green leaves, berries, moss, and a dried Scarlet Oak leaf (*Quercus coccinea*). On 21 May 2008, we noted evidence of ophiophagy in two adult female Wood Turtles from Berkeley County. At 1335 h, an adult female Wood Turtle (mass = 1050.0 g; carapace length = 189.59 mm) defecated a 27.2 x 19.7 mm section of intact, previously shed snake skin. The skin section was undigested, clearly a shed specimen, and appeared to be from a gartersnake (*Thamnophis* sp.). At 1501 h, another adult female (mass = 986.0 g; carapace length = 181.75 mm) defecated a 62.4 x 11.1 mm section of partially digested Ring-necked Snake (*Diadophis punctatus*) while cloacal temperature was being recorded. This specimen had intact skin and muscle, and several vertebrae and ribs emerging from one end. Snake material, including exuviae, has not been reported as a food item for *G. insculpta*.

Thamnophis and *Diadophis punctatus* are both abundant in Berkeley County, although all *D. punctatus* we observed were found well hidden under rocks and logs during daylight hours, when Wood Turtles typically forage. *Diadophis punctatus* is nocturnal, but may be active diurnally during the breeding season (Ernst and Ernst 2003. Snakes of the United States and Canada. Smithsonian Institution Press, Washington D.C. 668 pp.). We have no evidence to suggest whether the *D. punctatus* specimen was taken as carrion or predated. The worm-like appearance of *D. punctatus* might have elicited predation by *G. inscuplta*, or the snake might have been taken as carrion, possibly as the remnant of another predator's meal. Although a wide variety of vertebrates have been reported to prey on *D. punctatus*, the only reptile predators recorded are squamates (Ernst and Ernst 2003, *op. cit.*).

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GOPHERUS AGASSIZII (Desert Tortoise). **BURROW ASSOCIATE**. Desert Tortoises are semi-fossorial and construct burrows that are a unique environment that provides shelter from the extreme heat and are generally more humid, both features which aid in reducing water loss (Bulova 2002. J.Therm. Biol. 27:175–789; Zimmerman et al. 1994. Herpetol. Monogr. 8:45–59). It would be expected that numerous other species would make use of this structure; however, in a review of burrow associates, Luckenbach (1982. *In* Bury [ed.], North American Tortoises: Conservation and Ecology, pp. 1–38. Wildl. Res. Report 12, U.S. Fish and Wildlife Service, Washington, D.C.) lists only 31 species observed in Desert Tortoise burrows. From this list we can conclude that virtually all desert vertebrates will use or modify a Desert Tortoise burrow for shelter, while only a few arthropods have been noted. This is rather surprising as more than 350 animals have been observed using burrows of the Gopher Tortoise (*Gopherus polyphemus*), with roughly 300 of these being invertebrates (Jackson and Milstrey 1989. *In* Diemer et al. [eds.], Gopher Tortoise Relocation Symposium Proceedings, pp. 86–98. State of Florida Game and Fresh Water Fish Commission Nongame Wildlife Program Technical Report No. 5). It is likely that part of this large discrepancy between the two species of tortoises' burrow associate fauna is based on the fact that the southwestern deserts of the United States are less diverse than the southeast, where the Gopher Tortoise is found. However, we believe that more invertebrates should be making use of Desert Tortoise burrows, despite the conclusions of Grant (1936. Zoologica 21:225–229) that burrow associates of the Desert Tortoise are not important.

