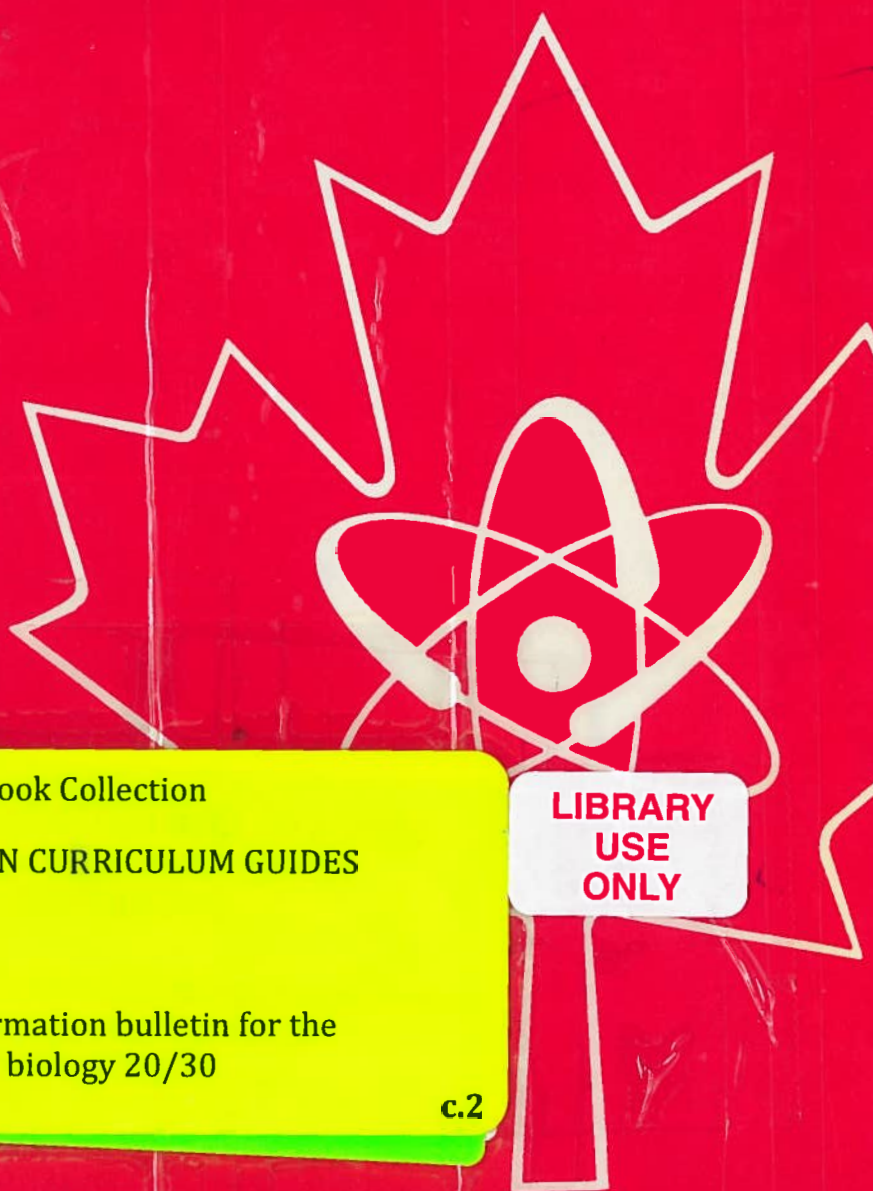


Science

An Information Bulletin for the Secondary Level Biology 20/30

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**An Information Bulletin
for the Secondary Level
Biology 20/30**

**Saskatchewan Education
September 1992**

Acknowledgements

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- the internal Science Program Team
- pilot teachers
- other contributing field personnel

This document was completed under the direction of the Mathematics and Natural Sciences Branch, Curriculum and Instruction Division, Saskatchewan Education

Using This Document

The Information Bulletin matches key resources to the topics of the Curriculum Guide. **The Information Bulletin does not prescribe what must be covered during Biology 20 or Biology 30.** The Bulletin presents references to resources which may be used by the teacher to give students opportunities to achieve understanding of, and ability in, the factors of the Dimensions of Scientific Literacy, and understanding of the science foundational and learning objectives as written in the Curriculum Guide. **The Curriculum Guide, therefore, prescribes what must be covered.** This document is an aid to teachers who are using the Curriculum Guide.

Many video resources have been acquired recently. Check the current issue of Media House Productions catalogue for those which are available. Many have been acquired with dubbing rights. For a nominal fee, you may obtain them for your school collection, until the erasure date.

Teachers should also consult *Science: A Bibliography for the Secondary Level – Biology, Chemistry, Physics* for supplementary resources. Correlate these resources to the curriculum as you plan your units.

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Unit 4 Animal Systems 18

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Biology Key Resources

Note: For annotations and ordering information, see *Science: A Bibliography for the Secondary Level – Biology, Chemistry, Physics, Secondary Sciences: Biology 20/30, Chemistry 20/30, Physics 20/30. An Information Bulletin for Administrators*, or the Book Bureau order form.

BSCS. (1989). *Advances in Genetic Technology*. Toronto, ON: D.C. Heath.

