PRELIMINARY OBSERVATIONS ON HERPETOFAUNAL DIVERSITY IN THE ALMATY REGION, SOUTHERN KAZAKHSTAN (SEPTEMBER 1998)

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ABSTRACT.— During field inspections in 11 localities over five days in early September 1989, a total of 2 Amphibia and 15 Reptilia (out of totals of respectively 4 and 27 in the Almatinskoi Oblasti) were recorded in the Almaty District of southern Kazakhstan. The lizards, *Phrynocephalus h. helioscopus* and *Eremias a. arguta*, and snake, *Coluber ravergieri*, are characteristic of open steppe areas in the Charyn River Canyon area. Beside the anurans, *Rana ridibunda* and *Bufo v. viridis/danatensis*, near water, the snake *Natrix tessellata* was observed by the Kaskelen River. Geckos, *Alsophylax pipiens* and *Cyrtopodion r. russowi*, were found at a cliff base by the Ili River rock drawings. The agamid *Trapelus sanguinolentus aralensis*, an open steppe species, was recorded on the Kerbulak massif, which supported a dense population of the steppe tortoise *Agrionemys horsfieldi*. *Trapelus s. aralensis* were also recorded amongst bushes on vegetated sand dunes by the artificial Lake Kapchagay; geckos, *Teratoscincus s. scincus*, were also recorded here after darkness. Herpetofaunal diversity was apparently higher in the less arid Ili River than in the Charyn River Canyon area.

THE amphibians and reptiles of Kazakhstan have been described in two basic texts (Paraskiv, 1956; Iskakova, 1959), as already indicated in Lambert (1995a, 1995b), and are included with other works for the former Soviet Union generally (Terentev & Chernov, 1949; Bannikov et al., 1971). Subsequently, species were covered in a field guide by Bannikov et al. (1977). The lizard fauna of deserts in Kazakhstan has been described by Brushko (1993), and information from ecofaunistic investigations on amphibian and reptile species throughout Kazakhstan were reviewed by Brushko & Kubykin (1998). They indicated that only the far north of the North Kazakhstan Region still remained largely unexplored herpetologically. Subsequently, a list of species was compiled specifically for the Almaty Region by R.A. Kubykin (in litt.), indicating that the region is very well known herpetofaunally, and this list is reproduced here (see Appendix). Bounded to the north by Lake Balkash and to the south by the Tien Shan range, the Semirechensk area, making up the Almatinskoi Oblasti, has been well surveyed and its species are well known. However, few observations specifically on herpetofaunal richness and diversity have yet been made, and as a basis for more detailed work in the future, preliminary observations are presented here.

During a field excursion on 3rd September for the 3rd International Asian Herpetological Meeting held at the Al-Farabi Kazakh State National University, Almaty, 1st-5th September 1998, the journey by road followed the Issyk river valley, entered the Ile-Alatau National Park, and continued towards Akci above the tree line at a height of 2300 m (some 45 km E of Almaty) in the Tien Shan range. Only two lizards — probably *Eremias a. arguta* (by bushes on a rock outcrop) — were sighted during midday at this altitude. Following the Meeting, an opportunity was taken during a four-day field excursion, 6-9th September 1998, to make further observations on species at localities in a variety of habitats at lower altitudes elsewhere in the Almaty District of southern Kazakhstan. Species sightings during visual encounter surveys allowed richness to be recorded in several localities, and preliminary information

on herpetofaunal diversity (species composition and relative abundance) was provided at the same time. The following observations will also give those unfamiliar with this part of the world some idea of the amphibians and reptiles that can be observed during quite cursory field surveys.

Itinerary

Names of places were recorded when visited, and use was also made of Sheet TPC F-6C of the 1:500,000 Tactical Pilotage Chart (July 1981 revision), published by the Defense Mapping Aerospace Center, St Louis, Missouri (USA), and a 1:1,000,000 map Almatinskaya Oblasti of the Kartograficheskaya Firma Geo, predlagaet Karty (1998).

Figure 1. Almatinskoi oblasti, southern Kazakhstan. Observation localities are denoted by solid circles. See text for numbering.

6th September: Depart Almaty by road east, and via Chilik, arrive at the Charyn River Canyon [some 180 km ENE of Almaty].

7th September: Depart Charyn River Canyon by road west via Almaty, and then north, via Kapchagay [some 72 km N. of Almaty], and arrive at the Ili River (rock drawings), 29 km NNE of Kapchagay town.

8th September: Depart Ili River, and via Kerbulak Massif, arrive Lake Kapchagay, 18 km ENE of Kapchagay town.

9th September: Depart Kapchagay Lake, and via Kapchagay town and Kaskelen River [50 km N of Almaty], arrive Almaty.

