spent in communal hibernacula. The observations reported here were made at one such hibernaculum: a south-facing outcrop of fissured basalt surrounded by dry, alkaline playas and sandy dunes dominated by sagebrush (Artemisia tridentata) and greasewood (Sarcobatus vermiculatus).

At 1540 h on 7 May 2013 (overcast, light breeze, air temp 24.4°C), I observed a pair of C. o. lutosus (male ca. 780 mm SVL; female ca. 650 mm SVL) mating atop an outcrop of fissured basalt, 3.7 m above the ground. When first observed, the snakes’ tails were intertwined, and the male was laying alongside the female, rubbing his chin along her dorsal surface via a series of short head thrusts. After a few minutes of this, insertion was effected, and the pair raised their tails in the air (Fig. 1). Following insertion, the male alternated periods of chin-rubbing and crawling in various directions (often away from the female) with periods of inactivity. This continued until just after 1600 h, when the pair separated, and the female slowly crawled off. During the entire process, a third adult snake (sex unknown) was coiled next to the mating pair; it remained essentially immobile during the entire process, despite the fact that the male crawled over it repeatedly. The surface of the rock on which the C.o. lutosus were mating was 27.2°C.

At 1400 h on 30 April 2014 (clear, light breeze, air temp 23.9°C), I observed a second pair of C. o. lutosus (male ca. 650 mm SVL; female ca. 600 mm SVL) mating, at the same den as the first. When first observed, these snakes were also atop fissured basalt, 3.7 m above the ground, and < 1 m from a group of five other adult C. o. lutosus. As I watched, the male repeatedly crawled over the female, energetically rubbing her with his chin in the same manner as the male of the first pair observed. He repeatedly wrapped his tail around hers in an attempt to achieve insertion. When copulation finally began, the male alternated bouts of slow crawling (often facing away from the female) with periods of quiescence, as described above. The pair remained engaged for > 30 min, at which point I left them. When I returned at 1730 h, they had disengaged and moved to separate locations among the rocks.

One of the most significant aspects of these observations is their timing (i.e., spring), as existing accounts are contradictory. Crotalus o. lutosus are frequently reported to mate during summer (July and August), a statement based largely on examination of reproductive organs and studies of other subspecies of C. oreganus (Glaudas et al. 2009. J. Arid Environ. 73:719–725; Ernst and Ernst 2012. Venomous Reptiles of the United States, Canada, and Northern Mexico, Vol. II: Crotalus. Johns Hopkins University Press, Baltimore Maryland. 391 pp.). For example, based on examination of the kidneys and gonads of preserved snakes, Glaudas et al. (op. cit.) suggest that C. o. lutosus “mates only in summer.” However, Klauber (in Wright and Wright 1957. Handbook of Snakes of the United States and Canada. Cornell University Press, Ithaca, New York. 1105 pp.) states that C. o. lutosus “mate in the spring and young are born alive in the fall.” Nussbaum et al. (1983. Amphibians and Reptiles of the Pacific Northwest. University of Idaho Press, Moscow, Idaho. 332 pp.) state that C. o. lutosus “emerge from the dens in late April and mate during May. During the mating season, males may be seen in combat near the dens.” In addition, various accounts of mating in other subspecies of C. oreganus (mostly C. o. oreganus) indicate that the activity may take place in either late summer or spring, and that variation in timing between populations and regions exists (Wright and Wright, op. cit.; Klauber 1956. Rattlesnakes: Their Habits, Life Histories, and Influence on Mankind. University of California Press, Berkeley, California. 1476 pp.; Ernst and Ernst, op. cit.).

With respect to these accounts, I note that the observations reported here were made at the extreme northern limit of the species’ range, where winters are severe and the active season of the snakes is short. Furthermore, I observed other reproductive behaviors in this population (e.g., male combat, pursuit of females, and courtship) during late summer (August), consistent with the completion of vitellogenesis in late summer (Wright and Wright, op. cit., Glaudas et al., op. cit.). The timing of these behaviors suggest that snakes in this population begin mating in late summer (following vitellogenesis), and that the spring mating described here is an artifact of the onset of cold temperatures, which forces snakes into hibernacula before all females have mated. Such a pattern matches that observed by Klauber (op. cit.) and thoroughly described by Aldridge and Duvall (2002. Herpetol. Monogr. 16:1–25), the latter of whom considered it a modification to the tropical pattern of vitellogenesis and mating in response to seasonal interruption by cold temperatures.