BSCS. (1991). *Basic Genetics: A Human Approach. 2nd Edition*. Dubuque, IA: Kendall/Hunt Publishing.

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BSCS. (1983). *Genes and Surroundings*. Dubuque, IA: Kendall/Hunt Publishing.

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Standing Room Only (Software). Scarborough, ON: Sunburst Communications.

University of Saskatchewan, Saskatchewan Agriculture and Agriculture Canada. (1987). *Guide to Farm Practice in Saskatchewan. Revised Edition*. Saskatoon: University of Saskatchewan.

Vance, Fenton, James Jowsey, and James McLean. (1984). *Wildflowers Across the Prairies. Revised Edition*. Saskatoon: Western Producer Prairie Books.

Biology 20 Core Units

Unit 1 Introduction to Biology

Biological Science: An Ecological Approach (7th Edition)

Chapter 1, Section 1.7

- "A Hypothesis Is A Statement that Explains an Observation", pp. 19-21

Chapter 5, Sections 5.1 - 5.3

- "Cells and Cell Structure", pp. 107-113

Chapter 9, Sections 9.1 - 9.4

- "Diversity, Variation, and Evolution", pp. 213-226

Appendix 1

- "Some General Procedures for the Laboratory", pp. 691-698

Investigation 1.4

- "How Do Flowers Attract Bees? A study of Experimental Variables", pp. 21-24

Investigation 5.1

- "Observing Cells", pp. 112-113

Investigation 9.1

- "Variation in Size of Organisms", pp. 213-215

Investigation 9.2

- "Natural Selection -- A Simulation", pp. 223-224

Investigation A2.1

- "Chemical Safety", pp. 699-703

Investigation A2.2

- "Introduction to the Microscope", pp. 704-706

Investigation A2.3

- "The Compound Microscope: Biological Material", pp. 706-708

Biological Science: An Ecological Approach 7th Edition Student Study Guide.

Intro. Activity

- "Predicting Your Future", pp. 1-2

Activity 1.1

- "Getting Ready to Read", p. 3

Activity 1.2

- "Taking Helpful Notes", pp. 4-6

Activity 1.3

- "Seeing With a Purpose", pp. 6-7

Activity 5.1

- "The Main Idea", pp. 41-42

Activity 5.2

- "Identifying a Hypothesis", pp. 42-43

Activity 9.1

- "Evolution Search", p. 71

Activity 9.2

- "Outlining the Theory of Evolution", pp. 72-73

Science, Technology, and Society

Activity 1

- "Science, Technology, and Society: An Introduction", pp. 1-24

Biology: Living Systems

Chapter 2

- "Biology as a Science", pp. 22-33

Chapter 4, Section 4:1

- "The Cell Theory", pp. 63-64

Section 4:2

- "Characteristics of Cells", pp. 64-65

Chapter 6, Section 6:1

- "Spontaneous Generation: Prologue", pp. 107-109

Section 6.2

- "Convincing Evidence", pp. 109-110

Chapter 10, Section 10:6

- "Evolution Observed", pp. 204-205

Section 10:7

- "Lamarck", pp. 206-207

Section 10:8

- "Darwin: Gathering Evidence", pp. 207-208

Section 10:9

- "Darwin's Explanation: Natural Selection", pp. 208-210

Section 10:10

- "Darwin and Lamarck Compared", pp. 210-211

Investigation 2

- "How does one test a hypothesis?", pp. 34-35

Biology: Living Systems. Resource Master Book

This book contains student worksheets, student investigation worksheets, students "skills" worksheets, and masters for overhead transparencies, designed to help reinforce science skills, develop laboratory skills, and review and apply science concepts. They are correlated to the chapters of the student text. Refer to the chapters and sections listed under *Biology: Living Systems* above to determine which of these resources may be useful in this unit.

Biology: Living Systems. Reading and Study Guide

This book contains worksheets and review sheets which are designed to aid students in developing mathematics and reading skills through science content. The book is correlated to the chapters of the student text, so refer to the sections and chapters listed under *Biology: Living Systems* above to determine which sections of this resource may be useful.

Probing Levels of Life: A Laboratory Manual

- 3 "The Compound Microscope -- A Biological Tool", pp. 6-10
- 4 "Microscopic Measurements", pp. 11-14
- 8 "Basic Cell Structure", pp. 23-25
- 13 "Spontaneous Generation", pp. 34-35
- 22 "Coacervates -- The Road to Life", pp. 62-63

Project WILD (1990) Activity Guide

Note: Have the following activities been used at the Middle Level? Enhance them; use them for the first time, or use them as assessment devices. (See page 16 of the Curriculum Guide.)

- Wild Words, p. 82
- Micro Odyssey, p. 165

The following activities may be used as introductory ones or they may be used as summative evaluation activities at the end of other units and/or the Biology 20 course.

