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Herpetogeographical Map of Turkmenistan

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Abstract. -The herpetological map presented in this paper shows the distribution and abundance of the reptiles of Turkmenistan. The country is divided into 17 complexes and the 84 species and subspecies found in Turkmenistan are listed as occurring in mountains, plains, or both.

Key words: Reptilia, Turkmenistan, biogeography, distribution.

Introduction

In the mid-1960's biogeography entered a new state of development with the practice of ecosystems mapping (Chyel'tsov-Bebutov, 1963, 1964, 1970, 1976). We do not here discuss the principles of the preparation and classification of geographical maps which depict animal population areas. We can only note that they make-up the series of sections included in many integrated regional atlases. Special surveys (Chel'tsov and Chibisova, 1976; Chel'tsov-Bebutov et al., 1972) have dealt with them as well. Nevertheless, the above mentioned maps were prepared for birds and mammals. Until now there have been no geographical maps (as geographical science visualized these) which present the quantitative proportions of reptiles in the total animal kingdom of any region (Chel'tsov-Bebutov and Chibisova, 1976).

The three authors of this article (Ataev, Rustamov, and Shammakov, 1989) created a color version of the Herpetogeographical Map of Turkmenistan in 1989. It was presented in 1989 at the All-Union Seminar dealing with the animal kingdom registration and cadastre (in Ufa), the Zoological Section of the Moscow Naturalists Society (in Moscow) and the VII-th All-Union Herpetological Conference (in Kiev). This article presents a black and white version of the map, giving no consideration to color qualitative background, on the scale 1:2,000,000, to be included into the Turkmen SSR Geographical Atlas (Fig. 1).

Field data, gathered throughout the whole Turkmenistan during 1960-1985 (Schammakov, 1981; Ataev, 1985), served as the main sources for this map. Other data were obtained from literature (Rustamov, 1966, 1981; Ataev, 1975; Rustamov and Schammakov, 1982; Ataev, Rustamov and Schammakov, 1985; Rustamov and Shcherbak, 1986; Makeev et al., 1988). Topographic maps on the scale of 1:1,000,000 and 1:500,000 were used as the cartographic basis.

The taxonomic generalization level of the topological contours shown on the map were dependent on both its scale and an analysis of data gathered by Ataev and Schammakov, unfortunately, apart, not in assemblage, with the zoogeographical survey of the country by Rustamov. A further point: the whole complex of a habitat and the animal population, which it supports, was taken as a unit undergone to zoogeographical mapping (Chel'tsov-Bebutov, 1963, 1964, 1976). We tried to single out the larger habitats at a level of an ecosystem (landscape or land system, according to Christian, 1975), not of the land unit, which is in close correlation with both the chosen scale and the content of the rest of the maps belonging to the Nature Division of the Atlas. The map scale provoked the necessity to single out such complexes of the reptiles population territorial aggregation, which should be grouped into a definite unity with regard to both common conditions of the habitats (the integral components of which are those aggregations) and the dominant species prevailing in number. A total of 17 complexes as such were revealed. Thus,

the map was build up on consideration of the habitats of reptiles and their species composition and density. Any territorial differentiation not proved by distinctions in the reptile population was not, as a rule, taken into account.

The reptile fauna of the Turkmenistan (Table 1) includes 78 species (84 subspecies) which belong to 2 orders and 14 families. The fauna consists of 3 species (3 subspecies) of tortoises, 47 (51) lizards, and 28 (30) snakes. The information on the reptiles species and population quantities distributed through every complex is placed in a special table that is not given in the atlas, as well as the Table 1, because of the lack of space. One needs this table because the map contours contain no concrete figures on the general density and species number of reptiles. The reptile populations are characterized only according to their appropriate abundance levels. This is quite enough for examining the general content of the map. Nevertheless, we provide herpetologists using this map with more concrete figures (Table 2). Reptile distributions, their abundance, and correlation are dependent upon habitats diversity as well as the fauna richness and specific ecologico-geographical peculiarities (Rustamov, 1966, 1981; Ataev, 1975; Rustamov and Schammakov, 1982). This, in turn, forms the physiognomy of the 17 territorial herpetological complexes.

To optimize the reptiles population characteristics, the map legend was made up of 2 parts: the table (placed at the Supplement) and the text. In addition, the insets give information on the fauna composition and contain the out-scale signs characterizing the loci of the habitats. The tables series are arranged according to the principle that permitted us to depict the territorial structure of herpetological complexes, although the map scale and content give no possibility to illustrate the morphological specification of the habitats occupied by these complexes. For example, the table-legend horizontal columns present the main groups of the territorial herpetological complexes revealed on the basis of common ecosystems availability within the compared habitats. Those (groups) are: plain-desert (4 habitats), flood-plain valley (7), piedmont semi-desert (3), and mountain-arid (3). The vertical columns present the territorial units obtained as a result of geographical regionalization that, in our case, merely ground the boundaries of the herpetocomplexes. Such units of the regionalization scheme (zoogeographical regions) within Turkmenistan include: 1 area, 1 sub-area, 3 provinces, 4 districts, 6 regions and 10 sections (Rustamov and Scherbak, 1986).

