Collection Policy: GENETICS & DEVELOPMENT

Subject Scope | Priority Tables | Other policies . . .

1.0 TEACHING, RESEARCH AND EXTENSION PROGRAMS

1.1 Mission and emphases of the department

Genetics & Development has a broadly-based collection of 11 faculty members who carry out basic research on a variety of different organisms: bacteria, protozoa, fungi, insects, nematodes, mammals, plants, and organelles. The research involves fundamental studies of the genetics and developmental biology of the organisms: how genes are transmitted from one organism to another, how genes are expressed, how organisms develop from fertilized eggs to adult forms, and how genes play a role in such development. Most members of the Section use molecular biology methods in their research, and therefore must keep up with the latest advances by following that literature carefully. Members regularly clone genes and sequence their DNA. Section faculty teach courses in basic genetics, basic development and in more specialized areas of these fields, such as population genetics, molecular evolution, embryology, gevelopmental genetics, microbial genetics, plant genetics, molecular biology and genetics and molecular biology and development. In addition, the Section teaches (by means of a senior lecturer) two very up-to-date courses in human genetics, and access to that voluminous literature is necessary.

1.2 Faculty research

Eleven faculty and 5 research associates carry out research on various aspects of genetics and developmental biology. A very brief list of research interests follows, concentrating on the individual faculty members:

- mechanisms of genetic recombination, focusing on yeast
- molecular population genetics and evolution, primarily using insects
- interspecies (hybrid) and cell transplantation studies of development, using amphibia
- gene expression and genome rearrangements, using protozoa
- gene expression in mitochondria and the roles of chromosomal gene products in that expression, using yeast
- genes and gene functions involved in mitosis, using insects
- expression of genes in mitochondria, especially cytoplasmic male sterility, using higher plants
- the genes that control the earliest cell divisions of embryos, using nematodes and insects
- molecular evolution and function of genes controlling energy-producing chemical reactions, using insects
- regulation and function of genes that encode reproductive hormones, using insects
- the expression of biosynthetic genes and stationary-phase degradative genes in bacteria
- genetics of biosynthetic pathways and environmental stress response, using plants

A search is underway for a new faculty mameber with research interests in the area of mammalian development. The Field of Genetics and Development contains an additional 17 faculty with genetic and development interests that extend those of the section.

1.3 Graduate program

The 34 graduate students, from all over the United States and from several foreign countries, are distributed over the research areas listed above (in 1.2) fairly evenly. However, there has probably been a trend towards more emphasis on developmental studies in recent years, as that part of the program has grown.

1.4 Undergraduate program

There are about 75 concentrators, all of whom are majors in Biological Sciences. Some specialize in genetics, others in developmental biology. Many are pre-medical students. Perhaps one-fourth are interested in careers in science, often research-oriented. At any one time, about 20-25 undergraduate students are carrying out research in the laboratories.

1.5 Extension activity

None

1.6 Noteworthy facilities *(e.g. unique classrooms, laboratories, farms, etc.)*

None

2.0 SUBJECT DESCRIPTION AND GUIDELINES

2.1 Subject definition

The following was obtained from the Peterson's Guide to Graduate Programs in the Biological and Agricultural Sciences, 1992.

Genetics is the study of the inheritance of characteristics from organism to organism and the mechanisms of gene function that specify these characteristics. A wide spectrum of specializations is included in this definition. At one end of the spectrum, molecular geneticists study how mutations -- alterations in the nucleotide sequence in the DNA -- alter the gene expression and hence physical characteristics; at the other end, population geneticists study how genes are conserved or lost in large groups of organisms and how new species arise. At Cornell, the area of population genetics is also explored by the section of Ecology, Evolution and Systematics.

Current areas of activity in genetic research include the study of specific genes, using cloning techniques to determine the products and their control; the ways in which genes are put together into chromosomal arrays and the mechanisms by which chromosomes are distributed between daughter cells; inherited metabolic diseases of human beings and animals; the roles of particular genes in the development of fertilized eggs into adult plants and animals; damage to genetic material caused by environmental hazards; and the production of new, useful forms of life by genetic engineering.

