floating leaves: yellow and white pond lily (Nuphar sp.) - Plant with floating leaves: water aloe (Stratiotes aloides) - Reed bed: reed (Phragmites communis) - Reed bed: cat-tail (Typha latifolia) - Reed bed: bur-reed (Sparganium erectum) - Shallow water: water plantain (Alisma plantago-aquatica) and duck weed (Lemna sp.) - Shallow water: arrow head (Sagittaria sagittifolia) - Shallow water: iris (Iris sibirica) - Shallow water: marsh trefoil (Menyanthes trifoliata) - Shallow water: horsetail (Equisetum fluviatile) - Shallow water: mare's tail (Hippuris vulgaris) - Sedge belt: swamp-rush (Heleocharis sp.) - Forest peat - Village pond - Artificial scenery with ponds - School pond

**Ecosystem Pond. Animal Society. -** Zone of warping of a pond with animals, schematic figure - Fresh-water jellyfish, Craspedacusta sp. - Moss animal (Bryozoans) - Fresh water Snail, Planorbis orbicularis - Fresh water Snail, Puccinea putris - Fresh water Mussel, Unio sp. - Reed Spider, Aranea cornuta - Malaria Mosquito, Anopheles spec. - Alder Fly (Drone Fly), Sialis lutaris - Damselfly, Coenagrion - Dragonfly, Aeschna cyanea - Water Strider (Skipper), Gerris sp. - Carp, Cyprinus carpio - Pike, Esox lucius - Frog, Rana esculenta - Frog spawn, Rana esculenta - Ring Snake (Common Grass Snake), Natrix natrix - Great Reed Warbler, Acrocephalus arundinaceus - Little Bittern, Ixobrychus minutus - Coot, Fulica atra - Gadwall, Anas strepera - Great Crested Grebe, Podiceps cristatus - Muskrat, Ondatra zibethica - Water Shrew, Neomys fodiens

**Ecosystem Puddle. -** Melt-water puddle in the mountains - Frogs in snow-puddle - Red colored puddle, caused by flagellates - Euglena sanguinea, unicellular red flagellate - Lowland puddle - Branchipus - Water flea, Daphnia and Ephippium with winter eggs - Cartwheel trace with toads, Bombina - Fire-bellied Toad, Bombina variegata - Wood puddle - Molge in wood puddle, Triturus alpestris - Small puddle in root region of fallen tree - Water Striders in a puddle, Gerris sp.

**Ecosystem Moor. -** Formation of an upland moor I: zones of warping of ponds (diagram) - Formation of an upland moor II: low moor and forest peat (diagram) - Formation of an upland moor III: raised bog (diagram) - Bog with wool grass, Eriophorum - Forest peat - Upland moor (Raised bog) - Marginal slope of an upland moor - Peat Moss, Sphagnum, habitus - Leaf of peat moss, Sphagnum, with water-storage cells - Dying wood at the edge of a moor - Survival of plants in moors: Protection against suffocation by peat moss Sphagnum (diagram) - Hummocks and hollows - Fenberry, Vaccinium oxycoccus - Blueberry, Vaccinium myrtillus, flowers and fruits - Cranberry, Vaccinium vitis-idaea - Heather, Erica. Ling, Calluna - Black Crowberry, Empetrum nigrum - Star Moos, Mnium - Sedge Grass, Carex pauciflora - Sundew, Drosera - Butterwort, Pinguicula - White Birch, Betula pubescens - Moor pine, Pinus montana - Peat cut - Backswimmers, Notonecta glauca - Moor Frog, Rana arvalis - Common Viper, Vipera berus - Black Crouse, Lyrurus tetrix

**Ecosystem Forest. -** Schematic figure of the sections of the wood - Moss, Polytrichum (soil protection) - Club moss, Lycopodium (soil protection) - Fern, Aspidium, (soil protection) - Blueberry, Vaccinium myrtillus, (soil protection) - Privet, Ligustrum vulgare - Whitethorn, Crataegus oxyacantha - Holly, Ilex sp. - Spruce, Picea sp. - Beech, Fagus silvatica - Red Ant, Formica rufa - Shepherd Spider, Opilio sp. - Crab Spider, Thomisus sp. - Camberwell beauty (butterfly), Nymphalis antiopa - Common Yellow Underwing (butterfly), Noctua pronuba - Long Horned Beetle, Cerambyx cerdo - Stag Beetle, Lucanus cervus - Scolytid Beetle, Ips typographus, gallery design - Grass Frog, Rana temporaria - Toad, Bufo bufo - Common Lizard, Lacerta vivipara - Heron, Ardea cinerea - Goosander, Mergus merganser, breeding place - Goshawk, Accipiter gentilis - Capercaillie, Tetrao urogallus - European Woodcock, Scolopax rusticola - Tengmalm's Owl, Aegolius funereus - Black Woodpecker, Dryocopus martius - Crossbill, Loxia curvirostra - Common Shrew, Sorex araneus - Bank Vole, Clethrionomys glareolus - Yellow-necked Field Mouse, Apodemus flavicollis - Red Squirrel, Sciurus vulgaris - Beach Marten, Martes foina - Red Deer, Cervus elaphus

**Ecosystem Alpine Meadows. Plants. -** Alpine meadow zone, schematic figure - Alpine meadow zone, landscape - Flora destroyed by winter sports - Crustose lichen, Rhizocarpon geographicum - Foliose lichen, Haematomma sp. - Alpine meadow grass, Poa alpina - Grassland, Nardus stricta - Fern, Botrychium lunaria - Alpine birch, Betula nana - Gentian, Gentiana verna - Gentian, Gentiana punctata - Alpine Rose, Rhododendron ferrugineum - Alpine Soldanel, Soldanella sp. - Biscutella laevigata, an Alpine crucifere - Rampion, Phyteuma sp. – Pasque flower, Anemona pulsatilla - Mountain Avens, Dryas octopetala - Lion's Foot, (edelweiss), Leontopodium alpinum - Lilium martagon, an alpine lily - Nigritella nigra - Orchis globosus, an alpine orchid - Dwarf Pine, Pinus mugo

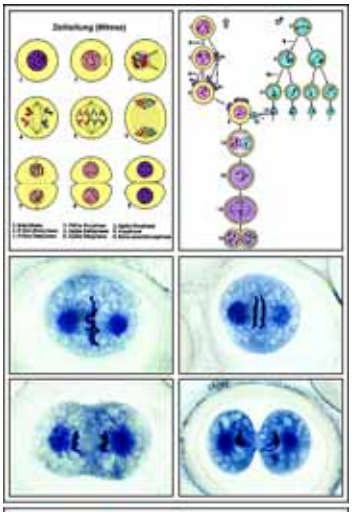
**Ecosystem Alpine Meadows. Animals. -** Ecological niches for the animals of the high mountain region - Alpine Blue Butterfly, Lycaena sp. - Painted Lady, Vanessa cardui - Gaurotes virginea - Alpine Carabid Beetle, Carabus sp. - Siberian Grasshopper, Gomphocerus sibiricus - European Black Salamander, Salamandra atra - Mountain Lizard, Lacerta vivipara - Golden Eagle, Aquila chrysaetos - Alpine Ptarmigan, Lagopus mutus - Water Pipit, Anthus spinoletta - Alpine Accentor, Prunella collaris - Wheatear, Oenanthe oenanthe - Snow Finch, Montifringilla nivalis - Alpine Chough, Pyrrhocorax graculus - Raven, Corvus corax - Snow Vole, Microtus nivalis - Blue Hare, Lepus timidus - Marmot, Marmota marmota - Ibex (Steinbock), Capra ibex

**Ecosystem Mud-flats (Shallows). -** Shallow coast, schematic figure - Shallow coast, photograph - Shoal sand - Shoal mud - Animals, living in the shoal sand and mud (schematic figure) - Lugworm, Arenicola marina - Sea Annelid, Nereis diversicolor - Annelid, Lanice conchilega - Annelid, Heteromastus filiformis - Sea Mussel, Mytilus edulis - Mussels, Scrobicularia plana (Hen) and Solenidae sp. - Soft-shelled Clam, Mya arenaria - Common Periwinkle, Littorina littorea - Shallow Snail, Hydrobia ulvae - Common Cockle, Cardium edule - Shore Crab, Carcinus maenas - Shrimp, Crangon crangon - Shrimp fishing-boat - Plaice, Pleuronectes platessa - Marine Polychaete, Nereis diversicolor - Common Shelduck, Tadorna tadorna - Ringed Plover, Charadrius hiaticula - Dunlin, Calidris alpina - Oystercatcher, Haematopus ostralegus - Avocet, Recurvirostra avosetta - Curlew Sandpiper, Calidris ferruginea - Seal, Phoca vitulina - Baby-seal, Phoca vitulina, juv.

## No. 8250 E **Environmental Damages** (Short Version TH)

*Atlas of 18 Overhead-Transparencies size 22 x 28 cm, comprising over 80 color pictures (photomicro- and macrographs, nature photographs, human photographs, electron micrographs, life cycles, drawings, diagrams, tables, scenes, test data and results). - With comprehensive interpretation text. - In strong plastic file with ring-mechanism. Compilation and text: Dr. Karl-Heinrich Meyer B.S. and Johannes Lieder.*

**The Wood: -** Pine (Pinus), healthy leaves, t.s. - Pine (Pinus) leaves damaged by acid rain, t.s. - Fir (Abies), healthy leaves, t.s. - Fir (Abies), stem tip damaged t.s. - Beech (Fagus), healthy leaves t.s. - Beech (Fagus), t.s. of leaves with destroyed epidermis and chloroplasts - Rhytisma acerinum, tar spot of maples, consequence of single-crop farming - Early leaf fall, caused by thawing salt - Healthy lichen, indicator of clean air - Damaged lichen, caused by air pollution - Healthy wood of beech, t.s. - Wood destroyed by fungus - Polyporus, wood rot fungus, fruiting body t.s. - Root nodules of Alnus, with symbiotic bacteria - Spruce beetle (Cryphalus picea), larva t.s. - Wood with normal annual rings, t.s. - Wood with anomalous narrow annual rings caused by drought, t.s. - Bark with larval galleries of spruce beetle, t.s. - Pineapple-like gall on spruce caused by lice, t.s. - Gall nut on oak caused insects, t.s.
**Water Pollution: -** Intestinal bacteria (Escherichia coli) from putrid water - Putrefactive bacteria (Spirillum) from sludge poor in oxygen - Putrefactive bacteria (Sphaerotilus) bacteria, forming long chains with sheaths - Sludge bacteria (Methanobacterium) causing sewer gas - Sulphur bacteria (Thiocystis) - Wasserbluthe (Microcystis), blue-green alga "blooming" in stagnant water - Anabaena, blue green algae, in eutrophic water - Spirogyra, filamentous green alga in nutrient-rich water - Spirulina, corkscrew-shaped algae occurring in bitter seas - Chlamydomonas, one-celled green alga in eutrophic water - Cladophora, green alga with branching filaments from moderately polluted water - Diatoms, mixed algae from scarcely polluted water - Euglena, common green flagellates occurring in stagnant eutrophic water - Ciliates, different species from nutrient-rich water - Rotifers (Rotatoria), small animals from putrid water - Tubifex, fresh water oligochaete, living in the sludge - Carchesium, bell-shaped stalked ciliate from moderately polluted water - Water mold (Saprolegnia), harmful to plants and animals - Skin of fish injured by chemicals, t.s. - Skin ulcer of amphibian, t.s.
**Life in the soil: -** Acidophile soil bacteria, solution of heavy metals - Nitrite bacteria, formatting harmful nitrogenous substances - Root of beech with ectotrophic mycorrhiza, t.s. - Root of birch with partly endotrophic mycorrhiza, t.s. - Root of lupin with symbiotic nitrogen fixing bacteria - Netted venation, portion of rotted deciduous leaf - Charlock (Sinapis), t.s. of stem. Green manure plant - Soil bacteria (Bacillus megatherium), smear - Hyphae of root fungi, t.s. - Lichen, indicator of clean air - Mushroom (Xerocomus), mycelium - Root of willow (Salix), planting protecting against erosion - Earthworm (Lumbricus) t.s., causing soil improvement - Springtails (Collembola), w.m. - Mite from forest soil, w.m. - Constituents of humus soil - Constituents of peaty soil.
**Air Pollution and Allergens: -** Pollen grains of different kinds of grass - Pollen grains of different deciduous trees - Pollen grains of different conifers - Mixed house dust - Dust mite from a living room - Spores of different fungi - Wood powder - Asbestos powder (cancerogenous) - Talcum powder - Crystals of washing-powder - Polyamide fibers - Nylon fibers - Mucous membrane of human nose, t.s. - Healthy human lung, t.s. - Human lung injured with dust particles, t.s.



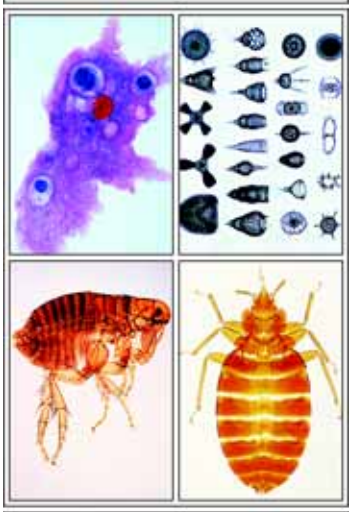
NEW!

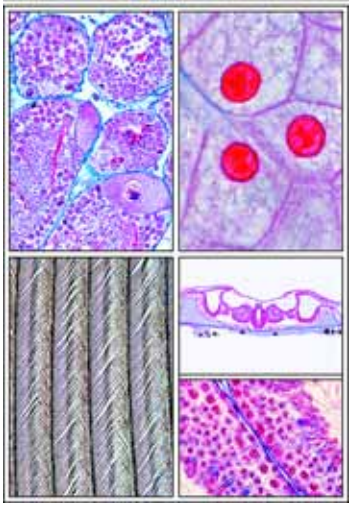
## No. 8236 E **Atlas of Color Photomicrographs to Accompany the Multimedia-Program for Biology ABCD** ***7th Edition!***

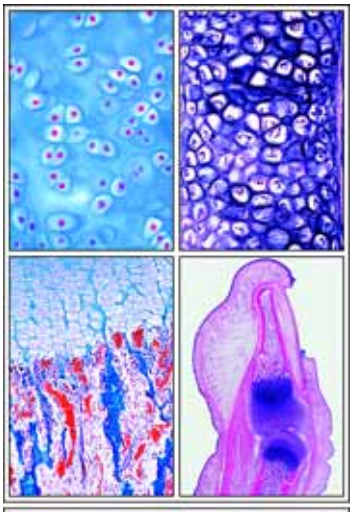
*Atlas of **45** OHP Transparencies size 22 x 28 cm, comprising **over 252** color photomicrographs according to the 175 Prepared Microscope Slides of the **MULTIMEDIA-SYSTEM FOR BIOLOGY A, B, C and D** (see pages 4 - 10). Detailed explanatory textbook. Plus new sketch and work-sheets with semidiagrammatic designs and texts.*

This atlas of OHP transparencies is intended to present a clear-cut outline of all fields of biology and cover all the organisms studied in schools. Each of the specimens has been carefully chosen on the basis of its instructional value.

***Zoology.*** **- Amoeba proteus**, showing nucleus and pseudopodia - **Radiolaria**, mixed species - **Foraminifera**, mixed species - **Euglena**, flagellate with eyespot - **Trypanosoma gambiense**, sleeping disease, blood smear - **Plasmodium berghei**, malaria parasite, blood smear - **Paramecium**, nuclei stained - **Sycon**, marine sponge t.s. - **Hydra**, w.m. extended specimen - **Hydra**, t.s. of body - **Obelia hydroid**, w.m. of colony - **Planaria**, typical t.s. - **Dicrocoelium lanceolatum**, sheep liver fluke w.m. - **Distomum hepaticum (Fasciola),** beef liver fluke w.m. - **Taenia saginata**, tapeworm, proglottids t.s. - **Taenia**, tapeworm, w.m. of mature proglottids - **Trichinella spiralis**, l.s. of skeletal muscle showing encysted larvae - **Ascaris**, roundworm, t.s. of female in region of gonads - **Lumbricus**, earthworm, typical t.s. back of clitellum - **Daphnia and Cyclops**, small crustaceans - **Araneus**, spider, leg with comb w.m. - **Araneus**, spinneret w.m. - **Dermanyssus gallinae**, chicken mite, w.m. - **Musca domestica**, house fly, head and mouth parts - **Musca domestica**, leg with clinging pads - **Apis mellifica**, honey bee, mouth parts of worker - **Apis mellifica**, honey bee, wings - **Apis mellifica**, hind leg of worker with pollen basket - **Apis mellifica**, sting and poison sac - **Apis mellifica**, head with compound eyes and brain t.s. - **Apis mellifica**, abdomen of worker t.s. with intestine and nephridia - **Periplaneta**, cockroach, chewing mouth parts - **Culex pipiens**, mosquito, head and piercing-sucking mouth parts of female - **Culex pipiens**, mosquito, reduced mouth parts of male - **Trachea** from insect - **Spiracle** from insect - **Pieris**, butterfly, portion of wing with scales - **Ctenocephalus canis**, dog flea, w.m. - **Cimex lectularius**, bed bug, w.m. - **Helix pomatia**, snail, hermaphrodite gland (ovotestis), t.s. with developing ova and spermatozoa - **Mya arenaria**, clam, gill sec. with ciliated epithelium - **Bird feathers**, wing or vane and down feathers - **Asterias rubens**, starfish, arm (ray) t.s. showing tube feet, digestive gland, ampullae - **Branchiostoma lanceolatum** (Amphioxus), t.s. of body with gills, liver, and gonads
***Histology of Man and Mammals.*** **- Squamous epithelium**, isolated cells from human mouth - **Ciliated epithelium**, in t.s. of fallopian tube - **Fibrous connective tissue** of mammal - **Tendon** of cow, l.s. white fibrous tissue - **Adipose tissue**, stained for fat - **Hyaline cartilage** t.s. - **Compact bone**, t.s. cells, lamellae, and canaliculi - **Striated muscle**, l.s. showing nuclei and striations - **Heart muscle**, human, l.s. branched fibers with intercalated discs - **Smooth (involuntary) muscle** l.s. and t.s. - **Lung** of cat, t.s. showing alveoli - **Human blood smear**, red and white corpuscles - **Frog blood smear**, nucleated red corpuscles - **Artery and vein** of mammal, t.s. - **Lymph gland** of pig, t.s. showing lymphoid tissue - **Thyroid gland** of pig, sec. showing colloid - **Adrenal gland** of cat, t.s. through cortex and medulla - **Esophagus** of cat, t.s. - **Stomach** of cat, t.s. fundic region - **Small intestine** of cat, t.s. - **Large intestine (colon)**, t.s. stained for mucous cells - **Liver** of pig, t.s. - **Pancreas** of pig, sec. with islets of Langerhans - **Kidney** of cat, t.s. through cortex and medulla - **Ovary** of cat, t.s. with primary, secondary, and Graafian follicles - **Testis** of mouse, t.s. showing spermatogenesis - **Sperm** of bull, smear - **Medullated nerve fibers**, osmic acid fixed showing Ranvier's nodes - **Motor nerve cells**, smear from spinal cord of cow - **Spinal cord** of cat, t.s. white and grey matter - **Cerebrum**, human, t.s. of cortex with pyramidal cells - **Cerebellum** of cat, t.s. shows Purkinje cells - **Retina** of cat, t.s. detail of rods and cones - **Tongue** of rabbit, t.s. of papilla foliata with taste buds - **Human skin** from palm, v.s. sweat glands - **Human scalp**, l.s. of hair follicles
***Botany, Bacteria and Cryptogams.*** **- Bacteria from mouth**, smear Gram stained showing bacilli, cocci, spirilli, spirochaetes - **Bacillus subtilis**, hay bacillus, smear with bacilli and spores - **Streptococcus lactis**, milk souring organisms - **Oscillatoria**, a blue green filamentous alga - **Nostoc**, blue green alga, colonies within gelatinous sheaths - **Diatoms**, mixed species - **Cladophora**, green alga, branched filaments with multinucleate cells - **Volvox**, with daughter colonies and sexual stages - **Spirogyra**, vegetative filaments with spiral chloroplasts - **Spirogyra** in scalariform conjugation, formation of zygotes - **Desmids (Desmidiaceae),** various species - **Fucus vesiculosus**, brown alga, female conceptacle with oogonia t.s. - **Fucus vesiculosus**, male conceptacle with antheridia t.s. - **Mucor or Rhizopus**, mold, w.m. of

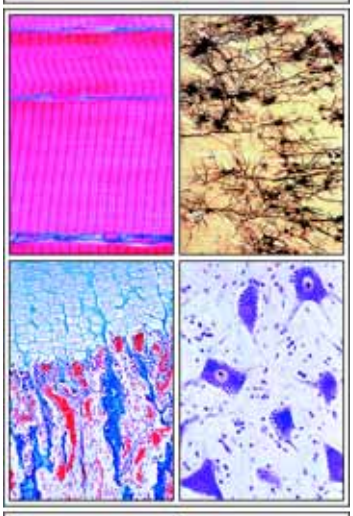






mycelium and sporangia - **Morchella**, morel, t.s. of fruiting body with asci and spores - **Claviceps purpurea**, ergot, sclerotium t.s. - **Saccharomyces**, yeast, budding cells w.m. - **Psalliota**, mushroom, t.s. of pileus with basidia and spores - **Puccinia graminis**, wheat rust, uredinia on wheat leaf t.s. - **Puccinia graminis**, aecidia and pycnidia on barberry leaf t.s. - **Physcia**, lichen, thallus with symbiotic algae t.s. - **Marchantia**, liverwort, antheridia l.s. - **Marchantia**, archegonia l.s. - **Moss** stem with leaves w.m. - **Sphagnum**, peat moss, w.m. of leaf with chlorophyll-bearing and hyaline cells. - **Fern prothallium**, w.m. showing sex organs - **Pteridium**, bracken fern, rhizome t.s. - **Aspidium**, t.s. of leaf with sori, sporangia and spores - **Equisetum**, horse tail, strobilus with spores l.s.