- Changing Attitudes, p. 257
- Cartoons and Bumper Stickers, p. 268
- Does Wildlife Sell Cigarettes? p. 270
- The Power of a Song, p. 272
- Facts and Falsehoods, p. 316
- Ethi-Reasoning, p. 340
- Enviro-Ethics, p. 351

Unit 2 Ecological Organization

Biological Science: An Ecological Approach (7th Edition)

Chapter 1

- "The Web of Life", pp. 5-19

Chapter 2

- "Populations", pp. 27-51

Chapter 3

- "Communities and Ecosystems", pp. 53-75

Chapter 20

- "Selection and Survival", pp. 555-562

Chapter 21

- "Ecosystems of the Past", pp. 565-581

Chapter 22

- "Biomes Around the World", pp. 597-631

Chapter 23

- "Aquatic Ecosystems", pp. 633-665

Chapter 24

- "Managing Affected Ecosystems", pp. 667-689

Investigation 1.1

- "The Powers of Observation", pp. 5-6

Investigation 1.2

- "You and the Web of Life", pp. 10-12

Investigation 1.3

- "Field Observation", pp. 16-17

Investigation 2.1

- "Study of a Population", pp. 27-31

Investigation 2.2

- "Population Growth", pp. 36-39

Investigation 2.3

- "Water - A Necessity of Life", pp. 43-45

Investigation 3.1

- "Abiotic Environment: A Comparative Study", pp. 54-55

Investigation 3.2

- "Competition", pp. 58-60

Investigation 3.3

- "Acid Rain and Seed Germination", pp. 63-64

Investigation 20.2

- "A Field Study of Animal Behaviour", pp. 554-555

Investigation 20.3

- "Environmental Tolerance", pp. 556-558

Investigation 22.1

- "Climatograms", pp. 600-601

Investigation 22.2

- "Studying a Piece of the Biosphere", pp. 608-612

Investigation 22.3

- "Long-Term Changes in an Ecosystem", pp. 616-618

Investigation 22.4

- "Effect of Fire on Biomes", pp. 620-624

Investigation 24.1

- "Views of the Earth from Afar", pp. 668-670

Investigation 24.2

- "Decisions About Land Use", pp. 682-685

Biological Science: An Ecological Approach 7th Edition Student Study Guide

Activity 1.4

- "Constructing a Concept Map", pp. 7-8

Activity 1.5

- "Disappearing Marshlands", pp. 9-10

Activity 2.1

- "Writing About Populations", p. 11

Activity 2.2

- "Planning to Study Biology", p. 12

Activity 2.3

- "Pig Populations", pp. 13-15

Activity 2.4

- "Using Tables of Data", pp. 16-17

Activity 2.5

- "Population Profiles", pp. 17-18
-

Activity 3.1

- "Getting an Overview", pp. 14-20

Activity 3.3

- "Finding a Niche", pp. 22-23

Activity 3.4

- "A Problem of Immunity", pp. 23-24

Activity 20.1

- "Looking Ahead", p. 151

Activity 20.4

- "A Fish Model", pp. 154-156

Activity 21.1

- "In Search of Early Artists", pp. 157-158

Activity 21.3

- "Animal Families Through Time", pp. 162-164

Activity 22.1

- "Solar Radiation", pp. 167-168

Activity 22.2

- "Reading About Biomes", p. 169

Activity 22.3

- "Biomes in 3 Dimensions", pp. 170-171

Activity 22.4

- "Where Biomes Meet", p. 172

Activity 22.5

- "Human Intervention", p. 173

Activity 23.1

- "A Muddy Sea Around Us", p. 175

Activity 24.1

- "Cloudy Writing", p. 181

Activity 24.3

- "Prediction -- Extinction", pp. 184-185

Science, Technology, and Society

Activity 2

- "Concerns About Science and Technology", pp. 25-27

Activity 3

- "Decision Making", pp. 29-33

Investigating the Human Environment: Land Use

Use the whole module, or whatever parts of it you wish to adapt.

Biology: Living Systems

Chapter 1

- "Life: Common Characteristics", pp. 4-21

Chapter 10, Section 10.1

- "Fossils: Formation and Dating", pp. 197-199

Section 10.2

- "Fossil Record: Interpretation", pp. 199-201

Chapter 32

- "Population Biology", pp. 672-691

Chapter 33

- "The Ecosystem", pp. 692-713

Chapter 34

- "Origin and Distribution of Communities", pp. 714-737

Chapter 35

- "Humans and the Environment", pp. 738-763

Investigation 1

- "Do living systems release carbon dioxide?", pp. 12-13

Investigation 32

- "How do population changes alter population pyramids?", pp. 688-689

Investigation 33

- "How does one measure soil humus?", pp. 710-711

Investigation 34

- "How do biomes of North America differ?", pp. 734-735

Investigation 35

- "What evidence is there that the greenhouse effect is occurring?", pp. 750-751

Biology: Living Systems. Resource Master Book

This book contains student worksheets, student investigation worksheets, students "skills" worksheets, and masters for overhead transparencies, designed to help reinforce science skills, develop laboratory skills, and review and apply science concepts. They are correlated to the chapters of the student text. Refer to the chapters and sections listed under ***Biology: Living Systems*** above to determine which of these resources may be useful in this unit.

