MIDWEST BIOSCENE

ASSOCIATION OF MIDWESTERN COLLEGE BIOLOGY TEACHERS VOL. 10 (2), JUNE, 1984

****

MESSAGE FROM THE EDITOR:

Spring came late this year to Crawfordsville. Some would argue it never arrived. April, then May, slipped by and now it is almost July. Nevertheless here it is the June issue of **BioScene**. Sadly, this issue lacks the diversity of perspectives present (I am sure) but cleverly hidden within our membership. John Elmore and G. Tanner Girard, not yet members of AMCBT DID, contribute an informative article about Desert Ecology. Thank you John and Tanner. Thanks also to Bob Satterfield and Jim Holler for their article on Science Education. My colleagues at Wabash also contributed a number of reviews of computer software which may stimulate interest.

Oh, but friends, you who are silent, do you want to continue to read the views of the same 25 or so members and non-members who write articles. Well, I am tired of seeing the same names issue after issue, particularly my own. The next issue is yours, silent ones. Will it be a blank piece of paper or will it be a volume filled with exciting ideas about biology? It's up to you. November 1 is the deadline for articles! (The August issue will be devoted to the meeting.) I hope that my mailbox will be stuffed, but I am skeptical. In the meantime, if you want to yell or whisper at me about the **BioScene**, I can be reached at 362-1400 ext. 219.

Question for consideration - What is your institution doing to encourage Black students to attend your college, to enable them to achieve academic and social success, and to encourage them to continue their education to become scholars in the arts and sciences? According to the **Wall Street Journal**, June 12th edition, Black academicians are an endangered species. And what about Hispanic and Chicano youth - after all they are the fastest growing minority? Indeed, should predominately white institutions be concerned about the needs of minorities, particularly when finances are tight?

MIDWEST BIOSCENE is published by the Association of Midwestern Biology Teachers, **AMCBT** Central Office, Rockhurst College, 5225 Troost, Kansas City, MO. 64110. Subscription free to **AMCBT** members. Editor: William Doemel, Wabash College, Crawfordsville, IN 47933 [(317) 362-1400 ext 219]. Opinions expressed by authors are their own and are not necessarily those of the Association nor the institutions with which the authors are affiliated.

From the Exec Sec--

The very first thing that this individual has to do is to extend his most humble apologies to John Bliese, Department of Biology, Kearney State College. In putting together the Membership Roster, I did not include John's name in the listing of Honorary Life Members. John's contributions to AMCBT and to Biology are too extensive for me to attempt to list in this short space, but they are indeed notable. John also has been a member of AMCBT for a very long period of time, and I should frankly have known better. Mea culpa John.

If some of you who have corresponded with this office have come to the conclusion that the E-S has been a little wooly this semester, it was true. I am in the process of completing the necessary requirments for a Secondary Teaching Certificate in the state of Missouri, and have been practice teaching as my schedule would allow. At times I have not known whether I am on foot or horseback. Believe me I have come to appreciate far more, those colleagues of ours who supply us with students.

Please talk up the forthcoming Annual Meeting. John Jungck is getting together a program which looks extremely interesting, at least in the preliminary stages. Also recruit some new members, and bring them along to the meeting in Chicago.

Lastly, those of you who have not as yet sent in your annual dues please do so. There will be a second notice coming out soon, and you could save us the postage.

****

RESERVE 9/28 - 9/29 NOW FOR THE FALL AMCBT MEETING

1984: BRAVE NEW WORLD

ST. XAVIER COLLEGE

Saint Xavier College is a coeducational liberal arts college founded by the Sisters of Mercy and chartered in 1847. The previous location of the College was at 49th and Cottage Grove Avenue. The campus is now located in Southwest Chicago in the heart of a residential area. In 1969 the College became coeducational. From the outset the College has been primarily a teaching-learning institution. The element of service has always characterized the College. The College offers undergraduate programs in over 25 major fields and interdisciplinary areas and graduate programs in Business Administration (MBA), Criminal Justice, Education, Learning Disabilities, and Nursing. The College is on a 4-1-4 schedule with a 2 session summer schedule. A Weekend College program was introduced a few years ago. Currently the College serves more than 2,100 students.

The physical plant is that of seven buildings joined together. The Science Department is housed in three floors of the "S" Wing. Chemistry and Physics are on the third floor with Biology on the second and the animal facility next to the computer lab on the first floor.

About sixteen years ago, the Departments of Biology and Chemistry merged as a Department of Science. This was done to protect both majors and also to facilitate the sharing of equipment, personnel, and materials. The Department has

a Chair and a Co-Chair, each with specific duties developed by the faculty.

The Department of Science has five full time biologists, five full time chemists, a full time physicist, and a full time laboratory coordinator. Two regular part-time faculty also work in the Department, along with secretaries and student workers.

Students in the Department can get a BS degree in Biology or Chemistry and a BA degree in Natural Science. Biology majors can take a program for certification as secondary school biology teachers. At present the Department serves about 68 Biology majors along with providing support courses for the nursing major. Graduates have been successful in gaining admission to medical, dental, veterinary, and osteopathic schools, along with graduate schools. In the past few years a number of students have spent a semester in research at Argonne National Laboratory. Within the past eight years the College has developed a cadaver facility, an animal facility and a small research laboratory for biology, and a computer facility for the entire college. The Department anticipates a new greenhouse in the near future.

The Department is very pleased to welcome AMCBT to its campus in September 1984.

****

"1984: Brave New World?"

St. Xavier College

Chicago, Illinois

Tentative AMCBT Schudule

9/27 Thursday PM - Executive Board

9/28 Friday AM - Field Trips (maximum 20 each)

I Shedd Aquarium

- behind the scenes (Linda Wilson?)

- option for people to go over to the Field Museum of Natural History on the same field trip (Ken Mason?)

II Argonne National Labs

- particularly biology (Radiation Biology, Oncology, and Human Protein Index as possible examples)

III Morton Arboretum

- in general and specifically effects of highway pollutants on plants

9/28 Friday PM

1 PM Business Meeting

1:30 PM - 2:30 PM Keynote Address
Dr. Joan Straumanis
Academic Dean
(& Professor of Philosophy)
Kenyon College
Gambier, Ohio
"Re-Visioning Science Education"

Joan will use the feminist lens to "re-vision" our notion of science education. She will describe ways of moving from androcentric science education to forms which need not necessarily be explicitly feminist or genderless, but genderful and able to embrace diverse interests of race, class, ethnicity and gender.

2:30-3:00 PM Commentary (Invited questions & audience participation.)

3:00-3:45 PM Informal Discussion/Coffee Break

I Faith Wilson
University of Missouri at Kansas City
"Teaching Experimental Design and Inference to Undergraduate Biologists"

II G. Tanner Girard
Principia College
Elsah, Illinois
"An Interim Natural History Course in Baja"

III Focus on Teacher Training

IV Films (Hopefully these will be from a fairly high quality collection of college biology films from Open University in England)

4:30-4:45 PM Changeover/Coffee

4:45-5:30 PM Four Simultaneous Sessions

V Dick Wilson
Rockhurst College
Kansas City, Missouri
"Teaching Research Proposal Preparation and Experimental Designs"

VI Robert L. Wallace
Ripon College

Ripon, Wisconsin
"Experience with a Computer Information Retrieval System: DATATRIEVE"

VII Non-majors teaching session

VIII Films (continued)

5:15-7:00 PM Cocktail Hour (?Software Exchange Session)

7:00 PM Dinner

8:30-10:00 PM Dinner Speaker
(Tentative)
Dr. Daphne Fautin
California Academy of Sciences
San Francisco, California
"Coevolution of Sea Aenomes and Aenome Fish in Tropical Reefs"

9/29 Saturday AM

7:00-9:00 AM Special Interest Groups (Resolutions Committee:
Producing Guildelines on Contact Hours/Labs.)
(Harold Wilkinson involved - Needed Instrumentation; Lab Safety; Retention and
Bob Satterfield

9:00-9:40 AM Four Simultaneous Sessions

IX Panel: Research in Liberal Arts Colleges I

a. Richard Kowles
St. Mary's College
Winona, Minnesota
"Report on their undergraduate research symposia"

b. William Doemel
Wabash College
Crawfordsville, Indiana
"Microbiological Research at a Small Liberal Arts College"

X G. Tanner Girard
Principia College
Elsah, Illinois
"Tropical Biology in Central America for Undergraduates"

XI Labs that Work I
(tentative: he has not made a final

commitment)
Hans Pearson
Silver Lake College
Manitowoc, Wisconsin
"Self-made sampling equipment for lab/field investigations in aquatic/terrestrial ecology"

XII Films (A documentary on The New Alchemy Institute in Falmouth (Cape Cod), Massachusetts. John Todd, a marine biologist, founded an alternative style farm (fish culture, organic farming, wind power, and green house design) which has received NSF support. Members who heard Don Scoby's presidential address will want to see this one.