***Botany, Phanerogams.*** - **Allium cepa**, onion, w.m. of epidermis shows simple plant cells - **Root tip** and root hairs - **Zea mays**, corn, monocot root t.s. - **Ranunculus**, buttercup, dicot root t.s. - **Tilia**, lime, woody dicot root t.s. - **Dahlia**, t.s. tuber with inuline crystals - **Lupinus**, lupin, root nodules with symbiotic bacteria t.s. - **Elodea**, waterweed, stem apex l.s. meristematic tissue and leaf origin - **Zea mays**, corn, monocot stem with scattered bundles t.s. - **Helianthus**, sunflower, herbaceous dicot stem t.s. - **Pyrus**, pear, t.s. of fruit with stone cells - **Solanum tuberosum**, potato, tuber with starch and cork cells t.s. - **Elodea**, waterweed, aquatic stem with primitive bundle t.s. - **Triticum**, wheat, t.s. of stem of a gramineous plant - **Aristolochia**, birthwort, one year stem t.s. - **Aristolochia**, older stem t.s. - **Sambucus**, elderberry, stem with lenticels t.s. - **Tilia**, lime, three sections of wood - **Cucurbita**, pumpkin, l.s. of stem with sieve tubes and vessels - **Cucurbita**, pumpkin, stem t.s. with sieve plates - **Euphorbia**, spurge, stem with lactiferous ducts l.s. - **Salvia**, sage, t.s. of a square stem with angular collenchyma - **Tulipa**, tulip, epidermis of leaf with stomata and guard cells w.m. - **Iris**, typical monocot leaf t.s. - **Syringa**, lilac, leaf t.s. - **Fagus**, beech, sun and shade leaves, two t.s. - **Nerium**, oleander, xerophytic leaf with sunken stomata, t.s. - **Lilium**, lily, anthers t.s. - **Lilium**, ovary t.s. showing arrangement of ovules - **Taraxacum**, dandelion, composite flower l.s. - **Triticum**, wheat, grain with embryo l.s. - **Pinus**, pine, three sections of wood - **Pinus**, pine, male cone with pollen l.s. - **Pinus**, female cone with ovules l.s. - **Pinus**, mature pollen grains with wings w.m.

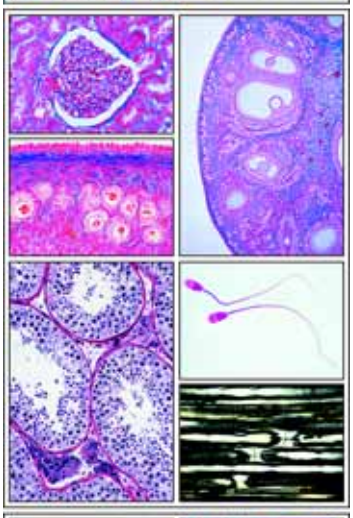


***Cytology and Genetics.*** - **Allium cepa**, l.s. of root tips showing mitosis in all stages - **Lilium**, lily, t.s. of young anthers, meiotic stages of the pollen mother cells - **Salamandra larva**, sections with mitotic stages - **Mitochondria**, in thin sec. - **Golgi apparatus**, t.s. through spinal ganglion - **Chloroplasts**, in leaf of Elodea or Mnium, special stained - **Aleurone grains**, in sec. of Ricinus endosperm - **Allium cepa**, onion, w.m. of dry scale showing calcium oxalate crystals - **Storage**, section of liver or kidney, vital stained with trypan-blue to demonstrate storage - **DNA in cell nuclei**, by Feulgen staining technique - **DNA and RNA**, fixed and stained with methyl green and pyronine to show DNA and RNA in different colors - **Giant chromosomes** from the salivary gland of Chironomus. Individual genes and puffs can be observed - **Human chromosomes**, spread in the stage of metaphase, for counting chromosomes - **Meiotic and mitotic stages** in crayfish testis. Nuclear spindles - **Maturation divisions** in ova of Ascaris megalocephala - **Cleavage stages** in ova of Ascaris

***Embryology.*** - **Chicken embryo**, 48 hour, t.s. with neural tube and chorda - **Sea-urchin development** (Psammechinus miliaris), two cell, four cell and eight cell stages - **Sea-urchin development** (Psammechinus miliaris), morula, blastula and gastrula - **Frog embryology** (Rana), sec. trough the blastula stage showing the blastocoel - **Frog embryology** (Rana), sag. sec. through young larva in the tail bud stage, with primordia of organs

***Bacteria and Diseased Organs of Man.*** - **Escherichia coli**, bacteria from colon, probably pathogenic, smear Gram stained - **Eberthella typhi**, causing typhoid fever, smear Gram stained - **Tuberculous lung** of man, t.s. with miliary tuberculosis - **Coal dust lung (Anthracosis)** of man, t.s. (smoker's lung) - **Liver cirrhosis** of man caused by alcohol abuse, t.s. showing degeneration of liver cells - **Arteriosclerosis**, t.s. of diseased coronary artery - **Metastatic carcinoma (cancer)** of human liver, t.s.

***Ecology and Environment.*** - **Leaf (needle) of fir** (Abies), two t.s. of leaves, healthy and damaged by environmental influences (acid rain) - **Leaf of beech** (Fagus), two t.s. of leaves, healthy and damaged by environmental influences (acid rain) - **Bacteria from waste-water**, smear with many typical forms.



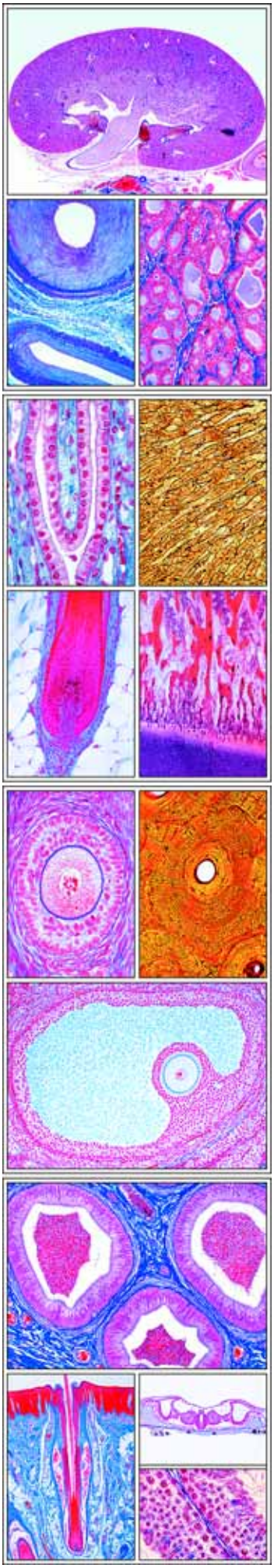
## No. 72303 E **Histology** (Comprehensive Version)

NEW!

***NEW enlarged and revised Comprehensive Edition*** *(former no. 172303). Atlas of 41 Overhead-Transparencies size 22 x 28 cm, comprising 228 pictures of color photomicrographs and photomacrographs, histological and anatomical designs and graphs. Types of cells. Epithelial, connective, muscular and nervous tissues. Digestive organs. Glands. Respiratory organs. Blood and lymphatic system. Urinary and genital organs. Endocrine glands. Scalp and hair. Organs of sense. Central nervous system. Plus NEW Sketch- and worksheets with semidiagrammatic designs and texts. Manual with comprehensive interpretation text. Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. - Compilation and text: Prof. Dr. Kurt Fiedler and Johannes Lieder*

**Cells, Cell Division and Genetics -** Typical Animal Cell, diagram - Typical animal cell, liver cells t.s. - Mitochondria - Golgi apparatus - Barr bodies in mouth epithelial cells and in nerve cell of woman - Storage, sections of liver and kidney, vital stained - Liver parenchyma - Pigment cells - Motor nerve cells, smear - Polynucleate cells - Syncytium - Neuroglia cells - Mucous cells - Metastatic carcinoma (cancer) - Ascaris, metaphase with equatorial plate - Whitefish mitosis - Amitosis - Human chromosomes, GTB-and RBA-banding pattern - Liver cell electron micrograph - Animal cell division, mitotic stages - Mitosis and meiosis in t.s. of testis - **Epithelial Tissues. -** Squamous epithelium - Stratified squamous epithelium, t.s. - Intercellular bridges - Epithelium of the cornea - Endothelium - Transitional epithelium - Cuboidal epithelium - Intestinal epithelium with goblet cells - Ciliated epithelium - Ciliated epithelial cells, electron micrograph - Cilia, flagella and their structures - Types of epithelia, design - **Connective Tissues -** Types of connective tissues, design - Embryonic connective tissue - Adipose tissue of mammal, stained for fat - Areolar connective tissue - Tendon, l.s. - Yellow elastic connective tissue t.s. - Reticular connective tissue - **Cartilage and Bone -** Hyaline cartilage - Elastic cartilage - Fibrous cartilage - Compact bone, human t.s, and l.s. - Fibula (calf-bone), t.s. - Human tibia, t.s. - Bone development, l.s. finger of fetus, intracartilaginous ossification - Bone development, t.s. of fetal skull, the intermembranous ossification - Osteoblasts (bone forming cells), t.s. - Development of bone. Zone of ossification, t.s. - Cancellous bone, t.s. - Long bone with epiphysis, l.s. - Phalanx of human embryo with endochondral ossification, l.s. - Finger joint, l.s. - Diagram of development of a long bone - **Muscle Tissues -** Striated muscle l.s., t.s. and graphic design of skeletal muscles - Striated muscle, principle of contraction, diagram - Capillaries and arteries of a muscle - Striated (skeletal) muscle, electron micrograph - Smooth muscles, l.s. - Cardiac or heart muscle, t.s. and l.s. - Sensory and motor innervation of a muscle, color diagram - Motor end plates on muscle fibers - Muscle with muscle spindle, t.s. - **Respiratory System -** Larynx of mammal, l.s. - Trachea, human t.s. and l.s. - Lung of human and cat, t.s. - Bronchiole, cartilage, and artery t.s. - **Circulatory System and Blood -** Wall of vein and artery, t.s. elastic tissue stain - Artery and vein of mammal, t.s. - Blood capillaries in the mesenteries - Blood of frog, Rana, smear - Human and Frog blood smear - Blood smear from leukemic person - Red bone marrow, smear - Large omentum (mesentery) - **Lymphatic System -** Lymph node of human and mammal, t.s. - Palatine tonsil, t.s. - Lymph node of pig, t.s. - Thymus gland of young cat, Hassall's corpuscles - **Endocrine Glands -** Human thyroid gland, t.s. - Human parathyroid gland, t.s. - Islands of Langerhans, t.s. - Human pituitary gland, l.s. - Pineal body (Epiphysis), human t.s. - Human adrenal gland, t.s. - Interstitial cells of Leydig in human testis t.s. - **Digestive System: Mouth and Teeth -** Development of tooth: Dental lamina, tooth primordium, older tooth - Tooth, detail with ameloblasts, enamel, dentin - Incisor tooth, longitudinal section - Jaw with dental root, t.s. - Human tooth, ground - Bacteria of caries in l.s. of diseased human tooth - Bacteria from human intestine - Lip, t.s. - Fungiform papilla of the tongue t.s. - **Digestive System: Esophagus and Stomach -** Esophagus, human t.s. - Stomach t.s. fundic region - Gastric mucosa, l.s. - Gastric glands, l.s. - **Digestive System: Intestine -** Duodenal fold, l.s. - Human jejunum, l.s. - Intestinal villus - Large intestine (colon), t.s. - Human colon, l.s. - Tubulous glands of colon, l.s. and t.s. -

Vermiform appendix, t.s. - Small intestine with injected blood vessels, t.s. - **Digestive System: Pancreas, Liver and Salivary Glands -** Human pancreas, t.s. - Human liver, t.s. - Liver of pig, t.s. - Liver lobule, t.s. with injected bile canaliculi and t.s. with injected blood vessels - Submaxillary gland, t.s. - Sublingual gland t.s. - Parotid gland, t.s. - **Excretory System -** Kidney of mouse, sagittal l.s. - Kidney of cat, t.s. - Human renal cortex and medulla l.s. - Malpighian corpuscle, - Human urinary bladder, t.s. - Human ureter, t.s. - **Reproductive Organs: Female -** Ovary of cat, t.s. - Egg development: Young and older primary follicle, secondary, early and mature Graafian follicle, germ hillock and egg, ruptured Graafian follicle - Fallopian tube with embedded oocyte, t.s. - Corpus luteum t.s. - Ciliated epithelium of the Fallopian tube t.s. - Uterus, secretory, menstrual post-menstrual and pregnant t.s. - Placenta - Umbilical cord (navel string), t.s. - Vagina t.s. - **Reproductive Organs: Male -** Testis of mammal, t.s. show all stages of spermatogenesis - Human testis, interstitial cells of Leydig, t.s. - Testis, germinal epithelium - Epididymis t.s. - Seminal vesicle, t.s. - Spermatic cord (Ductus deferens), t.s. - Prostate of young man, t.s. - Penis, t.s. - Sperm smear - **Nervous System -** Peripheral nerve, human sciatic nerve, t.s. low, medium and high magnification - Medullated nerve fibers l.s. - Ranvier's node, l.s., electron micrograph - Spinal cord t.s. silvered - Spinal cord with motor nerve cells - Gray and white matter of spinal cord, t.s. - Nerve cells with Nissl's granules - Motor nerve cell - Cerebral cortex, human, t.s. - Cerebellum, human, t.s. - Pyramid cells - Purkinje cells - Pseudounipolar neuron (T-cell) - Spinal cord, spinal and sympathetic ganglion - **Organs of Sense: The Eye -** Eye, mammal and human, sagittal l.s. - Cornea, iris, ciliary body, lens - Papilla of optic nerve l.s. - Optic nerve, t.s. - Retina, t.s. high magnification - Retina, graphic design - **Organs of Sense: The Ear -** Cochlea l.s. - Organ of Corti l.s. - **Organs of Sense: Smell and Taste -** Olfactory region, t.s. - Olfactory epithelium with sensory cilia, t.s. - Tongue of rabbit with papilla foliata and taste buds, t.s. - Taste buds, high magnification - Vallate papilla of the human tongue t.s. - **Organs of Sense: Touch and Perception -** Corpuscle of Eimer, tactile organ l.s. - Tactile hairs with blood sinus, t.s. and l.s. - Vater-Pacinian corpuscles t.s. - Grandry's and Herbst's tactile corpuscles - Touch corpuscles in human skin, t.s. - Meissner's corpuscle from human finger, design - Krause's corpuscle, cold receptor, design - **Integument, Skin and Scalp -** Human skin from palm, l.s. cornified epidermis, germinative zone, sweat glands - Nail development of human embryo, sagittal l.s. of finger tip - Human skin, zone of keratinization and germinative zone - Human skin negro, t.s. with pigmented cells - Human skin with sweat glands, t.s. - Human skin l.s. injected to show the blood vessels - Human scalp, vertical section showing l.s. of hair follicles - Hair papilla and germinative zone, t.s. - Hair shaft with arrector pili muscle and sebaceous gland l.s. - Hair follicles in human scalp t.s. - Sebaceous glands t.s. - Human scalp, injected to show the blood vessels - Mammary gland, human t.s.



NEW!

## No. 8245 E **Histology and Human Science** (Short Version TA)

*Atlas of 30 Overhead-Transparencies size 22 x 28 cm, comprising over170 pictures (anatomical pictures, photomicro- and macrographs, nature photographs, human photographs, electron micrographs, X-ray photographs, drawings, diagrams, tables, scenes, test data and results). With comprehensive interpretation text. Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. - Compilation and text: Dr. Karl-Heinrich Meyer B.S. and Johannes Lieder.*

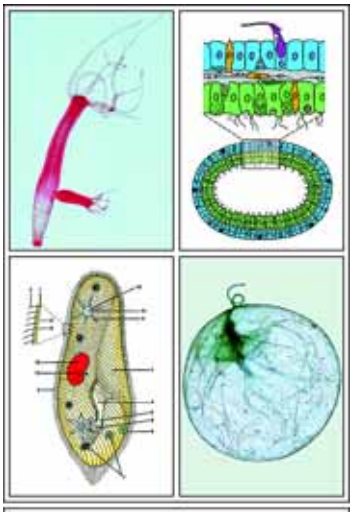
***Tissues and Skin:*** - Squamous epithelium, isolated cells - Squamous epithelium, color drawing and three dimensional design - Cuboidal epithelium in l.s. of kidney tubules - Columnar epithelium, human t.s. - Simple ciliated columnar epithelium, oviduct, t.s. - Pseudostratified ciliated columnar epithelium, trachea, t.s. - Areolar connective tissue, human - Areolar connective tissue, schematic color design - Adipose tissue, human, stained for fat - Adipose tissue, development, schematic color design - White fibrous tissue, tendon, human, l.s. - Yellow elastic connective tissue (Ligamentum nuchae), t.s. - Hyaline cartilage, human t.s. - Yellow elastic cartilage, human, sec. - White fibrous cartilage, human sec. - Compact bone, human tibia, t.s., low magnification - Compact bone, human t.s., high magnification showing Havers system - Spongy bone, human t.s., low magnification - Spongy bone, human t.s., high magnification for finer details - Bone development, l.s. of fetal finger - Striated (skeletal) muscle, human l.s., high magnification showing the striations - Striated muscle, t.s. of muscle bundle - Striated muscle t.s. high magnification for finer details - Smooth (involuntary) muscle, human l.s. - Smooth (involuntary) muscle, schematic color design - Heart (cardiac) muscle, human l.s. - Skin from finger tip, human, l.s. - Scalp, human, shows l.s. of hair follicles, - Scalp, shows t.s. of hair follicles, low magnification - Hair follicles from human scalp, high magnification.

