Gordon Alexander (1901–1973) was a professor at the University of Colorado (1931–1966), where he served as the head of the Biology Department for 20 years (1939–1958) (Fig. 1). For a brief period, during World War II, Alexander served as the acting head of the University of Colorado Museum of Natural History. Alexander was a distinguished ornithologist and entomologist whose research resulted in publications that ranged from keys to the grasshoppers of Colorado (Alexander 1941), to descriptions of the general adaptations used by organisms living along altitudinal gradients (Alexander 1962, Alexander and Hilliard 1969), to articles on the biogeography of birds (Alexander 1937, 1964a) and grasshoppers of the Front Range and Rocky Mountain regions of Colorado (Alexander 1964b). During his tenure at the university, Alexander mentored 36 masters and 10 doctoral students.

The History of an Avid Naturalist

Edward Gordon Alexander was born on 18 August 1901 in Rich Hill, MO, a small rural town on the western border with Kansas. Gordon's father was a Methodist minister whose vocation required him to move to a new church every four years. The family, which included Gordon and his younger brother Hendrix, lived in a variety of towns and cities along the Missouri River Valley, including Kansas City, KS, and Lexington, MO. Although moving so often would be hard on a young family, Gordon made the most of the situation because it afforded him plenty of opportunity to explore the rural Missouri River Valley. This early exploration led to his fascination with the natural history and biology that surrounded him.

In his youth, Gordon was an avid bird-watcher who would often take his lunch, climb a tree, and sit for hours waiting for birds to come to him. At other times he would tramp across the floodplains of the Missouri River to observe migrating birds and their feeding habits. During his early years, Gordon not only enjoyed studying and drawing plants and animals, he also began to collect bird eggs and nests, insects, and fossils. At the age of sixteen, Gordon wrote in his journal about an impending move to Lexington, "It is on the Missouri River and there are many limestone bluffs where I trust I can get a number of Carboniferous fossils."

During the summer of 1919, before he attended Central Methodist College (now Central Methodist University) in Fayette, MO, Gordon contacted the Stephens Natural History Museum at the college to see if they would store and share his egg, nest, and bird collection. By this time, Gordon had exchanged part of his egg collection for specimens from other parts of North America and had purchased specimens to supplement his collection. Gordon's attitudes about shooting birds and collecting eggs changed greatly over his lifetime, and he was known to be apologetic about his teenage collecting activities.

At Central Methodist College, Gordon studied biology; and it was here that he met his future wife, Marion, the daughter of Frederick B. Isely, a biology professor who became Gordon's mentor. Isely influenced Gordon in career choices, including the recommendation of Princeton University for graduate study and his choice of grasshoppers as a research focus. One result of that collaboration was a joint paper on determining grasshopper food habits by examining crop contents, which was published in Science by Gordon after Isely's death (Isely and Alexander 1949).

In the fall of 1923, Gordon began a graduate program in biology at Princeton University. Between 1924 and 1926, Gordon continued his studies at Princeton with the support of the Francis Hinton Maule Fellowship, which he received during his first three years there. In September 1926, Gordon and Marion Isely married, and Gordon returned to his alma mater in Missouri, to become an instructor of biology. Marion was also a trained biologist with a master's degree from the University of Missouri.

While at Central Methodist, Gordon continued his research for his doctoral dissertation, "The Significance of Hydrogen Ion Concentration in the Biology of Euglena gracilis Klebs," with the intent of returning to Princeton a couple of years later. In 1928, however, Gordon received a telegram from Princeton asking him if he would be willing to travel to Siam (now Thailand) on a two-year Rockefeller Scholarship to teach biology and
help establish a premedical program at Chulalongkorn University in Bangkok. He agreed, and Gordon and Marion were soon traveling to British Columbia to catch a ship that would take them to southeast Asia.

While in Thailand, Gordon’s natural history observations led him to recognize and write about convergent evolution and the similarities he saw in the fauna of the new and old world. For example, he was captivated by the fact that it was not only the birds that had evolved the ability to fly. He observed “flying fish” in the gulf and “flying squirrels,” “flying foxes,” and “flying lemurs” on his numerous expeditions through the Thai countryside. Although only the flying foxes had developed true flight, all these animals had evolved adaptations similar to those of birds to solve similar problems of locomotion. During the winter and spring months in Thailand, Gordon also collected a variety of birds (woodpeckers, perching birds, cuckoos, and kingfishers), which were either indigenous or regular visitors to Thailand. These specimens are now housed in the University of Colorado Museum of Natural History.