9:40-9:50 AM Changeover/Coffee

9:50-10:30 AM Four Simultaneous Sessions

XIII Panel: Research in Liberal Arts Colleges II

c. Ken Yasukawa
Beloit College
Beloit, Wisconsin
"Students' Preparation of Publishable Manuscripts and Students as Research Collaborators"

d. Commentary and Discussion

XIV Labs that Work II
A. B. (Roc) Ordman
Beloit College
Beloit, Wisconsin
"Affinity Chromatography in the Biochemistry Laboratory"

XV (Volunteered/but has not replied to letter of 5 March '84)
Evan Hazard
Bemidji State University
Bemidji, Minnesota
"Using Writing to Enhance Learning in Biology Courses"

XVI Film: Repeat of The New Alchemy film

10:30-11:00 AM Coffee Break/Discussion/Balloting

11:00AM-Noon Brave New World Revisited: Discipline

Sections

a. Anatomy and Physiology - Ray Reed

b. Genetics and Evolution - John Jungck

c. Field Ecology - Dick Wilson

d. Microbiology - Bob Satterfield

e. Botany - Bill Andresen (?)

f. Cell Biology - Ann M. Larson

Noon — Eat at local Chicago restaurants except executive board - business luncheon

SPECIAL: Sunday AM (Very early)

Sr. Marion Johnson will lead a field trip to the Indiana Sand Dunes on Lake Michigan. She will describe the successional studies which are occurring there. (Run only if there is advance interest.)

****

DESERT ECOLOGY IN BAJA

by

John Elmore and G. Tanner Girard

Biology Department, Principia College

The Baja peninsula is an excellent field site for biological studies. Biological adaptation is easily witnessed in the desert environment where water scarcity is the primary limitation. The Baja flora is diverse for a desert, and well-studied (Wiggins 1980). Natural history guides and species checklists are available (Bostic 1975). Despite a history of development attempts dating back to a scouting expedition by a Cortez lieutenant in 1533, large expanses of wilderness remain. Lengthy coastlines on the Pacific and Sea of Cortez offer diverse habitats for coastal biology studies as well. Students from Principia College, Elsah, Illinois have participated in six biological field study programs in Baja since 1964. From this experience, we know that students enjoy the feeling of discovery that comes from well-planned biology field courses in exotic habitats, such as Baja.

In summer 1964, led by Professor Emeritus John Wanamaker and Mr. Bill Mueller, a small group of Principia College biology students traveled through the rugged country of Baja, driving on dirt roads and river washouts. Five more trips have been taken to Baja on a biennial basis since 1974, including the most recent (November-December 1982), led by Dr. G. Tanner Girard and accompanied by Dr. John Wanamaker. Completion of the Transpeninsula Highway in 1971 has allowed the last five expeditions to travel the length of the peninsula and return to

Illinois in three and one-half weeks. Students receive biology credit in a course focusing on the natural history of Baja.

The primary purpose of the course is to provide students with an opportunity to study the ecology and natural history of deserts through the diverse habitats available in Baja. Desert adaptations of plants and animals are observed. Quadrat methods are used to quantify plant distribution and characteristics for comparison between habitats. Animals are observed, identified, and captured in live traps. Coastal campsites allow exploration of habitats such as mangrove, rocky intertidal, or sand beach, as well as provide a welcome bath in the Sea of Cortex or Pacific. The consequences of human impact on desert environments is explored by visiting missions, observing agriculture and tourist development, or trying to answer group problems such as how to dispose of garbage. Even the few towns which collect refuse simply dump it in the dessert.

The majority of the trip is spent camping under the stars in the wilderness, with all the social benefits of students working together to perform group chorse. Discovering the desert is still the overriding focus. Hopefully, by the end of the trip, we will have dispelled the belief that all deserts are endless sand dunes with few life forms. On one trip, a student, who had previously never been west of Wisconsin, wrote in her journal, "I never knew there were so many plants in the desert!"

Course Design

The course is listed in the Principia College catalogue as Biology 360: Natural History of Baja California. Some of the academic activities of the trip are: 1) visit Tucson's Arizona-Sonora Desert Museum; 2) visit Organ Pipe Cactus National Moument; 3) conduct plant studies using the quadrat method; 4) observe human impact on the land; and 5) compare marine life of Pacific and Gulf coasts.

The students are required to keep a daily journal throughout the trip. Entries pertain to vegetative zones, weather conditions, animal and plant life, human impacts, ecological relationships, and personal views.

Students are evaluated on the basis of their journals, field study results, oral presentaitons, and class participation. They are also expected to know the common plants of Baja, and occasional field quizzes are another part of their grade.

The total cost per student in 1982 was $1,175 for 5 quarter hours credit. This fee included room, board, tuition, transportation, and a modest salary for three staff. Transportation was by 15-passenger Dodge van and a 4-wheel drive, 3/4 ton pickup truck, both of which are owned by Principia College.

Student Selection and Trip Preparation

Each student is required to fill out an application form that can be obtained from the office of Special Programs, which handles all the abroad programs at Principia. It is best for the student to have taken at least two biology courses before applying to the program.

During fall quarter, the students become familiar with Baja by doing a report on a chosen topic. Topics include mammals, birds, plants, climate,

geography, and marine life. The students meet once a week for eight weeks during the quarter, and are given lectures about the peninsula. The last few weeks of the quarter are devoted to lectures given by the students on their report topic..

Principia College is very fortunate to have a large collection of Baja books, including some rare early volumes donated from personal collections, for student research use. Each student is required to read The Forgotten Peninsula by Joseph Krutch (1970). A Field Guide to the Common and Interesting Plants of Baja California by Jeanette Coyle and Norman Roberts (1976) is the only book the students must pruchase. This is a very useful field guide for the students, with many illustrated pictures and information about Baja. Other articles of interest are duplicated for the students and a field library of essential sources and identification guides is carried to Baja.

Students are given a clothing and personal equipment list which must be followed because of stowage limitations in the vehicle. General information on how many clothes to bring and what "extras" are needed are placed on the list. Mask, snorkel and fins are optional items which are very useful at a few campsites along the Gulf of California coast.

Financial aid is available for students through the Principia College Financial Aid Office. The amount of the aid is based on the student's needs.

About half-way through fall quarter, each student is assigned to a crew involved in final preparations for the trip. The vehicle crew is in charge of making sure the truck is tuned-up and that spare parts are on hand in case of a breakdown in Mexico. Extra belts, oil, gas treatment, and a sturdy jack are all vital for an extended trip into Mexico. Extra gasoline should be carried because gas stations may be closed or out of gas when a fuel stop is scheduled. Many updated road maps and guidebooks by various authors are available for Baja. The AAA Club of Southern California publisheds a highly recommended road map which is available to members.

The food crew is involved in preparing our menu for the trip, making shopping lists, and packing the food into boxes dated for use. These food boxes are packed into the truck according to when they will be used.

The equipment crew is responsible for checking all lamps and stoves (oil, lighting), making sure enough silverware and sierra cups are aviailable for everyne, cleaning pots and griddles, and checking to see that the tents are in good working condition. They are also responsible for packing necessary scientific equipment such as thermometers, measuring tape, altimeter, etc., and the field library.

It is very important to know how much water is needed for each day, and how many days there are between fills. On our most recent trip, we took six plastic water jugs (5 gallons); once in Mexico, we added iodine to the water to ensure safety.

The day before our departure, the group gets together to load up the truck with all the food, equipment, and personal gear. The last order of business is a good night's sleep before the first leg of the trip, the 2400 km drive to Tucson. Table 1 lists the itinerary for the 1982 Baja trip.

