It appears that the high *E. obsoletus* abundance on sites 1 and 2 is attributable to several aspects of the altered environment at Elephant Butte Lake Resort. The elevated moisture regime created by watering and natural drainage should be beneficial to this mesically adapted species. Whitford and Creusere (1977) witnessed a local range extension in a population of *E. obsoletus* from more mesic mountain slopes to lower playa grassland and yucca-mesquite habitats. They attributed this expansion to above average rainfall causing increased primary productivity, resulting in increased insect productivity. If increased food availability is positively correlated with lizard population dynamics (as suggested by Whitford and Creusere, 1977), the artificial change in moisture regime at Elephant Butte Lake Resort may have boosted the site's carrying capacity for *E. obsoletus.* The species was verified in nearby Ash Canyon which is a potential source for migration into the resort area.

Fitch (1955), in describing detailed microhabitat requirements for the species in Kansas, noted dense ground vegetation, moist soils, and flat rocks as being of primary importance. Although we can not assume that moisture and thermal requirements are the same for populations in arid regions, habitat descriptions from southwestern localities where *E. obsoletus* occurs frequently mention riparian vegetation and large rock structures (Jameson and Flury, Texas J. Sci. 1:54-77, 1949; Fouquette and Lindsay, Texas J. Sci. 7:402-421, 1955; Axtell, 1959; Gehlbach, Proc. U.S. Nat. Mus. 116:243-332, 1965). The stone support structure appears to be the most significant habitat feature in explaining the relatively high abundance of *E. obsoletus* at site 2 (Table 1). If, as Pianka (Ecology 47:1055-1059, 1966) has theorized, *Eumeces* actively forages over large areas, the extensive structural cover would provide security from predation while foraging, and increase cover for nesting and resting periods.

Total lizard species richness was low (Table 1) compared to studies of Whitford and Creusere (1977), Lewis (1950), and others in natural Chihuahuan Desert habitats. Even though the species list (Table 1) may not be complete due to the short sampling period, the low richness probably resulted from the disturbed nature of the study area and a paucity of locally occurring species adapted to use the expanded structural niches and food resources.

The creation of the Elephant Butte Lake Resort area has altered the natural structure of the lizard community found in the adjacent Chichuahuan Desert to one that appears to be less diverse. However, this area does provide habitat conditions which support larger numbers of *E. obsoletus* than the surrounding desert.

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BIOCHEMICAL IDENTIFICATION OF RED-LEGGED FROGS, *RANA AURORA DRAYTONI* (RANIDAE) AT DUCKWATER, NEVADA.—A substantial population of frogs exists at the isolated, warm water springs of Duckwater, a Shoshone Indian reservation in the Railroad Valley of Nye Co., Nevada. The main spring has a large flow of water of around 32°C and pH 8.0 at its cource (Brues, Proc. Amer. Acad. Arts Sci. 67:185-303, 1932). The springs flow into numerous channels and ditches, including Duckwater Creek, and feed patches of marshland. The frogs that inhabit the streams and marshes of this area are isolated by considerable distances from other populations of similar frogs, either *Rana aurora* or *R. pretiosa.* Stebbins (A field guide to western reptiles and amphibians, Houghton-Mifflin Co., Boston, 1966) included this population of frogs in his treatment of *R. aurora*, but suggested (pers. comm.) that their taxonomic status be investigated further. Although the Duckwater frogs are similar to *R. aurora*, the ventral coloration resembles somewhat that of *R. pretiosa*, and it has been suggested (F. R. Kay, pers. comm.) that these frogs may in fact be *R. pretiosa*, hybrids, or even a new species. Cited as *Rana* sp., these frogs are currently listed as potentially threatened or endangered by the U.S. Fish and Wildlife Service (Potter, Federal Register 47:58454-58460, 1982). In order to verify the identity of these frogs, I obtained specimens from Duckwater to compare with specimens of *R. aurora.* Preliminary chromosomal study indicated karyotypic differences from *R. pretiosa* but no difference from *R. aurora* (D. M. Green, unpublished). The results of subsequent electrophoretic investigation indicated that the frogs are probably an introduced population of the southern subspecies, *R. aurora draytonii.*