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Probing Levels of Life: A Laboratory Manual

- 1 "Life: Common Characteristics", pp. 1-2
- 2 "Life In A Square Meter Community", pp. 3-5
- 74 "Dandelion and Plantain Populations", pp. 191-193
- 75 "Predation: A Limiting Factor in Population Growth", pp. 194-196
- 76 "Microarthropod Populations in Leaf Litter", pp. 197-199
- 77 "Interspecific Relationships Between Populations", pp. 200-204
- 78 "Physical Factors of Soil", pp. 205-206
- 79 "Field Studies of a Freshwater Ecosystem", pp. 207-212
- 80 "Effect of Temperature on Seed Germination", pp. 213-214
- 81 "Field Study of a Terrestrial Community", pp. 215-223
- 82 "Ecological Succession in a Microenvironment", pp. 224-226
- 83 "Effect of a Pollutant on Protozoan Populations", pp. 227-228

Issues in Agriculture

Unit 7: "Soil Conservation", pp. 33-37

Landscapes: A Guide to the Landforms and Ecology of Southern Saskatchewan.

This series, consisting of a teacher reference manual, landscape guides, a set of slides, a landscape map, and posters was sent to each school in Saskatchewan in the early 1980's. The slides have been copied onto video format and are available from Media House Productions. The series is invaluable for the teacher who wants to apply the study of ecology to the environment of southern Saskatchewan.

Saskatchewan Soil Survey has produced maps describing soil zones, soil pH, and wind and water erosion risk zones of Saskatchewan soils.

For copies of these maps, write:

Saskatchewan Soil Survey
Room 210 John Mitchell Building
University of Saskatchewan
Saskatoon, Saskatchewan
S7N 0W0

Guide to Farm Practice in Saskatchewan

was published by the Division of Extension and Community Relations every three years from 1933 to 1987. It is **no longer in print** but copies may be available from extension agrologists. It contains much information which may be useful both for teacher background and for student research. Sections on the climate, soil productivity, and habitat protection in Saskatchewan will be especially useful in this unit.

Managing Saskatchewan Rangeland (1991) is available from the Saskatchewan Agriculture Development Fund. (Contact Calvin Massier at 787-5902 to request copies.)

Project WILD (1990) Activity Guide

- Designing a Habitat, p. 70

Note: This activity could be adapted to terrestrial organisms.

- Puddle Wonders, p. 72
- Riparian Retreat, p. 105
- Wetland Metaphors, p. 168
- The Edge of Home, p. 177

Note: This activity would work well in conjunction with "Riparian Retreat".

- Oh Deer, p. 206
- Checks and Balances, p. 239
- Where Have All the Salmon Gone, p. 245
- Water We Eating, p. 275
- The Glass Menagerie, p. 283
- Planning for People and Wildlife, p. 306
- Aquatic Times, p. 310
- Improving Wildlife Habitat in the Community, p. 348
- Dragonfly Pond, p. 354

Note: This activity can provide guidelines for any research using human resources.

- Turtle Hurdles, p. 363
- Plastic Jellyfish, p. 368

Standing Room Only, is computer simulation of human population growth which allows students to enter values for a range of variables, and receive a projection of population growth into the 21st century. It is available for MS-DOS and for the Apple II series with 128K memory, from:

Sunburst Communications
Department DLCN
Box 3240 Station 'F'
Scarborough, ON, M1W 9Z9

The Wheatgrass Mechanism may be useful in this unit and the unit dealing with the diversity of life. It offers a narrative and romantic look at the life on the prairies.

Unit 3 The Diversity of Life

Biological Science: An Ecological Approach (7th Edition)

Chapter 10

- "Ordering Life in the Biosphere", pp. 243-275

Chapter 11

- "Prokaryotes and Viruses", pp. 277-392

Chapter 12

- "Eukaryotes: Protists and Fungi", pp. 305-436

Chapter 13

- "Eukaryotes: Plants", pp. 331-359

Chapter 14

- "Eukaryotes: Animals", pp. 361-389

Investigation 10.2

- "Levels of Classification", pp. 253-257

Investigation 11.1

- "Distribution of Microorganisms",
pp. 377-279

Investigation 11.2

- "Control of Eubacteria", pp. 291-292

Investigation 11.3

- "Screening for AIDS", pp. 298-300

Investigation 12.1

- "Variety Among Protists and Cyanobacteria",
pp. 305-406

Investigation 12.2

- "Life in a Single Cell", pp. 309-313

Investigation 12.3

- "Growth of Fungi", pp. 318-320

Investigation 13.1

- "Increasingly Complex Characteristics",
pp. 333-335

Investigation 14.1

- "Diversity in Animals: A Comparative Study",
pp. 361-363

Biological Science: An Ecological Approach 7th Edition Student Study Guide

Activity 10.1

- "How Many Robins?", pp. 79-80

Activity 10.4

- "Working as a Team", p. 83

Activity 11.1

- "Skimming Paragraphs", p. 85

Activity 11.3

- "Identifying Bacteria", pp. 87-88

Activity 11.5

- "Rice", p. 90

Activity 12.3

- "Finding the Nucleus of an Idea",
pp. 96-97

Activity 12.4

- "Reading to Find Hypotheses", p. 97

Activity 12.5

- "Whodunit?", p. 98

Activity 13.1

- "Finding Information on Plants", p. 98

Activity 13.2

- "Reporting on Plants", p. 99

Activity 13.3

- "Tentative Explanations", p. 100

Activity 13.4

- "Primitive Plants", p. 101

Activity 14.1

- "Indoor Birdwatching", pp. 107-109

Activity 14.3

- "Seeing From All Sides", pp. 111-112

Activity 14.4

- "Concept Mapping Diversity and Adaptation in
Animals", pp. 113-115

Activity 16.2

- "Writing a Short Bibliography", p. 126

Biology: Living Systems

Chapter 12

- "Classification", pp. 244-257

Chapter 13

- "Monerans, Protists, Fungi, and Viruses", pp. 260-285

Chapter 14

- "Plants", pp. 286-307

Chapter 15

- "Animals: Sponges Through Mollusks", pp. 308-327

Chapter 16

- "Animals: Arthropods Through Vertebrates", pp. 328-355

Chapter 19

- "Simple Organisms and Disease", pp. 388-409

Chapter 31

- "Behavior", pp. 648-671

Investigation 12

- "What information can be gained from classifying living organisms?", pp. 254-255

