INTRODUCTION TO THE CAVES OF THE GUADALUPE MOUNTAINS SYMPOSIUM

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Over 25 years ago, in October of 1971, four young geology graduate students—Harvey DuChene, Carol Hill, Dave Jagnow, and Dwight Deal—sat on the floor of the Mystery Room in Carlsbad Cavern, chatting and wondering about the many puzzling features in this most enigmatic of caves. "Fingertips can be pushed ¼ - ¾" into the wall rock," wrote Jagnow into Hill's notebook. "Random thoughts on inadequate data," began Deal's rambling discourse. "Darndest things I ever saw," was DuChene's first remark on encountering some strange-looking krinkled wall blisters, followed by his thoughts on how these cornflake-like speleothems might have formed. Harv ended his comments with the entry: 'Wild idea for today!'

As these remarks show, we didn't have a clue as to what was going on—as to how the cave itself had formed; why the bedrock was so corroded and "punky"; why there was a "popcorn line" in certain sections of the cave; why large blocks of gypsum existed on the floor of the cave; what the bluish waxy clay deposits in the cave signified; and what the presence of the calcite spar meant and why it was so highly corroded, even down to a linoleum-like pattern over rock surfaces. We didn't know it then, but this trip heralded the beginning of a remarkable 25+ year "journey" that would later be referred to by cavers as the "golden age of speleology in the Guads." The ideas developed in the Guadalupe Mountains during this time span would change the course of speleology, and would also help bring it into the position of a "respectable" science, rather than an amateur effort by a "bunch of grubby cavers." Now, after almost 30 years and at the beginning of the 21st Century, it seems most appropriate that these ideas should be consolidated into a single work. The result is this Caves of the Guadalupe Mountains Symposium issue.

The Guadalupe Mountains are located in southeastern New Mexico and west Texas, USA, in the Pecos River section of the Great Plains physiographic province (Fig. 1). The mountains are about 110 km long and 25 km wide. They start as low hills near Carlsbad, New Mexico, and increase in prominence southwestward to Guadalupe Peak, the highest point in Texas (2667 msl). Here, on their west face, perpendicular cliffs stand in relief above the Salt Flats below. Along the length of the mountains, Capitan reef rock is exposed and cut by major canyons.

The Guadalupe Mountains are situated at the northern margin of the Chihuahuan Desert. The climate of the region is semiarid to arid, with an average winter temperature of 7°C, an average summer temperature of 27°C, and annual precipitation averaging between about 20-40 cm in the lower elevations and 50 cm in the higher elevations. More than half of the annual rainfall occurs during the summer months of July, August, and September. Vegetation includes cacti, succulents, and desert shrubs in the lower elevations, with transitional to montane coniferous forest on the ridge tops.

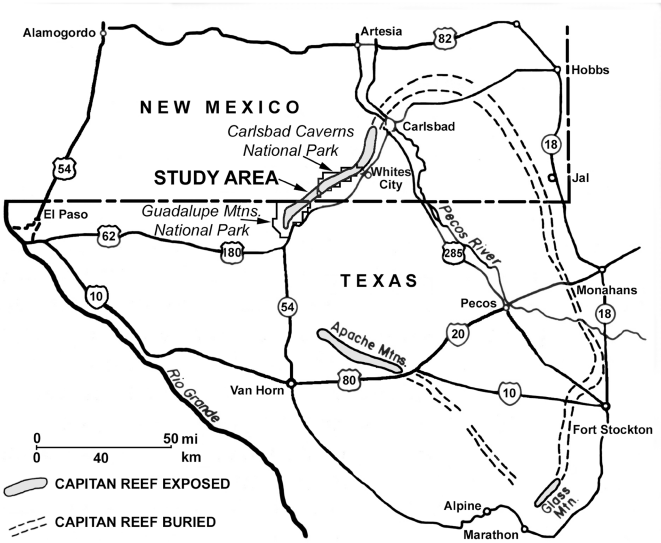

Figure 1. Location map of study area–the Guadalupe Mountains of southeastern New Mexico and west Texas.

The caves in the Guadalupe Mountains are developed within the Capitan Reef Complex, which includes the backreef, reef, and forereef facies of the Permian Capitan Formation. Cave development has been episodic since the Late Permian, but large horizontal cave passages date from about 12 Ma to the present.

Guadalupe caves have an unusual mode of speleogenesis – one involving sulfuric acid and the degassing of hydrogen sulfide from the hydrocarbon-rich Delaware Basin. This concept of basinal degassing relates to more than just the formation of unusual caves. It is also a key factor in understanding the migration of hydrocarbons, the formation of petroleum reservoirs, the deposition of uranium ore, and the origin of Mississippi Valley type (MVT) lead-zinc deposits. Thus, the sulfuric acid speleogenesis of Guadalupe caves, as discussed in this Symposium, is paramount to understanding a number of geologic processes that have heretofore remained enigmatic.