TABLE 1.—*Allele frequencies at polymorphic loci of samples of red-legged frogs from Mendocino Co., California* (Rana a. aurora), *Contra Costa Co., California* (R. a. draytoni) *and Duckwater, Nye Co., Nevada.*

		sample		
locus	allele	Mendocino	Contra Costa	Duckwater
Acon-1	A	—	0.900	0.833
	B	1.000	0.100	0.167
Acon-2	B	—	—	0.167
	C	1.000	1.000	0.500
	D	—	—	0.333
Est-3	A	—	0.200	—
	B	0.313	0.233	1.000
	C	0.563	0.433	—
	D	0.125	0.133	—
Est-4	B	0.375	—	—
	C	0.625	1.000	1.000
GOT-1	B	0.250	1.000	1.000
	D	0.750	—	—
GOT-2	C	0.937	0.633	0.333
	D	0.063	0.367	0.667
GP-2	B	—	0.067	—
	C	1.000	0.933	1.000
a-GPDH	B	0.063	0.100	—
	C	0.937	0.900	1.000
LDH-1	C	1.000	0.867	0.833
	D	—	0.133	0.167
MDH-1	B	0.875	1.000	1.000
	C	0.125	—	—
MPI	C	—	0.033	0.833
	D	1.000	0.967	0.167
PGI	A	—	0.033	—
	B	1.000	0.967	1.000
SDH	D	0.125	0.467	0.667
	E	0.875	0.533	0.333

Six frogs for electrophoretic study were collected from Duckwater on August 13, 1983. These frogs were compared with eight frogs from Mendocino Co., California (*R. a. aurora*) and fifteen frogs from Contra Costa Co., California (*R. a. draytoni*). All specimens have been deposited in the Museum of Vertebrate Zoology, Univ. California, Berkeley. Horizontal starch gel electrophoresis, using samples of heart, liver, spleen, kidney and body-wall musculature followed methods described by Selander et al. (Stud. Genet. 6:49-90, 1971) and Shaw and Prasad (Biochem. Genet. 4:297-320, 1970).

Of thirty presumptive gene loci examined, none featured fixed alternative alleles which could serve to completely distinguish any of the three samples of frogs (Table 1). Seventeen of the loci were monomorphic. However, the relative frequencies of alleles could serve in some cases, as with GOT-1, to distinguish populations of the two subspecies, *R. a. aurora* and *R. a. draytonii*. In these cases, the frogs from Duckwater usually had relative frequencies of alleles with values more similar to *R. a. draytonii* than to *R. a. aurora*. At only three loci (Acon-2, Est-3 and MPI) were allele frequencies of the Duckwater frogs noticeably different from either subspecies. Alleles apparently unique to the Duckwater population were present only at Acon-2, but not in high frequencies. No frogs exhibited the alleles characteristic of the similar species *R. pretiosa* or *R. cascadae* at such loci as IDH-1 (Case, Syst. Zool. 27:299-311, 1978).

Genetic distances (Nei, Amer. Nat. 106:283-292, 1972; Nei, Genetics 89:583-590, 1978; Rogers, Univ. Texas Publ. 7213:145-154, 1972) were computed using allele frequency data of all thirty loci. *Rana a. aurora* was found to be a Nei distance, *D*, of 0.063 from *R. a. draytonii* (Rogers D = 0.109) and 0.126 (0.179) from the frogs from Duckwater. The *R. a. draytonii*, however, were a Nei D of only 0.046 (Rogers D = 0.090) from the Duckwater frogs. All of these genetic distances are well within the range expected for conspecifics. Average heterozygosity estimates, $\bar{\underline{H}}$, were 0.074 for *R. a. aurora* and 0.085 for both *R. a. draytonii* and the Duckwater frogs.