Arizona-Sonora Desert Museum

One of the vital stops to prepare students for the kinds of flora and fauna that they will see in Baja is located just 22 kilometers outside of Tucson, Arizona. This is the Arizona-Sonora Desert Museum, a private, non-profit, natural history institution whose purpose is to inform the public about the plants and animals that exist in the desert. A recent addition to the museum is the Earth Sciences Center, demonstrating the geology of the entire area from almost the beginning of earth! The students are given a brief tour of the museum, and then left to explore on their own to gain some more confidence about learning the flora and fauna of Baja. Later, in the field, they will observe many of the organisms that are conveniently displayed and labeled in the museum.

Daily Program

Student teams participated in daily camp chores and rotated assignments every three days. Student teams were responsible for: 1) cooking (cook breakfast, lunch, dinner, collect and purify water); 2) clean-up (clean after cooks, dispose of garbage, excavate latrine); 3) vehicles (load and unload vehicles at camp, check vital parts on truck, pitch and unpitch group tents).

The normal routine on a driving day was: breakfast, break camp, prepare sack lunches, drive to destination (ave. about 320-400 kilometers), make occasional stops along the way to observe vegetation, set up camp, dinner, writing in journals, and rest. At several points there were two day stops (see Itinerary, Table 1), so instead of driving, the morning was spent doing a quantitative vegetative study of the area around our camp.

Mexican Travel

Each student is required to bring either a passport or a birth certificate to obtain Mexican tourist cards. Obtaining the tourist cards is the responsibility of visitors to Mexico if they travel south of Ensenada in Baja. When a trip to Mexico is being planned, current information on obtaining visitors' permits should be solicited from the Mexican Embassy or a consulate.

A most important part of any trip to Mexico is to have an interpreter along who is fluent in Spanish. The interpreter enables the group to interact more with the people of Mexico, whether in some small village or in the marketplace of La Paz. The students are able to ask the interpreter about phrases they will need if they want to purchase items or buy dinner. This gives the students a chance to communicate with the Mexican people.

Mexican auto insurance must also be purchased before entering the country because U. S. insurance is invalid in Mexico. We usually purchase our insurance in Tucson, and also have some money exchanged before going into Mexico.

Phytogeographic Areas of Baja

The narrow Baja peninsula extends 1300 kilometers, or nearly twice the length of Florida. From the U. S. border at Tijuana, just north of the 32nd parallel, the peninsula runs southeast to Cabo San Lucas at the tip. This point, below the 23rd parallel and the Tropic of Cancer, is about the same latitude as Havana, Cuba. Mountains, reaching a maximum height of 3100 meters, form the

backbone of the peninsula. Violent storms dump enough rain at times to wipe out highway bridges, while other areas may not have measurable rainfall for five or ten years. Variations in topography and precipitation patterns combine to form a diverse array of habitats.

The Baja peninsula is recognized by Shreve and Wiggins as divided into three phytogeographic regions (1964). Each region has individual vegetative communities that contain certain species found only in that community. The rich diversity of plants along with a large number of endemic species of cacti makes Baja a great place for a biology student. The following are regions that we include in our trips (see Fig. 1).

The California area, located in northern Baja, is composed of four communities: 1) coniferous forests; 2) Pinon-Juniper woodland; 3) Chaparral; and 4) coastal scrub.

The coniferous forests are found in the Sierra Juarez and Sierra San Pedro Martir mountain ranges. Average height of the ranges is 1520 meters, with trees of 10 to 60 meters tall. Dominant trees are Jeffrey pine, incense cedar, Coulter pine, and lodgepole pine. We have not visited these areas with students, but they could be added with another two days in the itinerary.

On the lower slopes of the mountain ranges (betwen 900 and 1520 meters) is found the Pinon-Juniper woodland. Trees in this community range from 3 to 10 meters, common species being manzanita, pinon pine, Coast live oak, and California juniper.

The chaparral community is composed of shrubs 0.6 to 4 meters tall, with extensive root systems. Fires are very common to the chaparral, and due to this plants have adapted by developing fire-resistant seeds and stump sprouting. Red shank, sagebush, chamise, scrub oak, laurel sumac, and manzanita are the dominant species of the chaparral community.

Along the Pacific coast is found the coastal scrub community. This vegetative area does not fit under chaparral, desert, or woodland. Buckwheat, velvet cactus, cliff sponge, and bladderpod are some common coastal scrub species.

Moving south down the peninsula, we come into the region that occupies most of Baja. Known as the Central Desert area, it is composed of four subfloras: 1) San Felipe desert; 2) Central Gulf Coast desert; 3) Vizcaino desert; and 4) Magdalena Plains desert.

The San Felipe desert is located on the gulf side, extending from the U.S. border to Bahia de Los Angeles. This area receives the least amount of rainfall, so consequently has sparse vegetation. Decomposition of volcanic and granitic rocks, and alluvial deposits make up the soil of this region. Creosote bush and bursage are the dominant plant species (approximately 90% of vegetative cover in somes areas).

From Bahia de Los Angeles and extending south to the Cape comprises the Central Gulf Coast desert. Mountains coccupy most of this region composed of volcanic and granitic rock. Dominant plant species include torote, lomboy, boojum, and cardon.

On the Pacific coast of central Baja lies the Vizcaino desert. The plants of this region are low and widely spaced due to the constant winds of the sea. Elephant tree, boojum, cholla, yucca, and ball moss are some of the dominant species.

The Magdalena Plains desert is located in southwestern Baja along the Pacific coast. Volcanic mountains occur along the coast, but the rest of the region is very flat. Common plants include creeping devil, old man cactus, cholla, mesquite, and palo verde.

The Cape Region makes up the tip of the peninsula, and is divided into two areas: 1) Oak-Pinon woodland; and 2) Arid Tropical forest. Up high in the Sierra La Victoria lies the Oak-Pinon woodland community. Rain is abundant in the mountains because tropical storms from the south dampen the area. Adequate rainfall allows for the growth of trees, with the dominant species being oaks. Dominant plants include Quercus devia, Quercus tuberculata, pinon pine, palmita, and laurel sumac.

The Arid Tropical forest is rich in diversity with many succulents and low shrubs giving the community a jungle-like atmosphere. Many different plants thrive in this region, among them San Miguel, palo amarillo, palo verde, coral tree, cardon-barbon, and plumeria.

The dependable presence of water, whether from riparian, spring, coastal, or agricultural sources produces other habitat types not indicated in the descriptions of the broad phytogeographic areas. A narrow riparian zone along streams, flowing toward the Pacific through the coastal scrub community, is characterized by sycamore and live oak. Often modified by agriculture, these areas produce much of Baja's vegetables and fruit. Wine grapes are cultivated extensively around Santo Tomas. Further south, arroyos in the vicinity of Catavina are characterized by blue palm and rush. Continuing south, protected valley oases, such as San Ignacio and Mulege, have large data palm groves first planted by Spanish missionaries in the 1700's. Centered at Cuidad constitucion, a government sponsored agricultural project, with thousands of desert acres converted primarily to cotton, relies on fossil water reserves pumped from below the Magdalena Plain. Mangrove, both black and white, and other salt-tolerant plants, such as pickleweed and dune morningglory, are found in isolated areas along both coasts.

Academic Study

One of our main trip goals is to do quadrat studies (Smith 1980) in different areas of the peninsula. For instance, in 1982, we collected quadrat data in different habitats of the San Felipe desert, Vizcaino desert, and San Felipe-Central Gulf Coast transition region. Plant species lists are compiled. Values such as total vegetative cover, relative cover by species, and average height by species are computed for comparison to values from other areas. Animals and their signs are identified, but, generally, we found animals difficult to observe and quantify, since most desert animals are nocturnal. Sherman live traps, baited with peanut butter, are useful in capturing small rodents, such as kangaroo rats or Peromyscus. Traps should be checked promptly before sunrise so the animals can be released alive.

Group study is an important part of our academic study, but towards the end of the trip we also have a solo day. Conducted at Bahia Conception, the students select areas near camp they would like to study independently. Bahia Conception is chosen as the study area because of the many different habitats all accessible from our campsite. Some projects have included studying the avian species of the area, geology striation study, plant transects, mangrove inhabitants, island ecology, and marine life study. The studens get the whole day to complete their study; in the evening, they present their study to the group.

An Ending Note

While traveling in a foreign country, one can expect problems due to the new surroundings confronting the students. Student morale can get very low when the days are packed full of driving, studying, setting up camp, and entering that final word in the journal. Several days without wash water, showers, or beds is a new experience for many students also. For the most part though, the good parts of the trip greatly outweigh the rigors of camping.