On 13 November 2007 at 1200 h at a study site in the west Mojave Desert northeast of Barstow, San Bernardino County, California (Walde et al. 2007. West. N. Am. Nat. 67:147–149) we observed a tarantula (Araneae, Mygalomorphae, Theraphosidae) in a Desert Tortoise burrow. The tarantula was brown with a carapace of ca. 25 mm and was considered to be a male because of the relatively small abdomen. There are two species of tarantula in this area, *Aphonopelma mojave* and *A. iodius* (Prentice 1997. J. Arachnol. 25:137–176). These two species are easily distinguished as *A. mojave* is black and small, while *A. iodius* is larger and has a light to medium brown carapace with variably colored legs from medium to dark brown, to black (Prentice, *op. cit.*). Therefore, we can conclude that the tarantula observed in the burrow was *A. iodius*. These species are both fall breeders, a time when males go in search of females (Prentice, *op. cit.*), therefore it is likely that this *A. iodius* took refuge in the burrow during its mate searching, although it may have been looking for food. The burrow was an overwintering burrow for an adult female Desert Tortoise.

Previously, an unknown species of tarantula was documented in a Desert Tortoise burrow during a study in Nevada (Burge 1978. *In* Trotter [ed.], Desert Tortoise Council Proceedings of 1978 Symposium. pp. 80–111). To our knowledge, the only other spider documented in Desert Tortoise burrows is the Black-widow Spider (*Lactrodectus mactans*) which has been observed in California and Nevada (Burge, *op.cit.*; Luckenbach, *op. cit.*). The presence of these highly effective predators in the burrows of Desert Tortoises suggests that additional species of invertebrates are likely utilizing the burrows as well.

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GOPHERUS AGASSIZII (Desert Tortoise). **PREDATION BY MOUNTAIN LION**. During a long-term study on tortoise growth within three fenced 9-ha enclosures in Rock Valley, Nevada Test Site (NTS), Nye County, Nevada, USA, tortoises have been captured annually since 1964 (Medica et al. 1975. Copeia 1975:630–643; Turner et al. 1987. Copeia 1987:974–979). Between early August and mid October 2003 we observed a significant mortality event. The Rock Valley enclosures were constructed of 6 x 6 mm mesh 1.2 m wide hardware cloth, buried 0.3 m in the soil with deflective flashing on both sides on the top to restrict the movement of small mammals and lizards from entering or leaving the enclosures (Rundel and Gibson 1996. Ecological Communities and Process in a Mojave Desert Ecosystem: Rock Valley, Nevada, Cambridge University Press, Great Britain. 369 pp.).

On 6 August 2003, the carcass of an adult female Desert Tortoise #1411 (carapace length 234 mm when alive) was collected while adult male tortoise #4414 (carapace length 269 mm) was observed alive and in good health on the same day. Subsequently, the carcass of #4414 was found on 16 October 2003. Between 16–17 October 2003, the remains of six (five adult and one juvenile) Desert Tortoises were found, some within each of the three enclosures in Rock Valley. A seventh adult tortoise was found on 26 September 2006, its death also attributed to the 2003 mortality event based upon the forensic evidence. Each of the seven adult Desert Tortoises had the central portion of their carapace broken open approximately to the dorsal portion of the marginal scutes while the plastron was still intact (Fig. 1A). Adjacent to seven of the eight remains, we located numerous bone fragments including parts of the carapace and limbs as well as dried intestinal content in nearby Range Rhatany (*Krameria parvifolia*) shrubs (Fig. 1B). The significance of the frequent use of this shrub is puzzling. Three of the Desert Tortoise shell remains possessed distinctive intercanine punctures measuring 55–60 mm center to center indicating that this was an adult sized Mountain Lion (*Puma concolor*). By comparison, a two-year old male Mountain Lion salvaged on NTS had an upper intercanine bite width of 45 mm, and a six-month old kitten measured 35 mm, respectively. The Mountain Lion is the only predator that exists in southern Nevada that could possibly have a bite with such a large gap between its upper canine teeth (Murmann et al. 2006. J. Forensic Sci. 51:846–860).