Investigation 13

- "What are the traits of organisms in the Kingdoms Monera, Protista, and Fungi?", pp. 254-255

Investigation 14

- "What are the characteristics of gymnosperms?", pp. 304-305

Investigation 15

- "What does the pork worm *Trichinella spiralis* look like, and what is its life cycle?", pp. 324-325

Investigation 16

- "How do poisonous and nonpoisonous snakes compare?", pp. 352-353

Investigation 31

- "How can you study the behavior of an animal?", pp. 656-657

Biology: Living Systems. Resource Master Book

This book contains student worksheets, student investigation worksheets, students "skills" worksheets, and masters for overhead transparencies, designed to help reinforce science skills, develop laboratory skills, and review and apply science concepts. They are correlated to the chapters of the student text. Refer to the chapters and sections listed under ***Biology: Living Systems*** above to determine which of these resources may be useful in this unit.

Biology: Living Systems. Reading and Study Guide

This book contains worksheets and review sheets which are designed to aid students in developing mathematics and reading skills through science content. The book is correlated to the chapters of the student text, so refer to the sections and chapters listed under ***Biology: Living Systems*** above to determine which sections of this resource may be useful.

Probing Levels of Life: A Laboratory Manual

- 26 "Construction and Use of a Dichotomous Key", pp. 74-75
- 27 "Binomial Nomenclature -- Scientific Names of Trees", pp. 76-77
- 28 "Morphology and Staining of Bacteria", pp. 78-80
- 29 "Size and Structure of Protozoa", pp. 81-82
- 30 "Morphology of Lichens", pp. 83-84
- 31 "Morphology of Green Algae", pp. 85-86
- 32 "Mosses, Club Mosses, and Horsetails", pp. 87-89
- 33 "Ferns, Gymnosperms, and Angiosperms", pp. 90-91
- 34 "Diversity of Lower Invertebrates", pp. 93-94
- 35 "Constructing a Key to the Lower Invertebrates", p. 95
- 36 "Identification of Aquatic Insect Larvae and Juveniles", pp. 96-97

- 37 "Diversity of Vertebrates", pp. 98-99
44 "Controlling Microbial Growth",
pp. 116-117
45 "The Regional Spread of Disease-Causing
Protozoa", pp. 118-119
73 "Response of Multicellular Animals to
Light", pp. 187-190

***Saskatchewan Flora and Fauna – Kingdoms
of the Spore; An Invertebrate World***

***Saskatchewan Flora and Fauna 2 – The
Vertebrates: Cold-blooded Vertebrates, Birds,
Mammals***

The above kits were distributed to all schools in Saskatchewan during 1984 and 1987, respectively. Each consists of a filmstrip with a cassette audio tape sound track, a transcript of the sound track, and a teacher's guide. Common species found in Saskatchewan are used to illustrate groups of organisms. The kits are invaluable for the teacher who wishes to set the study of biology in a Saskatchewan context, and who wishes to make best use of field trips.

Guide to Farm Practice in Saskatchewan

was published by the Division of Extension and Community Relations every three years from 1933 to 1987. It is no longer in print but copies may be available from extension agrologists. It contains much information which may be useful both for teacher background and for student research. Sections on grain crops, forage crops, horticulture, weed control, plant diseases, insect pests, livestock and poultry, and vertebrate pests will be especially useful in this unit.

Wildflowers Across the Prairies

This is an excellent book for identifying species of flowering plants which are native to Saskatchewan and for encouraging students to become interested in the diversity of Saskatchewan angiosperms.

Project WILD (1990) Activity Guide

Note: Have any of these activities been used in earlier grades? Enhance them, use them for the first time, or use them as assessment devices.

- Water Plant Art, p. 62
- Mythical Mystical, p. 115
- Blue Ribbon Niche, p. 180
- Fishy Who's Who, p. 195
- Fashion a Fish, p. 197
- Aquatic Roots, p. 242

Unit 4 Agricultural Botany of Saskatchewan

Biological Science: An Ecological Approach (7th Edition)