Academics are the main focus of the trip, but time is taken to have some fun also. The last few days of the trip are spent in La Paz, where the group stays in beautiful Hotel Los Arcos. Two comfortable days are spent in la Paz to enjoy the shops and sights of the city. Also, on our last beach stop at Todos Santos, one day is given to the students to enjoy the beach and catch some great bodysurfing waves.

Once back at school, the next task at hand is putting together a slide presentation to the College. This is a good form of advertisement fo future Baja programs, and also gives other students a chance to learn something about a country they know little about. Deciding how to arrange and produce a slide program is an important learning experience for the students.

All in all the trip is a memorable one for both student and teacher. An extended field study such as this is something every biology major should experience during their college career. The chance to apply classroom knowledge to an actual field study will benefit the student in helping to bridge the gap between school studies and real world decisions. Baja is an excellent field study site, for as Joseph Wood Krutch (1970, p. 277) states in The Forgotten Peninsula, "It is a land of delight, one where it is possible to escape for a time into a world still what nature rather than human forces have made it."

References

Bostic, D.L. 1975. A natural history guide to the Pacific coast of north central Baja California and adjacent islands. Vista, California: Biological Educational Expeditions.

Coyle, J. and Roberts, N.C. 1976. A field guide to the common and interesting plants of Baja California. La Jolla, California: Natural History Publishing Co.

Krutch, J.W. 1970. The forgotten peninsula; a naturalist in Baja California. New York: Apollo editions.

Shreve, F. and Wiggins, I. L. 1964. Vegetation and flora of the

Sonoran Desert, 2 volumes. Stanford, California: Sanford University Press.

Smith, R. L. 1980. Ecology and field biology, 3rd ed. New York: Harper and Row.

Wiggins, I. L. 1980. Flora of Baja California. Stanford, California: Stanford University Press.

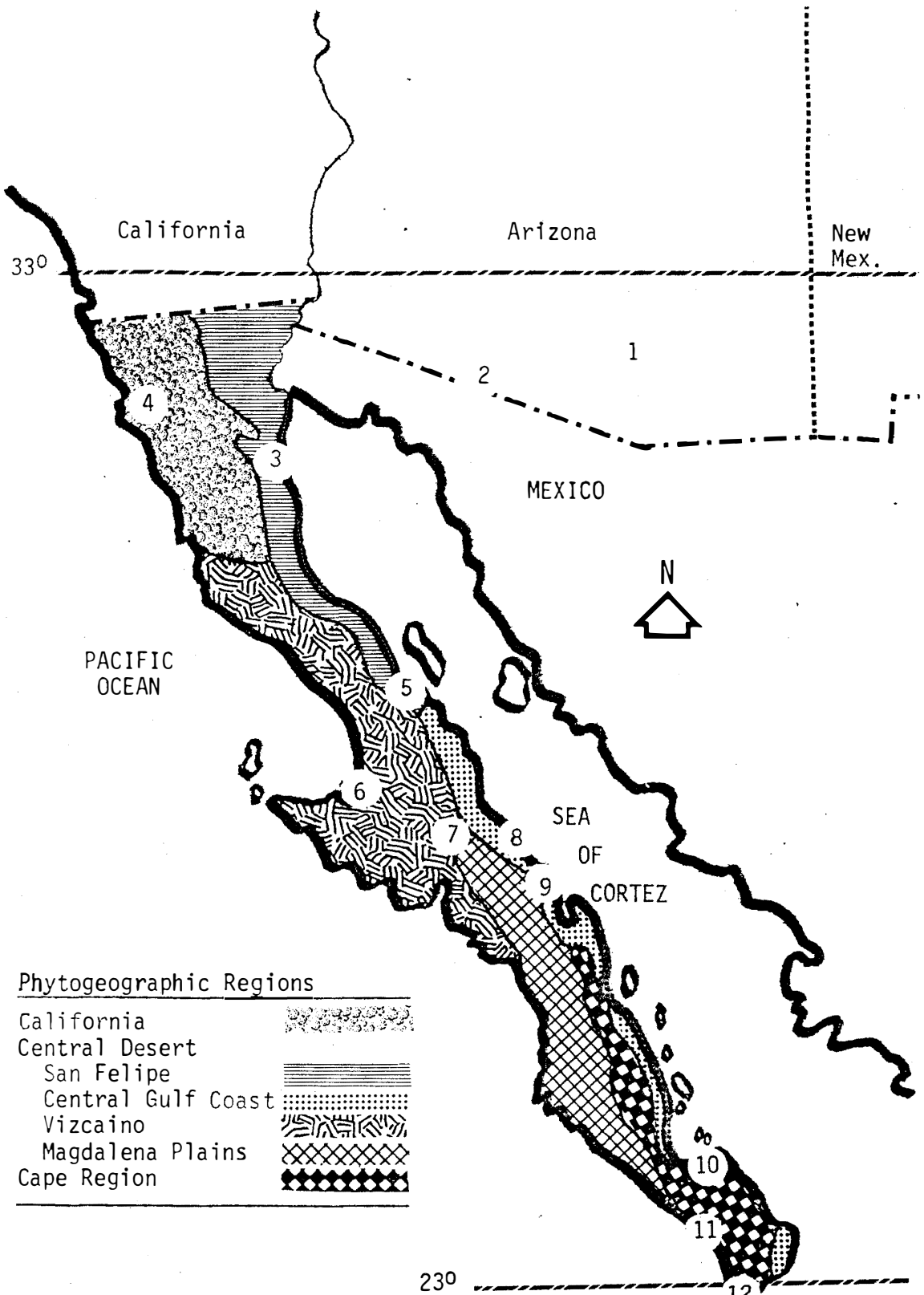
TABLE 1

Itinerary for Prinicpia College Biology Field Study

in Baja California, November 22 - December 18, 1982

Nov.	22	Depart Elsah, IL. Roadside camp, Oklahoma
	23	Bitter Lakes Refuge, Roswell, New Mexico. Camp.
	24	PM--arrive Tucson, Gilbert Ray campground
	25	Thanksgiving. Visit Arizona-Sonora Desert Museum. Camp.
	26	Visit Sabino canyon, camp Organ Pipe National Monument.
	27	Cross border, to Crucero La Trinidad. Desert camp.
	28	To Ensenada. Trailer park camp.
	29	To El Marmol. Desert camp.
Nov. 30 - Dec.	1	To Rancho Santa Ines. Laundry, water, cabins.
Dec	2-3	To Gonzaga Bay turnoff and Bahia de Los Angeles. Coastal camp.
	4	To Mission San Borja. Desert camp.
	5	To Guerrero Negro and San Ignacio. Oasis camp.
	6-7	To Santo Rosalia, Mulege, and Bahia Concepcion. Coastal camp.
	8-9	To La Paz. Hotel Los Arcos.
	10-11	To Todos Santos. Pacific Ocean beach camp.
	12-13	To Cabo San Lucas and La Paz. Hotel Los Arcos.
	14	To Guerrero Negro. Desert camp.
	15	Through Tecate to El Centro, California. Motel.
	16	To Tucson. Students who wish may depart for home from Tucson.
	17	Vehicles en route to Elsah, IL.
	18	Arrive Elsah, IL.

Figure 1. Phytogeographic regions of Baja Peninsula from Shreve and Wiggins (1964). Numbers 1-12 refer to the following locations: 1) Tucson; 2) Organ Pipe National Monument; 3) Crucero la Trinidad; 4) Ensenada; 5) Bahia de los Angeles; 6) Cuerrero Negro; 7) San Ignacio; 8) Santa Rosalia; 9) Mulege; 10) La Paz; 11) Todos Santos; 12) Cabo San Lucas.



Crisis in Science Education

Bob Satterfield, College of DuPage
and
Jim Holler, University of Wisconsin-Platteville

This article reflects some of the opinions expressed by people attending the discussion about science education (1983 Annual Meeting). These opinions do not necessarily coincide with the views of the authors but these viewpoints certainly deserve to be expressed.

As with many problems facing the country, the bottom line seems to be economics. There is just not enough support for higher education. Some of the more obvious results are poorly equipped laboratories, lack of funds for research, limited money for sabbaticals, and last but not least, poor salaries for teachers. Too many qualified people are leaving higher education for better paying jobs.

Another concern is trend toward the retraining or "retreading" of teachers. Teachers are permitted to go back to school to acquire minimum knowledge of a subject and then are required to teach this subject. Some of these "volunatry" retraining programs are accomplished by holding the threat of job loss over the faculty menber's head.