Return to the States

In 1930, Gordon and Marion returned to Princeton, and Gordon completed his Ph.D. research. As Gordon’s fascination with natural history had grown, he was anxious to complete his doctorate thesis on physiology and pursue these other interests. Gordon and Marion remained in Princeton until 1931, when, after obtaining his Ph.D., and following the birth of their daughter Anne, Gordon accepted a faculty position at the University of Colorado in Boulder (Fig. 2).

Upon their arrival in Boulder in 1931, the Alexanders moved into the area around the university known as “The Hill.” Their first home, within walking distance of the school, was a rental property, but during 1937, a year after the birth of their son Douglas, they built their own home, a place that became a gathering site for many of Professor Alexander’s students.

As a new faculty member at the university, Professor Alexander quickly became interested in the effects of altitude on grasshopper biology. His first publication, in 1933, was entitled “Some Relations between Altitude and the Distribution of Acrididae in Colorado.” At this same time, he also developed a strong interest in teaching pedagogy and in 1935, published his first introductory text on biology, An Outline of General Biology. Alexander believed that a strong introduction into general biology was needed by all students of biology, whatever their interests. During these early years at the University of Colorado, Alexander’s publications demonstrated his diverse interests in art, natural history, ornithology, grasshopper biology, physiology, and altitudinal gradients.

The bombing of Pearl Harbor on 7 December 1941 brought the United States into World War II and changed the lives of many Americans. Although life at the university continued, students and professors were drafted to fight for their country while those left behind were expected to keep the country on a steady footing. Dr. Alexander remained at UC during the war, although his duties and responsibilities were much expanded.

During 1944, Dr. Alexander was appointed acting director of the University of Colorado Museum of Natural History. The position was only temporary and was a circumstance of the war: the director, Hugo G. Rodeck, had volunteered to serve in the army and was later killed during fighting in Luxembourg. According to Gordon’s son Douglas, Gordon was unhappy about the condition and pest infestation of the collection specimens and promptly set about fumigating the entire museum.

Following World War II, many foreign students came to the United States to study. These included many Thai students. Marion and Gordon opened their home to the students once more, and their house became a home away from home for many international students. Their home was furnished with furniture and artifacts they had brought back from Thailand, making it a reminder for the Thai students of their far-off homes and families. Marion helped international students and their spouses with conversational English by bringing the students and their families together to cook common meals. Marion and Gordon often entertained students who were unable to go home to their own families during holiday times.

During the 1958–1960 field seasons, Gordon and his colleague, John Hilliard, Jr., led a National Science Foundation (NSF)-sponsored survey project to examine the distribution and phenology of species of Orthoptera along an elevational gradient in the Rocky Mountains of Colorado (Fig. 3). The eastern portion of this transect began in the Front Range near Boulder and extended west over a vertical range of more than 3,000 m (from 1,530 m in the plains to 3,660 m above sea level in the western alpine region). While their main study focused on surveying 14 sites on a near-weekly basis, they surveyed more than 300 independent sites and processed almost 65,000 grasshoppers. By noting the presence of juveniles, they determined which species were residents at a particular site and which were accidentals (species that either flew or were blown into the area) (Fig. 4). This 1958–1960 survey was published in the journal Ecological Monographs (Alexander and Hilliard 1969), which documented the grasshopper species that were present along the elevational gradient.

Photo by D. Van Horn.
and also discussed the phenology and ecology of many of the more common taxa.

In 1966, Dr. Alexander retired from the University of Colorado, although he maintained an active research program. He also retained his strong ties in Thailand, and in 1971 Gordon and Marion visited Thailand for the third and final time. Their first visit in 1928 had been when Gordon was on a Rockefeller Scholarship to teach and work with faculty and students at Chulalongkorn University. Their second trip was in 1956, when Alexander was on a Fulbright Scholarship, and again taught at the University.