***Circulatory, Respiratory and Endocrine System***: - Artery, human, t.s. stained for elastic fibers - Vein, human, t.s. stained for elastic fibers - Aorta, human, t.s. - Artery and vein, human t.s., routine stained - Artery and vein, human t.s., schematic color design - Blood smear, human, Giemsa stain - Blood smear, human, schematic color design - Frog blood smear, nucleated erythrocytes - Red blood cells (erythrocytes) of 12 species of animals for comparison, color design - Nasal region of small mammal, t.s. - Trachea, human t.s., low magnification - Trachea, human t.s., high magnification - Lung, human, t.s. - Lymph node, human t.s., general view, low magnification - Lymph node, human t.s., high magnification for fine details - Spleen, human t.s. - The vascular system of the human spleen, color diagram - Tonsil (Tonsilla palatina), human t.s. - Red bone marrow, human, smear - Thymus from human child, t.s. - Thyroid gland (Gl. thyreoidea), human t.s. - Adrenal gland (Gl. suprarenalis), human t.s. - Pituitary gland sag. l.s. of complete organ - Pituitary gland (Hypophysis), human t.s. - Location of pituitary gland and pineal body, sagittal l.s. of human head - Pineal body (Epiphysis), human t.s. - Islets of Langerhans in the pancreas, human, sec.

***Digestive System***: - Lip, human foetus, t.s. - Tooth, human, t.s. of crown - Tooth, human, t.s. of root embedded in the yaw - Tooth development from human foetus, l.s. early stage - Tooth development from human foetus, l.s. later stage - Tongue, human, t.s. - Tongue of mouse, l.s. showing cornified papillae - Esophagus, human t.s., low magnification of the whole organ - Esophagus, human t.s. high magnification for fine detail - Stomach, fundic region, human t.s. - Duodenum, human t.s. - Jejunum, human t.s. - Vermiform appendix, human t.s. - Colon, human t.s., low magnification - Tubulous glands of the colon, detail, l.s. - Tubulous glands of the colon, detail, t.s. - Submaxillary gland (Gl. submandibularis), human t.s. - Sublingual gland (Gl. sublingualis), human t.s. - Parotid gland (Gl. parotis), human t.s. - Pancreas, human t.s. - Liver, human, t.s. - Liver, human, sec. staining of glycogen - Liver, of pig with liver lobules, t.s. low magnification - Liver lobule, t.s. with injected bile canaliculi - Vascular systems of a liver lobule, three dimensional color diagram - Gall bladder, human t.s.

***Urinary and Genital system: -*** Kidney, human l.s., low magnification - Kidney of mouse, sagittal l.s. through complete organ - Structure of kidney, color diagram - Human renal cortex, l.s., higher magnification - Human renal medulla, l.s. - Renal corpuscle (Malpighian corpuscle), high magnification - Kidney, sec. with injected blood vessels - Ureter, human t.s. - Urinary bladder, human t.s. - Ovary, mature, t.s. low magnification for general survey - Egg development: primary follicle - Egg development: secondary follicle - Egg development: mature Graafian follicle with germ hillock and egg cell - Egg development: Ruptured Graafian follicle after the oocyte has been discharged l.s. - Egg development: mature ovulated egg with corona radiata - Ovary with corpus luteum, human t.s. - Uterus, human, t.s. - Oviduct (fallopian tube), human, t.s. - Uterus of rat with embryo in situ, t.s. - Embryo of mouse, sagittal l.s. of entire specimen - Embryo of mouse, sagittal l.s. of head - Embryo of mouse, t.s. of thoracic region - Placenta, human t.s. - Structure and function of the placenta; diagram - Umbilical cord (navel string), human t.s. - Vagina, human t.s. - Mammary gland, human t.s. - Testis from human adult, mature stage t.s. - Testis t.s. stained to show all stages of spermatogenesis, high magnification - Interstitial cells of Leydig, in human testis t.s. - Testis, epididymis, spermatogenesis; color diagrams - Epididymis, human t.s. - Sperm smear of bull - Penis, t.s. - Seminal vesicle, t.s. - Prostate of young man, t.s. - Spermatic cord (Ductus deferens), human t.s.

***Nervous System and Sensory Organs: -*** Cerebral cortex, human, t.s. routine stained - Cerebral cortex, human, t.s. silvered for pyramidal cells - Cerebellum, human, t.s. routine stained - Cerebellum, human, t.s. silvered for Purkinje cells - Human brain, ventral view with cranial nerves - Brain of mouse, l.s. of the complete organ - Human spinal cord and



medulla oblongata. Lateral and dorsal view with spinal nerves, ventral view without nerves - Brain stem with cranial nerves, ventral and dorsal view - Human vertebrae. Superior view and lateral view of three vertebrae with intervertebral discs - Human central nervous system, lateral view. Position of the dura sac in the spinal canal - Spinal cord, t.s. routine stained - Spinal cord, t.s. silver stained - Gray matter of spinal cord, t.s. showing nerve cell bodies - White matter of spinal cord, t.s. showing nerve fibers - Portion of the spinal cord with roots, ganglia, and branches of spinal nerves, three-dimensional diagram - Sympathetic ganglion, human t.s. - Pseudounipolar neuron (T-cell) from spinal ganglion - Peripheral nerve, human sciatic nerve, t.s., low magnification - Peripheral nerve, bundle from sciatic nerve, t.s., medium magnification - Peripheral nerve, nerve fibers, t.s., high magnification, axons and medullary sheaths - Peripheral nerve, teased material of osmic acid fixed material with Ranvier's nodes - Optic nerve, human t.s. - Motor nerve cells, smear from spinal cord of ox shows nerve cells and their appendages - Various shapes of human neurons, 5 figures - Nerve cell body from the cerebrum with dendrites, axon, and synapses. Diagram - Synapsis, spatial picture - Motor nerve endings, muscle stained with gold chloride showing the motor end plates - Motor end plates (neuromuscular junction), diagram, 2 figures - The human eye. Eyeball, eye muscles, eyelid, sagittal section - Eye, anterior part with iris, ciliary body, cornea, l.s. - Eye, posterior part with retina and entrance of optic nerve, l.s. - Retina from eye, t.s. for all details - Human retina, chief synaptic connections, color diagrammatic design - Cornea from eye, human t.s. - Eyelid of cat, t.s. showing Meibomian gland - Cochlea (internal ear) from guinea pig, l.s. showing organ of Corti - Morphology of the human ear. Ear concha, external auditory canal, middle ear, internal ear - Organ of Corti, two color spatial diagrams - Olfactory region from nose of rabbit, t.s. - Olfactory epithelium with sensory cilia, t.s. detail view - Tongue of rabbit with papilla foliata shows abundant taste buds, t.s. - Papilla foliata t.s., detail view of taste bud, high magnification - Vallate papilla of the human tongue t.s., detail view - Tactile hairs with blood sinus, l.s. - Tactile hairs with blood sinus, t.s. - Touch corpuscles in human skin, t.s. - Grandry corpuscles in t.s. through beak of duck - Pacinian corpuscles in mesentery or pancreas - Meissner's corpuscle from human finger - Krause's corpuscle, cold receptor

## No. 8237 E **Zoology (Invertebrates)** (TB)

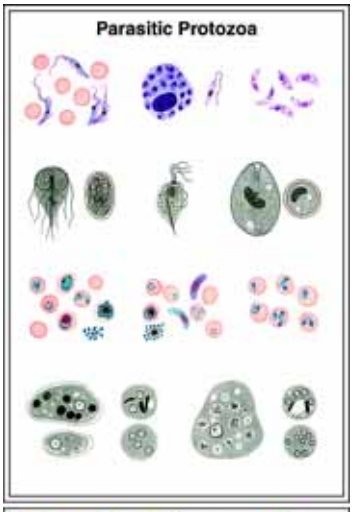
NEW!

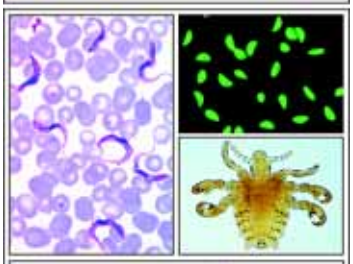
*Atlas of 26 Overhead-Transparencies size 22 x 28 cm, comprising over 165 pictures (color photomicrographs and - macrographs, color life-cycles and anatomical pictures).Manual with comprehensive depictured interpretation text. In strong plastic file with ring-mechanism. - Sketch and work-sheets with semidiagrammatic designs and texts - Compilation and text: Dr. K.-H. Meyer and Johannes Lieder*

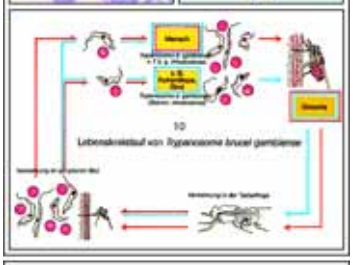
**Protozoa** Amoeba proteus - Amoeba, color design showing habit, cyst, feeding, division, - Euglena, green flagellate - Euglena, habit, division, conjugation and formation of cysts. Color design - Radiolaria, mixed - Foraminifera, mixed - Trypanosoma gambiense, habit and division, color design and blood smear - Ceratium, dinoflagellates - Noctiluca miliaris - Plasmodium falciparum, tertian malaria, blood smear - Plasmodium berghei, smear with asexual and sexual stages - Eimeria stiedae, coccidiosis, section of liver - Paramecium, ciliate, anatomy, color design, living specimen, macro- and micronuclei stained, binary fission, conjugation and structure of the surface - Vorticella, a stalked ciliate, living specimen - **Porifera** Sponge of the sycon type, schematic design and t.s. - Spongilla, fresh water sponge, t.s. - Sycon, spicules w.m. - Euspongia, commercial sponge, skeleton - **Coelenterata** Hydra, fresh water polyp, anatomy and reproduction, color design - Hydra with bud, transverse section, nematocysts, color design - Hydra, l.s. of a specimen with ingested food - Polyp and medusa (Obelia), life cycle and development - Obelia hydroid, vegetative and reproductive polyps - Obelia medusa, jellyfish, w.m. - Aurelia, ephyra w.m. - Actinia, sea anemone, t.s. and l.s. - **Platyhelminthes** Fasciola hepatica (Distomum hepaticum) liver fluke, digestive, reproductive, excretory, nervous systems, color designs - Fasciola hepatica, t.s. body - Planaria, w.m. general body plan of a flatworm and t.s. - Taenia saginata, tapeworm, t.s. of proglottids and color design - Taenia saginata, mature proglottid w.m. - Moniezia, tapeworm, scolex - Echinococcus granulosus, dog tapeworm, adult specimen with scolex and proglottids and t.s. of cyst with scolices - **Nemathelminthes** Ascaris, roundworm, t.s., color design - Ascaris, t.s. of adult female - Nemathelminthes, body plan of male and female, color design - Trichinella spiralis, section and flat mount of infected muscle with encysted larvae - Enterobius vermicularis (Oxyuris), pin worm - Nereis, t.s. of body - Hirudo medicinalis, medicinal leech, t.s. - Lumbricus, earthworm, copulating specimens, reproduction and t.s. color design - Lumbricus, t.s. of body back of the clitellum - Lumbricus, anterior end 1.-9., 9.-16. and 16.-23. segment l.s. - **Crustacea** Daphnia and Cyclops, small crustaceans, anatomy, color design - Daphnia, water flea, living specimen - Cyclops, copepods - Artemia salina, brine shrimp - Astacus, crayfish, gills t.s. - Astacus, ovary t.s. with developing eggs - Astacus, testis t.s. with spermatogenesis - **Arachnida** Spider, anatomy and general body plan, color design - Spider, sagittal l.s. and t.s with book lung - Spider, entire young specimen - Spider, leg with comb, survey and high magnification - Spider, spinneret - Scorpion, w.m. for all details and sagittal section - Scorpion, poison gland - Varroa, parasitic mite of bees - Argas persicus, tick - Ixodes, tick, six legged larva - Dermanyssus gallinae, chicken mite - Tyroglyphus farinae, mite from meal - **Insecta** Musca domestica, house fly, head and mouth parts w.m., t.s. and color design - Apis mellifica, honey bee, mouth parts w.m., t.s. and color design - House fly, sucking tube, scanning electron micrograph - Blatta, cockroach, anatomy and general body plan of insects, color design - Periplaneta or Blatta, cockroach, biting mouth parts of a herbivore w.m. - Periplaneta, head and mouth parts, color design - Blatta, cockroach, adult female, dorsal view, reproductive organs, color design - Pieris, butterfly, clubbed antenna - Bombyx mori, silk moth, feathered antenna - Melolontha, cockchafer, laminate antenna - Pieris, butterfly, mouth parts with sucking tube - Musca domestica, structure of the leg with pulvilli - Apis mellifica, honey bee, structure of the leg, color design - Apis mellifica, posterior leg with pollen basket and foreleg with antenna cleaner - Melolontha, cockchafer, digging leg - Apis mellifica, anterior and posterior wings - Musca domestica, wing with halters - Spiracle (stigma) of insect, surface view and section, color design and w.m. - Pieris, butterfly, wing showing arrangement of scales, w.m. and design - Trachea from insect, showing elastic spiral threads, w.m. and design - Periplaneta, cockroach, upper and lower wings - Tracheal gills, of May fly nymph, design - Compound eye of an insect, histology, schematic design - Head with brain and eyes of an insect t.s., design - Compound eye, t.s. through head of honey bee - Cornea, showing facets - Compound eye of Melolontha, showing superposed insect eye, l.s. - Grasshopper, testis t.s. with spermatogenesis - Sting of honey bee, anatomy and function, color design and w.m. - Apis mellifica, honey bee, t.s. of abdomen of drone showing testis - Apis mellifica, t.s. of abdomen of queen showing ovaries - Anopheles, malaria mosquito, adult female - Anopheles, head and mouth parts of female and male - Culex pipiens, common mosquito, adult female - Culex pipiens, head and mouth parts of female and female - Drosophila, fruit fly, adult - Flea, anatomy, color design - Ctenocephalus canis, dog flea, adult male - Pulex irritans, human flea, adult female and male - Pediculus humanus, human louse - Cimex lectularius, bed bug - Aphidae sp., plant lice - **Mollusca** Chiton, a primitive mollusk, t.s. through the body - Alloteuthis, cuttlefish, entire young specimen - Octopus, cuttlefish, section through sucking tube - Cuttlefish, anatomy and general body plan, color graphic design - Camera eye of cuttlefish (Sepia), l.s. - Mya arenaria, t.s. and l.s. of gills - Anodonta, mussel, complete t.s. - Mussel (clam), anatomy and general body plan, color design - Snail, anatomy and general body plan, color design - Snail, typical t.s. - Helix pomatia, Roman snail, hermaphrodite gland (ovotestis) t.s. - **Echinodermata** Echinus, sea urchin, reproduction, color design - Asterias, horizontal and sagittal l.s. with internal organs, color design - Asterias, arm t.s. and color design - Sea urchin embryology, uncleaved fertilized egg, 2-cell stage, 4-cell stage, 8-cell stage, morula, blastula, gastrula and pluteus larva - **Acrania, Fish, Amphibians, Reptiles and Birds** Branchiostoma lanceolatum, block diagram combined with t.s. and l.s., color design - Branchiostoma, typical t.s. shows gills, liver and gonads - Scyllium, dogfish, region of head and gills, t.s. - Fresh water fish, abdominal region t.s. - Cyprinus, carp, blood smear - Fish scales, cycloid, ctenoid and placoid scales - Salamandra larva, head with eyes t.s. - Rana, frog, blood smear - Rana, stomach t.s. gastric glands - Rana, small intestine (duodenum) t.s. - Rana, lung t.s., simple baglike lung - Rana, kidney t.s., Malpighian corpuscles - Rana, testis showing spermatogenesis t.s. - Rana, ovary with developing eggs t.s. - Rana, skin with skin glands, l.s. - Lacerta, lizard, skin with scales, l.s. - Lacerta, lizard, lung t.s. - Gallus, chicken, blood smear - Gallus, lung t.s. showing bird lung with parabronchi - Bird feathers, construction and function, color design - Bird feathers, wing and down

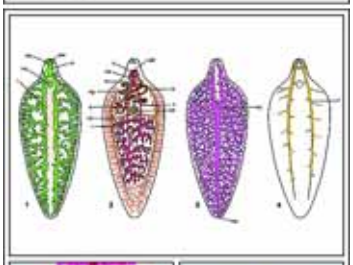
## No. 72306 E **Parasitology**

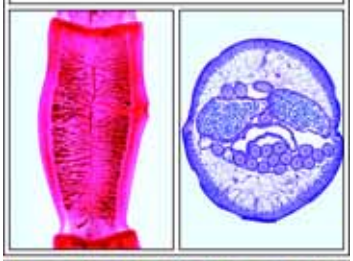
***NEW enlarged and revised Comprehensive Edition*** *(former no. 172306). Atlas of 35 Overhead-Transparencies size 22 x 28 cm, comprising 228 pictures (color photomicro and -macrographs, habit photographs, anatomical pictures, designs and life-cycles of the parasites). Manual with comprehensive interpretation text, drawings and designs. Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. - Compilation and text: Prof. Dr. Werner Frank and Johannes Lieder*