The policy of hiring part-time faculty has also contributed to the problem. These people often have less training and will work for less compensation. Too often these people have another full-time job and one questions how much time they can be spening on preparation for classes.

Another concern is the poor preparation of students at the secondary level. Not enough science courses are required for entrance into college; thus, many students avoid taking these courses in high school. Even more appalling is the lack of oral and written communication skills. There should be a minimum competency in writing obtained before students enter college.

A possible corollary to poor training is the way that science is often taught at the secondary level. In many courses, science is taught as a foreign language requiring students to memorize a vocabulary without having them think.

In addition, there is too much emphasis on job training at the secondary and college level. Students are too often encouraged to take only courses which will prepare them for a vocation. Hence, they may leave college without an education.

One of the foremost concerns is that of the training of administrators both at the secondary and at the college level. In most instances, they have none or little background in science. As a result they see little value in the laboratory portion of science courses. Another ramification of this concept is that laboratories do not require as much preparation as lecture; hence, labs are not counted as much toward the faculty member's workload. There is a tendency to place all too much emphasis on FTE as the sole basis for dtermining workload.

Perhaps the basic reason for the trouble in science education or education in general is the way that the public appears to perceive teachers. Teachers are now thought of as not being truly professional. Teachers have been relegated to

second class citizenship in terms of their salaries and the respect they are given. Teaching often is perceived as a second job serving only to augment the primary income of the family. Thus one of the big problems seems to be a public relations problem.

There are some who feel that the teaching of "scientific creationism" is detrimental to science educaitor in general. It certainly does not appear to contribute to true scientific thinking. One of the things science must teach is to be aware of all possibilities.

Last but not least, faculty morale has descended to such a point that this should be a serious concern of every citizen of this country. All of the preceding factors contribute to this problem.

Some of the solutions would appear obvious. There must be a reordering of the priorities of this nation. There must be more money and wiser use of the funds which are allotted to education. Education should be the cornerstone of our nation. It is important that knowledge be accorded its proper role in our society. For too many years teaching as a profession has been relegated to a secondary position. Until this is remedied problems will continue to occur.

****

REVIEWS OF SOFTWARE FOR THE BIOLOGY CLASSROOM

(Editor's Note: As part of a computer evaluation program, members of the Wabash College Biology Program reviewed software for Apple II+ and IIe computers. Software were ordered with the conditions that (1) software could be returned within 30 days if unacceptable, and (2) we agreed in writing not to copy documentation, disks or program code prior to purchase. All software suppliers agreed to these conditions.)

****

Nucleic Acid Connection, COMPress $60.00

Content: There are three parts to the program: (1) Optional diagrams of nucleic acid bases, (2) Graphics of a cell synthesizing 3 RNAs (transfer, messenger, ribosomal) and (3) Nucleic acid connection. (2) is embedded in (3). (1) gives structural formulae for AT:CG base pairs and allows a "Mutation to occur": DO YOU WANT MUTANTS? A color monitor is important here. This viewer didn't care for (1). (2) shows the RNAs coming out of the nucleus of a cell, folding up into their conformation and forming polyribosomes. Parts (1) and (2) are elementary compared to (3) which allows the operator to choose the length of a gene (100 or 300 bases) and display the DNA sequence, mRNA sequence or amino acid sequence of the protein product. A genetic code dictionary is available as a display; it should be printed in the instruction guide. A mutation always comes up in the gene initially.

Evaluation: One should be able to see the whole gene and its system before mutation occurs. 10 mutagenic agents may be applied to the gene. A sense of mutation frequency is implicit in these operations; the program is virtually open ended. The CG:AT ratio is indicated for each display of DNA sequence. The

operation is a bit frustating at times. One cannot direct a specific mutation and follow its consequence. There are two misspellings in the narative: infromation and DNA connexion. The instructions are marginal. The program will appeal to stronger biology students with some computer experience. The content of (3) is sophisticated, despite its limitations. For thorough use of the total program, a great deal of time would be required. This program could form an introduction to the chemistry of mutagenesis with appropriate reading assignments.

Educational level: For good first-year students, upper level biology students.

Appropriate course: Biology, Biomolecules, Genetics, Molecular Biology, Cell Biology.

Clarity of instructions, 1 = least, 5 = most: 2
Documentation, 1 = poor, 5 = excellent: 3
Graphics 1 = poor, 5 = excellent: 3
Ease of use (level of instructor help required), 1 = difficult, 5 = easy: 4
System requirements: disk drives, color monitor

Other observations: This could be cleaned up by the manufacturer to provide a very nice program for a variety of students.

Reviewed by Professor Thomas A. Cole, Treves Professor of Biology, Wabash College.

Genetics, Educational Materials and Equipment Company $85.00

Content: This program introduces many of the fundamental concepts of transmission genetics such as Mendel's laws, mono and dihybrid crosses, probability, sex linkage and a sectionon inbreeding and homozygosity. Questions are asked throughout so ther eis good opportunity for interaction.

Evaluation: This program is OK although I disagree with some of the terminology used. Overall it would be useful in a course for non-majors as a remedial tool for students having difficulty with basic concepts of genetics.

Clarity of instructions, 1 = least, 5 = most: 4
Documentation, 1 = poor 5 = excellent: 4
Graphics, 1 = poor, 5 = excellent: 4
Ease of use (level of instructor help required), 1 = difficulty, 5 = easy: 4
System requirements: disk drive

Reviewed by John W. Munford, Assistant Professor of Biology, Wabash College.

Microbiology Techniques, Educational Materials and Equipment Company $45.00

Content: The program contains six modules: (1) Pipets, (2) Dilutions, (3) Dilution Practice, (4) Bacterial Growth, (5) Tabulate and Graph. (6) Bacterial Key. (1) defines Mohr and serological and shows the difference between

"drain-out" and blow-out." An overview of pipet sizes and subdivisions is provided. The reading the pipet exercise is worthwhile for the beginning student. (2) is a good exercise that requires exponents and logarithms and dilution terminology. (3) provides ten problems to calculate the dilution factor, bacterial count and the logarithm of the bacterial count. Answers for the dilution factor and bacterial count in exponential form are not accepted. (4) contains 13 sets of information and all of them come up again in Review. The problems on log growth will be useful to show up the student who is not critical in expressions of mathematical information. (5) Has 9 parts and a printer is useful here. (6) This bacterial key would be very manageable for the introductory student and could be used as a problem-solving exercise in a laboratory period or as homework exercises. There are six diagnostic programs for bacterial identification. A printer allows this part to be more useful.

Evaluation: The content is a good introduction to microbiological techniques and could serve several levels of students if used judiciously.

Educational level: College, lower- and upper-division.

Courses: General or Introductory Biology and Microbiology, Possibly Genetics.

Suitability: Suitable for most of the class in lower-level and remedial for those students in upper-level courses.

Clarity of instructions, 1 = least, 5 = most: 3
Documentation, 1 = poor, 5 = excellent: 4
Graphics, 1 = poor, 5 = excellent: 3
Ease of use (level of instructor help required), 1 = difficult, 5 = easy: 3
System requirements: disk drives, printer

Other observations: This program contains a lot of options for the cost: high data base /unit cost

Reviewed by Thomas A. Cole, Treves Professor of Biology, Wabash College.

Microbiology Techniques (an alternative perspective of the same program).

Content: The program is menu driven and consists of 6 options: Pipets, Dilutions, Dilution Practice, Bacterial Growth, Tabulate and Graph, and Bacterial Key. "Pipets" explains differences between Mohr and Serological pipets. Also the student is drilled on reading a pipet. "Dilutions" explains in detail the means of preparing and calculating a dilution series, then provides the student with practice problems. The "Dilution Practice" provides students with data which they are to use to determine the dilution factor, bacteria/ml and log 10 bacteria/ml. In "Bacterial Growth", the student is introduced to doubling time, lag, log, and stationary phrase growth. In "Tabulate and Graph", students work with data to determine growth rates. Finally "Bacterial Key" introduces the idea of a dichotomous key.

Evaluation: Overall the program provides the student with an excellent introduction to techniques, particularly pipetting, dilutions, and doubling time determinations. The key is also useful but gives students too much confidence in the validity of tests - a similarity index would be better. "Tabulate and Graph"

is too much like a black box, although the instructor could use the program to assist students who are having difficulty understanding growth rates. It also ignores the growth rate constant.