On July 31, 1973, Gordon and Marion were tragically killed when the airplane in which they were traveling crashed while landing in Boston. The year of their death had been filled with travel and reunions with old friends, as was typical of Gordon and Marion. Their funeral in Boulder was attended by friends and family who brought masses of garden-grown and wild flowers—a fitting tribute for two people who had loved the outdoors and the natural beauty around them (Fig. 5). In their memory, the Marion and Gordon Alexander Memorial Scholarship Fund was established with the University of Colorado Foundation to fund student research in the biological sciences.

The memorial service in 1973 included the following tribute: "A modest, friendly person, Gordon found time to be a teacher, advisor, administrator, researcher and writer—as well as a husband and father. He is remembered for his earnest interest in his students that caused them to feel free to drop in for encouragement and counsel. He and Marion entertained hosts of students, former students, new faculty, Thai and other foreign students, both in their home and at Kinglet, their cabin. The cabin was often a convenient coffee and donut stop during mountain ecology field trips."

One of Gordon and Marion’s great loves was the Front Range of the Rocky Mountains. They explored it, studied its animal and plant life, knew it intimately, and were concerned about its ecology. Their ashes were scattered above treeline on Mt. Audubon, so in a real sense they became a dynamic part of the seasons and cycles of the life that they loved. Gordon Alexander’s research, with his detailed observations and records, are now providing a foundation for further explorations of mountain ecology into the 21st century.

Environmental Change and the Gordon Alexander Orthoptera Collection

Natural history collections document past biodiversity, including where and when species were found and the morphological and phenological patterns they displayed. Natural history museum collections and their associated data thus provide a vital baseline that can be used to understand how environmental changes, such as changes in climate or land use strategies, affect organisms. By using a comparative approach, these collections can also be used to understand how and why some species are being affected while others appear to show little change. Understanding these effects by using museum information ultimately can inform strategies for preserving species.

In 1958-1960, Dr. Alexander and Alexander Orthoptera Collection at the University of Colorado Museum of Natural History identified, curated, and databased the 24,000 grasshoppers from more than 70 species and almost 700 unique localities that make up the Alexander Collection (http://ghopclimate.colorado.edu/). During the spring and summer of 2006, we began a NSF-funded resurvey project to examine how the grasshopper populations near Boulder surveyed by Alexander might be responding to regional warming. Our preliminary results suggest that grasshoppers are responding to recent warming, and in sites where climate change has been measured, grasshoppers are hatching and becoming adults half a month to a month earlier than they did 50 years ago. This study has also begun to document potential shifts in the distribution of species. By using the original survey information from the Alexander collection in conjunction with current resurveying of sites, we will continue to better understand the effects of recent climatic warming on the phenology, distribution, and life history of grasshoppers in the Rocky Mountains (Fig. 6).

For more information about Gordon Alexander, interviews of past project participants, access to the Alexander Collection data, and information on the current resurvey project, please visit the Gordon Alexander Project Web site: http://ghopclimate.colorado.edu/. In the future, this Web site will also provide regional climate data and grasshopper phe-
Fig. 6. *Dactylotum bicolor* is an example of species that was rarely collected near Boulder, CO, during Alexander’s surveys. The status of a species such as this is of great interest in our recent survey. Photo by D. Van Horn.

nology data. The project’s specimens and associated metadata will be used to create laboratory exercises to introduce students to climate change and its effects on organisms.

Acknowledgments

During the process of sorting, databasing, and curating thousands of specimens from almost 250 sealed Schmidt boxes and reading the field notebooks, we found ourselves inevitably wanting to find out who Gordon Alexander was as a person, teacher, and researcher. We thank his children, Douglas Alexander and Anne Bingham, his previous student and close colleague, John Hilliard, Jr., and his former student and project photographer, Donald Van Horn, for providing us with historically important documents, letters, photos, and discussions that have allowed us to reconstruct the life and contributions of an important entomologist. We thank Donald Van Horn for his permission to use many of his historic photographs. Finally, we also acknowledge the support of the National Science Foundation (awards: 0447315 & 0718112), which made this endeavor and our new resurvey research possible.

References Cited


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Correction: Correction: The Summer 2008 issue’s featured insect was misidentified. The photograph is of a mating pair of Argia enaea, the Fiery-eyed Dancer. We thank the members who alerted us to the misidentification.