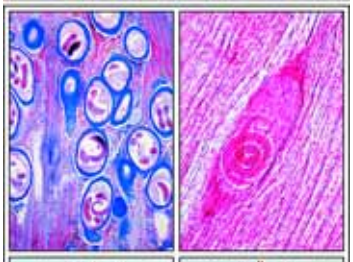


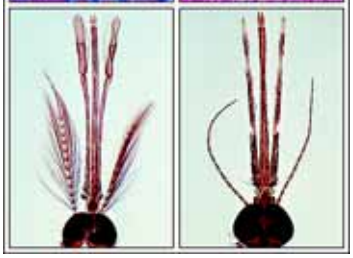





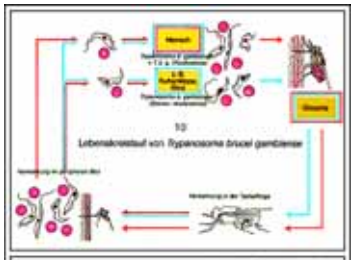


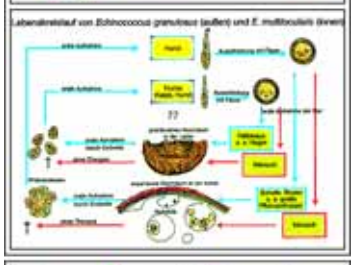


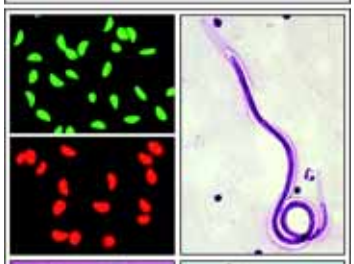


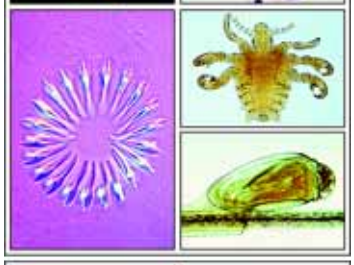


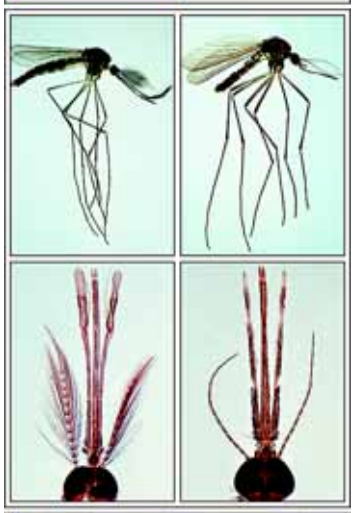
Topics such as „parasitic animals, a menace to human health“ are contents of the biological and health instruction in senior high schools and junior colleges offering general education. There is no doubt that in the near future this curricular aspect will be paid more and more attention to. This transparency atlas hence shall inspire, but also offer the substantial and necessary help to realize an instruction characterized by a higher degree of clearness due to its illustrative material. Almost 50% of all human diseases in the developing countries are caused by parasites, and those animals which constitute human food are affected in a still higher degree. Our modern times are characterized by mass tourism, and travels of teenagers to subtropical and tropical countries of the Third World are no longer the rare exceptions.
As developed countries show a rising tendency of diseases caused by parasites - also by earlier in these regions almost unknown ones - more action is called for in the sphere of schools, too.
That is why this transparency atlas, due to its excellent usefulness to instruction, applies not only to students of human and veterinary medicine, but also to school biologists. To all of them this atlas offers reliable help with its brilliant microphotographs, typical pictures of diseases, impressive life-cycles and the text, based on the latest scientific findings.
**Humoral and cellular reactions** - Parasitic Protozoa:, color graphic design - Ouchterlony precipitation - Indirect Fluorescent Antibody Test (IFAT - Foreign-body giant cells - Hypertrophy - Granuloma - Proliferation - Hyperplasia - **Protozoa: Trypanosomes** - Trypanosoma gambiense, sleeping disease, life-cycle - Trypanosoma gambiense, blood smear and design - Trypanosoma cruzi blood smear, t.s. of infected heart muscle and life-cycle - Trypanosoma equiperdum, dourine - Apathogenic trypanosomes, blood smear - **Protozoa: Leishmanias** - Leishmania, life-cycle - Leishmania tropica (Oriental Sore), photograph of infected person - Rhodnius prolixus (Cone Nose Bug) the carrier - Leishmania donovani, Kala Azar, from infected spleen, smear and section - **Protozoa: Multiflagellar flagellates** - Trichomonas vaginalis - Giardia lamblia (syn. Lamblia intestinalis), trophozoite and cyst - **Protozoa: Entamoebae** - Entamoeba histolytica, life-cycle - Entamoeba histolytica, section of infected intestine and biopsy of the rectal mucosa - Entamoeba histolytica, trophozoites and 4-nucleate cysts - Entamoeba coli, non-pathogenic, trophozoite and 8-nucleate cysts - **Protozoa: Toxoplasma and Sarcosporidians -** Toxoplasma gondii, life-cycle - Toxoplasma gondii, pseudocyst from Liquor and cyst in section of brain - Sarcocystis, schizont with merozoites - Sarcocystis tenella, section of infected muscle tissue showing Miescher's tubes - Sarcocystis spp., oocysts - **Protozoa: Telosporidia -** Gregarina, from mealworm intestine - Monocystis lumbrici, smear from seminal vesicles of earthworm with sporocysts - Nosema apis, honey bee dysentery, t.s. of diseased intestine - Eimeria stiedae, coccidiosis, section of liver shows all stages of the parasite - **Protozoa: Malaria parasites -** Plasmodium falciparum, malaria tropica, life-cycle - Plasmodium berghei, blood smear from infected mouse with asexual and schizogony stages and design - Plasmodium falciparum, causes the malignant tertian malaria. Blood smear and smear from in-vitro culture - Plasmodium, exoerythrocytic meront (schizont) in the liver - Plasmodium vivax, trophozoite - Plasmodium malariae, trophozoite - Plasmodium vivax, young and mature meront - Plasmodium falciparum, mature meront, ring form stages and gametocyte in the blood - Plasmodium, exflagellation) in a mosquito after a blood meal - Haemoproteus columbae, pigeon malaria, blood smear - Plasmodium, section of the intestine from a mosquito showing oocysts - Plasmodium, section of the salivary gland from an infected mosquito showing sporozoites - Plasmodium gallinaceum, chicken malaria, blood smear - Plasmodium cathemerium, bird malaria, blood smear - **Protozoa: Babesias, Ciliates and Limax amoebae** - Babesia canis, causes piroplasmosis, blood smear - Balantidium coli - Trichodina domerguei, parasitic ciliate on fish gills - Naegleria fowleri, trophozoites and amebic encephalitis - **Platyhelminthes: Trematodes (Flukes and Blood Flukes)** - Distomum hepaticum (Fasciola hepatica, beef liver fluke), life-cycle, digestive, reproductive, excretory and nervous system - Fasciola hepatica, beef liver fluke, w.m. of entire specimen showing all details - Dicroceolium lanceolatum (dendriticum), sheep liver fluke, w.m. - Fasciolopsis buski, giant fluke, w.m. - Echinostoma revolutum, intestinal fluke, w.m. - Opisthorchis felineus, fluke of cats, w.m. - Clonorchis sinensis, Chinese liver fluke, w.m. - Fasciola hepatica (Distomum), ova w, miracidium, sporocyst, redia and cercaria w.m. - Fasciola hepatica, t.s. of body - Fasciola hepatica, t.s. of infected snail liver (intermediate host) with sporocysts and redia - Opisthorchiidae and Heterophyidae, life-cycle - Heterophyes aequalis w.m. dark field photograph - Heterophyes heterophyes in the intestine, l.s. - Schistosoma sp. life-cycle color graphic design - Schistosoma mansoni, copulating male and female - Schistosoma mansoni, egg granuloma - Schistosomulum - Schistosoma mansoni. Fork-tailed cercaria with penetration glands - Schistosoma mansoni, section of the digestive gland from an infected snail - Schistosoma mansoni, t.s. of two pairs in a cross sectioned vein - Schistosoma haematobium, egg with terminal spine - Schistosoma mansoni, egg with subterminal spine - Schistosoma japonicum, egg without spine - **Platyhelminthes: Cestodes (Tapeworms) -** Taenia saginata and Taenia solium, life-cycles - Taenia saginata, tapeworm, mature proglottids, design - Taenia saginata, mature proglottid stained and flat mount - Diphyllobothrium latum - Taenia saginata, tapeworm, scolex without hooklets - Taenia solium, tapeworm, scolex with hooklets - Taenia saginata, proglottid t.s. - Taenia saginata, egg - Hymenolepis nana, egg - Cysticerci of Taenia saginata („Cysticercus bovis“) in muscular tissue - Taenia solium cysticercus (Cysticercus cellulosae), section and w.m. with scolex extended - Taenia pisiformis, mature proglottid w.m. - Dipylidium caninum, dog tapeworm, proglottid w.m. - Hymenolepis nana, dwarf tapeworm, proglottids w.m. - Circular row of hooklets from the scolex of Hymenolepis nana - Cysticercoid of Hymenolepis nana and H. diminuta - Echinococcus granulosus and E. multilocularis, life-cycle - E. granulosus, dog tapeworm, adult specimen complete with scolex and a few proglottids, w.m. - E. granulosus, t.s. of hydatid cyst showing brood capsules - E. multilocularis, section through a multivesicular hydatid with protoscolices - E. granulosus, free protoscolices - E. granulosus, native women of northern Kenya suffering from a course of cystic echinococcosis - E. granulosus hydatids after the successful surgery - E. multilocularis. The infection showing the tumorous changes of the liver - E. multilocularis. The picture shows the sectioned liver of a deceased. - **Nemathelminthes (Roundworms)** - Ascaris lumbricoides and Enterobius vermicularis, life-cycles - Ascaris lumbricoides, roundworm of man and pig, t.s. of female - Ascaris, roundworm, t.s. of female in region of gonads, design - Ascaris lumbricoides and Trichinella spiralis, male and female, design - Heterakis spumosa, intestinal worm w.m. - Enterobius vermicularis (Oxyuris), thread worm of man, adult female filled with ova w.m. - Verminous appendicitis, c.s. of an appendix with an inflammation caused by Enterobius - Trichinella spiralis, life cycle - Trichinella, section and w.m. of infected muscle showing encysted larvae - Trichinella, larvae in muscle, 3 stages, design - Ancylostoma duodenale and Necator americanus, life-cycles - Ancylostoma duodenale, hookworm, posterior end of male shows detail of bursa w.m. - Ancylostoma duodenale, t.s. of adult female - Ancylostoma duodenale, adult male and female in copula w.m. - Trichuris trichiura, whip worm, w.m. - Strongyloides, roundworm, larvae w.m. - Wuchereria bancrofti, life-cycle - Dracunculus medinensis - Wuchereria bancrofti, sheathed microfilaria in a blood film - Onchocerca volvulus, section of nodule with parasites - **Pentastomids: Tongue Worms** - Armillifer armillatus (Tongue worm), picture of surgery and adult specimens - **Eggs of Helminths** - Schistosoma mansoni - Schistosoma haematobium - Schistosoma japonicum - Heterophyes - Fasciola hepatica - Clonorchis sinensis - Hymenolepis nana - Hymenolepis diminuta - Taenia saginata - Echinococcus granulosus - Trichuris trichiura - Enterobius vermicularis - Ascaris lumbricoides - Ancylostoma duodenale - Armillifer armillatus - Sarcocystis, oocysts - **Arachnida: Ticks and Mites** - Ornithodorus moubata, the transmitter of Relapsing Fever - Spirochaeta duttoni (Borrelia recurrentis), causes relapsing fever, blood smear stained for spirochaetae - Argas persicus, fowl tick, carrier of pathogenic spirochaetae, w.m. of adult - Ixodes, tick, six-legged larva - Dermacentor andersoni, tick, carrier of spotted fever - Dermanyssus gallinae, chicken mite - Varroa, Acarus siro, mite of honey bee - Neotrombicula autumnalis, mite - Ixodes ricinus, tick, life-cycle - Demo-

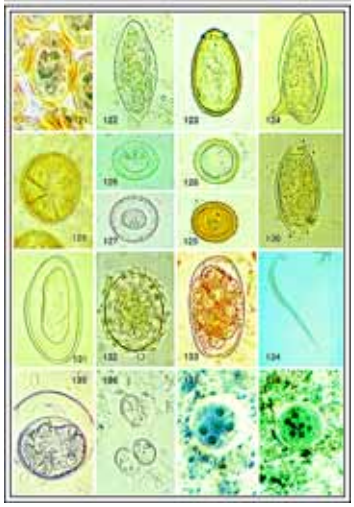












dex folliculorum, follicle mite of humans, w.m. and t.s. of human skin with parasites - Sarcoptes scabiei, itch mite, w.m. sec. through infected skin - **Insecta: Lice and Bugs** - Stomoxys, stable fly, piercing sucking mouth parts - Haematopinus suis, pig louse - Lipoptena cervi, louse fly - Phthirus pubis, pubic or crab louse, w.m. and egg (nit) attached to hair - Pediculus capitis, head louse - Cimex lectularius, bed bug, w.m. and graphic design - **Insecta: Mosquitoes** - Mosquito, Culex pipiens, life-cycle - Culex pipiens, mosquito, adult female and male w.m. - Anopheles, malaria mosquito, adult female and male, w.m. - Culex, mosquito, head and mouth parts of female and male, design - Culex, head and mouth parts of female and male w.m. - Anopheles sp., mouth parts of a female w.m. and male w.m. - Culex, eggs rafts w.m. - Culex, posterior end of larva w.m. - Culex, pupa w.m. - Culex, t.s. of mouth parts of female shows hypopharynx with the salivary duct - Anopheles, female sucking on human skin, photograph - **Insecta: Fleas** - Flea, habitus, anatomy and mouth parts, design - Pulex irritans, human flea, adult female and male w.m. - Xenopsylla cheopis, rat flea, carrier of the bubonic plague, adult female and male w.m. - Ctenocephalus canis, dog flea, adult female and male w.m. - Nosopsyllus fasciatus, rat flea, adult female and male w.m.

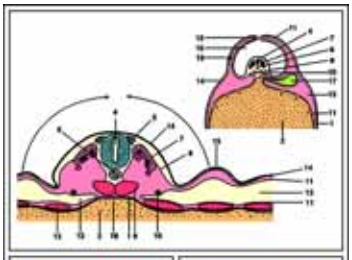
## No. 8249 E **Bacteria, Parasites and Human Pathology** (TG)

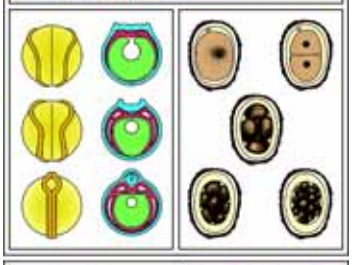
NEW!

*Atlas of 32 Overhead-Transparencies size 22 x 28 cm, comprising over 230 pictures (anatomical pictures, photomicro- and macrographs, nature photographs, human photographs, electron micrographs, life cycles, drawings, diagrams, tables, scenes, test data and results). - With comprehensive interpretation text. Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. - Compilation and text: Dr. K.-H. Meyer B.S.*

**USEFUL AND HARMFUL BACTERIA: -** ***Spherical bacteria, cocci*** **-** Neisseria gonorrhoeae, gonorrhea, diplococci - Staphylococcus aureus, pus organism, smear, Gram stained - Streptococcus pyogenes, smear from pus showing long chains, Gram - Streptococcus lactis, milk souring organisms, smear showing short chains - Sarcina lutea, Gram stained - Gaffkya tetragena, meningitis, occurring in tetrads, Gram - ***Rod-shaped bacteria, non spore-forming, gram-positive*** **-** Mycobacterium tuberculosis, smear from sputum, doubly stained after Ziehl-Neelsen - Mycobacterium leprae, leprosy, smear from lesion, Ziehl-Neelsen - Corynebacterium diphtheriae, Gram - ***Rod-shaped bacteria, non spore-forming, gram-negative*** **-** Azotobacter, soil organisms, Gram - Bacterium prodigiosum (Serratia marcescens), chromogenic organisms, Gram - Aerobacter aerogenes, intestinal bacteria, Gram - Proteus vulgaris, causing putrefaction, smear Gram - Acetobacter aceti, manufacture of vinegar, Gram - Escherichia coli, colon bacillus, Gram - Eberthella typhi, typhoid fever, Gram - Salmonella paratyphi, paratyphoid fever, smear Gram - Salmonella enteritidis, causes meat poisoning, smear Gram - Klebsiella pneumoniae (B. friedlanderi), pneumonia, stained to show bacteria and capsules - Pasteurella pestis, causing plague, smear Gram stained - Hemophilus influenzae (Pfeiffer), smear Gram stained - Rhizobium radicicola, nitrogen fixing organisms, t.s. root nodules of lupin with bacteria - Rhizobium radicicola, smear - Bacterium erysipelatos, causing erysipelas, Gram - ***Rod-shaped bacteria, spore-forming (bacilli)*** **-** Bacillus subtilis, hay bacillus, bacilli and spores doubly stained - Bacillus mycoides, large soil organisms growing in chains, staining of internal particles - Bacillus mesentericus, smear Gram - Bacillus anthracis, causing wool sorters disease, smear from infected spleen, Olt's stain - Bacillus anthracis, spores stained - Clostridium septicum, spores stained - Clostridium tetani, causing lockjaw, special stained to show the terminal spores by the Ziehl-Neelsen method - Clostridium perfringens, showing the central spores - ***Spiral bacteria and spirochaetes*** **-** Vibrio comma, causing Asiatic cholera, smear Gram - Rhodospirillum rubrum, chromogenic rods, smear Gram - Spirillum volutans, a very large spirillum, special stained to show the flagella - Spirochaeta duttoni (Borrelia recurrentis), Central African relapsing fever, blood smear - Treponema pallidum, section of syphilitic lesion, spirochaetae stained by Levaditi's silver method - ***Miscellaneous groups*** **-** Bacteria from human intestine, mixed species Gram - Bacteria from mouth, cocci, bacilli, spirilli, and spirochaetae are shown, smear and color design - Bacteria from bread, methylene blue - Bacteria from yoghurt, carbolfuchsine - Streptomyces griseus, branched organisms (streptomycin), smear Gram stained - Actinomyces, causing lumpy jaw, smear - Sphaerotilus natans, from putrid water, long chains within sheaths - Bacteria of caries in l.s. of diseased human tooth, doubly stained. **- PARASITES OF HUMAN AND ANIMALS: -** ***Protozoa*** - Parasitic Protozoa, color table - Indirect Fluorescent Antibody Test (IFAT). Fluorescein isothiocyanate - Trypanosoma brucei gambiense, Giemsa stain - Apathogenic trypanosomes, Giemsa - Trypanosoma brucei gambiense, blood smear and life-cycle - Trypanosoma cruzi - Life-Cycle, Chagas disease - Trypanosoma cruzi, Chagas disease, blood smear, Giemsa stain - Trypanosoma cruzi, l.s. of heart muscle with amastigotes - Rhodnius prolixus, Cone Nose Bug, vector of Chagas disease - Leishmania, life-cycle - Leishmania tropica, Oriental Sore - Leishmania donovani, Kala Azar, in smear and section of spleen - Trichomonas vaginalis, Giemsa - Giardia lamblia (syn. Lamblia intestinalis), trophozoite and cyst, iron hematoxylin - Sarcocystis tenella, section of infected muscle tissue with parasites in Miescher's tubes - Entamoeba histolytica, life-cycle - Entamoeba histolytica, trophozoites, and 4-nucleate cyst, Iron hematoxylin - Entamoeba histolytica, section of infected intestine - Entamoeba coli, trophozoite, and 8-nucleate Cysts, iron hematoxylin - Plasmodium falciparum, life-cycle - Plasmodium berghei, blood smear - Plasmodium falciparum, blood smear - Plasmodium cynomolgi, exoerythrocytic meront (schizont) in the liver of a monkey - Plasmodium spec., l.s. of the intestine of a mosquito showing oocysts - Plasmodium spec., t.s. of the salivary gland of an infected mosquito with sporozoites - Plasmodium vivax, trophozoite in an erythrocyte and mature meront - Plasmodium malariae, "band form"-shaped trophozoite and young meront - Plasmodium falciparum, (signet) typical ring form stages and gametocyte in the peripheral blood - Plasmodium gallinaceum, chicken malaria - Plasmodium cathemerium, bird malaria - Toxoplasma gondii, cyst and pseudocyst, Giemsa stain - Nosema apis, honey bee dysentery. Section of diseased intestine - Monocystis lumbrici, smear from seminal vesicles of earthworm - Gregarina, from mealworm intestine - Eimeria stiedae, causes rabbit coccidiosis, section of liver shows life cycle of the parasite - Babesia bigemina in blood smear of a cow, Giemsa stain - Balantidium coli - ***Platyhelminthes:*** - Dicroceolium lanceolatum (dendriticum), sheep liver fluke. W.m. of entire specimen - Fasciola hepatica (Distomum), beef liver fluke, w.m. of entire specimen - Fasciola hepatica, ova and miracidium - Fasciola hepatica, t.s. of infected snail liver (intermediate host) with sporocysts and redia - Fasciola hepatica, isolated sporocyst, redia and cercaria w.m. - Schistosoma spp., life-cycle - Schistosoma mansoni. Fork-tailed cercaria with penetration glands - Schistosoma mansoni, t.s. of two pairs in a vein - Schistosoma mansoni, copulating male and female - Schistosoma haematobium, egg with terminal spine - Schistosoma japonicum, egg without spine - Schistosoma mansoni, egg with subterminal spine - Taenia saginata and Taenia solium, life-cycles - Taenia saginata, tapeworm, scolex without hooklets w.m. - Taenia saginata, mature proglottid stained and flat mount and t.s. of proglottids - Taenia saginata, ova with embryos - Taenia solium, tapeworm, scolex with hooklets - Taenia solium cysticercus, bladderworm of pig tapeworm with scolex extended - Taenia pisiformis, mature proglottid w.m. - Hymenolepis nana, dwarf tapeworm of man, scolex with protruded rostellum and suckers - Circular row of hooklets from the scolex - Hymenolepis nana, proglottids w.m. - Diphyllobothrium latum, fish tapeworm, proglottids w.m. - Echinococcus granulosus, dog tapeworm, adult with scolex and a few proglottids, w.m. - Echinococcus granulosus, t.s. of hydatid cyst, and w.m. of free protoscolices from a hydatid - Echinococcus multilocularis. Section through a spongeous hydatid with protoscolices - ***Nemathelminthes:*** - Trichinella spiralis, section of infected muscle showing encysted larvae - Trichinella spiralis, infected muscle piece flattened - Ascaris lumbricoides and Enterobius vermicularis, life-cycles - Ascaris lumbricoides, roundworm of man and pig, t.s. of female and male - Ascaris lumbricoides, egg w.m. - Enterobius vermicularis (Oxyuris), thread worm of man, adult female, and egg - Trichuris trichiura, egg w.m. - Heterakis spumosa, intestinal worm of chicken, adult - Ancylostoma duodenale, hookworm, posterior end of male shows detail of bursa w.m. - Ancylostoma duodenale, adult female and male and female in copula w.m. - Ancylostoma duodenale, t.s. of adult female and egg w.m. - Dracunculus medinensis, macrophotograph - Onchocerca volvulus, filaria in subcutaneous node, t.s. - Wuchereria bancrofti, sheathed microfilaria - ***Arachnida:*** - Ornithodorus moubata, transmitter of the tropical African type of Relapsing Fever - Borrelia duttoni, Giemsa stain - Ixodes ricinus, Hard Tick w.m. - Neotrombicula autumnalis, Harvest Mite or Autumnal Chigger - Demodex folliculorum,