Development is the study of the growth and differentiation of an organism from fertilized egg to adult; this growth and differentiation is often caused by the differential expression of particular genes, and their study is the genetics of development. Any and all of the methods of molecular and cell biology are likely to play important roles in the section's research and teaching.

2.2 Subject scope

The materials needed by Cornell's section of Genetics and Development fall generally into the definition provided above. A more detailed description, including subject areas covered by instruction, is provided below. In addition, there is some overlap with the sections of a) Ecology, Evolution and Systematics and b) Biochemistry, Molecular and Cell Biology, which share some methods and interests.

2.2.1 General Genetics

Gene transmission, action, interaction, linkage, recombination, structure, mutation. Genetic aspects of differentiation. Genes in populations, breeding systems, extrachromosomal inheritance, recombinant DNA technology.

2.2.2 Population Genetics.

Genetic variation through time and space. The measurement of genetic variation. Mating and reproductive systems. Selection and fitness. Genetic drift. Migration and population structure. Speciation. Maintance of molecular variation. Adaptation at the molecular level.

2.2.3 Human Genetics

Biological, ethical, social and legal issues concerning the following: new reproductive strategies, augenics, genetic counseling, genetic screening, genetic effects of substance abuse, genetics and behavior, therapy for specific genetic diseases. (All genetic diseases are of interest as far as basic biomolecular information is concerned; clinical descriptions are not. Nature Genetics covers this area well.)

2.2.4 Molecular Evolution

Evolutionary changes in proteins and nucleic acids. The evolution of the genetic code and the construction of phylogenetic trees from biochemical data. The evolution and organization of genomes.

2.2.5 Microbial and Fungal Genetics

2.2.6 Development

The genetic effects on development, including how development modulates and uses transcriptional, post-transcriptional, translational and post-translational regulation of gene expression. Molecular aspects of development. Fertilization, pronuclear fusion, mitosis, cleavage divisions, cytoplasmic determinants, nuclear and cytoplasmic architecture. Embryology. Cellular interaction during development. Pattern formation, cell lineage, neural development, maternal information in development, germ cell development, sex determination and intercellular communication. Non-genetically determined aspects of development. Effects of external substances (e.g., drugs, alcohol) on development.

2.3 Emerging trends in the subject area

Here the problem is largely the constant emergence of new journals and books devoted to molecular biology and to molecular genetics and development. They have to be examined case by case, and the faculty in G&D should play an active role in choosing among them. It is an appropriate utilization of faculty time and effort.

The field of human genetics is increasing in importance.

3.0 SPECIAL INFORMATION NEEDS AND RESOURCES

Genetics and Development needs databases of gene and protein sequences, and the latest programs suitable for carrying out searches for homologies and for particular sequences. Access to many such databases is provided within the Biotechnology building. Other databases, such as GenBank, Entrez, and SWISPROT, are available via the World Wide Web. If fees are ever charged for these databases; however, the Library should provide access, since they are used by many laboratories on campus, as well as researchers outside the Genetics section.

OMIM is already available on the Mann Library Gateway.

Trends in ___ and *Current Opinions* journals are widely valued for teaching, as are journals of review articles.

3.1 Endowment funds or special funding arrangements

- Sarna Endowment -- genetics
- Clausen -- treatises on a biological topic
- Wright -- zoology
- Mann -- general biology
- Biomed -- biomedical.

4.0 TYPES OF MATERIALS

4.1 Priorities for types of materials

See Priorities Table.

4.2 Format

4.3 Geographical guidelines

The subject is not geographically determined.

4.4 Language guidelines

Primarily English.

5.0 OTHER RELATED LIBRARY COLLECTIONS

- Veterinary Library -- medical journals
- Physical Sciences -- chemical and biochemical literature
- Entomology -- insect genetics and development
- Olin -- medical ethics

The departmental library in the Biotechnology Building contains faculty personal subscriptions.

6.0 POLICY QUESTIONS, COLLECTION NEEDS, FUNDING PROBLEMS OR OPPORTUNITIES

Who will collect materials for the new cross-college program in Biomedical Engineering?