The appearance of the shell remains in Fig. 1A is similar to that depicting Jaguar (*Panthera onca*) predation on the Amazonian Red-footed Tortoise (*Geochelone denticulata*) as illustrated by Emmons (1989. J. Herpetol. 23:311–314), with the majority of the carapace broken open and the plastron still intact. Predation of Desert Tortoises by Mountain Lions was also documented in 1993 in southern Arizona (Little Shipp Wash Plot), where seven of eight carcasses found were attributed to Mountain Lion predation (Averill-Murray et al. 2002. *In* T. R.Van Devender [ed.], The Sonoran Desert Tortoise: Natural History, Biology, and Conservation, pp. 109–134. University of Arizona Press and Arizona-Sonora Desert Museum, Tucson, Arizona). Similarly, predation by a Mountain Lion has been reported on the Argentine Tortoise (*Chelonoidis chilensis*) in Argentina (Acosta et al. 2004. Herpetol. Rev. 35:53–54), and a Mountain Lion kitten was observed to kill and consume a portion of the carapace of a Texas Tortoise (*Gopherus berlandieri*) in west Texas (Adams et al. 2006. Southwest. Nat. 51:581–582).

Over the past 45 years this Desert Tortoise population has been monitored yearly, with no prior evidence of predation to tortoises within the fenced enclosures. On several occasions other predators such as Bobcats (*Lynx rufus*) have been observed within the study enclosures for as long as a week. Evidence of Kit Fox (*Vulpes macrotus*) sign has been observed on numerous occasions, and a Spotted Skunk (*Spilogale putorius*) and Longtail Weasels (*Mustela frenata*) have been captured and released (Medica 1990. Great Basin Nat. 50:83–84; B. G. Maza, pers. comm.), while Coyotes (*Canis latrans*) were never observed within the fenced enclosures. Prior to this predation event in Rock Valley, 17 Desert Tortoises were alive between 2000 and 2002, only 7 were known to be alive in 2004, while 2 tortoises have not been seen since 2002. Predation studies of Mountain Lions indicate that these events may be an example of a learned behavior of individual animals developing

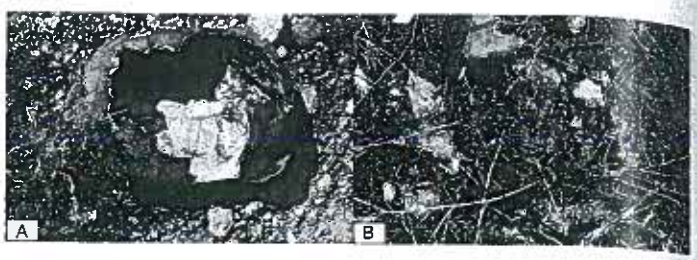

FIG. 1. A) Shell remains of an adult female Desert Tortoise (#1411) characteristic of Mountain Lion predation. B) Pieces of Desert Tortoise carapace and remnants of intestinal content found in a *Krameria parvifolia* shrub.

a preference for a prey (Logan and Sweanor 2001. Desert Puma: Evolutionary Ecology and Conservation of an Enduring Carnivore. Hornocker Wildlife Institute, Island Press, Washington. 463 pp.; Creeden and Graham 1997. Desert Bighorn Council Transactions, pp. 37–43), or the plight of a large predator locating an available source of food while passing through low elevation Mojave Desert habitat in late summer or early fall. Several Mountain Lion sightings were recently recorded in late summer and early spring (5 and 26 July 2006; 15 March 2007) at lower elevations (1300 m) in *Larrea/Ambrosia* habitat on the NTS, 8–10 km NE of Rock Valley in canyons near the base of Skull Mountain. Predation upon Desert Tortoises and their nests is also perpetrated by smaller carnivores, e.g., Coyotes, Kit Foxes, and Badgers (Grover and DeFalco 1995. Desert Tortoise (*Gopherus agassizii*): Status-of-knowledge Outline with References. U.S. Department of Agriculture, Forest Service Report INT-GTR-316, pp.76–79). Predation by these smaller carnivores generally leaves the carapace intact and the head and legs are gnawed off, sometimes leaving the upper portions of the appendages still connected to the carcass. The carcass of an adult male tortoise #1212 (carapace length 289 mm when last captured alive) was found in this condition on 15 October 2004. Such predation events upon alternate prey such as the Desert Tortoises appear to take place toward the end of the summer season and coincide with a combination of drought years and the reduced density of typical prey such as small mammals. Localized predation events by a large predator such as Mountain Lions can have a significant impact upon on a small population of prey, e.g., the reduction of the population of bighorn sheep in the Granite Mountains during drought 1989–1991 (Wehausen 1996. Wildl. Soc. Bull. 24:471–479). The Mountain Lion predation event that took place in Rock Valley during 2003 was likely a chance happening but has had a profound impact upon the local population. The presence of Bighorn Sheep (*Ovis canadensis*) in the adjacent Specter Range since their introduction in the fall of 1990 may have influenced the distribution of Mountain Lions.