follicle mite of humans, adult specimen w.m. - Demodex folliculorum, human skin with parasites, section - Sarcoptes scabiei, penetrate through the epidermis, sec. of skin - ***Insecta:*** - Lipoptena cervi, louse fly, adult - Pediculus humanus, human louse - Phthirus pubis, pubic or crab louse - Phthirus pubis, egg attached to hair - Cimex lectularius, bed bug - Haematopinus suis, pig louse - Stomoxys, stable fly, piercing sucking mouth parts - Culex pipiens, common mosquito, pupa - Culex pipiens, posterior end of larva - Culex pipiens, adult - Culex pipiens, head and mouth parts of female and male w.m. - Culex pipiens, t.s. through the mouth parts of adult female - Culex pipiens, eggs - Anopheles, malaria mosquito, adult - Anopheles, head and mouth parts of female and male, w.m. - Pulex irritans, human flea - Xenopsylla cheopis, rat flea, carrier of the bubonic plague - Ctenocephalus canis, dog flea, adult male and female - Nosopsyllus fasciatus, rat flea - Ceratophyllus gallinulae, chicken flea **- HUMAN DISEASES (PATHOLOGY): - *Abnormal alterations of cells and tissues -*** Parenchymatous and fatty degeneration of liver - Hemosiderosis of liver - Glycogenosis of liver - Pigmentary cirrhosis of liver - Necrotic esophagitis - Foreign body granulome with hemosiderin and giant cells - Tonsillitis - Liver cirrhosis - ***Injury of circulatory organs and blood-forming organs -*** Adiposis of heart - Cardiac callosity - Myocarditis chronica acute recidivans - Organized venous thrombosis of muscle - Infarct of spleen - Chronic myeloid leukemia of spleen - Malarial melanemia of spleen - Anthracosis of lung - ***Pathologic alterations of lung and liver, tuberculosis, pneumonia -*** Cardiac callosity - Influenzal pneumonia - Croupous pneumonia - Chronic pneumonia - Necrotic (cheesy) pneumonia - Miliary tuberculosis of lung - Chronic tuberculous pulmonary cavity with bacteria - Icterus hepatis - ***Reaction of kidney after arteriosclerosis, disturbance of metabolism, and inflammation; colitis -*** Glomerular atrophy of kidney - Amyloid degeneration of kidney - Acute hemorrhagic nephritis - Chronic glomerulonephritis - Septic embolic nephritis - Colitis dysenterica Shiga-Kruse - ***Specific inflammations after infection with syphilis spirochaetes -*** Congenital syphilis of liver, spirochaetes silvered after Levaditi - Congenital syphilis of liver (Feuerstein liver), routine stained - Gumma of testicle - ***Progressive alteration of injured tissues and organs (Hypertrophy and hyperplasia) -*** Atheroma of head - Struma colloides - Undescended testicle showing hyperplasia of Leydig's cells - Hypertrophy of prostate - Giant cell sarcoma of maxilla - ***Benignant and malignant tumors -*** Chondroma of pubic bone - Myoma of uterus - Fibroadenoma of breast - Fibroepithelial mixed tumor of parotid gland - Melanosarcoma of skin - Spindle cell sarcoma - Carcinoma cervicis uteri - Sarcoma of testicle - Cystadenoma papilliferum of ovary - Gelatinous carcinoma of rectum - Lymphosarcoma mediastini - Metastatic carcinoma of liver.

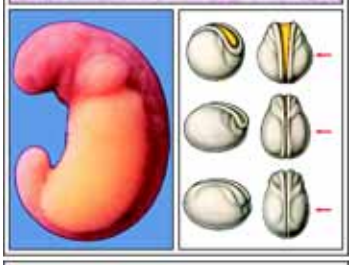




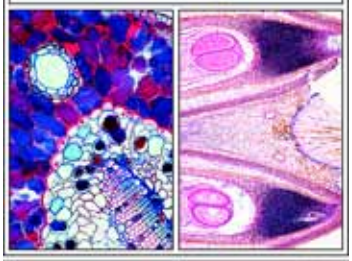
NEW!

## No. 8231NE **Embryology and Development** (TF)

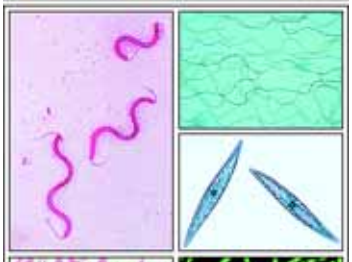
*Atlas of 21 Overhead-Transparencies size 22 x 28 cm, NEW ENLARGED EDITION, comprising over 122 pictures (color photomicrographs and -macrographs, color life-cycles and anatomical pictures, drawings and designs). Manual with comprehensive interpretation text, drawings and designs). Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. – Compilation and text: Dr. K.-H. Meyer and Johannes Lieder*

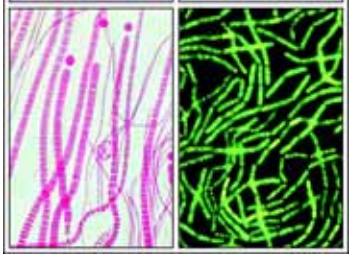


**Ascaris Embryology. Maturation and Cleavage of Ascaris megalocephala bivalens: -** Entrance of spermatozoon - First maturation division - Second maturation division - Formation of the second polar body - Fertilization, 6 stages - Mature oocyte with male and female pronuclei - fertilization - Metaphase of the first cleavage - Anaphase - Maturation, fertilization and cleavage of Ascaris megalocephala bivalens, all stages. **- Types of Eggs and Patterns of Cleavage: -** Types of eggs and patterns of cleavage I: as far as the 8-cell stage - Types of eggs and patterns of cleavage II: morula and blastula. **- Sea Urchin Embryology (Psammechinus Miliaris): -** Unfertilized eggs - Fertilized eggs - Two cells - Four cells - Eight cells - Sixteen cells - Thirty-two cells - Morula - Blastula, beginning gastrulation - Blastula, progressive gastrulation - Pluteus larva, - Sea urchin embryology, schematic graphic color designs of all stages. **- Frog Embryology (Rana): -** Uncleaved egg with jelly envelop - Egg, first division - Two-cell stage - Four-cell stage, second groove vertical to the first one, w.m. and t.s., - Eight-cell stage, four micromeres and four macromeres, w.m., - Median section through the sixteen-cell stage, - Morula, w.m. and section, blastocoel - Blastula, w.m. and section - Gastrula, w.m. and frontal section - Early neurula w.m. and sagittal section - Late neurula, neural folds are closed - Late neurula, detailed view of t.s. - Early tail bud stage, darkfield view - Middle tail bud stage, primordia of gills, - Tail bud stage, sagittal and parasagittal l.s. - Hatching stage t.s. through head showing brain, eyes, heart - Newly hatched larva, w.m. and parasagittal l.s. - Larva, t.s. region of eyes - Larva, t.s. region of heart - Larva, t.s. in region of stomach - Older larva, frontal section through eye region - Tadpole, region of head and eyes, head, thorax, abdomen t.s. - The cleavage divisions, schematic designs - The gastrulation, total views and sagittal sections. Schematic designs - The neurulation, dorsal views and transverse sections. Schematic designs - The early gastrula, schematic designs - Frog embryology, cleavage and formation of the blastula. Schematic designs - Frog embryology, sag. sec. young larva in the tail bud stage. Schematic designs.



**Chicken Embryology: -** 24 hour, w.m. primitive groove - 24 hour, t.s. through primitive groove - 24 hour, t.s. showing neural plate - 28 hour, w.m. 10 somites - 36 hour, t.s. of anterior and posterior region of abdomen - 40 hour, w.m. - 45 hour, l.s. shows primitive node - 48 hour, t.s. of abdomen - 50 hour, w.m. shows heart - 72 hour, w.m. injected to show the blood vascular system - 3 days, t.s. through head and abdomen - 4 days, t.s. abdomen, pronephros, Wolff's duct, - 5 days, w.m. showing formation of head - 8 days, l.s. - Chicken, skin of body (wing), l.s. and t.s. of feather development, - Chicken, t.s. embryo of 48 and 72 hours, color graphic design - Embryonic development of the central nervous system of Branchiostoma (Amphioxus). **- Development of the Neurula:** - Embryonic development of the central nervous system of the frog, t.s., from the side and from above - Embryonic development of the neural tube and central nervous system of humans. **– Human and Mammalian Embryology: -** Young mouse (Mus musculus), region of thorax and abdomen t.s., development of internal organs, - Developing eyes of mammal - Young mouse, median sagittal l.s. of head with brain - Older embryo of pig (Sus scrofa), median sagittal section - Young mouse, median sagittal l.s. through entire specimen, giving a complete picture of mammalian body plan - Embryonic stages of various vertebrate classes - Human embryo, l.s. - Development of human lungs and eyes.



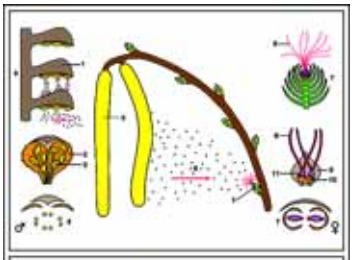
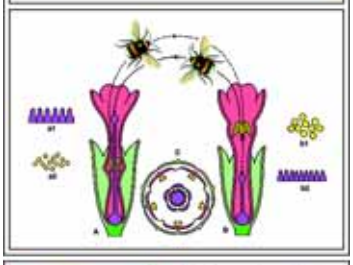
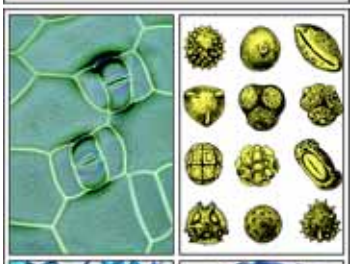
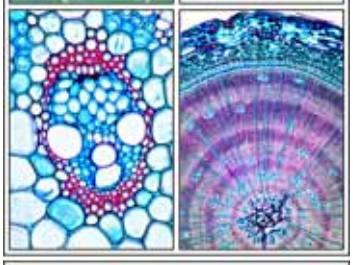
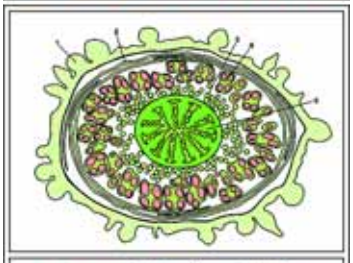
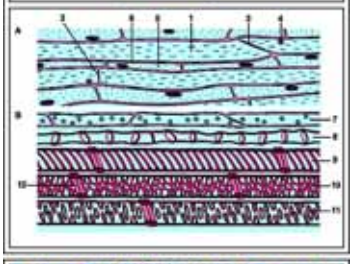
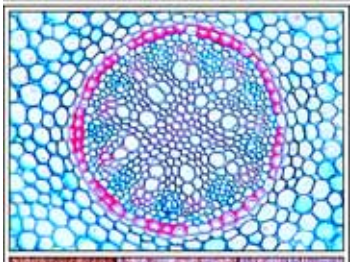
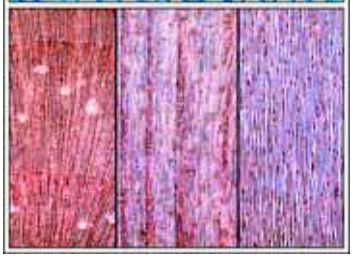


NEW!

## No. 72304 E **Plant Anatomy Part I. Phanerogams** (Comprehensive Version)

***NEW enlarged and revised Comprehensive Edition*** *(former no. 172304). Atlas of 43 Overhead-Transparencies size 22 x 28 cm comprising 270 pictures. (Color photomicrographs and -macrographs, anatomical pictures, life-cycles, drawings and designs). - Manual with comprehensive interpretation text, drawings and designs. - Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. - Compilation and text: Dr. Dieter Gerlach and Johannes Lieder*

**Cells** - Typical plant cell, design and photomicrograph - Raphide producing and meristematic cells - **Cell division** - Hyacinthus, cell division in the root tips, 9 stages, photomicrographs - Mitosis: l.s. of root tip of Allium - DNA and RNA in different colors - Polyploid nuclei. - Principle of cell division (mitosis), 9 color designs - **Plastids** - Nuclear membrane, tetracycline fluorescence - Mitochondria and proplastids - Position of nucleus in plant cell - Mitochondria in plant cells - Spherosomes in epidermal cells, fluorescence - Chloroplasts and grana in a plant cell, 3 electron microphotographs - Chloroplasts, color design - Chloroplasts with grana, bright field and phase contrast - Cells from a Vallisneria leaf, interference contrast - Chromoplasts, dichroism - Starch grains in polarizing microscope - **Vacuole and cell wall** - Concave and convex plasmolysis - Cell walls of medullar cells, interference contrast - Bordered pits from pine tracheids - Stone cells - **Storage in the cell** - Reserve cellulose - Aleurone grains - Fat cells, t.s. stained for fat - Tannins - Calcium

oxalate crystals - Inuline crystals in Dahlia - Crystal sand (raphides) in t.s. of leaf - Lysigenous oil glands, rind of Citrus fruit - Lactiferous vessels - **Parenchyma, aerenchyma, epidermis -** Parenchyma tissue, t.s. - Aerenchyma - Agave, xerophytic leaf - **Trichomes and emergences -** Papillae of a pansy petal - Glandular trichome of Pinguicula - Stinging hair of Urtica, nettle - Scale-like stellate hairs of Elaeagnus - Branched leaf hairs of Verbascum - Drosera, sundew, leaf with glandular hairs - Prickle of a rose shoot - **Supporting Tissue** - Urtica, stinging nettle, t.s. of stem, angular collenchyma - Coleus, t.s. of a square stem - Lamellar collenchyma - Palisade sclereids - Stone cells of Hoya carnosa - Sclerenchyma fibers from the bark of oleander - **Conducting tissue** - Vessel with helical wall structure - Vessel with pitted wall structure - Annular and helical thickenings in l.s. of a stem - Tracheids from pine wood - Sieve cells from pine bast - Vessels with tyloses - Sieve tubes and companion cells - Callose on sieve plates of grape in winter - Sieve plates in surface view, t.s. - Cucurbita, pumpkin, l.s. of vascular bundles, and color design - **Vascular bundles and their arrangement in the stem** - Zea mays, corn, typical monocot stem t.s., and color design - Zea, closed collateral vascular bundle - Ranunculus, vascular bundle t.s. - Ranunculus, buttercup, stem t.s. open collateral bundles - Helianthus, sunflower, typical dicot stem, t.s. and color design - Cucurbita pepo, stem with bicollateral vascular bundles, t.s. - Bicollateral vascular bundle of stem of Cucurbita, t.s. - Triticum, wheat, t.s. of stem of a gramineous plant - Convallaria, lily-of-the-valley, t.s. of rhizome - Convallaria, concentric vascular bundle of rhizome - Elodea, stem with primitive bundle t.s. - Salvia, sage, t.s. of a square stem - Nymphaea, water lily, aquatic stem t.s. - Juncus, bulrush, t.s. of stem with aerenchyma - Piper, pepper, t.s. of dicot stem with scattered bundles - Pinus, older stem with annual rings, resin ducts t.s. - **Secondary growth of the stem -** Aristolochia sipho, birthwort, one year and older stem, t.s. - Helianthus, sunflower, formation of vacular bundles in t.s. of stem - **Wood and bast** - Pinus, pine, wood t.s., r.l.s. and t.l.s. - Pinus, bast transverse section - Tilia, lime, stem showing wood and bast, t.s. - Tilia, lime, wood, t.s. - Tilia, lime, bast, t.s. - Dracaena, dragon-tree, stem t.s. - Pinus, pine, wood t.s., r.l.s. and t.l.s., 3 designs - Tilia, lime (linden), wood t.s., r.l.s. and t.l.s., 3 designs - **Periderm and bark** - Sambucus nigra, elder, periderm t.s. - Sambucus nigra, stem with developing and fully developed lenticell t.s. - Pinus, bark, t.s. - Clematis vitalba. virgin's bower, t.s. of older stem - **Vegetative stem apex, meristem -** Elodea, Hippuris, Asparagus and Pinus, shoot with vegetative apex, 3 median l.s. - **Stomata and leaf stalk -** Tulipa, tulip, epidermis of leaf with stomata, surface view - Helleborus niger, hellebore, stomata of leaf w.m. Interference contrast and fluorescence - Tulipa, tulip, epidermis with stomata, color design - **Structure of the leaf, habitat** - Helleborus niger, hellebore, t.s. of leaf and vascular bundle - Syringa, lilac, a typical dicot leaf, t.s. and color design - Elodea, t.s. of a simple aquatic leaf - Zea mays, corn, and Iris, 2 t.s. of monocot leaves - Fagus, beech, sun and shade leaf, t.s. - Nerium, oleander, xerophytic leaf with sunken stomata, t.s. - Nymphaea, water lily, floating leaf with air chambers t.s. - Ficus, t.s. of leaf with cystoliths - Aesculus, horse-chestnut, t.s. of petiole and t.s. of leaf bud - Abscission zone at the base of leaf stalk - Pinus, pine, needle t.s. - Utricularia, bladderwort, w.m. of bladder - Calluna, ling, revolute leaf t.s. - Picea, spruce, and Abies, fir, 2 t.s. of needles - **The root** - Hyacinthus, root tip l.s. - Zea mays, corn, root cap with statoliths, l.s. - Lemna, duckweed, root tip and cap w.m. - Root tips with root hairs, l.s. and color design - Vicia and Salix, 2 t.s. with formation of lateral woods - Hordeum, barley, development of bundles, t.s. - Zea mays, corn, typical monocot root, t.s. and color design - Iris, t.s. of a monocot root - Convallaria, t.s of the central vascular bundle - Dendrobium, orchid, aerial root with velamen t.s. - Smilax, carrion flower, t.s. of root - Ranunculus, buttercup, dicot root, t.s. and color design - Ranunculus, central cylinder of the root, t.s. - **Secondary growth of the root -** Caltha, marsh marigold, formation of the cambium, t.s. - Pinus, pine, woody root, t.s. - Monstera, aerial root t.s. - **Symbiosis -** Lupinus, t.s. of root nodule with symbiotic bacteria - Endotrophic mycorrhiza and ectotrophic mycorrhiza, t.s. - Alnus, alder, root nodules with symbiotic actinomycetes t.s. - Cuscuta, dodder, haustoria in the host tissue, l.s. - **The flower** - Lilium, lily, t.s. and l.s. of flower bud showing petals - Prunus avium, cherry, flower bud with perigynous ovary, l.s. - Papaver, poppy, t.s. of dicot flower showing floral diagram - Corylus avellana, diclinous male flower l.s. - Arum maculatum, cuckoopint, l.s. of flower, insect trap - Taraxacum, dandelion, l.s. and t.s. of composite flower - Wind pollination and insect pollination, 2 color designs - **Reduction division in pollen mother cells of Lilium** - Lilium, lily, anther, t.s. - Pollen grains, mixed species, scanning electron micrograph - Lilium, lily, pollen grains, w.m. and t.s. - Lilium, lily, germinating pollen grain - Lilium, stigma with pollen tubes l.s. - Maturation divisions in the pollen mother cells of Lilium candidum, all stages in 16 photomicrographs - **Structure of the ovary and development of the embryo sac -** Lilium, lily, ovary t.s. - Lilium, megaspore mother cell, - Lilium, pachytene stage of prophase. - Lilium, anaphase of the first (heterotypic) division - Lilium, two-nucleate embryosac - Lilium, second (homeotypic) division - Lilium, four-nucleate stage, - Lilium, fourth division - Lilium, mature eight nucleate embryosac - Pollen tube, double fertilization - Lilium, growing pollen tube, l.s. - Lilium, double fertilization - Lilium, formation of the embryo l.s. - Capsella, shepherd's purse, development of embryo l.s. - **Development of seed and fruit -** Capsella, fruit with seeds, t.s. and l.s. - Triticum, wheat, l.s. of seed (grain) - Triticum, l.s. of the embryo - Prunus, plum, young drupe (stone fruit) t.s. - Pyrus malus, apple, young pome (fleshy), t.s. - Fragaria, strawberry, young aggregate fruit, l.s. - Phaseolus, bean, t.s. of pod, pericarp and seed - **Reproduction in gymnosperms** - Pinus, pine, life cycle with all development stages, color designs - Pinus, pine, male flower, l.s. - Pinus, mature pollen grains with wings w.m - Laryx, larch, pollen grain, t. s. - Pinus, young female cone, l.s. - Pinus, bract scales, ovuliferous scales and ovules, l.s. - Pinus, ovule with archegonia, l.s. - Pinus, mature archegonium, l.s. - Pinus, growing ovule, with macroprothallium - Pinus, ovule in sixteen-nucleate stage - Pinus, embryo and endosperm, t.s. and l.s.