The text of the legend gives the reptile population characteristics for every habitat gone into either complex. In front of the latter's name there is a circle under the correspondent number, the color map has qualitative background representing the complex. The latter's name is followed by the species number and the animals total density index (individuals per ha). The text of the legend is reduced in this article as the abundance indices are brought out in the special table (see Table 2).

Further reptile population characteristics for every complex are presented with species numeration of a fixed sequence: first species which use large areas are listed, then the stenotypic ones, which are confined to individual, smaller habitats within a contour. For example, clay surface, solonchaks, construction sites, etc., which are evidently differentiated due to their decreased sizes. The species names are arranged one after another according to decreasing population number within the habitat, of which a brief description is given immediately prior to the species enumeration (see the text of the legend). The dominant species are followed by (1), the codominant ones by (2), and the minor species by (3). The dominant species are defined by us as those whose number is over 10 per hectare, codominant species from two to nine per hectare, and minor species only one per hectare.

Thus, the map shows the herpetological territorial complexes differentiated

according to their species composition, total abundance and dominance levels (with regard to the species number) as well as principle features of the territory's morphology and its ecosystems structure, including the pattern of soils and vegetation cover.

Mapping had proved to be the most effective means to manifest and analyze the reptiles population richness throughout the country. The present map can serve as the data source to evaluate the actual situation with the Turkmenistan reptile resources, or to elaborate the practical measures on resource use and conservation. The map can be a help to anybody who will create new, more detailed, large-scaled herpetological maps of either Turkmenistan or any other country.

TABLE 1. Reptiles of Turkmenistan. Su- USSR Red Data Book; T- Turkman SSR Red Data Book.

	Mountains	Plains	Mountains & Plains
Order Testudines			
Emys orbicularis (Linnaeus, 1758)	-	-	+
Mauremys caspica (Gmelin, 1774)	-	-	+
Agrionemys horsfieldi (Gray, 1844)	-	-	+
Order Squamata Suborder Sauria			
Phrynocephalus helioscopus helioscopus Pallas, 1771	-	+	-
P. interscapularis Lichtenstein, 1858	-	+	-
P. maculatus Anderson, 1872 (Su, T)	-	+	-
P. mystaceus mystaceus Pallas, 1776	-	+	-
P. raddei raddei Boettger, 1888	-	+	-
P. r. boettgeri Bedriaga, 1905	-	+	-
P. reticulatus reticulatus Eichwald, 1831	-	+	-
P. r. bannikovi Darevsky, Rustamov et Schammakov, 1976	-	-	+
P. rossikowi rossikowi Nikolsky, 1899(Su, T)	-	+	
P. r. schammakowi Szczerbak et Golubev 1979, (Su, T)		+	
Stellio caucasius caucasius	+	-	-
Stellio c. triannulatus Ananjeva et Ataev, 1984	-	-	+
S. chernovi (Ananjeva, Peters et Rzepakovsky, 1981)	+	-	-
S. erythrogaster Nikolsky, 1896	+	-	-
S. lehmanni Strauch, 1896	+	-	-
Trapelus sanguinolentus aralensis (Lichtenstein, 1823)	-	-	+
Pseudopus apodus apodus Pallas, 1775	+	-	-
Alsophylax laevis Nikolsky, 1907 (Su, T)	-	+	-
A. loricatus szczerbaki Golubev et Sattorov, 1979 (Su, T)	-	+	-
A. pipiens (Pallas, 1814) (T)	-	+	-
Bunopus tuberculatus Blanford, 1874 (Su, T)	+	-	-
Crossobamon eversmanni (Wiegmann, 1834)	-	+	-
Cyrtopodion caspius caspius Eichwald, 1831	-	-	+
C. fedtschenkoi (Strauch, 1887)	+	-	-
C. longipes microlepis Lantz, 1918 (Su, T)	+	-	-
C. russowi (Strauch, 1887)			
C. spinicauda (Strauch, 1887) (Su, T)	+	-	-
C. turcmenicus (Szczerbak, 1978) (Su, T)	+	-	-
Eublepharis turcmenicus Darevsky, 1977 (Su, T)	+	-	-
Teratoscincus scincus scincus Schlegel, 1858	-	+	-