Educational level: Advanced high school and college

Appropriate courses: Introductory Biology, Cell Biology and Microbiology

Suitability: Entire class and remedial

Clarity of instructions, 1 = least, 5 = most: 5
Documentation, 1 = poor, 5 = excellent: 5
Graphics, 1 = poor, 5 = excellent: 5
Ease of use (level of instructor help required), 1 = difficult, 5 = easy: 5
System requirements: printer optional but useful

Other observations: comes with student work sheets. Excellent program for $45, a real bargain.

Reviewed by William N. Doemel, Associate Professor of Biology, Wabash College.

Genetics and Evolution, Educational Materials and Equipment Company $97.00

Contents: There are 4 parts: (1) Hardy-Weinberg, (2) Genetic Drift, (3) Palingenesis and (4) Allometric Growth. Parts (1) and (2) would be useful for our lower-level students. (1) allows the study of mutation, selection, migration or inbreeding selective mating (but inbreeding does not appear on the printed instructions). The variables are population size, recessive allele frequency, immigration, emigration, mutation, inbreeding and fitness. Clearly, an extensive exercise would be possible from using this part. One can choose instructions, illustrative run or sample. After the graph is drawn, the program is locked. (2) allows one to choose the population size, but the standard is a 21 x 21 grid with up to 8 characters. A color monitor is necessary for full use of this part.

Evaluation: Since the students have trouble understanding the parameters of the gene model - bead experiment, they would have much trouble understanding this part, unless thorough introduction or the bead experiment were presented first. (3) allows the study of acceleration, hypermorphosis, neoteny or progenesis. It might be useful for advanced students in developmental biology or genetics. Students with better than average mathematics preparation could be urged to work through this part in an evolution course. (4) uses $y = b.x^a$ where a = differential growth rate and b = the correlation between the growth of the organ and a. This part probably would be useful to advanced courses and then, only the students with a predisposition to mathematics.

Educational level: mainly college, only very strong high school students.

Appropriate courses: General Biology, Genetics, Evolution, or Developmental Biology

Suitability: (1) and (2) for entire classes of lower-level students and remedial for upper-level: (3) and (4) for advanced lower-level and general upper-level.

Clarity of instructions, 1 = least, 5 = most: 2
Documentation, 1 = poor, 5 = excellent: 3
Graphics, 1 = poor, 5 = excellent: 3
Ease of use (level of instructor help required), 1 = difficult, 5 = easy: 2
System requirements: disk drives, color monitor

Other observations: There is a typographical error in the instructions: change = chance. New instructions would have to be written for regular use with our lower-level courses.

Reviewed by Thomas A. Cole, Treves Professor of Biology, Wabash College.

Meiosis, Educational Materials and Equipment Company $45.00

Content: There are three parts: A. Introduction, B. Meiosis Simulation and C. Review. The introduction (A) defines meiosis and asks for the word homologous, then compares X and Y chromosomes against the definition of homologous. Questions reveal oogenesis, spermatogenesis, 2N = 46 for humans, haploid = 23. The simulation (B) involves 4 choices: (1) spermatogenesis, (2) oogenesis, (3) spermatogenesis with nondisjunction and (4) oogenesis with nondisjunction. Spermatogenesis (1) provides graphics of chromosomal events in sperm formation: tetrad formation, crossing over, secondary spermatocyte and spermatid formation. There is an error in the display on crossing-over: "Crossing over changes the linkage of genes resulting in a mutation." Oogenesis (2) goes through the same displays as (1), modified for polar body formation. Spermatogenesis with nondisjunction shows the failure of separation to form abnormal gametes and proceeds to trisomy (Down's syndrome) and monosomy (Turner's syndrome). Oogenesis with nondisjunction (4) repeates the processes in (3) and forms an ootid with N+1 chromosomes. It repeats trisomy and monosomy. The Review (C) asks 7 questions and provides information if the response is not correct. The study quide reviews mitosis, has 4 activity sections and provides a glossary.

Content: The content covers all of the fundamental material which we expect freshmen biology majors to have mastered. Some of the questions asked in the introduction and review are fairly challenging for the typical freshman.

Educational level: Good high-school, average college students.

Apprpriate courses: General Biology

Suitability: Entire class.

Clarity of instructions, 1 = least, 5 = most: 4
Documentation, 1 = poor, 5 = excellent: 3 (The error could be used as a teaching tool.
Graphics, 1 = poor, 5 = excellent: 4
Ease of use (level of instructor help required), 1 = difficulty, 5 = easy: 4
System requirements: Disk drive, color monitor is specified, but the program can be run without it.

Other observations: This program provides as much learning experience as some

with a higher price.

Reviewed by Thomas A. Cole, Treves Professor of Biology, Wabash College.

Meiosis (This is an alternative perspective of the same program.),
Content: See above.

Evaluations: PCCR.
Errors - crossing over yields mutations, pre-meiotic interphase is included as part of Meiosis I.

Graphics are not impressive. Student can get more out of interacting with pop beads than with this model.

Educational level: High school, intro college

Suitability: Remedial at best

Clarity of instructions, 1 = least, 5 = most: 2
Documentation, 1 = poor, 5 = excellent: 2
Graphics, 1 = poor, 5 = excellent: 3
Ease of use (level of instructor help required, 1 = difficult, 5 = easy: 1

Reviewed by John W. Munford, Assistant Professor of Biology, Wabash College.

Osmosis & Diffusion, Educatinal Materials and Equipment Company $41.00

Content: Introduces the concepts of osmosis and diffusion relating them to the random motion of molecules. The concept of a semi-permeable (not selectively permeable) membrane is introduced. The simulation part of the program allows the student to investigate the effects of water/liquid-solubility, pore-size, charge, and temp on osmosis and diffusion in a qualitative way.

Evaluation: Most of what is on this program can be just as easily explained with pencil and paper. The student only has to run the experiment a couple of times to see what will happen. We do this type of experiment in non-majors biology with dialysis tubing. The Quiz at the end has some questionable answers. The Student Lab booklet is OK for this program.

Educational level: High school, college intro.

Suitability: Remedial

Clarity of instructions, 1 = least, 5 = most: 4
Documentation, 1 = poor, 5 = excellent: 3
Graphics, 1 = poor, 5 = excellent: 3
Ease of use (level of instructor help required), 1 = difficult, 5 = easy: 4
System requirements: disk drives, color monitor, no printer option

Other observations: Recommended for remedial use only.

Reviewed by John W. Munford, Assistant Professor of Biology, Wabash College.

Osmosis and Diffusion (an alternative perspective of the same program).

Content: Has several parts including: 1) a brief tutorial on osmosis and diffusion; 2) Demo; 3) experiment capabilities in which one can vary, (a) temperature, (b) pore size, (c) solubility [fat or HOH], (d) charge [plus, minus or meutral], (e) inside concentration [0-100%], (f) outside concentration [0-100%], (g) mix with HOH; 4) a ten question quiz. In the study guide a Bibliography and a glossary of terms is provided.

Evaluation: The manual provides an accurate and concise introduction to semipermeable membranes as well as osmosis, diffusion, hypotonic and hypertonic solutions. In tutorial, screens move ahead automatically - while plenty of time is provided to "continue" and "backup" option would be better. I think it could be useful for getting students to make hypothesis, design experiments to test the hypothesis and formulate new hypotheses. Allows the student to quickly test a lot of possibilities.

Educational level: Jr. High School, Sr. High School

Apropriate courses: Introductory Biology for majors and non-majors.

Suitability: Probably remedial

Clarity of instruction, 1 = least, 5 = most: 4
Documentation, 1 = poor, 5 = ecellent: 4
Graphics, 1 = poor, 5 = excellent: 3
Ease of use (level of instructor help required), 1 = difficult, 5 = easy: 4
Other observations: simple but useful - probably worth the money

Reviewed by Austin E. Brooks, Professor of Biology, Wabash College.

Population Fluctuations, Diversified Materials and Equipment Company $47.50

Content: The two major sections of the program are (A) Review of Population Concepts and (B) Experimental Mode. (A) discusses the factors which modify population growth: birth rate, death rate, migration and uses a model of fly reproduction while continuing to biotic potential, carrying capacity and low-breeding density. The (B) section contains three models: exponential, logistic growth limited by carrying capacity, logistic growth limited by carrying capacity and low breeding experiments. There are 5 options: modify specifications (variables), display table, display plot, print table (the printer slot must be known), and review concepts (a return to A). The variables are the growth model, initial population size, reproductive rate, number of generations, carrying capacity and low breeding density modification.