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GOPHERUS POLYPHEMUS (Gopher Tortoise). **EMERGENCE BEHAVIOR**. Female Gopher Tortoises often place their nests in a mound of soil or bare area (referred to as the "apron") located immediately in front of their burrows (studies reviewed in Mushinsky et al. 2006. *In* Meylan [ed.], Biology and Conservation of Florida Turtles, pp. 350–375. Chelonian Research Foundation, Lunenburg, Massachusetts). However, observations of nest emergence and subsequent behavior of hatchling Gopher Tortoises are few. To our knowledge, Ashton and Ashton (2008. The Natural History and Management of the Gopher Tortoise. Krieger Publishing Company, Malabar, Florida) provide the only account of a hatchling Gopher Tortoise entering an active adult burrow immediately following nest emergence. We observed a hatchling Gopher Tortoise emerge from a nest located on a female tortoise burrow apron while an adult male courted the resident female and document the hatchling's emergence, the male's response, and the hatchling's post-emergence use of the active adult burrow.

We made our observation using an automated video system focused on an adult female burrow at the Camp Shelby Joint Forces Training Center in southern Mississippi, USA. On 26 August 2006 at 1229 h (CST; overcast skies; ambient air temperature [T_a] = 30°C), an adult male was on a burrow apron courting an adult female that was inside her burrow as a hatchling Gopher Tortoise emerged from its nest, located about ~10 cm in front of the male. The female, which entered her burrow earlier, did not emerge while the hatchling was present. The male head bobbed intermittently before, during, and after the emergence event. Although he was directly facing the hatchling and head bobbing in its direction, he was probably directing this behavior toward the female's burrow, which was also in front of him. The male extended his head toward the hatchling three times. All but the third head extension could easily have been part of the courtship ritual, but the third appeared to be clearly in response to the hatchling as the male extended his head far forward and touched the small turtle with its nose for several seconds. To our knowledge, this is the first report of an adult Gopher Tortoise responding to the presence of a hatchling. We did not identify any other unambiguous response by the adult toward the hatchling. The hatchling moved toward the male, and the male also moved slightly toward it (and the female burrow) until the hatchling was just in front of the male's gular and left forelimb. The two tortoises appeared to repeatedly make random contact before the hatchling walked away.

The male then proceeded toward the burrow, inadvertently pushing the hatchling that was still in his path with his forelimb and shell as he walked by. The hatchling, now behind the male, followed. The male continued to head bob toward the female's burrow and disappeared into the burrow at 1241 h. The hatchling appeared to enter the burrow at 1242 h, but it is unknown if it completely entered the burrow because the camera was positioned slightly behind the burrow entrance. The hatchling intermittently appeared in the burrow entrance until 1246 h, when it was no longer visible. A short while later, a small tortoise, possibly the same hatchling, emerged from the burrow entrance before going back inside. At 1255 h, shortly after it started to rain, the male emerged from the burrow and left the apron and the video-taped area. At 1305 h (T_a = 27°C), while it was still raining, a small tortoise (possibly the same hatchling) emerged from the burrow entrance. After beginning to leave the apron, it turned around and somehow, perhaps due to the slope of the terrain, overturned onto its carapace. Thirty seconds later, the hatchling righted itself, left the apron, and went into some dense vegetation before going out of view for the final time at 1329 h. Neither the male nor the hatchling returned to the burrow later that day before the video system stopped recording at 2030 h.