Eremias arguta uzbekistanica Chernov, 1934 (T)	-	+	-
E. grammica (Lichtenstein, 1823)	-	+	-
E. intermedia (Strauch, 1876)	-	+	-
E. lineolata (Nikolsky, 1896)	-	+	-
E. nigrocellata Nikolsky, 1896 (T)	-	+	-
E. persica Blanford, 1874	-	-	+
E. regeli Bedriaga, 1905 (T)	-	-	+
E. scripta scripta Strauch, 1867	-	+	-
E. strauchi kopetdaghica Szczerbak, 1971	+	-	-
E. velox velox Pallas, 1771	-	-	+
Lacerta raddei raddei Boettger, 1892 (T)	+	-	-
L. strigata Eichwald, 1831	-	-	+
Mesalina guttulata wotsonana Stoliczka, 1872	-	+	-
Ablepharus deserti Strauch, 1868	-	+	-
A. pannonicus (Lichtenstein, 1823)	-	-	+
Chalcides ocellatus ocellatus Forskal, 1775 (Su, T)	+	-	-
Eumeces schneideri princeps Eichwald, 1839	-	-	+
E. taeniolatus taeniolatus Blyth, 1854	-	-	+
Mabuya aurata septemtaeniata Reuss, 1834	-	-	+
Ophiomorus chernovi Anderson et Leviton 1966 (Su, T)	+	-	-
Varanus griseus caspius Eichwald, 1831 (Su, T)	-	-	+
Suborder Serpentes			
Eryx elegans (Gray, 1849) (Su, T)	+	-	-
E. miliaris miliaris Pallas, 1773	-	+	-
E. tataricus speciosus Tsarevsky, 1915 (T)	+	-	-
Boiga trigonatum melanocephalia Annandale, 1904 (Su, T)	-	-	+
Coluber caspius Gmelin, 1789 (T)	-	-	+
C. karelini karelini Brandt, 1838	-	+	-
C. najadum najadum Eichwald, 1831 (T)	+	-	-
C. ravergieri Menetries, 1832	-	-	+
C. rhodorhachis rhodorhachis (Jan, 1865)	-	-	+
C. r. ladacensis (Anderson, 1871)	-	-	+
Eirenis medus (Gernov, 1949)	+	-	-
Elaphe dione (Pallas, 1773)	-	+	-
E. quatuorlineata sauromates Pallas, 1814 (T)	-	+	-
Lycodon striatus bicolor Nikolsky, 1903 (Su, T)	+	-	-
Lythorhynchus ridgewayi Boulenger, 1887 (Su, T)	-	-	+
Natrix natrix persa Pallas, 1814	-	+	-
N. tessellata (Laurenti, 1768)	-	-	+
Oligodon taeniolatus (Jordan, 1853) (Su, T)	+	-	-
Psammophis lineolatum (Brandt, 1838)	-	+	-
P. schokari schokari Forskal, 1775	+	-	-
Pseudocyclophis persicus persicus Anderson, 1872	+	-	
Ptyas mucosus nigricans Cernov, 1949 (Su, T)	-	-	+
Spalerosophis diadema schiraziana Jan, 1865	-	-	+
Telescopus rhynopoma (Blanford, 1874) (Su, T)	+	-	-
Agkistrodon halys caraganus Eichwald, 1831 (T)	-	+	-
A. h. caucasicus Nikolsky, 1916 (T)	+	-	-
Naja oxiana (Eichwald, 1831) (Su, T)	-	-	+
Typhlops vermicularis Merrem, 1820	+	-	-
Echis multisquamatus Cherlin, 1981	-	-	+
Vipera lebetina turanica Cernov, 1940	-	-	+

TABLE 2. Abundance and proportions of ecologico-systematic groups within the territorial complexes of Turkmenistan. 1*- species number; 2*- individuals per hectare.

Systematic groups and abundance	Testudines			Sauria			Serpentes			Total	
Complexes	1*	2*	%	1	2	%	1	2	%	1	2
1. South-Ustjurt	1	3.7	2.4	17	141.4	92.8	9	7.3	4.8	27	151.5
2. Caspian	1	3.6	3.3	16	95.0	84.8	13	13.2	11.8	30	111.8
3. Karakum	1	3.7	2.2	23	155.0	89.5	10	14.4	8.3	34	173.1
4. Sundukli	1	3.8	3.2	17	106.9	90.6	7	7.3	6.2	25	118.0
5. Sarykamysh	1	3.7	3.1	14	104.1	88.0	7	10.5	8.9	22	120.3
6. Uzboi	2	7.8	6.9	16	92.7	81.9	7	8.0	11.2	26	107.5
7. Atrek-Sumbar	3	7.9	8.4	12	65.5	69.6	10	20.5	22.0	25	93.9
8. Tedzhen-Haushan	1	3.4	3.2	16	99.6	84.6	12	14.4	12.2	29	117.4
9. Murgab	1	3.5	2.2	16	153.0	88.3	12	14.5	9.5	29	171.0
10. Amu-Darya	1	3.3	2.0	19	172.7	90.5	13	14.2	7.5	33	190.2
11. Kopetdag piedmont-anthropogenic	1	3.9	7.4	6	35.5	72.6	8	10.5	20.0	15	49.9
12. Kopetdag piedmont	1	3.6	2.3	19	148.2	93.1	10	7.3	4.6	30	159.1
13. Kugitang piedmont	1	3.8	3.8	16	86.7	88.8	8	7.3	7.4	25	97.8
14. Badghyz-Karabil	1	11.5	27.2	18	27.4	59.2	12	3.8	13.6	31	42.7
15. Balkhan	1	1.2	4.4	6	21.2	89.0	4	1.5	6.6	11	23.9
16. Kopetdag mountain	3	9.1	11.3	16	58.6	81.5	18	5.2	7.2	37	71.9
17. Kugitang mountain	1	1.3	4.8	9	22.6	83.4	10	3.2	11.8	20	27.1