Descriptions of analytical techniques (e.g., DNA probes, recombinant DNA, DNA fingerprinting) and laboratory manuals are of interest. The *Practical Approach* series is useful, as explanations of the techniques and relevant references are provided. *Current Protocols in Molecular Biology* are of less value to the Library, as laboratories are more likely to buy their own copies.

Mann Library should refer conference proceedings to the library liaison before purchase. For Yankee Book Plan materials, Mann should modify the profile so that slips rather than actual volumes are received. Mann should be wary of symposium proceedings from Karger and Elsevier; they may be unnecessary. ICN and UCLA symposia and symposia published by research institutions are more suitable.

7.0 PRINCIPAL LC CLASSES

QH426-470
RB155

8.0 RELATED COLLECTION POLICIES

- ECOL -- population genetics
- MICR -- genetics of microorganisms
- ENTO -- genetics and development of insects
- ORNI -- genetics and development of birds
- PLBR -- applications of genetics to plant breeding
- ANSC -- applications of genetics to livestock
- ABEN -- biomedical engineering techniques
- BIOC -- biochemistry of proteins and nucleic acids

Priorities Table for Genetics & Development

Code	IMPORTANCE/INTENSITY CODES DEFINITIONS
NA	Not applicable to the discipline.
0	Ephemeral; of insufficient value to be provided by library.
1	Of short term interest, but with little or no enduring value; very selectively acquired; retained, uncataloged, for limited duration only, e.g. newsletters in newly emerging, poorly documented areas, and manuals or pamphlets for reserve reading.
2	Limited scholarly interest or utility; collected very selectively, but not of high priority.
3	Important for research and/or instruction; should be well represented, but collected selectively rather than intensively.
4	Very important for faculty and/or students; intensively collected, i.e. every effort is made to provide as deep coverage of this literature as possible.
5	Essential to work in the discipline; the most important type of material for research or instruction purposes. Ensuring the highest possible coverage should be the library's top priority in this discipline.

Code	SERIALS	Notes
5	Journals, scholarly	-
5	Journals, technical	-
-	Journals, other (describe)	-
5	Annual reviews, advances in...	-
4	Scientific and technical reports and research bulletins of major academies, learned societies, professional research and educational organizations and government agencies	-
4	Proceedings, of international congresses and symposia	-
5	Proceedings, national or local	-
3-4	Statistical series	-
?	Trade journals and periodicals	?
0	Popular periodicals, hobby	-
0	Popular periodicals, semi-technical	-
0	Popular periodicals, farm press	-

0	Newsletters/newspapers	-
0	Proceedings of legislative bodies	-
-	Student publications	Cornell PhD theses only to maybe Honors theses
3	Administrative publications of major academies, learned societies, professional, research and educational organizations and government agencies	-
0	Corporate annual reports	-
0	Yearbooks	-
0	Press releases	-
0	Lists	-
0	Working papers	-
Code	**MONOGRAPHS**	**Notes**
4	Major scholarly monographs	-
3-4	Professional and technical	-
3	Subject histories	-
3	Textbooks, upper division, graduate	-
0	Biographies	-
0-1	Popular monographs	-
0-1	Technical reports	-
0-1	Government reports	-
3	Proceedings, international	-
3	Proceedings, other	-
0	Theses and dissertations (outside CU)	-
0	Festschrift	-

2	Patents	-
0	Corporate histories	-
0	How-to books & lab manuals	-
0	Pamphlets	-
-	Ephemera (describe)	-
0	Maps	-
0-2	Technical bulletins/handbooks/compendia	-
Code	**ELECTRONIC INFORMATION**	**Notes**
-	Applications programs	-
5	Bibliographic databases	-
3-5	Bulletin boards	-
4-5	Fulltext files	-
-	Geographic information systems	-
-	Numeric/statistical files	-
-	Other (describe, taking as much space a necessary)	-

Completed by: S. A. Zahler ; Sam Demas, Ed. by Henry Murphy
Jan 7, 1994
Revised by Linda Stewart, Mariana Wolfner and Antonie Blackler
July 7, 1996

Top of Page