

HERPETOFAUNA AND HERPETOLOGY IN ISRAEL

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Our survey area, comprising Israel with the Golan Plateau, West Bank and the Sinai Peninsula, approximates the size of England and Wales south of Birmingham. Its herpetofauna comprises about 100 land and freshwater reptilian species and six amphibians, owing to the heterogeneity of habitats and the area's geographical situation between three continents. The Mediterranean zone in the north, receiving over 200mm of average annual rainfall, carries low forests, maquis and shrub areas; the Saharo-Arabian desert zone in the south receives under 100, in some places under 50mm. The intervening Irano-Turanian steppe zone is narrow in Israel, with its abrupt boundary between mesic and desert habitats.

Based on the material in the National Collections (in Tel Aviv Univ. and Hebrew Univ.), the amphibians are restricted to the north, beginning with *Salamandra salamandra* of the Galilee and Mt. Carmel, through *Pelobates syriacus*, *Triturus vittatus*, *Hyla savignyi* and *Rana ridibunda* to *Bufo viridis* which penetrates the desert. The following account of the reptiles demonstrates zoogeographical principles rather than list all the species.

A few reptile species occur throughout the area, some showing different subspecies in and out of the desert: mainly *Hemidactylus turcicus* and *Ptyodactylus hasselquistii* (Gekkonidae; the latter probably comprises three parapatric species); *Agama stellio* (Agamidae); *Chalcides ocellatus* and *Eumeces schneideri* (Scincidae); *Psammophis schokari* (Colubridae).

Several species of southeastern Europe and Turkey occur in Mediterranean Israel but not in the desert. Notable examples are *Cyrtodactylus kotschy* (Gekkonidae); *Lacerta trilineata*, *L. laevis* and *Ophisops elegans* (Lacertidae); *Ophisaurus apodus* (Anguidae); *Coluber jugularis*, *C. nummifer*, *C. rubriceps*, *Eirenis decemlineata*, *E. rothi* and *Telescopus fallax* (Colubridae).

Among species restricted to the desert, the following groups are conspicuous: *Agama pallida*, *A. savignii*, *A. sinaita*, *Uromastix aegyptius* and *U. ornatus* (Agamidae); *Acanthodactylus boskianus*, *A. pardalis*, *A. opheodurus*, *A. scutellatus*, *Mesalina brevirostris*, *M. guttulata*, *M. olivieri* and *M. rubropunctata* (Lacertidae); *Coluber elegantissimus*, *C. rogersi*, *C. rhodorachis*, *Telescopus dhara*, *T. hoogstraali* (Colubridae) and the venomous snakes *Echis coloratus* and *Walterinnesia aegyptia*.

Sand occurs in the desert as disjunct "islands", to which psammophilous reptiles are often restricted. Many Saharan species are restricted to the Western Negev sands, e.g. *Stenodactylus petrii* (Gekkonidae), *Agama savignii* (Agamidae), *Scincus scincus* (Scincidae) and *Cerastes vipera* (Viperidae). Others extend their ranges for varying distances northwards along the coastal plain or eastwards to other sand patches, such as *Sphenops sepsoides* (Scincidae), *Lytorhynchus diadema* (Colubridae) or *Testudo kleinmanni*.

Several Arabian species occur in the Wadi Arava (along the Jordan frontier) but no further west: *Bunopus blanfordii* and *Stenodactylus (Ceramodactylus) doriae* (Gekkonidae) and *Cerastes cerastes gasperettii* (Viperidae).

The tropical *Atractaspis engaddensis*, together with *Echis coloratus* and other snakes, extends northwards along the warm Jordan Valley.

Endemics are few. *Chalcides guentheri* is restricted to the Mediterranean of Israel and adjacent Lebanon; *Uromastix ornatus* appears to be confined to Sinai and immediately adjacent areas; *Vipera bornmuelleri* occurs only on the high mountains of Lebanon and Hermon and *Cyrtodactylus amictopholis* Hoofien, 1967, is known only from Mt. Hermon above 1500m (though not rare there)

In summary, if one considers also marine turtles, the Israeli herpetofauna encompasses at least

twelve distinct patterns of zoogeographical distribution.

Several taxa have been described or discovered for Israel since the 1951 review by Haas, mainly in the desert and on Mt. Hermon. Noteworthy are the cases of *Testudo kleinmanni* rediscovered in the Western Negev sands in 1963 and *Psammophis aegyptius* the recognition of which in southernmost Israel only followed its identification in Sinai.

In principle in Israel amphibians and reptiles are protected by law. Few specimens are endangered except through habitat destruction which is the main problem. The Nile crocodile disappeared at the beginning of the century. The endemic *Discoglossus nigriventer* apparently vanished with the drying of Lake Hula, the whole species now consisting of only two museum specimens. *Lacerta trilineata* has been decimated, at least in some places, possibly by feral cats. *Natrix tessellatus* appeared to be mysteriously vanishing in recent years but has been rediscovered as abundant in at least one locality. The softshell turtle *Trionyx triunguis* has disappeared except for one river where it is protected, researched and fed by the Nature Reserves Authority. But the terrapin *Mauremys caspica rivulata* is now spreading southwards in artificial, even polluted, water bodies.

Nature protection is vested in the governmental Nature Reserves Authority, which also takes part in public education. The main effort of public education is carried by the Society for the Protection of Nature in Israel through its manifold and ramified activities, based in part on a network of field schools. The Society also initiated the Israel Herpetological Information Centre which operates in conjunction with the Hebrew University and Tel Aviv University. Among other activities the IHIC collects and computerizes assorted observations and together with the Hebrew University and the Nature Reserves Authority holds an annual Herpetological Symposium Day for a mixed audience of about a hundred.

Formal teaching of herpetology at university level is given mainly at the Hebrew University of Jerusalem which has an undergraduate course (about 15 students annually) and a graduate course (about six students every second year). However, theses (M.Sc., Ph.D.) centered on an amphibian or a reptile are executed also at other universities, especially Tel Aviv University.



Plate 1. *Stenodactylus sthenodactylus sthenodactylus* is a Saharan cursorial gecko widespread throughout the Negev of Israel, extending along the coastal sandy soils up to the Haifa bay, and eastwards to the Wadi 'Arava.

Shown is a hatchling and the egg shell from which it hatched;
the parent had originated from Holon, S of Tel Aviv.

(From Kodachrome diapositive, 21.IX.1979, by Y.L. Werner; scale, cm and mm.)

Recent major research efforts have included population and ecological genetics of *Bufo viridis*, *Hyla savignyi*, *Rana ridibunda* and *Agama stellio* (Haifa University); ecological and especially thermal physiology (Haifa University and Technion, Haifa); venomous snakes, snake venoms, and their evolution as well as both reproductive biology and physiology of embryos (Tel Aviv University).

At the Hebrew University, other than listing and mapping, the vocal behaviour of geckos and defensive behaviour of some snakes, as well as the fecundity of common lizard species, have been studied in conjunction with the Nature Reserves Authority. A major computerized ongoing project concerns geographic variation of common reptiles, throughout the Middle East, in morphological and reproductive characters, with a search for inter-character and environmental correlations.

(Additional information as well as literature references may be found in "Herpetological survey of Israel (1950-85), with comments on Sinai and Jordan and on zoogeographical heterogeneity" to appear in "Zoogeography and Terrestrial Ecology in Israel" edited by Y. Tom-Tov and E. Tchernov in the Monographiae Biologicae Series, Junk publishers.)