It is concluded from the foregoing electrophoretic data that the frogs found at Duckwater are not significantly different, genetically, from *R. aurora*, and more specifically, from *R. a. draytonii*. The flesh of the legs does not appear to be as deeply pigmented with red as expected for most *R. a. draytonii*, which could be interpreted as a qualitative difference. However, the morphology of the Duckwater frogs does not differ in any consistent or significant way from *R. a. draytonii*. Notable features, such as the tilt of the eyes, are quite unlike those of *R. pretiosa*. F. R. Kay (pers. comm.) noted a difference in vocal sacs between Duckwater frogs and specimens of *R. aurora* but M. P. Hayes (pers. comm.) has found that this variation in the vocal sacs is actually polymorphic within *R. aurora*. The present biochemical data indicate that these frogs are not related to *R. pretiosa* as intimated by Emmerson and Kay (Herp. Rev. 3:39, 1972).

There is historical evidence that the population of frogs at Duckwater had been introduced. Brues (1932), in a comprehensive faunal survey of hot springs in western North America, listed the inhabitants of over 100 sites, including Duckwater Spring. While noting their occurrences elsewhere, Brues made no mention of frogs at Duckwater Spring even though they are now common there. R. R. Miller, in a letter to J. A. Maciolek (pers. comm.) commented that C. L. Hubbs and family visited the Duckwater area in 1934 and 1939 and did not note the presence of any frogs although, if they found any, it was their usual practice to make notes of amphibians. Wright and Wright (Handbook of frogs and toads, Comstock Publ. Assoc., Ithaca, 1949) made no mention of frogs in the vicinity of Duckwater in either text or maps. The first notice of frogs at Duckwater dates from 1950 when W. W. Tanner (pers. comm.) found them to be numerous near the spring and in nearby meadows; the reference to Duckwater by Stebbins (1966) stems from this collection. It seems likely, based on the foregoing information, that the frogs may have been introduced sometime during the 1940's, a time when numerous "frog farms" (now almost universally defunct) were still being established in many western states and Canadian provinces. Linsdale (Proc. Amer. Acad. Arts Sci. 73:197-257, 1940) mentioned an introduced population of *R. a. draytoni* at Millett, Nevada, also in Nye Co. about 130 km to the west of Duckwater.

The sample of frogs examined from Duckwater shows about the same levels of polymorphism as samples from California. Any reduced level of polymorphism could be attributable to a founder effect if only a small number of specimens had been introduced. The evidence is more in accordance with a large number introduction, suggestive of "frog farming". Feral populations of *R. catesbeiana* now dot western North America as a legacy of frog farming in the 1930's and 1940's. Other species, such as *R. pipiens* and *R. clamitans*, were introduced as well (Green, Canadian Field Nat. 92:78-79, 1978), either by mistake or by design. The *R. aurora* currently found at Duckwater, Nevada, may also be included in this category.

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BLOOD EJECTION FREQUENCY BY *PHRYNOSOMA CORNUTUM* (IGUANIDAE).—The defensive ejection of a stream of blood by *Phrynosoma cornutum* is well documented as a rare but consistent behavioral occurrence (Stebbins, A field guide to western reptiles and amphibians, Houghton Mifflin Co., Boston, 1966). The anatomical and physiological bases of this behavior have been elucidated by Burleson (Copeia 4:246-248, 1942) and Heath (Physiol. Zool. 37:273-279, 1964; Physiol. Zool. 39:30-35, 1966), but behavioral aspects of blood ejection are not well known. The mechanism is the result of an elaborate system of independent circulatory control which apparently evolved for thermoregulatory functions (Heath, 1964). Secondary eye specializations are also involved (Heath, 1966). Reports of blood ejection by other similarly adapted iguanid species (*Uma notata*, Cowles, Desert Journal, Univ. California Press, 1977) suggests that blood ejection behavior has evolved independently several times. The most thorough examination of blood ejection from a behavioral perspective was that of Holder (Sci. Amer. 85:186-187, 1901),