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CROTAULUS VIRIDIS (Prairie Rattlesnake). DIET. On 19 July 2017 at 0130 h, we observed an adult Crotalus viridis (total length ca. 68 cm) on Texas Hwy 54 just south of its junction with US Hwy 62/180 (approx. 31.7969°N, 104.8496°W, WGS 84; 1275 m elev.), Culberson County, Texas, USA. The snake’s head was nearly touching a freshly envenomated small adult Scaphiopus couchii (Couch’s Spadefoot). It appeared as though the snake was about to ingest the anuran, but it retreated a short distance upon our approach (Fig. 1). Based on our review of relevant literature (Degenhart et al. 1996. Amphibians and Reptiles of New Mexico. University of New Mexico Press, Albuquerque. 431 pp.; H ma r s o n 1999. Amphibians and Reptiles in Colorado: A Colorado Field Guide, 2nd ed. University Press of Colorado and Colorado Division of Wildlife, Niwot, Colorado. 484 pp.; Weder and Dixon 2000. Texas Snakes: Identification, Distribution, and Natural History. University of Texas Press, Austin. 437 pp.; Ernst and Ernst 2003. Snakes of the United States and Canada. Smithsonian Books, Washington, D.C. 668 pp.; Morey 2005. In M. J. Lannoo Fig. 1. Adult Crotalus viridis and recently envenomated Scaphiopus couchii, Culberson County, Texas, USA.
CRYPTELYTROPS ALBOLABRIS (White-lipped Viper). BEHAVIOR. Studies of terrestrial vipers have observed direct and indirect responses to fire (Smith et al. 2001. Southwest. Nat. 46:54–61). We present the first in-depth, direct behavioral response of an arboreal pit viper species to fire. This viper, a gravid female Cryptelytrops albolabris (CRAL013) located in the buffer zone of the Sakaerat Biosphere Reserve, Thailand (14.51382°N, 101.95125°E, WGS 84; 249 m elev.), was radio-tracked (Holohil 1.8 g BD-2THX temperature sensitive transmitter) regularly once during the day and once at night from 1 October 2015 to 13 March 2016. On 9 February 2016 at 1916 h, a fire was observed being tended to by local villagers within 20 m of the snake, which was sheltered within a log ca. 0.5 m above the ground (Fig. 1). It had moved to this location on 24 January 2016 after rain (< 12 h), the previous site being 15.6 m to the northwest.

Progress of the fire was checked at 1950 h after the standard radiotelemetry study datapoint at 1916 h, when local people were no longer attending to the fire. The fire was ca. 16 m north of the viper, moving in a disjointed line through the forest. The fire began to pick up and could be felt near the viper (< 10 m) at 1952 h. At 1955 h the fire was 12 m to the north of the viper, and less intense. Another fire front was observed 30 m to the west. At 2012 h fire began to encroach from the northeast. By 2018 h the fire was 3.5 m away to the west, and by 2202 h 1 m away from the north and the east. The fire on the east side died down at 2030 h when it reached a streambed, 30 cm from the shelter. However, the fire from the north passed directly under the log the snake was sheltering in at 2039 h. The flames were small and did not set the log ablaze. By 2047 h the fire had mostly passed, but much smoke was present at the shelter site. At 2053 h leaves were smoldering in the streambed to the east of the log. The viper was still within the shelter at 2058 h. By 2106 h fire patches were still present within 6–7 m of the shelter, but most of the main fire line had moved beyond 15 m. Checks at 2118, 2120, 2123, and 2152 h suggested that the viper was still in the shelter. The fire was 100 m away from the location at 2212 h. To summarize, the log was left unattended during the duration of the event (from 1950 to 2212 h), despite changes in intensity and proximity of the fire. Effects of the fire can be seen in Fig. 1. Internal body temperature of the snake was 25.5°C at the start of the observation, 27.5°C at the start of the observation (taken at 5 intervals; 123, 136, 204, 207, and 236 minutes) into the observation, and 25.5°C at the conclusion (296 minutes after observation start).

The viper remained relatively stationary from 24 January to 28 February 2016, moving less than 2.5 m along the log. A Bushnell™ trail camera (Model X-8) was set at 1-min intervals to observe the log once observers left on 9 February: CRAL013 was not observed leaving the shelter at any point during that night or the following morning. Interestingly, the results of a second, smaller, burn near the same viper were observed on 8 March. We did not directly observe the second fire event, but the ground was freshly scorched on our 8 March daily check. The viper had moved less than 2.5 m between the night check (2037 h) on 7 March and the morning check (1412 h) on 8 March, and was located underground in a termite mound. The earliest date after the second fire event was 9 March. We did not directly observe the second fire event, but the ground was freshly scorched on our 8 March daily check. The viper had moved less than 2.5 m between the night check (2037 h) on 7 March and the afternoon check (1612 h) on 8 March, and was located underground in a termite mound. The earliest date after the first fire TRAL013 was observed was 14 February (Fig. 2), and 13 March was the earliest date after the second fire; she did not appear to have sustained injuries after either fire event.

Previous work has primarily looked at large-scale (population level) responses of snakes to fire. More study is required to understand the behavioral mechanisms that individual snakes exhibit in response to fire (Withgott and Amlaner 1996. Herpetol. Rev. 27:145–146). Interestingly, the viper in our observation sought shelter rather than fleeing or climbing vertically, a response similar to that of many terrestrial viper species (Durban 2006. Amer. Midl. Nat. 155:329–334; Smith et al., op. cit.). Further study is required to better characterize the behavioral responses of slow moving and presumably arboreal snakes such as C. albolabris.

Fig. 1. Post-fire surrounding habitat of CRAL013 from 9 February illustrating the fallen tree (circled in red) used as a shelter site.

Fig. 2. Tracked female Cryptelytrops albolabris (CRAL013) ambushing on 14 February adjacent to the log she sheltered in during the fire of 9 February.