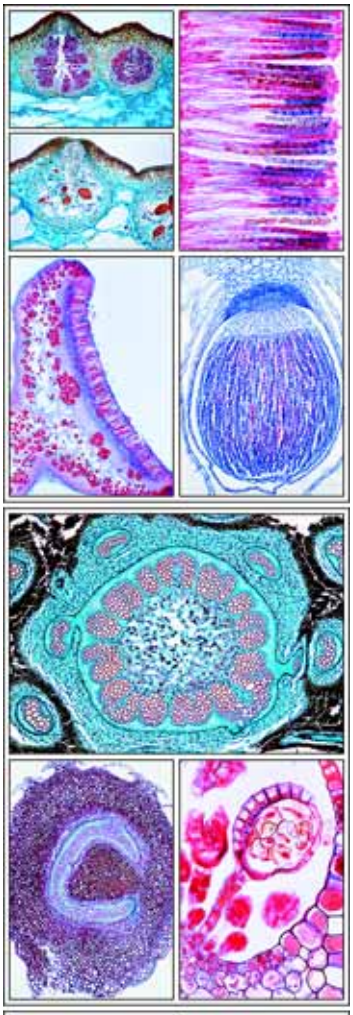
## No. 72305 E **Plant Anatomy Part II. Cryptogams** (Comprehensive Version)

NEW!

***NEW enlarged and revised Comprehensive Edition*** *(former no. 172305). Atlas of 32 Overhead-Transparencies size 22 x 28 cm, comprising 194 pictures. (Color photomicrographs and -macrographs, anatomical pictures, life-cycles, drawings and designs). - Manual with comprehensive interpretation text, drawings and designs. Sketch and work-sheets with semidiagrammatic designs and texts - Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. - Compilation and text: Dr. Dieter Gerlach and Johannes Lieder*

**Schizophyta: Schizomycetes, Bacteria**: - Bacteria types, color design - Bacteria smear Gram stained with bacilli, cocci, spirilli, spirochaetes - Syphilis of liver, stain of spirochaetes - Mycobacterium tuberculosis, - Streptomyces griseus - Bacillus megaterium, cell walls - Bacteria from human intestine - Bacillus megaterium, nuclear equivalents, acridin-orange-Fluorescence - Spirillum volutans, large species - Rhodospirillum rubrum, chromogenic rods - Bacillus subtilis, hay bacillus, bacilli and spores - Clostridium tetani, lockjaw, terminal spores - Sarcina lutea - Streptococcus pyogenes, pus - Eberthella typhi, typhoid fever - Bacillus anthracis, wool sorters disease - Klebsiella pneumoniae pneumonia, bacteria and capsules - Bacillus mycoides, soil organisms - Electron micrograph of sections through bacterial cells (E. coli) - **Cyanophyceae, Blue-Green Algae:** - Gloeocapsa - Nostoc, filaments and heterocysts - Rivularia, blue-green alga - Oscillatoria, chromato- and centroplasm, Acridine orange, fluorescence - Oscillatoria, volutin spheres and drawing - Chroococcus, unicellular algae - Gloeocapsa - Noctiluca miliaris, marine phosphorescence - Pyrrhophyta, Fire Algae, Dinoflagellates: - Different dinoflagellates - Ceratium hirundinella - **Euglenophyta:** - Euglena, green flagellate - **Chlorophyta, Green Algae:** - Chlamydomonas, w.m. and color graphic design of life-cycle - Haematococcus - Volvox, w.m. and color graphic design - Hydrodictyon, waternet, w.m. - Pediastrum, star-shaped flat colonies - Pediastrum, shown in interference contrast - Ulothrix, with girdle-shaped chloroplasts w.m. - Chaetophora sp. - Cladophora, branching filaments - Draparnaldia, green alga - Oedogonium, filamentous green alga, oogonium and dwarf male - Eudorina, spherical colonies - Chlamydomonas, biflagellate algae - Pleurococcus, growing on bark - **Conjugatophyceae: Conjugates** - Spirogyra, in scalariform conjugation, fusion of the protoplasts and formation of zygotes - Spirogyra, vegetative filaments - Spirogyra, sexual reproduction, conjugation, color graphic design - Zygnema, star-shaped chloroplasts - Desmidiaceae, desmids, different species - **Charophyceae, Stoneworts** - Chara, stonewort, tip of the thallus with apical cell - Chara, oogonium and antheridiophore, w.m. and color graphic design - Chara, l. s. - **Xanthophyta, Yellow Algae:** - Ophiocythium majus, and Tribonema aequale, yellow-green alga - Vaucheria, vegetative filaments - Vaucheria, life cycle, color graphic design - Vaucheria, oogonium and antheridium - **Chrysophyta: Bacillariophyceae**

**(Diatoms):** - Navicula, diatoms - Pinnularia, Surirella, and Melosira, diatoms, interference contrast - Pleurosigma angulatum, test diatoms, polarized light - Diatoms, mixed species - Pleurosigma, diatoms, stained for chloroplasts - **Phaeophyta, Brown Algae:** - Ectocarpus, plurilocular gametangia - Sphacelaria, apical cell and sporangium - Laminaria saccharina, thallus with sporangia t.s. - Fucus vesiculosus, brown alga, male and female conceptacles, t.s. and life - cycle - Laminaria, male and female gametophyte and young sporophyte. - Dictyota, apical cells - Dictyota, thallus with unilocular sporangium - **Rhodophyta, Red Algae:** - Polysiphonia, red alga, antheridia, cystocarp and tetraspores w.m. and color graphic design - Batrachospermum, fresh water red alga - **Myxomycetes - Slime Fungi:** - Stemonitis, slime mold, capillitium with spores w.m. - Diderma spec. plasmodium. - Plasmodiophora brassicae, clubroot, young plasmodia and host cells with spores t.s. - **Phycomycetes - Algalike Fungi:** - Saprolegnia, water mold, oogonia and zoosporangia w.m. - Saprolegnia, life-cycle, color graphic design - Albugo candida, white rust of crucifers - Plasmopara viticola, downy mildew of grapes - Synchytrium endobioticum, potato black scab - Mucor mucedo, black bread mold, sporangium - Rhizopus, bread mold, zygospores w.m. - Pilobolus, sporangiophores - Empusa muscae, l.s. abdomen of house fly - Plasmopara viticola, downy mildew of grapes - Venturia pirinum (Fusicladium), pearscab - **Ascomycetes, Sac Fungi:** - Saccharomyces, yeast, budding cells, ascospores and life cycle - Taphrina pruni (Exoascus), plum pockets - Erysiphe spec., section with cleistothecia - Aspergillus, brown mold - Penicillium, blue mold - Botrytis allii, grey mold of onions - Claviceps purpurea, ergot, sclerotium, stroma and life-cycle - Peziza, cup fungus, t.s. of apothecium - Morchella, morel, fructification, asci and ascospores - Morchella, morel, life-cycle, color graphic design - Tuber rufum, truffle, fruiting body - Rhytisma acerinum, tar-spot of maple - Sclerotinia fructigena (Monilia), plum rot - **Basidiomycetes, Club Fungi:** - Wood, mycelium with clamp connections - Scleroderma vulgare, fruiting body t.s. - Psalliota, mushroom, gill fungus - Boletus edulis, pore fungus - Coprinus, t.s. of pileus with basidia and spores, and life-cycle - Puccinia graminis, wheat rust, uredinia, telia, aecidia t.s. and life-cycle - Ustilago hordei, promycelia with copulating hyphae - Ustilago zeae, cornsmut - **Fungi imperfecti:** - Epidermophyton, fungi imperfecti, hyphae and conidia w.m. - **Lichenes, Lichens:** - Physcia, lichen, thallus with symbiotic algae, t.s. - Physcia, apothecium t.s. - Pleurococcus enclosed by hyphae of a lichenous fungus - **Bryophyta: Hepaticae, Liverworts:** - Marchantia, liverwort, thallus with air chambers, t.s. - Marchantia, young developing archegonium - Marchantia, antheridia, archegonia, sporophyte and gemma-cup l.s. - Marchantia, life cycle - Marchantia, spores with elaters - **Bryophyta: Musci, True Mosses:** - Sphagnum, peat moss, t. s. of primitive stem - Polytrichum, moss, primitive central stele, t.s. - Mnium, moss, protonema - Mnium, w.m. of leaf, large chloroplasts - Sphagnum, peat moss, leaf - Polytrichum, moss, t.s. of leaves - Mnium, moss, - Tortula, moss, entire small plant and sporogonium - Mnium, moss, archegonium, antheridia and sporogonium, l. s. - Sphagnum sp., sporogonium, l. s. - Moss, stem tips with leaves, w.m. - Mnium, moss, life-cycle - Pteridophyta: Psilotales, Psilopsids: - Psilotum, primitive fern, stem with actinostele, t.s. - Psilotum, synangium, t. s. - **Pteridophyta: Lycopodiatae, Clubmosses:** - Lycopodium, club moss, t.s. of stem with plectostele - Lycopodium, l.s. of sporophyll with isospores - Selaginella, micro- and macrosporangium - Isoetes, quillwort, l.s. of entire plant - Isoetes, t. s. of the stem - **Pteridophyta: Equisetatae, Horse-tails:** - Equisetum, horse tail, median l.s. of stem apex - Equisetum, stem with eustele, t. s. - Equisetum, epiphyll with sporangia, t.s. - Equisetum, horse-tail, life-cycle - Equisetum, spores with elaters - Equisetum, germinating spores, color graphic design - **Pteridophyta: Filicatae, Ferns:** - Pteridium, braken fern, t.s. of the root - Pteridium, t.s. of rhizome with concentric vascular bundle - Adiantum, fern, rhizome with siphonostele, t.s. - Polypodium, rhizome with dictyostele, c. s. - Osmunda, royal fern, rhizome with ectophloic siphonostele, t.s. - Fern prothallium, filiform to the plane stage w.m. - Fern prothallium, mature with antheridia and archegonia, w.m. and l.s. - Fern prothallium, older stage with young sporophyte w.m. - Fern life cycle, color graphic design - Ophioglossum, sporophyll with sporangia, l.s. - Aspidium, fern, leaflet with of sporangia and sori l.s. - Phyllitis scolopendrium, leaflet with sporangia and sori, l.s.



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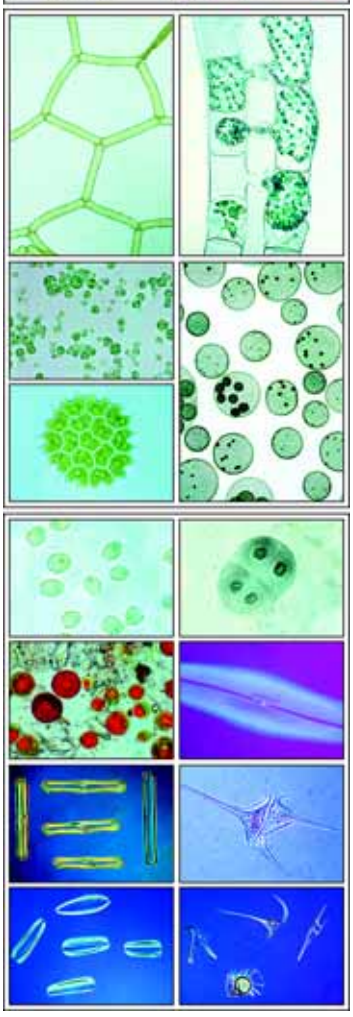
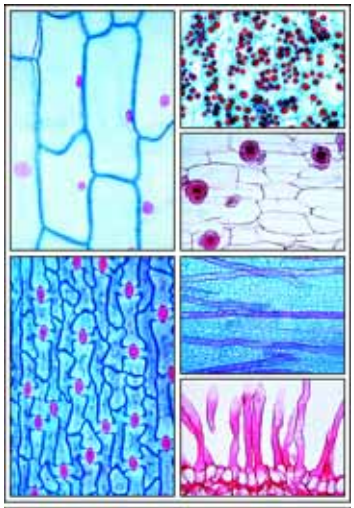
## No. 8246 E **Botany, Cryptogams** (Short Version TC)

*Atlas of 18 Overhead-Transparencies size 22 x 28 cm, comprising 116 pictures (anatomical pictures, photomicro- and macrographs, nature photographs, electron micrographs, drawings, diagrams, tables, scenes, test data and results). With comprehensive interpretation text. Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. - Compilation and text: Dr. Dieter Gerlach and Johannes Lieder.*

***Algae: -*** Oscillatoria, a blue-green filamentous alga w.m. - Oscillatoria, a blue-green alga, life cycle, color graphic design - Nostoc, blue green alga, w.m. shows heterocysts - Nostoc, blue green alga, filamentous colonies within gelatinous sheaths, color graphic design - Gloeocapsa, small colonies within sheaths w.m. - Mixed blue-green algae, many different species w.m. - Diatoms, recent marine, cleared shells of mixed species - Pleurosigma angulatum, test diatoms, high magnification to show detail of surface of shell - Spirogyra, alga with spiral chloroplasts, w.m. of vegetative filaments - Spirogyra, in scalariform conjugation and zygotes w.m. - Spirogyra, Conjugatae, fine structure and life cycle, color graphic design - Mixed desmids of various forms, strewn slide w.m. - Chlamydomonas, biflagellate algae w.m. - Chlamydomonas, biflagellate alga, sexual and asexual reproduction, color graphic design - Chlorella, unicellular green algae, w.m. - Cladophora, branching filaments with multinucleate cells w.m. - Cladophora, filiform green alga, life cycle and reproduction, color graphic design - Enteromorpha, seaweed w.m. - Oedogonium, filamentous green alga without branches w.m. - Haematococcus, unicellular red biflagellate algae - Eudorina, spherical colonies of thirty-two cells w.m. - Ulothrix, with girdle-shaped chloroplasts w.m. - Ulva, sea lettuce, a marine green alga, w.m. - Vaucheria sessilis, showing sexual stages w.m. - Volvox, spherical colonies with daughter colonies and sexual stages w.m. - Volvox, fine structure, reproduction, course of development, color graphic design - Chara, stonewort, with reproductive organs w.m. - Fucus vesiculosus, seaweed, male conceptacle with antheridia, t.s. - Fucus vesiculosus, female conceptacle with oogonia t.s. - Fucus (brown alga), habit, conceptacles, antheridia and oogonia, color graphic design - Laminaria saccharina, thallus with sporangia t.s. - Polysiphonia, marine red alga, male plant with antheridia w.m. - Polysiphonia, female plant with cystocarps w.m. - Polysiphonia, tetraspores w.m. - Batrachospermum, a fresh water red alga.
***Fungi and Lichenes: -*** Stemonitis, slime mold, capillitium with spores w.m. - Albugo candida (Cystopus), white rust of crucifers, t.s. - Plasmodiophora brassicae, clubroot, host cells with spores t.s. - Plasmopara viticola, downy mildew of grapes, leaf with conidia t.s. - Synchytrium endobioticum, potato black scab, t.s. of infected tissue - Aspergillus, brown mold, conidiophores and conidia w.m. - Rhizopus, bread mold, sporangia and zygospores w.m. - Rhizopus (mold), sexual reproduction, formation of zygospores, color graphic design - Claviceps purpurea, ergot, stroma with perithecia and asci l.s. - Claviceps purpurea, t.s. of sclerotium showing hyphae - Claviceps purpurea, life cycle, color graphic design - Morchella edulis, morel, fruiting body with asci and spores, t.s. - Morchella edulis, morel, color graphic design - Penicillium, blue mold, mycelium and conidiophores, w.m. - Saccharomyces cerevisiae, yeast, budding cells w.m. - Saccharomyces (yeast), sexual and asexual reproduction, color graphic design - Sclerotinia fructigena (Monilia), plum rot, sec. through conidia on host tissue - Tuber rufum, truffle, fruiting body with asci, t.s. - Boletus edulis, pore fungus, sec. of pileus showing c.s. of pores - Coprinus, ink cap, t.s. showing typical basidia and spores - Mushroom (Basidiomycetes), habit and fine structure, color graphic design - Mushroom, life cycle, + and -spores, development of mycelium, basidia and basidiospores, color graphic design - Puccinia graminis, wheat rust, sec. of uredinia telia - Puccinia graminis, wheat rust, sec. of telia - Puccinia graminis, sec. of aecidia and pycnidia on barberry leaf - Puccinia graminis, life cycle, color graphic design - Psalliota campestris (Agaricus), mushroom, gill fungus, t.s. of pileus - Ustilago zeae, cornsmut, t.s. of pustule with spores - Physcia, sec. of thallus of a typical lichen showing the fungus and the embedded algae - Physcia, l.s. of apothecium showing asci and ascospores - Physcia (lichen), sag. sec. of an apothecium with asci and ascospores, color graphic design.





***Mosses: -*** Marchantia, liverwort, cupule with gemmae, l.s. - Marchantia, liverwort, l.s. of archegonial branch showing archegonia - Marchantia, liverwort, l.s. of antheridial branch showing antheridia - Marchantia, liverwort, young sporophyte with developing spores l.s. - Liverwort (Marchantia) life cycle, all stages of development, color graphic design - Mnium, moss, t.s. of stem with primitive central stele - Mnium, moss, w.m. of leaf stained to show large chloroplasts - Mnium, moss, l.s. of antheridia - Mnium, moss, l.s. of archegonia - Moss (Mnium) life cycle, all stages of development, color graphic design - Mnium, moss, protonema w.m. - Polytrichum, moss, t.s. of leaves showing photosynthetic lamellae - Polytrichum, t.s. of leaf, color graphic design - Polytrichum, moss, t.s. of stem showing primitive vascular bundle - Polytrichum, moss, l.s. of sporophyte with spores - Sphagnum, peat moss, w.m. of leaf showing chlorophyll bearing and hyaline cells.