Evaluation: The content is a good review and consolidation of population concepts. The lack of units on parameters will slow some students down. The

students should have quick access to logarithm review while operating this program.

Educational level: High school and lower-level college

Appropriate courses: Introductory Biology

Suitability: Remedial aid for most all students in the introductory biology course.

Clarity of instructions, 1 = least, 5 = most: 4
Documentation, 1 = poor, 5 = excellent: 4
Graphics, 1 = poor, 5 = excellent: 3 The graphics in A are bland.
Ease of use (level of instructor help required), 1 = difficult, 5 = easy: 4
System requirements: disk drives, printer

Reviewed by Thomas A. Cole, Treves Professor of Biology, Wabash College.

Population Fluctuations, (this is an alternative perspective to the same program).

Content: Two options 1) tutorial that introduces with graphics several basic ideas including populations, birth rate, death rate, migration, carrying capacity, biotic potential, exponential curve, and low breeding density. Data table may be plotted but curves cannot be - limits usefulness in comparisons. Can get 3 growth models 1) exponential, 2) limited by carrying capacity, 3) limited by carrying capacity and low breeding potential.

Evaluation: While the program presents some good concepts it really isn't very useful to compare the effect of altering different variables since one can't get a plot of the curves. Remembering curves from one trial to the next is difficult. Tables may be preinted but it is hard by simple inspection to compare these. One could have students plot the data. I didn't use the study guide.

Educational level: High school and college

Appropriate courses: Introductory Biology

Suitability: Use in small groups perhaps, perhaps as a remedial aid.

Clairty of instruction: 1 = least 5 = most: 4
Documentation 1 = poor 5 = exellent: 4 (The study guide is well written; accurate and helpful in understanding terms.)
Graphics 1 = poor 5 = excellent: 4
Ease of use (level of instructor help required) 1 = difficult 5 = easy: 4
System requirements: does not say, it will run on Apple II and w/48K, disk drive, printer option

Other observations: Probably not worth the price.

Reviewed by Austin E. Brooks, Professor of Biology, Wabash College.

Coexist, Conduit $40.00

Content: Allows simulation of conditions required for coexistence choose: generation time, reproductive rate, competition coefficient, initial population size and carrying capacity. Program simulates population sizes of species given these conditions and there will be coexistence or extinction.

Evaluation: Program seems to do what it says it does. It works quickly. Simulation model is somewhat unrealistic i.e., simplistic (as it would have to be to model something this complex.)

Educational level: Lower-level college or high school.

Appropriate courses: Introductory Biology

Clarity of instructions, 1 - least, 5 = most: 4
Documentation, 1 = poor, 5 = excellent: 5
Graphics, 1 = poor, 5 = excellent: 4
Ease of use (level of instructor help required), 1 = difficulty, 5 = easy: 4
Need help with starting values
System requirements: 1 disk no printer

Other observations: Actual results not useful in and of themselves. But, may have value in allowing students to make and test a hypothesis even if results are unrealistic. I recommend returning for now, discussing it with staff and those working on Biology 1 and 2 labs and perhaps incorporating it.

Reviewed by David T. Krohne, Assistant Professor of Biology, Wabash College.

Evolution, COMPress $80.00

Content: This is a more complex program than Coexist. Includes 1) the usual Hardy-Weinberg simulation, 2) Palingenesis - the efforts of delaying or enhancing development and sexual development, and 3) allometry the effects of differential growth rates on final size and shape.

Evaluation: Drift does not seem to work correctly. Allele frequencies seem to osymptote on 0.5 regardless of starting point. Palingenesis program provides a qualitative more than quantitative result which is difficult to interpret given the documentation. Allometry is interesting but needs better documentation.

Educational level: College - some upper-level.

Apropriate courses: General Biology for majors and non-majors and Evolution

Suitability: Entire class

Clarity of instructions, 1 = least, 5 = most: 2
Documentation, 1 = poor, 5 = excellent: 2
Graphics, 1 = poor, 5 = excellent: 3

Ease of use (level of instructor help required), 1 = difficult, 5 = easy: 2
System requirements: printer and 1 drive

Other observations: don't recommend - again Oakleaf system is better.

Reviewed by David T. Krohne, Assistant Professor of Biology, Wabash Colege.

Evolut, Chelsea-Conduit $40.00

Content: Models evolution of one locus, 2 allele systems. Includes choices for: dominance/codominance; selective advantage/disadvantage; population size (drift) and initial gene frequencies.

Evaluation: This one seems to work well - drift seems to behave properly. One advantage is that you do not preset the number of generations. After each 10 generations you may stop or continue. This is useful if you don't have a sense of how long it will take to see effects. Runs rather slowly.

Appropriate courses: Introductory level

Clarity of instructions, 1 = least, 5 = most: 4
Documentation, 1 = poor, 5 = excellent: 4
Graphics, 1 = poor, 5 = excellent: 4
Ease of use (level of instructor help required), 1 - difficult, 5 = easy: 5
System requirements: 1 disk drive

Other observations: very simple program - don't recommend because Oakleaf program is better.

Reviewed by David T. Krohne, Assistant Professor of Biology, Wabash College.

Niche, Diversified Educational Enterprises, Inc. $60.00

Content: This is basically a game program. It asks you to guess the correct conditions under which an organism can thrive in its niche.

Evaluation: This is really a computer based game - it has factual errors and really teaches little biology - rather, it uses biology to create a game situation.

Educational level: high school or less

Clarity of instructions, 1 = least, 5 = most: 5
Documentation, 1 = poor, 5 = excellent: 4
Graphics, 1 = poor, 5 = excellent: None
Ease of use (level ofinstructor help required), 1 = difficult, 5 = easy: 5
System requirements: doesn't need printer

Other observations: not useful or appropriate for any course.

Reviewed by David T. Krohne, Assistant Professor of Biology, Wabash College.

Orderident, Educational Computing $40.00

Content: (1) A taxonomic key to the orders of insects - provides a series of questions that the user answers to produce a description of the morphological characters used in identifying the insect. It tells you what order your insect belongs. (2) Provides a list of the major characteristics of each order. (3) Allows you to enter any character(s) and determine which order displays them.

Evaluation: It is adequate for what it is trying to do...i.e., place an insect in its proper order. Also it provides a fun and easy way to learn the major characteristics of different insect groups and the morphological features that are useful for taxonomy of insects.

Educational level: Low level, it's a utility program not one that teaches concepts, etc.

Appropriate courses: Invertebrates, perhaps Intro Biology, just to get the students using a computer and looking at morphological traits.

Suitability: Entire class

Clarity of instructions, 1 = least, 5 = most: 5
Documentation, 1 = poor, 5 = excellent: 3 doesn't always agree with what's on the screen. See below*
Graphics, 1 = poor, 5 = excellent: 4
Ease of use (level of instructor help required), 1 = difficult, 5 = easy: 5
System requirements: disk drive

Other observations: There was only one obvious problem - after identifying an insect (or misidentifying) the program doesn't return you to the main menu.

Reviewed by Margaret A. Palmer, Byron K. Trippet Assistant Professor of Biology, Wabash College.

POPGEN, Diversified Educational Enterprises, Inc. $60.00

Content: simulation (interactive) of gene frequency changes caused by violation of the Hardy-Weinberg equilibrium conditions (i.e., 4 of 5 - sexual selection is not considered separately).

Evaluation: There are problems: 1) a glitch reverses p & g as simulation starts (a minor problem), 2) in drift simulation, P always seems to decrease from one initial high value regardless of population size and stops changing significantly at P = 0.5 - a major problem, 3) simultaneous effects of violations cannot be considered.

Appropriate courses: Introductory level

Suitability: Remedial

Clarity of instructions, 1 = least, 5 = most: 5
Documentation, 1 = poor, 5 = excellent: 4
Graphics, 1 = poor, 5 = excellent None
Ease of use (level of instructor help required), 1 = difficult, 5 = easy: 5
System requirements: has printer option for hard copy

Other observations: probably not too useful - doesn't demonstrate drift correctly.

Reviewed by David T. Krohne, Assistant Professor of Biology, Wabash College.