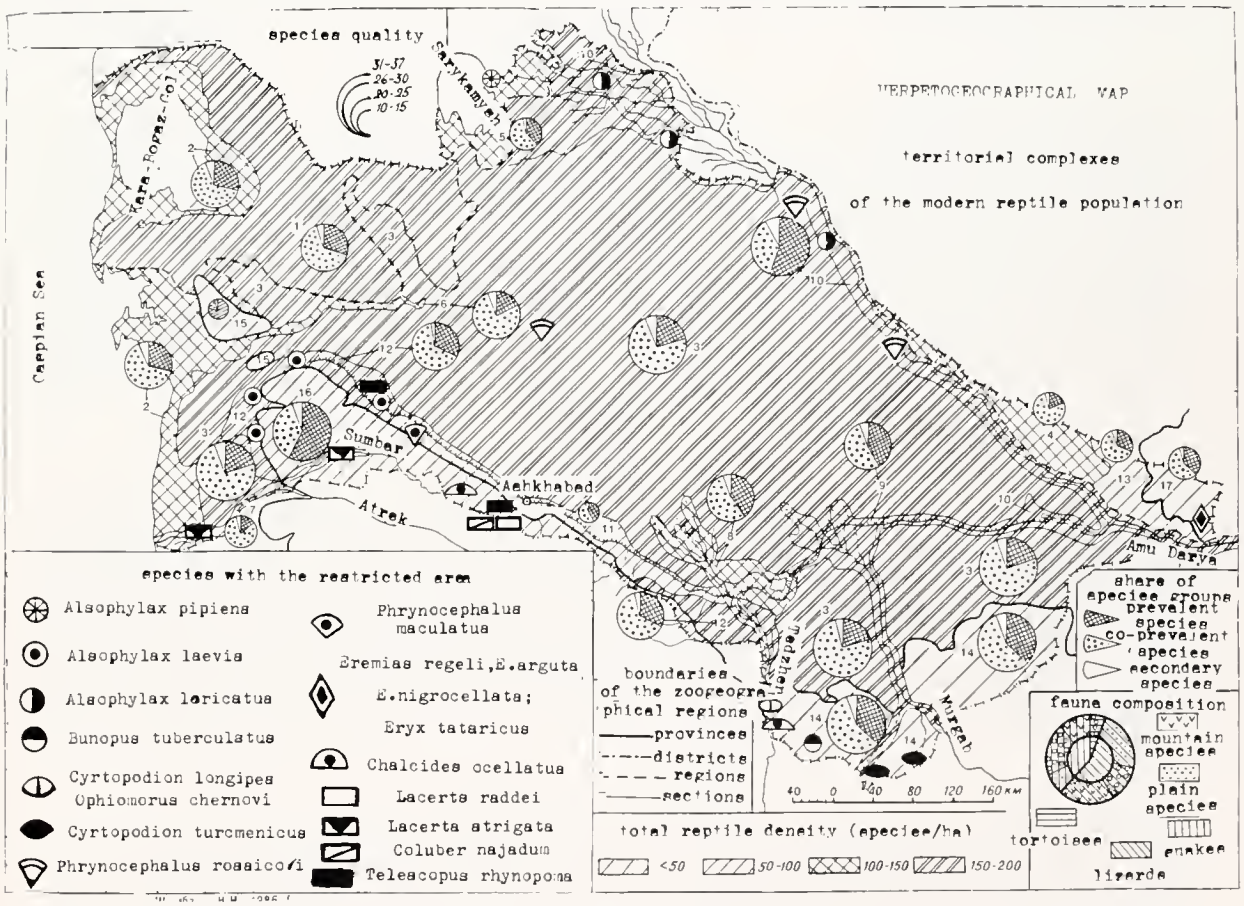

FIG. 1. Herpetological map of Turkmenistan. The species composition of various habitats within each of the 17 complexes is listed below. We define dominant species (1) as those that number over 10 per hectare, co-dominant species (2) as those that number from 2-9 per hectare, and minor species (3) as those that number one or less per hectare.

1. South-Ustjurt Complex

Various types of northwestern Turkmenistan deserts—*Cyrtopodion caspius* (1), *Eremias intermedia* (2), *Trapelus sanguinolenta* (2), *Agrionemys horsfieldi* (2), *Eryx miliaris* (2), *Psammophis lineolatum* (2), *Coluber karelini* (3), *Spalerosophis diadema* (3). Clay, crushed-stone and solonchak habitats—*Phrynocephalus helioscopus* (2). Sandy and clay—*Varanus griseus* (3), *Naja oxiana* (3), *Boiga trigonatum* (3), *Agkistrodon halys* (3). Clay—*Cyrtopodion russowi* (2). Sandy—*Phrynocephalus interscapularis* (1), *Teratoscincus scincus* (1), *Crossobamon eversmanni* (2), *Eremias grammica* (2), *Eremias scripta* (2), *Phrynocephalus mystaceus* (2).

2. Caspian Complex

Various types of eastern Caspian deserts—*Cyrtopodion caspius*(2), *Eryx miliaris* (2), *Coluber karelini* (3), *Eremias intermedia* (2), *Eremias velox* (2), *Trapelus sanguinolentus* (2), *Agrionemys horsfieldi* (2), *Echis multisquamatus* (2), *Psammophis lineolatum* (2), *Echis multisquamatus* (2), Sandy, clay and solonchak habitats—*Eremias lineolata* (2). Clay, crushed stone and solonchak—*Phrynocephalus helioscopus* (2). Sandy, clay and construction sites—*Eumeces schneideri* (2), *Coluber rhodorhachis* (3), *Varanus griseus* (3), *Naja oxiana* (3), *Boiga trigonatum* (3). Sandy and clay—*Agkistrodon halys* (3). Sandy and crushed stone—*Phrynocephalus reticulatus* (1). Sandy and on construction sites—*Coluber ravergieri* (3). Clay and on construction sites—*Mabuya aurata* (2). Sandy—*Phrynocephalus interscapularis* (1), *Teratoscincus scincus* (1), *Crossobamon eversmanni* (3), *Eremias grammica* (3), *Eremias scripta* (3), *Phrynocephalus mystaceus* (3). Clay—*Elaphe quatuorlineata* (3). Solonchak—*Lythorhynchus ridgewayi* (3). By water bodies—*Natrix tessellata* (3).