***Ferns and Fern Allies: -*** Psilotum, primitive fern, t.s. of stem showing exarch protostele - Psilotum, t.s. of three-lobed sporangium - Lycopodium, club moss, t.s. of stem showing actinostele - Lycopodium, t.s. of mature sporophyll showing isospores - Lycopodium, anatomy and life-cycle, color graphic design - Equisetum, horsetail, rhizome t.s. - Equisetum, mature strobilus l.s. - Equisetum, horsetail, life cycle, all stages of development, color graphic design - Equisetum, w.m. of spores with elaters - Aspidium, (Dryopteris), fern, rhizome t.s. - Aspidium, leaves with l.s. of sori - Aspidium, isolated sporangia and spores w.m. - Polypodium, leaf with sori and sporangia w.m. - Osmunda, royal fern, rhizome with ectophloic siphonostele t.s. - Fern prothallium, selected to show antheridia and archegonia w.m. - Fern prothallium, l.s. of antheridium with spermatozoids - Fern prothallium, l.s. of archegonium with egg cell - Fern life cycle, all stages of development in 19 pictures, color graphic design.

## No. 8247 E **Botany, Phanerogams** (Short Version TD)

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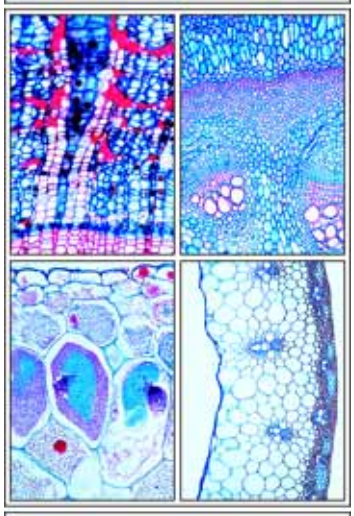
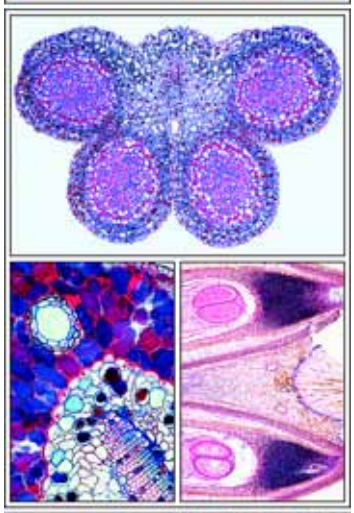
*Atlas of 20 Overhead-Transparencies size 22 x 28 cm, comprising over 142 pictures (anatomical pictures, photomicro- and macrographs, nature photographs, electron micrographs, drawings, diagrams, tables, scenes, test data and results). With comprehensive interpretation text. Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. - Compilation and text: Dr. Dieter Gerlach and Johannes Lieder.*



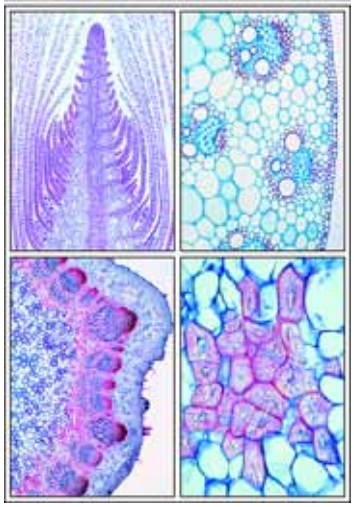
***Cells and Tissues:*** - Epidermal cells of Allium cepa (onion) shows typical plant cells - Epidermal cells of Allium cepa, color graphic design - Mitosis: l.s. of root tip of Allium cepa (onion), all stages in one picture - Cell division (mitosis) of Allium cepa, onion, 8 stages, color schematic design - Meiosis, t.s. of Lilium (lily) anthers showing pollen development - Meiosis: Lilium, zygotene stage, pairing of homologous chromosomes - Meiosis: Lilium, diplotene stage. Concentration and spiralization of pairs, chiasmata - Meiosis: Lilium, metaphase of first meiotic division, arrangement of chromosomes in the equatorial plate, top view - Meiosis: Lilium, anaphase of first meiotic division. Separation of chromosomes side view - Chloroplasts, w.m. of leaf of Elodea with large chloroplasts, bright field - Chloroplast in a mesophyll cell, electron photograph, low magnification - Chloroplast in a mesophyll cell, electron photograph, medium magnification - Chloroplast in a mesophyll cell, detailed electron photograph of the grana, high magnification - Chloroplasts, color schematic design - Aleurone grains, sec. of Ricinus endosperm - Starch grains, sec. of tuber of potato (Solanum tuberosum) - Starch grains isolated, high magnification detail, polarized light - Fat, t.s. of endosperm of Corylus (hazel) stained for fat - Inulin crystals, t.s. of tuber of Dahlia - Calcium oxalate crystals in w.m. of dry Allium scale - Raphides, t.s. of Impatiens leaf - Stem apex and meristematic tissue of Asparagus l.s. - Tracheids, reticulate, annular, and spiral vessels, isolated and w.m. - Cork cells, t.s. bark of Quercus suber (oak) - Stone cells, t.s. fruit of Pyrus communis (pear) - Parenchyme cells, t.s. of marrow of Sambucus niger (elderberry) - Root tip and root hairs, epidermal origin of root hairs - Pinus, pine, older woody root t.s.

***Roots: -*** Zea mays, corn, root t.s., typical monocot polyarch root - Zea mays, corn, root t.s., color graphic design - Convallaria, lily of the valley, t.s. of root shows endodermis, pericycle, phloem, xylem - Dendrobium, orchid, aerial root with velamen t.s. - Smilax, carrion flower, t.s. of root shows thickened endodermis - Salix, willow, l.s. of root showing origin of lateral roots - Ranunculus, buttercup, t.s. of a typical dicot root for general study - Ranunculus, t.s. of a typical dicot root, color graphic design - Ranunculus, t.s. shows detail view of the vascular tissue with protoxylem - Medicago, alfalfa, root t.s. with secondary growth - Taraxacum, dandelion, taproot with lactiferous vessels t.s. - Lupinus, root nodules with nitrogen fixing bacteria (Rhizobium) t.s. - Alnus, alder, root nodules with symbiotic actinomycetes (Streptomyces) t.s. - Fagus, beech, root with ectotrophic mycorrhiza, t.s. - Neottia nidus avis, orchid, root with endotrophic mycorrhiza, l.s. - Cuscuta, dodder, t.s. stem of host showing the haustoria of the parasite - Cuscuta, entrance of haustoria into the host tissue, high magnification.



***Stems: -*** Pinus, older stem with annual rings, resin ducts t.s. - Zea mays, typical monocot stem with scattered bundles, t.s. - Zea mays, typical monocot stem, color graphic design - Zea mays, t.s. of a vascular bundle high magnification detail - Triticum, wheat, t.s. stem of a gramineous plant with pith cavity and the ring-shaped arrangement of vascular bundles - Saccharum, sugarcane, stem t.s. - Helianthus, sunflower, typical dicot herbaceous stem t.s. showing open vascular bundles - Helianthus, sunflower, dicot herbaceous stem, color graphic design - Cucurbita, pumpkin, l.s. of stem with sieve tubes and vascular bundles - Cucurbita, pumpkin, l.s. of stem, color graphic design - Cucurbita, t.s. of stem showing surface of sieve tubes - Cucurbita pepo, t.s. of vascular bundle high magnification detail: xylem, phloem, sieve plates - Nymphaea, water lily, aquatic stem with idioblasts t.s. - Coleus, t.s. of a square stem showing collenchyma - Aristolochia, one year stem, t.s. - Aristolochia, older stem, t.s. - Fagus, beech, three sections of wood: cross, radial and tangential sections - Sambucus, elderberry, stem with lenticells t.s. - Tilia, lime, one year, stem t.s. - Tilia, two year stem t.s. - Tilia, three year stem t.s. - Elodea, waterweed, t.s. of aquatic stem showing primitive bundle - Piper nigra, pepper, t.s. of dicot stem with scattered bundles - Stem apex and meristematic tissue of Elodea, median l.s. showing leaf origin and growing point.

***Leaves:*** - Pinus, leaf (needle), t.s. of gymnosperm leaves - Pinus, leaf (needle), t.s., color graphic design - Elaeagnus, olive tree, scale-like stellate hairs w.m. - Verbascum, mullein, branched leaf hairs w.m. - Tulipa, tulip, leaf epidermis with stomata w.m., showing stomata and guard cells - Stomata of leaf epidermis, surface view and section, color graphic design - Zea mays, corn, monocot gramineous leaf t.s. - Typical monocot leaf, t.s., color graphic design - Syringa, lilac, t.s. of a typical mesophytic dicot leaf for general study - Typical dicot leaf, t.s., color graphic design - Elodea, t.s. of leaf showing the simple structure of an aquatic leaf - Nymphaea, water lily, floating leaf with air chambers t.s. - Nymphaea, water lily, t.s., color graphic design - Nerium, oleander, leaf with sunken stomata, t.s. of a xerophytic leaf - Typical xerophytic leaf, t.s., color graphic design - Agava, xerophytic leaf with thick epidermis t.s. - Coffea arabica, coffee, leaf t.s. - Dionaea, Venus flytrap, t.s. of leaf with digestive glands - Drosera, sundew, leaf with glandular hairs w.m. - Utricularia, bladderwort, w.m. of bladder - Aesculus, chestnut, t.s. of leaf bud showing bud squama and embedded folded leaves - Ficus elastica, India rubber plant, t.s. of leaf with cystoliths - Buxus, box, t.s. of xerophytic leaf with thickened cuticle and several palisade layers.



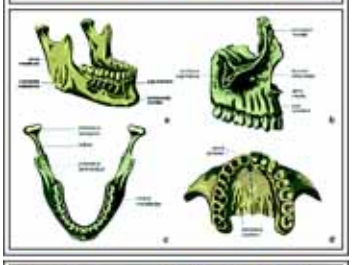
***Flowers and Fruits***: - Pinus, pine, mature pollen grains w.m. - Pinus, male cone with pollen t.s. (staminate cone) - Pinus, median l.s. of young female cone, megasporophylls with bracts and ovuliferous scales, ovules - Pinus, median l.s. of first year female cone, general view with growing ovules - Pinus, ovule with archegonia, median l.s. - Pinus, embryo and endosperm, median l.s. showing cotyledons - Pinus, embryo and endosperm, t.s. showing cotyledons - Mixed pollen types, showing various forms of many different species - Lilium, anther t.s. showing pollen chambers and pollen grains - Lilium, ovary t.s., showing arrangement of ovules, general view - Lilium, ovary t.s., ovule shows embryosac with the megaspore mother cell, resting stage - Lilium, ovary t.s., embryoac showing the anaphase of the second homeotypic division with two division figures - Lilium, ovary t.s., mature eight nucleate embryosac with egg cell, synergidae, polar nuclei and antipodal cells - Lilium, l.s. of stigma with pollen and pollen tubes - Lilium, l.s. of growing pollen tube, showing the division of the generative cell into two sperm nuclei - Solanum, potato, t.s. of ovary with formation of embryos - Capsella, shepherd's purse, l.s. of ovule with embryos in situ - Monocot flower bud, t.s. shows floral diagram

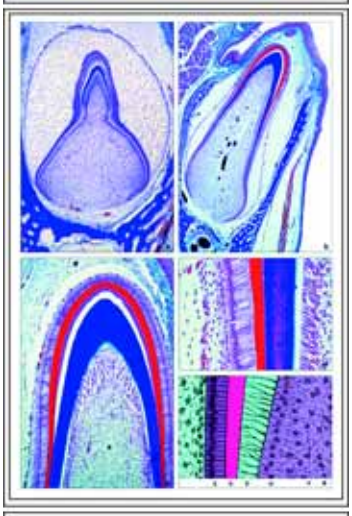
- Dicot flower bud, t.s. shows floral diagram - Arum maculatum, cuckoopint, l.s. of flower, insect trap - Lycopersicum, tomato, t.s. of flower bud shows floral diagram and axile placentation - Phaseolus, bean, t.s. of pod showing pericarp and seed - Papaver, poppy, t.s. of flower shows parietal placentation - Solanum tuberosum, potato, t.s. flower bud for floral diagram - Taraxacum, dandelion, l.s. of composite flower with tubular and ligulate florets - Taraxacum, dandelion, composite flower, color graphic design - Taraxacum, t.s. of composite flower - Cocos nucifera, coconut, endosperm t.s. - Citrus, lemon, young fruit t.s. - Triticum, wheat, t.s. of seed (grain) showing seed coat, endosperm with stored starch and embryo, entire view - Triticum, l.s. of seed (grain) showing all details, entire view, medium magnification - Triticum, l.s. through the embryo showing growing point of the stem, leaf origin, scutellum, primary root - Triticum, wheat, seed (grain), color graphic design - Zea mays, corn, grain (seed) l.s. embryo and endosperm

NEW!

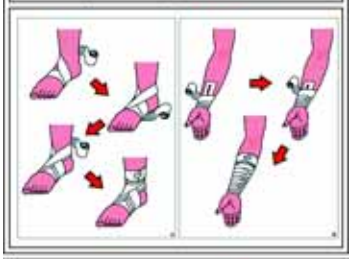
## No. 8253E **Atlas of Oral and Dental Histology**

*Atlas of 40 Transparencies size 22 x 28 cm, with over 150 pictures and 20 sketch- and worksheets. With detailed explanatory textbook. - Comprising the following themes: General and foodstuffs. Human mouth, tongue and throat. Human teeth and teeth development. Dental hygiene. Salivary glands, esophagus and stomach. Cells and tissues. Examples of histopathology. Sketch and work-sheets with semidiagrammatic designs and texts*





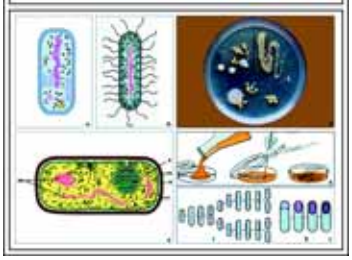
**General and Foodstuffs** - Human digestive organs - The composition of foodstuffs and the contents of calories - The Food Pyramid –**The Human Head** - Articulations of the skull: skull, atlas, axis - The skull, anterior and lateral view - Skull with separated bones – Mandible and Maxilla, lateral and dorsal view - Sagittal section of human head and neck, respiratory duct. Air passages - Frontal section showing the nasal cavity with its sinuses - The muscles of the head and the neck, front and lateral view – **The Human Mouth, Tongue and Throat** - Lip, t.s. - Internal parts of the mouth - Tongue, t.s. of papilla foliata with taste buds - Human tongue, t.s. - Fungiform and circumvallate papilla - Human tongue with areas of taste - The larynx; front view, dorsal view, l.s. - The processes of swallowing and breathing - Function of the arytenoid cartilages, glottis and vocal cords - Trachea, human l.s. showing cartilage and epithelium - Ciliated epithelium, t.s. of trachea - Human palatine tonsil and pharyngeal tonsil - Development of lymphocytes. Memory cells, plasma cells - Human immune system - **The Human Teeth and the Development of the Human Teeth -** The deciduous and the permanent set of teeth - The types of teeth - Upper and lower jaws - Development of a tooth: Dental lamina and early and late tooth primordium - Dental sack with later tooth differentiation - Apical part of crown - Detail with ameloblasts, enamel, dentin, and odontoblasts - Formation of enamel and dentin - Head of embryo with dental primordia - Diagram of tooth development - Section through the mandible showing deciduous tooth and developing permanent tooth germ - Incisor in the alveolus, median l.s. - Jaw with roots of fully-grown teeth, t.s. - Crown of incisor, ground thin – **Dental Hygiene** - Carious tooth, l.s. with caries-causing bacteria - Bacteria from human dental plaque, smear from human mouth, Gram stained with bacilli, cocci, spirilli, spirochaetes - Bacteria from human intestine - Dental Hygiene by tooth brushing – **The Human Salivary Glands, Esophagus and Stomach** - The position of the salivary glands in the head - Human submaxillary gland, t.s. - Human sublingual gland, t.s. - Human parotid gland, t.s. - Human esophagus, t.s. - Esophagus, color design - Wall of the stomach, t.s. - Intestinal epithelium with goblet cellst.s. and l.s. - Human stomach, l.s. drawing – **Human Cells and Tissues** - Typical Animal Cell. - Simple animal cells showing nuclei, cytoplasm and cell boundaries. - Mitochondria in section of human cells. - Golgi apparatus in section of human cells - Human chromosomes during metaphase (equatorial plate) showing the GTC-and the RBA-bands - General Information of Karyotype analysis. Normal male karyotype with bands: 46,XY,GTG - Types of epithelia, color diagram of 7 different types of epithelium - Squamous epithelium, isolated cells from human mouth - Stratified squamous epithelium - Intercellular bridges - Transitional epithelium Pigment cells in the skin - Endothelium of a small blood vessel cell boundaries revealed by silver impregnation - Sex chromatin: Barr body in mouth epithelial cells and nerve cell of woman - Columnar epithelium in human intestine t.s. photomicrograph - Cuboidal epithelium t.s. photomicrograph - Ciliated epithelium, t.s. of trachea - Ciliated epithelium - Scanning electron micrograph of cilia in upper part of human trachea - Cilia, flagella and their structures, electron micrograph. Transverse section of a group of cilia; three cilia are constructed divergely - Cilia, drawing of an electron micrograph - Human skin from palm, l.s. - Columnar epithelium - Connective tissues, drawings of 6 different types - Mesenchyme or embryonic connective tissue - Embryonic mucous connective tissue, umbilical cord t.s. - Loose connective tissue, stretch preparation of mesentery. - Reticular tissue silver stained - Tendon, l.s. - Yellow elastic connective tissue (Ligamentum nuchae), t.s. - Hyaline cartilage, t.s. - Cartilage, 3 types - Bone tissue, three dimensional color design to demonstrate the structure of the bone - Human bone, t.s. low magnification - Bone of human t.s., compact bone, diagram - Bone of human t.s. and l.s. - Cancellous bone, t.s. shows trabeculae of bone, bone marrow, and fat cells - Primary bone in marrow cavity of a long bone - Osteoblasts (bone forming cells), t.s. - Bone marrow with giant cells - Bone cells with processes - Phalanx of human embryo with beginning endochondral ossification, l.s. - Bone development, l.s. finger of fetus, showing intracartilaginous ossification - Long bone with epiphysis, longitudinal section - Finger joint, l.s, - Structure of a lon g bone - Structure of a skeletal muscle - The sensory and motor innervation of a muscle - Smooth muscles of human, l.s. - Striated muscle of human, l.s. - **Histopathology** - Atheroma capitis, Atheroma of the head - Giant cell sarcoma of the maxilla - Ffibroepitelial mixed tumor of the parotid gland - Melanosarcoma of the skin.



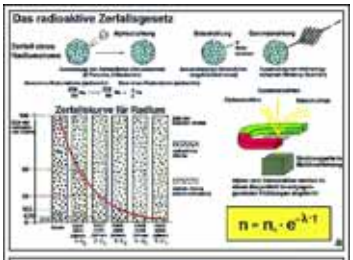
NEW!