POPGEN (This is an alternative perspective to the same program,

Content: Text screens introduce general concepts of populations including definition; biotic potential, environmental resistance, scientific model, density-dependent limiting factors, growth rate, carrying capacity. Three models exist: 1) no limiting factors - exponential or J curve; 2) adds effect of limiting factors - 5 curves and 3) same as 2 but incorporates time lag while population is adapting to environment. One must input 1) initial population size, 2) growth rate and 3) duration of simulation. Output to data table, graph of population vs. time and semi-log plot of population vs. time. All to screen or printer. Also can specify integer output. Large numbers are entered in scientific notation 2 million = 2E6.

Evaluation: Ability to get graphic data on printer makes this program instructive and useful for the quick comparison of variables.

Educational level: high school and beginning college

Appropriate courses: Introductory Biology for majors and non-majors and in a review way Ecology and Microbiology.

Suitability: Remedial and entire class

Clarity of instructions, 1 = least, 5 = most: 3
Documentation, 1 = poor, 5 = excellent: 4
Graphics, 1 = poor, 5 = excellent: 4 (only graphs but they are good.)
Ease of use (level of instructor help required), 1 = difficult, 5 = easy: 4
System requirements: Apple II with 48 K, disk drive, printer option

Other observations: probably worth the price

Reviewed by Austin E. Brooks, Professor of Biology, Wabash College.

Enzkin, Conduit $40.00

Content: This program is based on Michaelis-Menten kinetics and allows the student to vary 5 parameters of the enzyme catalyzed reaction; pH, incubation

temp., enz. vol., incubation time, subs. vol (not conc) for six different enzymes having different KM, pH and temp,. max. etc.

Evaluation: This program is O.K. for a student who is having some difficulty with the basic concepts of enzymology. It also could be used alongside a lab experiment designed in the same way as this program (i.e., with the same variable parameters).

Educational level: freshmen, sophomores

Appropriate courses: Biomolecules, maybe Cell Biology

Suitability: entire class of Biomolecules or Introductory Biology, remedial (at best) for Cell Biology

Clarity of instructions, 1 - least, 5 = most: 4
Documentation, 1 = poor, 5 = excellent: 2
Graphics, 1 = poor, 5 = excellent: 3 (problem with axes on graphs)
Ease of use (level of instructor help required), 1 = difficult, 5 = easy: 4
System requirements: disk drive

Reviewed by John W. Munford, Assistant Professor of Biology, Wabash College.

Baffles, Conduit $50.00

Content: Baffles is of the Tribbles genre. It is a game designed to develop the skills of logical thought. On a square "playing grid" consisting of 100 sectors up to 20 baffles can be placed. These baffles deflect "laser beams" fired from any location about the grid. The program provides you the point where the laser beam entered the grid and the point where it exited the grid. You are to deduce the location and tilt of the baffle.

Evaluation: The program has potential as a tool to teach logic to mature children. It is better suited for middle school than college. Certainly there are more sophisticated games that develop these same skills and cost much less. It requires little input by the teacher.

Educational level: Middle school

Suitability: entire class

Clarity of instructions, 1 = least, 5 = most: 5
Documentation, 1 = poor, 5 = excellent: 5
Graphics, 1 = poor, 5 = excellent: 4
Ease of use (level of instructor help required), 1 = difficult, 5 = easy: 5
System requirements: disk drive

Reviewed by William N. Doemel, Associate Professor of Biology, Wabash College.

DNAGEN, Diversified Educational Enterprises, Inc. $60.00

Content: A description of the flow of genetic information in triplet codes is accompanied by input capability in sequences of DNA, mRNA and protein. The result of each entry is a display of double-stranded DNA sequences, structure of mRNA and the primary structure of proteins. No rare or unusual bases or amino acids are allowed.

Evaluation: This program is straightforward and useful. There is a mistake in the genetic code dictionary (line 9 or the left hand side of the second rank should be C rather than U: The first two ranks are both labeled U.). Since information flow in a laboratory setting has been removed from the Biology 1 laboratory, this program might provide an opportunity to reintroduce the genetic code in a hands-on environment. It could be used profitably as it stands or with a table of Hb point mutations to make the operation a bit less abstract. The effect of single base substitution on the distal sequence would be able to be done with this program also.

Educational level: high school and college

Appropriate courses: Introductory Biology, Biomolecules and Genetics

Suitability: Entire class for Introductory Biology and Biomolecules. Remedial for most of Genetics.

Clarity of instructions, 1 = least, 5 = most: 5
Documentation, 1 = poor, 5 = excellent: 5
Graphics, 1 = poor, 5 = excellent: NA
Ease of use (level of instructor help required), 1 = difficult, 5 = easy: 5
System requirements: printer option, but extremely useful, particularly in the situations suggested above.

Other observations: recommend purchase.

Reviewed by Thomas A. Cole, Treves Professor of Biology, Wabash College.

DNAGEN (An alternative perspective of the same program)

Content: Program allows student to enter DNA base sequence and get mRNA and a.a. out or mRNA sequence and get DNA and protein or a.a. sequence and get DNA and mRNA out. Easy to make insertions and deletions to see the effects of frameshift mutations. Can vary inputs to see effect of mutations - also degenerating of the code.

Evaluation: Overall a simple but probably useful program particularly for students having problems - it is possible to a large number of simulations in just a few minutes.

Educational level: High school and college

Appropriate courses: Introductory Biology, Biomolecules, Genetics and Biology 21

Suitability: Might be used as a class exercise in lower courses (Introductory

Biology and Biomolecules) and remedial aid in Genetics and Biology 21.

Clarity of instructions, 1= least, 5 = most: 5
Documentation, 1 = poor, 5 = excellent: 4
Graphics, 1 = poor, 5 = excellent: None
Ease of use (level of instructor help required), 1 = difficult, 5 = easy: 5
System requirements: 48K, disk drive, printer option

Reviewed by Austin E. Brooks, Professor of Biology, Wabash College.

Aquatic Ecology Programs, Oakleaf $29.95

Content: This program performs the following calculations: Hynes/Hamilton Production estimate, Stream Flow and Current velocity, Lake morphometry, Light transmission in water, Diversity indices, Descriptive statistics (sample variance, median, standard deviation), Regression and correlation analyses.

Evaluation: A major weakness of this program is the absence of the ability to either print data to a printer or disk. Students must have a hard copy of the data. If the authors had put less graphics - not really necessary at all! - they may have been able to include a routine to dump to disk or printer. The progrm would even be more useful had they allowed for data entry from DIF files.

Educational level: college

Appropriate courses: Limnology, Ecology

Suitability: entire class

Clarity of instructions, 1 = least, 5 = most: 5
Documentation, 1 = poor, 5 = excellent: 5
Graphics, 1 = poor, 5 = excellent: 3 (not necessary!)
Ease of use (level of instructor help required), 1 = difficult, 5 = easy: 5
System requirements: disk drive

Reviewed by William N. Doemel, Associate Professor of Biology, Wabash College.

Sources of programs:

COMPress
PO Box 102
Wentworth, NH 03282

CONDUIT
PO Box 388
Iowa City, Ia

Oakleaf Systems
318 N. Mill St.
Decorah, IA 52101

Diversified Educational Enterprises, Inc.
725 Main Street
Lafayette, IN 47901

Educational Materials and Equipment Company
PO Box #17
Pelham, New York 10803

REVIEW SHEET FOR COMPUTER PROGRAMS

Date Program Reviewed_____

Reviewer: _____

Address: _____

Name of Program: _____

Source: _____ Cost: $_____

Briefly describe the content of the program:

Briefly evaluate the content of the program:

What is the educational level of this material?

List the courses for which this material is appropriate:

Is this material suitable for use by the entire class or as a remedial aid for some students?

General rating:

1. Clarity of instructions: (circle appropriate number)

(least) 1 2 3 4 5 (most)

2. Documentation

(poor) 1 2 3 4 5 (excellent)

3. Graphics

(poor) 1 2 3 4 5 (excellent)

4. Ease of use (level of instructor help required)

(difficult) 1 2 3 4 5 (easy)

System requirements: (i.e., disk drives, printer, other)

Other observations:

(Return to W. Doemel, Biology Department, Crawfordsville, IN 47933.)

BioScene Editorial Offices
Biology Department
Wabash College
Crawfordsville, IN 47933

non-profit organization
U.S. POSTAGE
PAID
Crawfordsville, IN
permit no. 50