Ashton and Ashton (*op. cit.*) report an event in which a hatchling entered an active adult burrow immediately upon emerging from its nest. It is unknown whether a hatchling that is at the surface can determine whether a burrow contains an adult tortoise. Our observation of a hatchling following an adult tortoise into a burrow entrance is notable because it provides unambiguous evidence that upon emergence, some hatchlings use adult burrow entrances (and probably deeper portions of burrows also) regardless of activity status or adult presence at the burrow mouth. Adult Gopher Tortoise burrows may provide newly-emerged hatchlings with a convenient, temporary refuge from hot and dry surface conditions from which they can leave to construct their own burrows when conditions are favorable for extended above ground activity.

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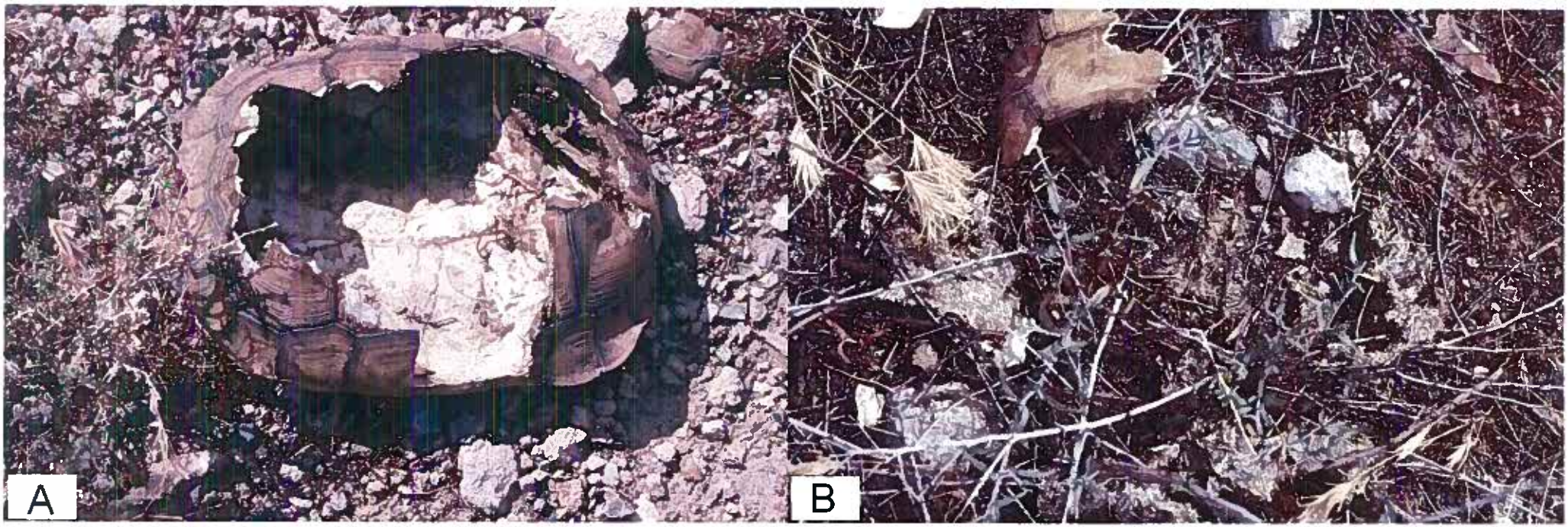
GOPHERUS POLYPHEMUS (Gopher Tortoise). **NESTING.** *Gopherus polyphemus* is endemic to the Longleaf Pine ecosystems of the Gulf Coastal Plain of the southeastern USA. Oviposition in this species usually occurs between May and early July when eggs are deposited in a nest cavity usually located on the apron of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