HERPETOFAUNAL RICHNESS AND ECOLOGY

In eleven localities (Fig. 1), a total of seventeen species was recorded during site inspections: two Amphibia and fifteen Reptilia. Reptiles were represented by one tortoise, ten lizards and four snakes. Fifteen lizard species are known to occur in the area (Brushko, 1972).

40 km ESE of Chilik (GPS: 43°30.18'N, 78°37.37'E; 961 m), 6.ix.98, hillside gully with shrubs. Species: nil [2.2 search-hours; 31°C].

66 Km ESE of Chilik (GPS: 43°20.49'N, 78°55.79'E; 1261 m), 6.ix.98, flat plain with low shrubs. Species (three): *Phrynocephalus h. helioscopus* (three); *Eremias a. arguta* (four); *Coluber ravergieri* (two skins) [2.9 search-hours; 32°C].

Charyn River Canyon (GPS: 43°27.31'N, 79°2.86'E; 1121 m), 6-7.ix.98, plateau above gorge, rocky surface with low shrubs, and by river with trees and shrubs. Species (eight): *Rana ridibunda* (two), *Bufo v. viridis/danatensis* (one), *Phrynocephalus h. helioscopus* (one), *Alsophylax pipiens* (two), *Cyrtopodion r. russowi* (eight), *Eremias a. arguta* (eighteen), *Elaphe dione* (two + two skins), *Psammophis lineolatus* (one) [10.7 search-hours; 24-31°C in morning, 26°C in evening]. *Eremias v. velox* was also recorded here.

Ili River (rock drawings), 29 km NNE of Kapchagay town (GPS: 44°3.87'N, 76°59.73'E;

451 m), 7-8.ix.98, cliff base and riverbank. Species (seven): *Rana ridibunda* (four), *Bufo v. viridis/danatensis* (one), *Alsophylax pipiens* (five), *Cyrtopodion r. russowi* (five), *Eremias lineolata* (one), *Coluber ravergieri* (three), *Natrix tessellata* (one) [5.1 search-hours; 28°-25°C in evening, 27°-28°C in morning].

Ili River, 23 km NNE of Kapchagay town (GPS: 44°2.12'N, 77°0.31'E; 452 m), 8.ix.98, dunes above riverbank. Species (three): *Rana ridibunda* (one), *Eremias s. scripta* (five), *Coluber ravergieri* (one) [1.1 search-hours; 30°C].

Kerbulak massif, 29 km N of Kapchagay town (GPS: 44°3.79'N, 77°2.87'E; 848 m), 8.ix.98, flat plain with low shrubs. Species (one): *Trapelus sanguinolentus aralensis* (road-kill - one).

Kerbulak massif, 29 km N of Kapchagay town (GPS: 44°3.59'N, 77°3.62'E; 754 m), 8.ix.98, flat plain with low shrubs. Species (one): *Agrionemys horsfieldi* (dried-up juvenile; skeletal remains of adult - two).

Kerbulak massif, 29 km N of Kapchagay town (GPS: 44°2.60'N, 77°5.25'E; 690 m), 8.ix.98, flat plain with low shrubs. Species: nil.

Lake Kapchagay, 18 km ENE of Kapchagay town (GPS: 43°55.85'N, 77°17.38'E; 501 m), 8-9.ix.98, part vegetated sand dunes by lakeshore. Species (three): *Rana ridibunda* (five), *Trapelus sanguinolentus aralensis* (20 +), *Teratoscincus s. scincus* (six) [5.5 search-hours; 30°C in afternoon, 23°-21°C in evening].

3 km SE of Kapchagay town (GPS: 43°48.08'N, 77°1.99'E; 504 m), 9.ix.98, open sand dunes, with light mainly annual herbaceous vegetation. Species (three): *Eremias s. scripta* (two), *Eremias grammica* (one), *Psammophis lineolatus* (one - skeleton) [2.8 search-hours; 18°-20°C].

Kaskelen River, 48 km N of Almaty (GPS: 43°41.49'N, 77°1.36'E; 492 m), 9.ix.98, riverine habitat. Species (two): *Rana ridibunda* (four), *Natrix tessellata* (two) [2.4 search-hours; 18°-21°C].

Alsophylax pipiens, SVL 60 mm, collected during early hours of darkness, cliff base, by Ili River (rock drawings), 29 km NNE of Kapchagay town, S. Kazakhstan, 7.ix.98. Photograph © Lee Grismer.

SPECIES OBSERVED

AMPHIBIA

1. *Rana ridibunda*: localities: 3, 4, 5, 9, 11 (n = 16); 2. *Bufo v. viridis/danatensis*: localities: 3, 4 (n = 2).