Chapter 6, Sections 1 - 2

- "Reproduction", pp. 135-138

Chapter 13, Sections 9 - 11

- "Flowering Plants", pp. 350-358

Chapter 18

- "The Flowering Plant: Form and Function", pp. 485-511

Chapter 19, Sections 9 - 12

- "Hormonal and Environmental Control of Plant Growth", pp. 529-538

Investigation 7.1

- "The Yeast Life Cycle", pp. 155-159

Investigation 13.2

- "Reproductive Structures and Life Cycles - Part B: Flowers", pp. 338-339

Investigation 13.3

- "Fruits and Seeds", pp. 352-353

Investigation 18.1

- "Water and Turgor Pressure", pp. 487-489

Investigation 18.2

- "Leaves, Stems, and Roots: Structural Adaptations", pp. 497-499

Investigation 18.3

- "Seeds and Seedlings", pp. 502-504

Investigation 19.3

- "Tropisms", pp. 533-535

Biological Science: An Ecological Approach 7th Edition Student Study Guide

Activity 6.1

- "Library Research", pp. 49-50

Activity 18.1

- "Yarrow Growth", pp. 137-138

Activity 18.3

- "Sales Resistance", p. 139

Activity 18.4

- "Plant Growth", pp. 140-141

Activity 18.5

- "Why Do Yarrow Plants Vary?", pp. 141-142

Activity 19.5

- "Effect of Gibberellic Acid", pp. 147-149

Biology: Living Systems

Chapter 20

- "Plant Reproduction and Development", pp. 412-431

Chapter 22

- "Plants: Other Life Functions", pp. 448-469

Investigation 20

- "How can you tell if a seed is still alive?", pp. 428-429

Investigation 22

- "How do different environmental conditions alter transpiration rate?", pp. 466-467

Biology: Living Systems. Resource Master Book

This book contains student worksheets, student investigation worksheets, students "skills" worksheets, and masters for overhead transparencies, designed to help reinforce science skills, develop laboratory skills, and review and apply science concepts. They are correlated to the chapters of the student text. Refer to the chapters and sections listed under ***Biology: Living Systems*** above to determine which of these resources may be useful in this unit.

Biology: Living Systems. Reading and Study Guide

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Probing Levels of Life: A Laboratory Manual

- 46 "Classification of Fruits", pp. 120-121
- 47 "Development of Seeds", pp. 122-123
- 48 "Vegetative Reproduction in Duckweed",
pp. 124-125
- 52 "Root Anatomy", pp. 134-135
- 53 "Stem Anatomy", pp. 136-137
- 54 "Transpiration in Plants", pp. 138-139
- 72 "Plant Behaviors", pp. 185-186

Saskatchewan Field Crops

This kit was produced by the above agencies in 1983 and distributed to all Saskatchewan schools. It consists a filmstrip with an audio cassette tape sound track, a transcript containing the text and pictures from the above, and a set of line drawings and fact sheets on eleven major crops. It is an excellent resource for this unit.

Project WILD (1990) Activity Guide

Note: Have any of these activities been used earlier? Enhance them, use them for the first time, or use them as assessment devices.

- Eco-Enrichers, p. 92
- What Did Your Lunch Cost Wildlife,
p. 335
- Living Research, p. 360

Biology 30 Core Units

Unit 1 The Chemical Basis of Life

Biological Science: An Ecological Approach (7th Edition)

Chapter 4

- "Matter and Energy in the Web of Life", pp. 77-103

Chapter 15

- "Nutrition", pp. 410-420

Investigation 4.1

- "Organisms and pH", pp. 80-82

Investigation 4.2

- "Compounds of Living Organisms", pp. 87-89

Investigation 4.3

- "Enzyme Activity", pp. 93-95

Investigation 15.1

- "Food Energy", pp. 398-400

Biological Science: An Ecological Approach 7th Edition Student Study Guide

Activity 4.1

- "Using Models", pp. 2-32

Activity 4.2

- "The Vernacular of Science", pp. 32-34

Activity 4.5

- "Variables", pp. 38-39

Activity 15.3

- "Using Tables of Data", pp. 119-122

Biology: Living Systems

Chapter 3

- "Materials of Life", pp. 38-61

Chapter 9, Sections 1 - 3

- "Structure of DNA", pp. 171-176

Investigation 3

- "How does one determine if a solution is an acid or a base?", pp. 58-59

Biology: Living Systems. Resource Master Book

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Biology: Living Systems. Reading and Study Guide

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Probing Levels of Life: A Laboratory Manual

- 5 "Detecting Compounds Made By Living Things", pp. 15-17
- 6 "Molecules of Biological Importance", pp. 18-19
- 7 "Amino Acid Chromatography", pp. 20-22
- 19 "DNA Models", pp. 52-53

Unit 2 Cell Structure and Function

Biological Science: An Ecological Approach (7th Edition)

