• **Genetical, Morphological and Behavioral Studies on the Evolutionary Biology of the Astyanax Species Complex of Middle America** — Aldemaro Romero, Department of Biology, University of Miami, Coral Gables, FL.

Despite the fact that caves provide a unique natural laboratory for the study of biological processes, few attempts have been made in order to develop evolutionary studies which correlate the genetical changes with the morphological, physiological, and behavioral adaptations of species at population level. One of the most interesting organisms for such studies is the characid *Astyanax mexicanus* (FILLIPI, 1853). This is one of the few freshwater fishes of South American origin which has overcome the Central American filter-barriers, becoming one of the most abundant species of the ichthyofauna of Central America and Mexico, and it is rapidly expanding in the Southern United States. At least 20 populations of this species show different degrees of adaptation (blindness and depigmentation) to cavernocolous life in Northern Mexico. Recent observations also show that a population of a close relative species, *A. fasciatus* (CUVIER), displays affinity toward the entrance of a subterranean source of water in Costa Rica. The epigean and troglobite forms of *A. mexicanus* are not only different in their morphological characteristics, but also in their behavior: contrary to the case for the epigean form, the troglobite one does not school, has lost circadian rhythms, is not aggressive and does not react to the alarm substance. Since these two forms interbreed in both natural and experimental conditions, producing fertile hybrids with a phenotype intermediate form in F_1 generation, and with a F generation (after F_1 x F_1) whose individuals range from an almost completely blind depigmentated form to an almost "normal" eyed one, studies on quantitative genetics can be done in order to trace the genetical traits involving different kinds of phenotypic features.

Since it has been clearly shown that the epigean and troglobite populations belong to the same species, several basic questions can be asked: why are these two forms so different and how did this fish evolve to a highly adapted troglobite form without a complete isolation since gene flow between both forms is still present? Which are the genetical mechanisms involved in the development of the troglobite population? Since these populations show different degrees of adaptation to the cavernicolous life, have they evolved from a single event or are they the product of different caves in the same area? Which are the advantages of cavernicolous life for this fish? How fast have these adaptive changes occurred? Are blindness and depigmentation a result of a complex morphological adaptation or have these conditions been achieved through a process of neoteny? Finally, are physiological and behavioral adaptations previous, simultaneous or posterior to the morphological ones?

• **Pollen Analysis of Modern Spectra Derived From Caves Situated Along An Environmental Gradient, Pryor Mountains, Montana** — Russanne Low, Department of Anthropology, University of Alberta, Edmonton, Alberta, Canada.

Pollen analysis of cave deposits is the primary method used to reconstruct past environments of Paleolithic archaeological sites. The thrust of the Pryor Mountain project is to provide a basis for evaluating how accurately cave sediments record regional vegetation. More specifically, the project is designed to determine:

-the role of windborne pollen in cave derived pollen assemblages.

-the influence of plant taxa occurring directly outside the cave mouth.

-the influence of solar exposure and other topographic variables on cave derived pollen assemblages.

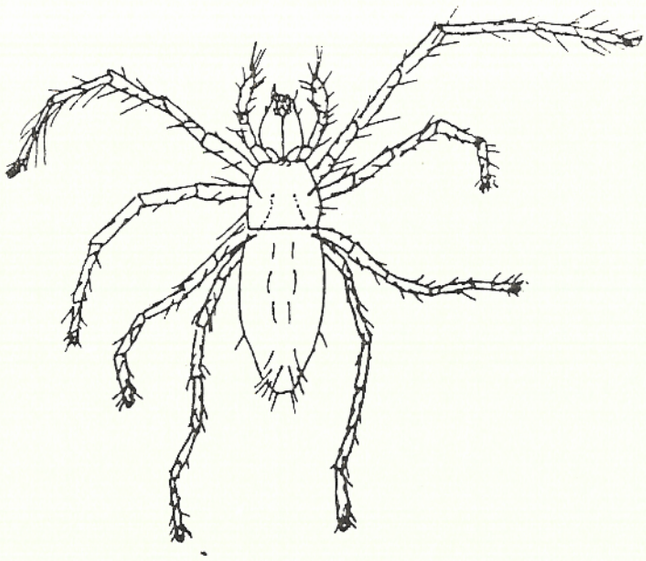
-the catchment represented by pollen trapped in different cave depths.

These results will facilitate more accurate paleoenvironmental interpretation of cave-derived assemblages.

In addition to these funded programs the Society assisted other activities by recognizing them as Projects or Study Groups of the NSS in order to increase their credibility with government agencies and other organizations from which the project sought cooperation or financial assistance. The following new Projects and Study Groups were recognized during the year:

• **A Guidebook to Miner's Carbide Lamps Project** — to develop and publish a book on the history and technology of carbide lamps including an index of carbide lamps.

• **Crystal Cave Dynamics Project** — to study Crystal Cave, an ice cave in Lava Beds National Monument. The project will 1) monitor



changes in ice mass over several annual cycles; 2) determine a heat budget from measurements of temperature, humidity, airflow, and conduction; 3) estimate the impact of human visitation from the heat budget.

These Projects and Study Groups join those which continue to be active; all are described later in this Manual. These scientific activities are but a few in which NSS members are involved. Most such activities are informally conducted and privately financed. Most result in reports given at local grotto meetings and papers published in grotto and NSS section newsletters. Some of these are also published by the Society as part of the **Speleo Digest**, which includes selected material from the publications of Society chapters and independent caving organizations during a calendar year. The NSS **Bulletin** publishes more formal scientific papers and is tailored to meet the needs of the speleologist who must periodically publish in a professional journal or abandon speleology as a profession. By publishing the **NSS Bulletin**, the Society encourages the professional scientist to conduct and publish speleological work. But the **Bulletin** does more; it raises the sensitivity of the average caver to how and why a cave was formed and what it contains. In 1982, the Burnsville Symposium issue satisfied this objective to a great extent and was well received by the membership. Examples of informal speleological projects conducted by Society members during the past year are:

• Analyzing water samples from Quill Lakes Cavern and Mammoth Cave for dissolved oxygen, carbon dioxide and temperature — Western Region.

• Discovery, excavation and study of a pleistocene age bone site in Paxton Cave, WV by a DCG caver/paleontologist.

• California cavers started a geologic history study in Coral Cave, CA. They hope that the more than 6 meters of soil deposits will reveal the complex paleomagnetic record over thousands of years.

• Meteorological studies are being done in Oregon Caves National Monument, Lake Shasta Caverns and other caves in the Klamath Mountains of Northern California and Southern Oregon — KMCTF.

The Society and its various members also sponsor speleology courses, a Convention and other symposia for the presentation of papers. During the past year these included:

• 1982 NWRA Symposium on Cave Science and Technology, Boise, ID (Feb. 1982)

• Speleology Course — Fall Semester, Indiana University (CIG)

• National Cave Management Symposium, Harrisonburg, VA (Nov. 1982)

• NSS Convention, Bend, OR (June 1982)