REPTILIA

3. Testudinidae: *Agrionemys horsfieldii*: locality: 7 (dead) (n = 2); 4. Agamidae: *Phrynocephalus h. helioscopus*: localities: 2, 3 (n = 4); 5. *Trapelus sanguinolentus aralensis*: localities: 6 (dead), 9 (n = 20+); 6. Gekkonidae: *Alsophylax pipiens*: localities: 3, 4 (n = 7); 7. *Cyrtopodion r. russowi:* localities: 3, 4 (n = 13); 8. *Teratoscincus s. scincus*: locality: 9 (n = 6); 9. Lacertidae: *Eremias a. arguta*: localities: 2, 3 (n = 22); 10. *E. lineolata*: locality: 4 (n = 1); 11. *E. multiocellata*: locality 3 (n =1); 12. *E. s. scripta*: localities: 5, 10 (n = 7); 13. *E. grammica*: locality: 10 (n = 1). 14. *Eremias v. velox*: locality 3 (n = 1); 15. Colubridae: *Coluber ravergieri*: localities: 2 (? - skins only), 4, 5 (n = 6); 16. *Elaphe dione*: locality: 3 (n = 4); 17. *Natrix tessellata*: localities: 4, 11 (n = 3); 18. *Psammophis lineolatus*: localities: 3, 10 (n = 2).

DISCUSSION AND CONCLUSIONS

Phrynocephalus h. helioscopus, *Eremias a. arguta* and *Coluber ravergieri* [recorded 66 km ESE of Chilik (locality 2)] are species characteristic of open steppe areas in southern Kazakhstan.

During timed searches, a total of eight species was observed in each of the Charyn River Canyon (locality 3) area (n = 37; 9.0 search-hours) and in

Cyrtopodion r. russowi, SVL 65 mm, Charyn River Canyon, S. Kazakhstan, rocky surface with low shrubs, 6-7.ix.98. Photograph © Lee Grismer.

Teratoscincus s. scincus, SVL 70 mm, collected during early hours of darkness, part vegetated sand dunes by lakeshore, Lake Kapchagay, 18 km ENE of Kapchagay town, S. Kazakhstan, 8.ix.98. Photograph © Lee Grismer.

Eremias v. velox, SVL 80 mm, Charyn River Canyon, S. Kazakhstan, rocky surface with low shrubs, 6-7.ix.98. Photograph © Lee Grismer.

Asymblepharus alaicus kucenkoi, SVL 85 mm, collected on mountain near Almaty, S. Kazakhstan, 2.ix.98. Photograph © Lee Grismer.

Coluber ravergieri, SVL 500 mm, collected during late afternoon, cliff base, by Ili River (rock drawings), 29 km NNE of Kapchagay town, S. Kazakhstan, 7.ix.98. Photograph © Lee Grismer.

Natrix tessellata, SVL 450 mm, collected during late afternoon, in riverine habitat by tributary rivulet of the Kaskelen River, 48 km N of Almaty, 9.ix.98. Photograph © Lee Grismer.

the comparably surveyed two sites (localities 4 and 5) of the Ili River area (n = 28; 6.2 search-hours). Surveying was not systematic, although a site-search technique was common to each (the Charyn River Canyon and Ili River valley both included searches after darkness). Numbers recorded from visual encounters were not therefore absolute, and recording in the Charyn River Canyon may in fact have been deficient, with rather lower sighting frequency than in the Ili River area. The Ili River habitats were damper than the generally arid conditions of the Charyn River Canyon. Shannon-Wiener Index of Diversity - H ' (Magurran, 1988) was respectively 1.530 (evenness 0.736) and 1.935 (evenness 0.930), indicating that diversity was higher (also evenness greater, as expected) in the Ili River than in the Charyn River Canyon area, and the difference was significant ($t = 2.37$, d.f. 21, $P<0.05$).

The lizards *Eremias lineolata* and *E. s. scripta* and snakes *Coluber ravergieri* and *Natrix tessellata* were not recorded at the Charyn River Canyon, nor in the Ili River valley were the lizards *Eremias a. arguta*, *E. v. velox* and *Phrynocephalus h. helioscopus*, and snakes *Elaphe dione* and *Psammophis lineolatus*, which are more steppe and plateau dwelling than river valley species. Locality records for *Eremias lineolata* have only been made north of Lake Kapchagay, particularly in the Ili valley, and likewise *E. s. scripta* in its eastern zone (Bannikov et al., 1977). *Natrix tessellata*, also recorded by the Kaskelen River (locality 11), is undoubtedly associated with water in southern Kazakhstan, as it is elsewhere in its range, and was not recorded in dry steppe country.