3. Karakum Complex

Various types of Karakum deserts—*Cyrtopodion russowi* (2), *Cyrtopodion caspius* (2), *Agrionemys horsfieldi* (2),*Eryx miliaris* (2),*Coluber karelini* (3), *Eremias grammica* (2),*Trapelus sanguinolentus* (2), *Psammophis lineolatum* (2), *Eremias velox* (2), *Echis multisquamatus* (2), *Echis multisquamatus* (2), *Spalerosophis diadema* (3). Sandy, clay and solonchak habitats—*Phrynocephalus raddei* (2), *Eremias grammica* (2). Clay, crushed stone and solonchak—*Phrynocephalus helioscopus* (2). Sandy, clay and on construction sites—*Eumeces schneideri* (2), *Coluber rhodorhachis* (3), *Varanus griseus* (3), *Naja oxiana* (3), *Boiga trigonatum* (3). Sandy, less common crushed stone—*Phrynocephalus reticulatus* (1). Sandy, clay, less common crushed stone—*Mesalina guttulata* (2). Sandy and on construction sites—*Coluber ravergieri* (3). Clay and crushed stone—*Lythorhynchus ridgewayi* (3). Clay and on construction sites—*Mabuya aurata* (2). Sandy—*Phrynocephalus interscapularis* (1), *Teratoscincus scincus* (1), *Crossobamon eversmanni* (2), *Eremias grammica* (2), *Eremias scripta* (2), *Phrynocephalus mystaceus* (2), *Vipera lebetina* (2).

4. Sundukli Complex

Various types of Sundukli massif deserts—*Cyrtopodion caspius* (1),*Eremias intermedia* (2),*Trapelus sanguinolentus* (2),*Agrionemys horsfieldi* (2),*Eryx miliaris* (2),*Psammophis lineolatum* (2),*Coluber karelini* (3),*Spalerosophis diadem* (3). Sandy, clay and solonchak habitats—*Phrynocephalus raddei* (2),*Eremias lineolata* (2),*Eremias velox* (2),*Cyrtopodion russowi* (2),*Echis multisquamatus* (2). Clay, crushed-stone and solonchak)—*Phrynocephalus helioscopus* (2). Sandy and clay—*Varanus griseus* (3),*Naja oxiana* (3),*Boiga trigonatum*(3). Sandy—*Phrynocephalus interscapularis* (1), *Teratoscincus scincus* (1), *Crossobamon eversmanni* (2), *Eremias grammica* (2), *Eremias scripta* (2), *Phrynocephalus mystaceus* (2). Crushed stone—*Cyrtopodion fedtschenkoi* (2).

5. Sarykamysh Complex

Various habitats of the Sarykamysh Depression—*Coluber karelini* (3), *Eremias velox* (2), *Trapelus sanguinolentus* (2), *Agrionemys horsfieldi* (2), *Cyrtopodion caspius* (2), *Psammophis lineolatum* (2), *Eryx miliaris* (2), *Spalerosophis diadema* (3), *Varanus griseus*(3). Sandy, clay and solonchak habitats—*Eremias grammica* (2). Sandy, clay, solonchak and on construction sites—*Cyrtopodion russowi* (2). Clay, crushed-stone and solonchak—*Phrynocephalus helioscopus* (2). Sandy, clay and solonchak—*Eremias lineolata* (2). Sandy, clay and on irrigated lands)—Agkistrodon halys (3). Sandy—*Phrynocephalus interscapularis* (1), *Teratoscincus scincus* (1), *Crossobamon eversmanni* (2), *Eremias grammica* (2), *Phrynocephalus mystaceus*

(2). Solonchak habitats, along collectors and canals, in settlements—*Elaphe dione* (3). On irrigated lands and water bodies—*Natrix tessellata* (2).

6. Uzboi Complex

Various habitats of Western Uzboi Valley—*Coluber karelini* (3), *Cyrtopodion caspius* (2), *Agrionemys horsfieldi* (2), *Trapelus sanguinolentus* (2), *Eremias velox* (2), *Echis multisquamatus* (2), *Eryx miliaris* (2), *Psammophis lineolatum* (2), *Spalerosophis diadema* (3), *Coluber rhodorhachis* (3), *Varanus griseus* (3), *Naja oxiana*(3). Sandy, clay, solonchak and on construction sites—*Cyrtopodion russowi* (2). Sandy, clay, solonchak and crushed-stone—*Eremias intermedia* (2). Flood-plain, clay and on construction sites—*Mabuya aurata* (2). Clay, crushed-stone and solonchak—*Phrynocephalus helioscopus* (2). Sandy, clay and solonchak—*Phrynocephalus raddei* (2), *Eremias lineolata* (2). Flood plain—*Emys orbicularis* (2). Sandy—*Phrynocephalus interscapularis* (1), *Teratoscincus scincus* (1), *Crossobamon eversmanni* (2), *Eremias scripta* (2), *Eremias grammica* (2), *Phrynocephalus mystaceus* (2).