Chapter 5, Section 3-8

- "Organelles and Functions", pp. 114-124

Chapter 15, Sections 5 - 10

- "Cellular Respiration", pp. 401-409

Chapter 19, Sections 1 - 5

- "Photosynthesis", pp. 679-690

Sections 6 - 7

- "Respiration in Plants", pp. 692-694

Investigation 5.2

- "Diffusion Through a Membrane", pp. 119-120

Investigation 5.3

- "Cell Size and Diffusion", pp. 123-124

Investigation 15.2

- "The Marathon", pp. 406-408

Investigation 19.1

- "Gas Exchange and Photosynthesis", pp. 516-519

Investigation 19.2

- "Photosynthetic Rate", pp. 522-525

Biological Science: An Ecological Approach 7th Edition Student Study Guide

Activity 5.3

- "Making Analogies", pp. 43-45

Activity 5.4

- "Learning By Questioning", p. 46

Activity 5.5

- "Diffusion", pp. 47-48

Activity 15.2

- "Cellular Respiration", pp. 118-119

Activity 15.4

- "Animal Protein: How Essential?", pp. 122-123

Activity 19.2

- "Concept Mapping Photosynthesis", p. 144

Activity 19.3

- "Photosynthesis vs Cellular Respiration", pp. 144-145

Activity 19.4

- "Transplanting Photosynthesis", pp. 145-146

Biology: Living Systems

Chapter 4, Sections 3 - 9

- "The Cell and Its Environment", pp. 65-73

Sections 10 - 14

- "Inside the Cell", pp. 74-82

Chapter 5

- "Energy for Life", pp. 88-103

Chapter 21

- "Plant Nutrition", pp. 410-447

Investigation 4

- "How can cells be measured with the microscope?", pp. 84-85

Investigation 5

- "How does the amount of catalase compare in different tissues?", pp. 100-101

Investigation 21

- "How can you estimate the number of stomata on a leaf?", pp. 444-445

Appendix C

- "Respiration and Photosynthesis", pp. 769-774

Biology: Living Systems. Resource Master Book

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Probing Levels of Life: A Laboratory Manual

- 8 "Basic Cell Structure", pp. 23-25
- 9 "Qualitative and Quantitative Plasmolysis", pp. 26-27
- 10 "Extracellular Enzymes", pp. 28-29
- 11 "Measurement of Food Energy", pp. 30-31
- 12 "Yeast Fermentation", pp. 32-33
- 49 "Leaf Structure and Function", pp. 126-128
- 50 "Analysis of Plant Pigments", pp. 129-130
- 51 "Some Aspects of Photosynthesis", pp. 131-133

Unit 3 Genetics

Biological Science: An Ecological Approach (7th Edition)

Chapter 5, Sections 9 - 11

- "Cell Reproduction", pp. 150-162

Chapter 6, Sections 1 - 5

- "Continuity Through Reproduction", pp. 165-170

Chapter 8

- "Continuity Through Heredity", pp. 223-262

Chapter 25, Section 9

- "Genetic Engineering Will Expand Into New Areas", p. 941

Investigation 5.4

- "Mitosis and Cytokinesis", pp. 126-127

Investigation 6.1

- "A Model of Meiosis", pp. 144-146

Investigation 8.2

- "DNA Replication and Transcription to RNA", pp. 186-188

Investigation 8.3

- "A Dihybrid Cross", pp. 192-196

Investigation 10.1

- "DNA Sequence and Classification", pp. 246-249

Biological Science: An Ecological Approach 7th Edition Student Study Guide

Activity 6.2

- "Picturing Meiosis", p. 51

Activity 6.3

- "The *Drosophila* Life Cycle", p. 52

Activity 6.5

- "Pangenesis", p. 55

Activity 7.3

- "Flow Chart of Differentiation", p. 60

Activity 8.1

- "Textbooks Aren't Perfect", pp. 63-64

Activity 8.2

- "Editing a Paragraph", p. 65

Activity 8.3

- "The Lion Hypothesis", pp. 66-67

Activity 8.4

- "The History of Genetics", pp. 67-68

Activity 8.5

- "Considering Ethics", p. 69

***Advances in Genetic Technology* (BSCS, 1989) entire book**

***Basic Genetics: A Human Approach* (BSCS, 1984) entire book**

***Genes and Surroundings* (BSCS, 1983) entire book**

Biomedical Technology

Activity 2

- "Genetic Screening", pp. 33-50

Activity 4

- "Prenatal Diagnosis", pp. 65-76

Activity 5

- "Recombinant DNA", pp. 77-89

Biology: Living Systems

Chapter 6, Sections 3 - 10

- "Reproduction of Cells", pp. 111-127

Chapter 7

- "Principles of Heredity", pp. 128-145

Chapter 8

- "Genes and Chromosomes", pp. 146-169

Chapter 9, Sections 4 - 7

- "The Role of DNA", pp. 176-185

Sections 8 - 12

- "Expression of Genes", pp. 186-193

Chapter 17, Sections 5 - 6

- "Sexual Reproduction", pp. 363-365

Sections 7 - 8

- "Reproduction in Viruses", pp. 366-370

Investigation 6

- "How can you observe chromosomes in cells?", pp. 124-125

Investigation 7

- "How similar are traits of offspring to traits of parents?", pp. 142-143

Investigation 8

- "How does a genetic disease affect red blood cells?", pp. 162-163

Investigation 9

- "What is a method for extracting DNA from cells?", pp. 184-185

Biology: Living Systems. Resource Master Book

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Biology: Living Systems. Reading and Study Guide

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Probing Levels of Life -- A Laboratory Manual

- 14 "Significance of Time and Mitosis", pp. 36-37
- 15 "Probability and Mendelian Genetics", pp. 38-42
- 16 "*Drosophila* Genetics", pp. 43-46
- 17 "Detecting Chromosome Problems By Karyotyping", pp. 47-48
- 18 "Human Pedigree Genetics", pp. 49-51
- 20 "Protein Synthesis", pp. 54-57

Saskatchewan Biotechnology

This teaching package consists of activities, student information sheets, a teacher's guide, and three posters focusing on the role of agricultural biotechnology in Saskatchewan. It is an excellent resource. It was sent to all schools in Saskatchewan in the spring of 1988.