The agamid *Trapelus s. aralensis* is another open steppe species, being recorded in an area vegetated by low shrubs on the Kerbulak massif (locality 6), which also supports a dense population in open grassland of the steppe tortoise *Agrionemys horsfieldi* (Kubykin, 1988). Many *T. s. aralensis* were also recorded amongst bushes of vegetated sand dunes by the artificial Lake

Eremias a. arguta, SVL 80 mm, collected during afternoon, plateau above gorge with stony surface and low shrubs, Charyn River Canyon, S. Kazakhstan, 6.ix.98. Photograph © Lee Grismer.

Kapchagay (locality 9), and it was here, associated with dunes, that *Teratoscincus s. scincus* was recorded after darkness, even with the air temperature down to 23°C (wind 5-15 kph). A number of *Rana ridibunda* were observed basking in sunshine by the lakeshore, always by water as elsewhere in southern Kazakhstan.

These preliminary observations give some indication of common species that may be sighted in certain of the habitats in southern Kazakhstan, and their relative abundance. The information enables more systematic surveys to be designed for hard data to be yielded on species richness, composition and relative density. These are components intrinsic to biodiversity, and the species assemblages may then be used as a bioindication of the influence of anthropogenic factors on populations in the field. Certain species will be found to be characteristic bioindicators of pristine conditions, and others of habitat disturbance due to agricultural development; further common species would be used as bioindicators of contamination levels from chemical spills and treatment of crops with pesticides. As a link in the food chain between invertebrate prey and higher-up predators, the residue loads of lizards sampled from the field and subject to whole body residue analysis will be biomarkers of the levels of pesticides entering wildlife food chains.

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Appendix 1

List of amphibians and reptiles in the Almaty region [Almatinskoi Oblasti], southern Kazakhstan (compiled by R.A. Kubykin, in litt.)

AMPHIBIA
Order ANURA
Family Bufonidae
Genus *Bufo* Laurenti, 1768
B. danatensis Pisanetz, 1978*
B. viridis viridis Laurenti, 1768
Family Ranidae
Genus *Rana* Linnaeus, 1758
R. asiatica Bedriaga, 1898*
R. ridibunda Pallas, 1771

REPTILIA
Order TESTUDINES
Family Testudinidae
Genus *Agrionemys* Khozatsky & Mlynarski, 1966
A. horsfieldi (Gray, 1844)

Order SQUAMATA
suborder SAURIA
Family Agamidae
Genus *Phrynocephalus* Kaup, 1825
P. guttatus guttatus Gmelin, 1789
P. helioscopus helioscopus Pallas, 1771
P. mystaceus (Pallas, 1776)
P. versicolor paraskiwi Semenov, Brushko, Kubykin & Shenbrot, 1987*
Genus *Trapelus* Oliver, 1804
T. sanquinolentus aralensis Lichtenstein, 1823
Family Gekkonidae
Genus *Alsophylax* Fitzinger, 1843
A. pipiens (Pallas, 1814)
Genus *Cyrtopodion* Fitzinger, 1843
C. russowi russowi Strauch, 1887
Genus *Teratoscincus* Strauch, 1863
T. scincus scincus Schlegel, 1858
Family Lacertidae
Genus *Eremias* Wiegmann, 1834
E. arguta arguta Pallas, 1773

E. grammica (Lichtenstein, 1823)
E. intermedia (Strauch, 1876)
E. lineolata (Nikolsky, 1896)
E. multiocellata (Günther, 1872)
E. scripta scripta Strauch, 1867
E. velox velox Pallas, 1771
Genus *Lacerta* Linnaeus, 1758
L. agilis Linnaeus, 1758
Family Scincidae
Genus *Ablepharus* Lichtenstein, 1823
A. deserti Strauch, 1868
Genus *Asymblepharus*
Eriomtschenko & Szcerbak, 1980
A. alaicus kucenkoi Nikolsky, 1902
suborder SERPENTES
Family Boidae
Genus *Eryx* Daudin, 1803
E. miliaris tataricus
Lichtenstein,1823
Family Colubridae
Genus *Coluber* Linnaeus, 1758
C. ravergieri Menetriés,1832
Genus *Elaphe* Fitzinger, 1832
E. dione (Pallas,1773)
Genus *Natrix* Laurenti, 1768)
N. natrix scutata Pallas,1771
N. tessellata (Laurenti,1768)
Genus *Psammophis* Fitzinger, 1826
P. lineolatum (Brandt,1838)
Family Crotalidae
Genus *Agkistrodon* Beauvois, 1799
A. halys caraganus Eichwald,1831
Family Viperidae
Genus *Vipera* Laurenti, 1768
V. ursinii (Bonaparte,1835)

Amphibia: Number of species in Kazakhstan - 11; number of species in the Almatinskoi Oblasti - 4 (36.4%).

Reptilia: Number of species in Kazakhstan - 51; number of species in the Almatinskoi Oblasti - 28 (54.9%).

Appendix 2

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