7. Atrek-Sumbar Complex

Various habitats of Atrek and Lower Sumbar valleys—*Trapelus sanguinolentus* (2), *Eremias velox* (2) *Agrionemys horsfieldi* (2), *Echis multisquamatus* (2), *Eumeces schneideri* (2), *Cyrtopodion caspius* (2), Coluber karelini (3), *Elaphe dione* (3), *Varanus griseus* (3),*Psammophis lineolatum* (2), *Spalerosophis diadema* (3), *Boiga trigonatum* (3). Flood plains and irrigated lands—*Natrix natrix* (2), *Natrix tessellata* (2), *Ablepharus pannonicus* (2), *Coluber caspius* (3). Sandy, clay, crushed stone, and solonchak habitats—*Eremias intermedia* (2), *Eryx miliaris* (2). Clay, crushed-stone and solonchak—*Phrynocephalus raddei* (2). Clay, crushed-stone and solonchak—*Phrynocephalus helioscopus* (2). By water bodies—*Emys orbicularis* (2), *Mauremys caspica* (2). Sandy—*Teratoscincus scincus* (1), *Crossobamon eversmanni* (2).

8. Tedzhen-Hauzkhan Complex

Various habitats of Tedzhen Valley and Hauzkhan Massif—*Eremias velox* (2), *Natrix tessellata* (2), *Trapelus sanguinolentus* (2), *Agrionemys horsfieldi* (2), *Echis multisquamatus* (2), *Eumeces schneideri* (2), *Mabuya aurata* (2), *Coluber karelini* (3),*Coluber rhodorhachis* (3), *Naja oxiana* (3), *Varanus griseus* (3), *Coluber ravergieri* (3), *Cyrtopodion caspius* (2), *Psammophis lineolatum* (2), *Boiga trigonatum* (3), *Vipera lebetina* (2), *Eumeces taeniolatus* (3), *Spalerosophis diadema* (3), *Eryx miliaris* (2), *Eremias intermedia* (2). Sandy, clay and solonchak habitats—*Phrynocephalus raddei* (2), *Eremias lineolata* (2). Clay, crushed-stone and solonchak—*Phrynocephalus helioscopus* (2). Sandy and clay—*Mesalina guttulata* (3). Sandy—*Phrynocephalus interscapularis*(1), *Phrynocephalus mystaceus* (2), *Eremias grammica* (2). Clay—*Lytorhynchus ridgewayi*(3).

9. Murgab Complex

Various habitats of the Murgab Valley—*Eremias velox* (2), *Trapelus sanguinolentus* (2), *Agrionemys horsfieldi* (2), *Cyrtopodion caspius* (2), *Echis multisquamatus* (2), *Eumeces schneideri* (2), *Psammophis lineolatum* (2), *Vipera lebetina* (2), *Mabuya aurata* (2), *Coluber karelini* (3), *Coluber rhodorhachis* (3), *Varanus griseus* (3), *Naja oxiana* (3), *Spalerosophis diadema* (3), *Ptyas mucosus* (3), *Boiga trigonatum* (3). On flood-plains and irrigated lands—*Ablepharus deserti* (1), *Ablepharus pannonicus* (2), *Natrix tessellata* (2), *Eumeces taeniolatus* (3). Sandy, clay, crushed-stone and solonchak habitats—*Eremias intermedia* (2), *Eryx miliaris* (2). Sandy, clay, solonchak habitats and on construction sites—*Cyrtopodion russowi* (2). Sandy, clay and solonchak habitats—*Phrynocephalus raddei* (2), *Eremias lineolata* (2). Sandy—*Phrynocephalus interscapularis* (1), *Teratoscincus scincus* (1), *Crossobamon eversmanni* (2). Clay—*Lythorhynchus ridgewayi* (3).

10. Amu Darya Complex

Various habitats of the Amu Darya Valley—*Ablepharus deserti* (1), *Eremias velox* (2), *Natrix tessellata* (2), *Trapelus sanguinolentus* (2), *Agrionemys horsfieldi* (2), *Cyrtopodion caspius* (2), *Echis multisquamatus* (2), *Psammophis lineolatum* (2), *Vipera lebetina* (2), *Eumeces schneideri* (2), *Mabuya aurata* (2), *Coluber karelini* (3), *Spalerosophis diadema* (3), *Varanus griseus* (3), *Naja oxiana* (3), *Coluber ravergieri*,(3), *Elaphe dione* (3), *Boiga trigonatum* (3) *Agkistrodon halys* (3), *Eumeces taeniolatus* (3). Sandy, clay, crushed-stone and solonchak habitats—*Eryx miliaris* (2), *Eremias grammica* (2). Clay, crushed stone and solonchak—

Phrynocephalus helioscopus (2). Sandy, clay and crushed stone—*Phrynocephalus raddei*(2), *Eremias lineolata*(2). Sandy and crushed stone—*Phrynocephalus reticulatus*(1). Clay and crushed stone—*Lythorhynchus ridgewayi* (3). Construction sites—*Cyrtopodion fedtschenkoi* (2).