Unit 4 Animal Systems

Biological Science: An Ecological Approach (7th Edition)

Chapter 6, Sections 6 - 8

- "Human Reproduction", pp. 146-152

Chapter 7

- "Continuity Through Development", pp. 146-152

Chapter 14, Sections 8 - 13

- "Life Functions in Animals", pp. 376-389

Chapter 16, Sections 1 - 7

- "Circulation and Immunity", pp. 423-441

Chapter 17, Sections 4 - 9

- "The Nervous System and Endocrine System", pp. 461-480

Investigation 7.2

- "Development in Polychaete Worms", pp. 161-162

Investigation 15.3

- "Assessing Risk for the Cardiovascular Disease", pp. 411-414

Investigation 14.2

- "Temperature and Circulation", pp. 381-382

Investigation 16.1

- "Exercise and Pulse Rate", pp. 423-424

Investigation 16.2

- "The Alpine Slide Mystery", pp. 435-437

Investigation 16.3

- "Exercise and Carbon Dioxide Production", pp. 440-441

Investigation 17.2

- "Sensory Receptors and Response to Stimuli", pp. 46-463

Investigation 17.3

- "Hormones and Stress", pp. 628-629

Investigation 17.3

- "A Bike Trip", pp. 472-475

Student Study Guide for Biological Science: An Ecological Approach (7th Edition)

Activity 6.4

- "Hormonal Activity in the Menstrual Cycle", pp. 53-54

Activity 7.1

- "Embryonic Development", pp. 57-58

Activity 7.2

- "Understanding Embryonic Development", pp. 58-59

Activity 7.4

- "Development of a Hypothesis", pp. 74-75

Activity 16.5

- "Reviewing", p. 128-129

Activity 17.2

- "Making a Flow Chart", p. 132

Activity 17.4

- "The Control of Blood Sugar Level", p. 100

Biology: Living Systems

Chapter 18, Sections 1 - 4

- "Nutrition", pp. 374-378

Section 5

- "Transport", p. 379

Section 6

- "Gas Exchange", pp. 379-380

Chapter 23

- "Animal Reproduction", pp. 472-487

Chapter 24

- "Animal Development", pp. 488-512

Chapter 25, Sections 1 - 5

- "Patterns of Digestion", pp. 515-519

Chapter 26

- "Transport", pp. 534-560

Chapter 28

- "Chemical Control", pp. 584-601

Chapter 29

- "Nervous Control", pp. 602-625

Investigation 23

- "How does sea urchin egg development compare to human egg development?", pp. 510-511

Investigation 26

- "How does one analyze pulse and heartbeat?", p. 546

Investigation 28

- "How does the body control calcium balance?", p. 598

Investigation 29

- "What is the function of certain brain parts?", pp. 622-623

58 "Development of a Chicken Embryo", pp. 147-150

61 "Capillary Circulation", pp.157-158

62 "Effects of Exercise on the Heartbeat Rate", pp. 159-162

65 "Effects of Iodine Compounds on Tadpole Metamorphosis", pp. 167-168

66 "Effects of Adrenaline on *Daphnia* Heartbeat", pp. 169-170

Biology: Living Systems. Resource Master Book

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Probing Levels of Life: A Laboratory Manual

41 "Ingestion and Digestion in Protists", pp. 107-108

56 "The Human Menstrual Cycle", pp. 143-144

57 "Effects of Salt Concentration on Development of Brine Shrimp", pp. 145-146

Unit 5 Evolution

Biological Science: An Ecological Approach ***(7th Edition)***

Chapter 9, Section 5-9

- "Evolution and Genetics", pp. 224-239

Chapter 21, Section 1-5

- "Evolution and the Past", pp. 567-575

Investigation 9.3

- "A Step in Speciation", pp. 230-232

Investigation 21.2

- "Evolution and Time", pp. 565-567

Investigation 21.2

- "Interpretation of Fossils", pp. 581-585

Investigation 21.3

- "Archaeological Interpretation", pp. 592-594

Biological Science: An Ecological Approach ***7th Edition Student Study Guide***

Activity 9.4

- "Grouse: A Species Problem", pp. 75-76

Activity 9.5

- "Finding Fallacies", p. 77

Activity 21.2

- "Developing Hypotheses: The Role of Plate Tectonics in Evolution", pp. 158-162

Activity 21.4

- "Surviving the Cold", pp. 164-165

Biology: Living Systems

Chapter 10

- "Change With Time", pp. 196-219

Chapter 11

- "Adaptation and Speciation", pp. 220-243

Investigation 10

- "How does comparative biochemistry support the theory of evolution?", pp. 216-217

Investigation 11

- "What evidence can be used to determine if an animal is or was a biped or a quadruped?", pp. 240-242

Biology: Living Systems. Resource Master Book

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Probing Levels of Life: A Laboratory Manual

- 23 "Adaptation", pp. 64-66
- 24 "Variation Within a Species and Between Species", pp. 67-68
- 25 "Evolutionary Changes in Primates", pp. 69-73

Project WILD (1990) Activity Guide

- "Here Today, Gone Tomorrow", p. 216