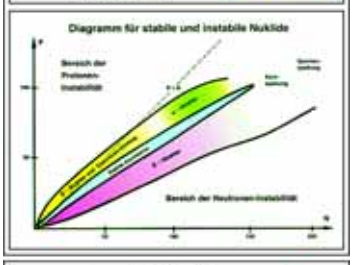
## No. 8255E **Basic Medicine and First Aid**

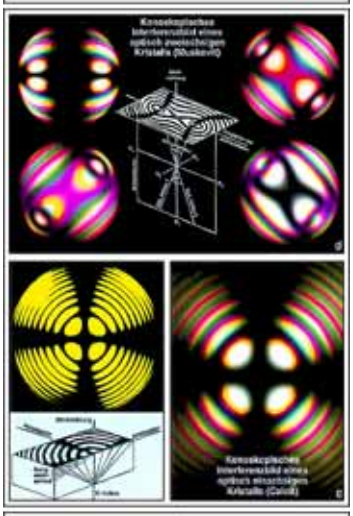
*Atlas of 18 Transparencies size 22 x 28 cm, with over 76 pictures and 20 sketch- and worksheets. With detailed explanatory textbook. - Comprising the following themes: The use of the microscope, bacteria and hygiene, medical instruments, first aid and assistance. Sketch and work-sheets with semidiagrammatic designs and texts*

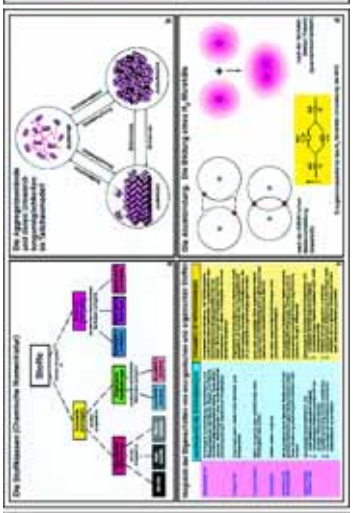


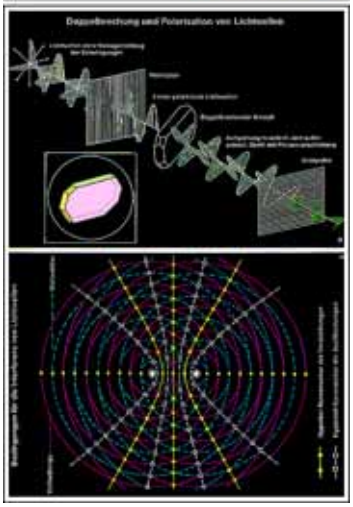
Construction of a microscope - Optical path of a microscope (path of rays) - How to prepare a microscopic slide: Blood or bacterial smear, whole mount of a zoological or botanical specimen, section of a zoological or botanical specimen - Working plan to prepare and stain a microscopic slide of a whole mount - Working plan to prepare and doubly stain a microscopic slide of a histological section (Hematoxylin-Eosine) - The different types of Bacteria. Cocci, bacilli, spirilla and spirochaetae. Forms and positions of the flagella and of the spores - Electron micrograph of sections through bacterial cells (E. coli) - Bacteria. Two pictures for comparison, one by scanning electron microscope, one by transmission electron microscope - Non-flagellated and flagellated bacteria - Bacterial culture in a Petri dish showing several different forms of growing - The procedure of preparing a bacterial culture - Bacteria in division, formation of spores in bacteria - Bacteria in smear of plaque of the teeth. – The Gram staining technology - Bacteria from waste-water, smear with many typical forms - Health care no. 1. Equipment for first-aid Part 1 - Different kinds of bandages - Sticking plasters - Spatula for mouth examination - Protection mask - Scissors - Blood pressure measuring equipment - Stethoscope - Thermometer - Health care no. 2. Equipment for first-aid Part 2 - Hypodermic syringe - Pipette - Auriscope for ear examination - Ophthalmoscope for eye examination - Forceps - Equipment for taking an electrocardiogram - Box with first-aid equipment - Health care no. 3. First aid: - Taking the temperature - Taking the blood pressure - Examination of the pulse rate on the wrist, two methods - Examination of the pulse rate by the doctor - Taking a pill and taking a medicine - Making an infusion - Making an injection - Examination of the heart and lungs with the stethoscope - Health care no. 4. First aid - In case of cuts: Cleaning of the wound, control of bleeding by applying a sterile dressing, covering the wound by bandages to keep the wound clean and keep harmful bacteria out - Chemicals in the eye: Clean eyes by flushing the eye with water - Broken arm or leg: any firm object or material will serve as a splint, application of a plaster cast - Slings used to support a fractured forearm - Walking on crutches - Health care no. 5. First aid: - In case of shock







or heart attack: opening the mouth, mouth-to-mouth rescue breathing, artificial respiration by respirator, artificial respiration by chest compression - Choking by a foreign object in the throat: Using the Heimlich maneuver to try to remove the object if the person is having trouble breathing - Health care no. 6. At the docotor and in the hospital - Correct application of a bandage on the foot and on the arm - Examination of the throat - Examination of the eye - Examination of the ear - Checking and stretching the leg in case of luxation - Health care no. 7. At the docotor and in the hospital - Drawing up of a syringe, removing possible air-bubbles - Taking of a blood sample - Checking the blood sample under the microscope - Transportation by the ambulance - Explaining an X-ray by the doctor - Eye test.

## No. 8240 E **The Structure of Matter Part I**

NEW!

*Atlas of 35 OHP Transparencies size 22 x 28 cm, comprising 86 color pictures with a great variety of details, mostly with several component figures (drawings, diagrams, tables, schemes, photomicrographs and -macrographs, electron micrographs, X-ray photographs, field emission micrographs, diagrammatic designs, technical photographs, test data and results). - Manual with comprehensive interpretation text, drawings and designs. - Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. – Compilation and text: Dr. rer. nat. Otto J. Lieder.*

The structure of matter is the object of world-wide research work. The present atlas contains a systematic survey of the respective research results and is designated for use in secondary schools and in classes of technical, physical and chemical colleges and adult education. Here a selected stock of pictures is placed at disposal, which in usual textbooks and education manuals is contained in a very limited size only.

**The composition of the atom, elementary particles, atomic nuclei, structure of the atomic shell. -** On the basis of selected examples the development from the ancient idea to the latest findings the fine structure of the matter is illustrated - The ancient idea of the elements as an answer to the question for the primary matter - Postulating of the atomic idea according to LEUKIPPOS and DEMOKRITOS - Conception of particles according to JOHN DALTON (atoms, atom bindings, molecules) - First structured atomic model of THOMSON - Scattering experiment of RUTHERFORD. Exploration of atomic dimensions and definition of the orbital model - Atomic model of NIELS BOHR (Quantization of particle energy) - Atomic model of ARNOLD SOMMERFELD - Matter waves (DE BROGLIE waves) as a proof of the double nature of matter and light - The HEISENBERG uncertainty relation and its consequences to the ideas of atomic structure - The quantum mechanical atomic model according to HEISENBERG and SCHROEDINGER - The atomic spectrum of hydrogen as the expression of electron transition within quantum energy stages of the hydrogen atom - General term diagram and spectral series of the alkali atoms - Term diagram H to -He - The conditions of origin of the three spectrum types - The solar spectrum. The FRAUNHOFER lines and the related chemical elements - The hydrogen isotopes and the atomic structure of the ten lightest elements according to NIELS BOHR - The symmetry of the simplest atomic orbitals and the structure of the atomic shell according to the orbital model

**Energy, matter, interactions. -** An attempt to give a clear idea of facts being not very vivid about the elementary particles of the matter through the description of possible interactions - The four interactions in elementary particles, their coupling constants - Matter and antimatter: The most important elementary particles and their properties and systematics - Models of the construction of atomic nuclei - The EINSTEIN equivalence principles of energy and matter - Diagram of stable and unstable nuclides - Nuclear fusion, nuclear binding energy and mass defect - Nuclear fission as a simple nuclear reaction - Spontaneous nuclear disintegration by FERMI-interaction - The law of radioactive disintegration - Methods to proof nuclear reactions: WILSON's cloud chamber, GLASER's bubble chamber and the nuclear emulsion technique - Nuclear fission after HAHN, STRASSMANN and MEITNER - Nuclear evaporation by high-energy particles - Symmetry models of elementary particles - Subelementary particles and their hypothetical characteristics - Experiments for the detection of quarks resp. partons - Attempt of a „General field theory" by HEISENBERG

**Classes of matter, properties, chemical bonding. -** Proceeding from the fundamentals of chemistry, inherent laws and correlations between the physical and chemical properties of the stuffs and the ideas of the atomic composition and chemical bonding are illustrated - The classes of the matter. Chemical nomenclature - The aggregate states and their changes after the particle model - Characteristics of anorganic and organic bonds - The most important general properties of the matter - The characteristic properties of the three types of elements - Possibilities of sigma- and pi-bonds - Atomic bond after the BOHR theory and the molecular orbital theory - Ionic bond. Electrodynamic interaction and electro-negativity of the elements - Metal bond - Polarization, transitional forms and diagrams of the bond types - Co-ordinative bond (semi-polar bond) - VAN DER WAALS forces - Hydrogen bonding - Types of hydrogen bonding - Ionic dissociation of salts, acids and bases - The electrolytic process and its educts - Typical substance with various bond-types - Polymerization and macromolecules

**Symmetry of crystals, properties of minerals, research into the structure. -** Correlations between arrangement of the particle grating and the macro-symmetry of the crystallized matter are shown. Some macro-physical properties of solids being suitable as criterions for the determination of minerals. The principles of X-ray analysis of the structure. - The macro-symmetry, a visible result of the arrangement of the particle grating - Rational planes and angular constant - Electron micrograph of a metal surface - Electron micrograph of a virus protein crystal - The crystallographic symmetry elements - Survey over the crystal symmetries and the symmetry elements - The crystal symmetries in the crystal grating model - The crystal symmetries and the crystal forms - Transition stages of crystallization: cube, octahedron, rhomboid dodecahedron - The three-dimensional orientation of lattice planes in the crystal grating and the MILLER indices of the crystal faces - The stereographic projection - Perfect crystal and real structure with three-dimensional distortions - Example for crystal twinning - Forms of crystal growth and crystal aggregates - Isotopy and macro-symmetry - Characteristics of the crystalline state - Color, transparency and opacity - MOHS scale of hardness - Typical anisotropic effects on scratch hardness and thermic velocity of propagation - Forms of cleavability - Lattice structure and cleavability - The double refraction - Dichroism and pleochroism - Double refraction and polarization of light waves - Orthoscopic interference figure of zinc selenite - Conoscopic interference figure of an uniaxial crystal - Conoscopic interference figure of a biaxial crystal - Polarization components - Extinguishing obliquities - Color table after Michel-Lévy - Interference of light waves as an attempt for structure analysis of light diffracting matter - Interference of water waves - Conditions of light wave interferences - Diffraction on double slit for light waves - Conditions of X-ray interferences - X-ray diffraction after MAX VON DER LAUE as a method for structure analysis of crystalline matter - Simulated historic experimental set-up after MAX VON DER LAUE - LAUE pattern of a triclinic mineral - LAUE pattern of a monoclinic mineral - LAUE pattern of a rhomboid mineral - LAUE pattern of a trigonal mineral - LAUE pattern of a hexagonal mineral - LAUE pattern of a tetragonal mineral - LAUE pattern of a cubic mineral - Structure of beryllium - Beryllium, tourmaline, dioptase - LAUE pattern of rocksalt - Numbered LAUE pattern of rocksalt - Radiographic method (powder photography) DEBEYE-SCHERRER - Examples of isotypic determination of substances by comparison of their powder photographs - Single crystal photograph after the BUERGER precession technique - Structure analysis by vector analysis of a PATTERSON function - Calculation of electron density by FOURIER analysis - Field emission microscope picture of a platinum peak - Field emission microscope picture of a tungsten peak - Proof of changing of atomic position on the surface of a platinum-iridium single crystal - Principle of field emission microscope

## No. 8241 E **The Structure of Matter Part II**

*Atlas of 27 OHP Transparencies size 22 x 28 cm, comprising 204 color pictures with a great variety of details, mostly with several component figures (drawings, diagrams, tables, schemes, photomicrographs and -macrographs, electron micrographs, X-ray photographs, diagrammatic designs, test data and results). - Manual with comprehensive interpretation text, drawings and designs. - Sketch and work-sheets with semidiagrammatic designs and texts - In strong plastic file with ring-mechanism. - Compilation and text: Dr. rer. nat. Otto J. Lieder.*

**Morphology of the minerals I. Elements and Bonds. -** The following series show the most important and well-known minerals in that state, which is for a collector the most common to find in the nature. The specimens for this selected normally are not treated. They show all the typical characteristics and enable therefore a sure identification of finds. From that minerals, which are often subject to variations of their appearance, two or more specimens are shown on one picture. Particular value was set on a correct reproduction of the natural colors and structures of the minerals.
Crystal chemistry systematics of minerals - Classification of silicate minerals - *1. Elements* - Graphite, fine aggregate - Diamond in kimberlite - Sulphur, rhomboid crystals - Native arsenic - Native copper as matrix - Native silver as crystal aggregate - Native gold on matrix quartz - Native bismuth, granular aggregate - *2. Sulphides and arsenides (ores)* - Pyrite (fools gold), typical crystals - Marcasite (white iron pyrite) - Bornite (purple copper ore) - Chalcopyrite (copper pyrite) - Covellite - Chalcocite - Galenite (lead glance) - Sphalerite (false galena, zinc blende) - Wurtzite - Cinnabar, the most important mercury ore - Pyrrhotite (magnetic pyrite) - Stibnite (antimonite) - Niccolite (copper nickel) - Smaltite (scutterudite) - Molybdenite, on quartz - Realgar (natural red arsenic disulphide) - Orpigment (yellow arsenic) - Arsenopyrite (mispickel) - Proustite (light red silver ore) - *3. Halides (salts)* - Halite (rock-salt) - Sylvite (sylvine) - Fluorite crystal (Derbyshire spar) - Carnallite, raw material for production of magnesium - Cryolite (Greenland spar, ice stone), for production of aluminium - *4. Oxides and hydroxides* - Magnetite (magnetic iron ore) - Haematite (red iron-ore) - Corundum, emery and ruby - Rock-crystal (quartz crystal) - Chalcedony and agate - Common and precious opal - Rutile, important titanium ore - Cassiterite (tinstone), in matrix - Pitchblende (nasturan), uranium ore (radioactive) - Chromite (chromium iron ore) - Ilmenite (titaniferous iron ore) - Pyrolusite (manganese ore) - Perovskite, pseudocubic crystals on schist - Spinel, octahedron aggregate - Zincite (red oxide of zinc, spartalite) - Psilomelane - Goethite - Brucite - Bauxite, raw material for the aluminium production - Limonite (brown haematite), weathered iron ore - *5. Carbonates* - Calcite crystal (calcspar) and Iceland spar rhombohedron - Dolomite rock (dolostone) - Siderite (iron spar, white iron ore) - Aragonite, large crystals - Cerussite (white leed ore) - Malachite (green carbonate of copper), cut and polished - Azurite (blue copper ore) crystal aggregate - Smithsonite (dry bone ore, calamine), crusty aggregate - Witherite, crystal aggregate - Magnesite - Rhodochrosite, cut - *6. Borates* - Tincal (borax), crystals - Ulexite (cotton ball), fibrous aggregate, cut and polished - Boracite crystals in gypsum - *7. Sulphates, chromates, molybdates and wolframates* - Gypsum, clear single crystal (spectacle stone) - Anhydrite (cube spar), pale-colored pieces - Barite (barytes, basofor) - Celestine (celestite) - Crocoite (red lead ore) - Wulfenite (yellow lead ore) - Wolframite, crystal - Scheelite (natural calcium tungstate) - *8. Phosphates, arsenates, vanadates* - Apatite, crystals in matrix - Pyromorphite, prismatic crystals - Callaite - Monazite, crystals - Erythrite (cobalt bloom) - Annabergite (nickel bloom) - Wavellite, spherolithic aggregate - Descloizide, vanadium ore, crystals - Vanadinite, on matrix - Torbernite
**Morphology of the minerals II. Silicates. -** This series presents 56 beautiful color photographs of the most important minerals out of the large group of the silicates.
Olivine in basalt - Garnet in mica-schist - Topaz crystal - Zircon crystal - Andalusite, stem-like aggregate - Disthene (cyanite), solid aggregate - Titanite (sphene), single crystals - Staurolite, twinning crystals - Hemimorphite (natural zinc silicate), crystals on matrix - Epidote, crystals - Zoisite, stem-like aggregate - Beryl, Blue variety 'aquamarine' - Cordierite (iolite), dichroitic crystals - Tourmaline, different color varieties - Dioptase on matrix - Chrysocolla, earthy substance - Diposide,, columnar crystals - Common and basalt augites, rock-forming silicates - Spodumene (triphane), lithium raw material - Jadeite, broken and cut pieces - Enstatite, broken piece - Bronzite, crystal intergrowth, - Hypersthene, broken piece - Tremolite, stem-like aggregate - Actinolite, prismatic crystals in solid talcum - Common hornblende, wide-spread rock-forming silicate - Basalt hornblende, typical crystals - Wollastonite (tubularspar), fibrous crystals - Rhodonite, solid granular concretion - Talcum, pale-colored split piece - Prehnite, pale-colored spherical aggregates - Muscovite (Muscovy glass), split piece - Phlogopite, tabular crystals - Biotite, split piece - Lepidolite, split piece - Fuchsite, flaky aggregate - Chrysotile (Canadian asbestos) - Antigorite - Nepheline (nephelite) in effusive rock - Leucite (white or Vesuvian garner) in basalt - Analcime (analcite) on matrix - Orthoclase and aventurine feldspar (sunstone), split pieces - Microcline, split piece - Amazonite (amazonstone) crystals - Albite (pericline) - Labradorite, split piece with typical coloration - Anorthite, broken surface - Sodalite, broken surface - Hauyne, in porous lave - Lazurite (ultramarine), gem lapis lazuli - Natrolite, crystal bundle in drusy basalt - Harmotome, crystals - Stilbite (desmine), brown bundle on apophyllite (fish-eye stone) - Apophyllite (fish-eye stone), crystals - Tektite, glassy silicate of unknown origin - Moldavite (water-chrysolithe, bottle-stone), glassy silicate originated from meteoric striking
**Morphology and microstructure of the rocks. -** The macrophotographs give a picture of habit and structure of the surface of the most important rocks. Microphotographs of thin sections of the same sorts in polarized light demonstrate their inner structure in colorful pictures. Review and nomenclature of the types of rocks.
Survey and nomenclature of the rock types - The chemistry of the eruptive rocks (magmatites) - Volcanics: Lave, pumice and obsidian - Intrusive rock granite - Thin section photomicrograph of granite - Intrusive rock granodiorite - Intrusive rock syenite - Thin section photomicrograph of syenite - Intrusive rock diorite - Thin section photomicrograph of diorite - Intrusive rock gabbro - Thin section photomicrograph of gabbro - Matrix rock granite porphyry - Thin section photomicrograph of granite porphyry - Matrix rock diabas - Thin section photomicrograph of diabas - Matrix rock pegmatite - Extrusive rock basalt - Thin section photomicrograph of basalt - Extrusive rock rhyolite (liparite) - Extrusive rock trachyte - Extrusive rock andesite - Clastic sedimentary rock sandstone - Thin section photomicrograph of sandstone - Clastic sedimentary rock greywacke - Clastic sedimentary conglomerate - Clastic sedimentary breccia - Chemical sedimentary rock travertine - Thin section photomicrograph of travertine - Biogenous deposit anthracite coal - Photo micrograph of the biogenous deposit diatomaceous earth - Pelitic metamorphic rock mica-schist (mica-slate) - Thin section photomicrograph of mica-schist - Sialic metamorphic rock gneiss - Thin section photomicrograph of gneiss - Carbonatic metamorphic rock marble - Thin section photomicrograph of marble - Regional metamorphic rock serpentine - Thin section photomicrograph of serpentine - Thin section photomicrograph of lunar rocks (basalt) - Thin section photomicrograph of lunar rocks (breccia and anorthosite) - Lunar rocks with lamellar structure caused by shock waves
**Gems and precious stones. -** This series also fascinates by the beauty and the great variety of details in its color photographs. There are shown well-known and economically interesting gems and precious stones.
Forms and cuts of precious stones - Classification of gems and precious stones - Corundum group: ruby and sapphire - Beryl group: aquamarine and emerald - Beryl group: emerald - Spinelgroup: pleonaste (ceylonite) and magnesian spinel - Topaz varieties - Garnet group: pyrope, grossular and almadine - Tourmaline varieties - Spodumene group: Hiddenite (lithia emerald) and kunzite - Quartz group I: rock crystal, amethyst, cairngorm (smoky quartz), citrine, rose quartz - Quartz group II: aventurine, hawk's eye, tiger's eye - Chalcedony varieties: carnelian, jasper, chrysoprase, bloodstone - Rutil needles in quartz crystal (Venus hair stone) - Banded chalcedony varieties: agate and onyx - Opal varieties - Jade varieties: jadeite and nephrite - Feldspar group: sunstone (heliolithe), moonstone, amazonstone - Callaite and turquoise matrix