11. Kopetdag Piedmont Anthropogenic Complex

Various habitats of Kopetdag piedmont oases—*Mabuya aurata* (1), *Cyrtopodion caspius* (1), *Eremias velox* (2), *Natrix tessellata* (2), *Trapelus sanguinolentus* (2), *Agrionemys horsfieldi* (2), *Coluber rhodorhachis* (3), *Coluber ravergieri*,(3), *Naja oxiana* (3). In flood-plains of shallow rivers and on construction sites—*Eryx miliaris* (2), *Echis multisquamatus* (2), *Spalerosophis diadema* (3). On flood plains—*Eremias lineolata* (2), *Lythorhynchus ridgewayi* (3).

12. Kopetdag Piedmont Complex

Various habitats of the Kopetdag piedmont plain—*Cyrtopodion caspius* (1), *Phrynocephalus raddei* (2), *Phrynocephalus helioscopus* (2), *Eremias intermedia* (2), *Eremias lineolata* (2), *Eremias velox* (2), *Cyrtopodion russowi* (2), *Trapelus sanguinolentus* (2), *Agrionemys horsfieldi* (2), *Eryx miliaris* (2), *Echis multisquamatus* (2), *Psammophis lineolatum* (2), *Coluber karelini* (3), *Spalerosophis diadema* (3), *Varanus griseus* (3), *Naja oxiana* (3). Clay and crushed-stone habitats—*Mabuya aurata* (1), *Lythorhynchus ridgewayi* (3). Sandy and clay—*Mesalina guttulata* (2), *Boiga trigonatum* (3). Clay—*Pseudocyclophis persicus* (3), *Eirenis medus* (3). Sandy—*Phrynocephalus interscapularis* (1), *Teratoscincus scincus* (1), *Crossobamon eversmanni* (2), *Eremias grammica* (2), *Eremias scripta* (2), *Phrynocephalus mystaceus* (2).

13. Kugitang Piedmont Complex

Various habitats of Kugitang piedmont plain—*Cyrtopodion caspius* (1), *Phrynocephalus raddei* (2), *Eremias intermedia* (2), *Phrynocephalus helioscopus* (2), *Eremias lineolata* (2), *Eremias velox* (2), *Trapelus sanguinolentus* (2), *Agrionemys horsfieldi* (2), *Eryx miliaris* (2), *Echis multisquamatus* (2), *Psammophis lineolatum* (2), *Coluber karelini* (3), *Spalerosophis diadema* (3). Clay and crushed-stone habitats—*Cyrtopodion fedtschenkoi* (2), *Lythorhynchus ridgewayi* (3). Sandy and clay—*Varanus griseus* (3), *Naja oxiana* (3). *Boiga trigonatum* (3). Sandy—*Phrynocephalus interscapularis* (1), *Phrynocephalus mystaceus* (2) *Eremias grammica* (2), *Eremias scripta* (2).

14. Badghyz-Karabil Complex

Various habitats of the Badghyz and Karabil hills—*Agrionemys horsfieldi* (1), *Mabuya aurata* (2), *Cyrtopodion caspius* (2), *Trapelus sanguinolentus* (2), *Eremias velox* (2), *Ablepharus pannonicus* (2), *Stellio erythrogaster* (2), *Eumeces taeniolatus* (2), *Eumeces schneideri* (2), *Pseudophus apodus* (3), *Vipera lebetina* (3), *Naja oxiana* (3), *Psammophis lineolatum* (3), *Varanus griseus* (3), *Spalerosophis diadema* (3), *Coluber ravergieri* (3), *Coluber rhodorhachis* (3). On slopes covered by stones and mud-streams—*Stellio caucasius* (2), *Typhlops vermicularis* (3). On bare rocks-outcrops—*Lycodon striatus* (3). On stone surfaces—*Pseudocyclophis persicus* (3). On slopes covered by loess and stones—*Psammophis schokari* (3). Food-plains and mud-streams—*Eremias persica* (2). Mud-streams—*Oligodon taeniolatus* (2). Flood plains—*Natrix tessellata* (3).

15. Balkhan Complex

Various habitats of the Great and Small Balkhan Mountains— *Cyrtopodion caspius* (1), *Stellio caucasius* (2), *Trapelus sanguinolentus* (2), *Eremias velox* (2), *Agrionemys horsfieldi* (2), *Coluber rhodorhachis* (3), *Naja oxiana* (3), *Ablepharus pannonicus* (3). Piedmonts and inter-ridge hills—*Varanus griseus* (3). Mud streams, undulated surfaces, piedmonts and inter-ridge hills—*Psammophis lineolatum* (3). Inter-ridge hills, piedmonts and construction sites—*Spalerosophis diadema* (3).

16. Kopetdag Mountain Complex

Various habitats of the Kopetdag Mountains—*Stellio caucasius* (2), *Ablepharus pannonicus* (2), *Agrionemys horsfieldi* (2), *Coluber rhodorhachis* (3), *Vipera lebetina* (3), *Naja oxiana* (3), *Cyrtopodion caspius* (1), *Trapelus sanguinolentus* (2), *Coluber ravergieri* (3), *Pseudopus apodus* (3), *Mabuya aurata* (1), *Eremias strauchi* (2), *Eremias velox* (2), *Typhlops vermicularis* (2), *Eumeces schneideri* (2), *Eumeces*

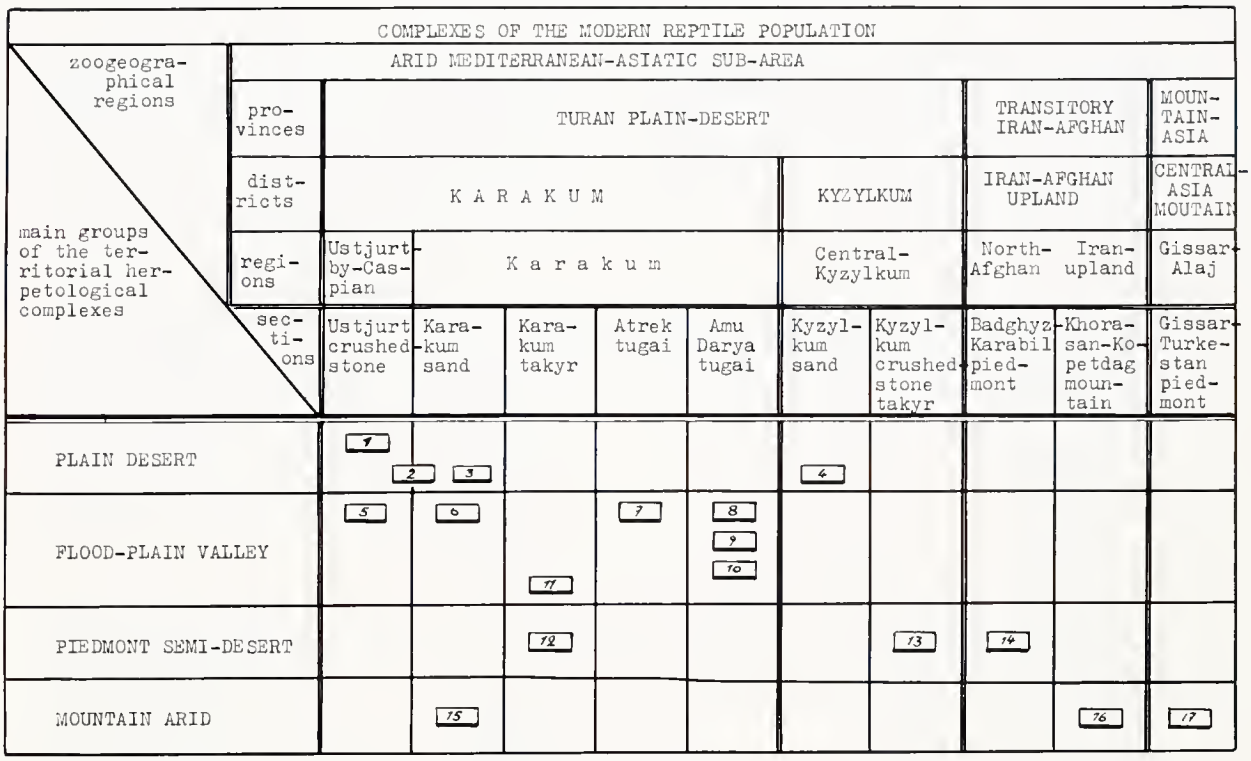

FIG. 2. Supplement to herpetological map of Turkmenistan.

taeniolatus (2), *Cyrtopodion spinicauda* (3), *Pseudocyclophis persicus* (3). Steppe-like, stone and inter-ridge hills—*Coluber caspius* (3). Stone inter-ridge hills and piedmonts—*Lycodon striatus* (3), *Psammophis schokari* (3). Steppe-like inter-ridge hills and piedmonts—*Eirenis medus* (3). Inter-ridge hills, piedmonts, and on construction sites—*Psammophis lineolatum* (3), *Spalerosophis diadema* (3). Stone and inter-ridge hills—*Oligodon taeniolatus* (3), *Eublepharis turcmenicus* (3). Piedmonts—*Varanus griseus* (3). Along shallow rivers and other water bodies—*Natrix tessellata* (2). Juniper stands—*Eryx elegans* (3), *Agkistrodon halys* (3).

17. Kugitang Mountain Complex

Various habitats of the Kugitang Mountains—*Cyrtopodion fedtschenkoi* (1), *Agrionemys horsfieldi* (2), *Vipera lebetina* (3), *Coluber ravergieri* (3), *Stellio lehmanni* (2), *Eremias velox* (2), *Naja oxiana* (3), *Ablepharus pannonicus* (2), *Coluber rhodorhachis* (3), *Eumeces schneideri* (2). Inter-ridge hills, piedmonts, and on construction sites—*Trapelus sanguinolentus* (2). Piedmonts, stone habitats, and on construction sites—*Cyrtopodion caspius* (2). Stone habitats and juniper stands—*Stellio chernovi* (3). Piedmonts, stone and inter-ridge hills—*Spalerosophis diadema* (3). Inter-ridge hills and stone surfaces—*Pseudopus apodus* (3), *Typhlops vermicularis* (3). Stone surfaces and piedmonts—*Psammophis lineolatum* (3). Piedmonts—*Lytorhynchus ridgewayi* (3). Along shallow rivers and other water bodies—*Natrix tessellata* (2).

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