Review Article

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Systematics and distribution of the genus *Cyrtopodion* Fitzinger, 1843 (Squamata: Gekkonidae) on the Iranian plateau: A review

Abstract

The genus *Cyrtopodion* was named by Fitzinger in 1843 and includes a wide diversity of gecko species inhabiting the arid and semi-arid regions of the Iranian Plateau and beyond. The evolutionary relationships within and between these species are still not fully resolved and therefore, despite its critical ecological role, this genus remains in need of taxonomic study. The present paper compiles available information on the classification, morphological characteristics, and geographical distribution of Iranian species of *Cyrtopodion*, using original species descriptions from Iran, genetic studies, and global biodiversity databases. Special attention is given to the *agamuroides* group, which has an ambiguous classification and may harbor hidden diversity, as well as to species endemic to Iran. Based on the assessments, only a few species have been evaluated for their conservation status by the International Union for Conservation of Nature (IUCN) and further research in this region and more precise classification methods are required. The Iranian Plateau is highlighted as a key region for future studies on gecko biodiversity, evolutionary relationships and conservation approaches. Ultimately, resolving these taxonomic gaps can play a key role in developing effective conservation strategies for the endemic and threatened species of this genus on the Iranian Plateau.

Keywords: *Cyrtopodion*, iranian plateau, gekkonidae, systematics, biogeography, conservation

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Introduction

Geckos are well-known for their adhesive toe-pads, which have been extensively studied from biomechanical and biomimetic perspectives, with research focusing on setal morphology, frictional forces, and locomotor mechanics across various species and surfaces. However, despite this broad interest in their adhesive system, the taxonomic and biogeographic aspects of many gecko lineages—particularly in understudied regions—remain poorly understood, as most studies have concentrated on a few model species in laboratory settings rather than natural populations. This study focuses on the genus *Cyrtopodion* on the Iranian Plateau, where systematic reviews are lacking and conservation priorities are unclear.[1–44]

The various species of the genus *Cyrtopodion* Fitzinger, 1843, are still not well classified. Though there are only a few classifications made just for the Iranian species,[45] they mostly correspond to the well-known subgenera *Cyrtopodion*, *Mediodactylus*, and *Tenuidactylus*.[46–48] The main difference is that *C. agamuroides* and *C. gastropholis* have been placed into a separate group called the agamuroides group. Because of their morphological similarities, with their long legs and slender bodies, these two species were once considered to belong to the genus *Agamura*.[49,50] Therefore, later authors have classified them as *incertae sedis*[51] rather than in any of the *Cyrtopodion* subgenera. *Mediodactylus* was raised to full genus status based on genetic results that indicated *Cyrtopodion* is paraphyletic to *Agamura* and *Bunopus*,[52] confirming earlier suggestions by other authors.[50,53] Even though the remaining species of *Cyrtopodion* constitute a monophyletic clade, the relationships between the genus *Agamura*, the subgenera *Cyrtopodion* and *Tenuidactylus*, and the agamuroides group remain unresolved. Anderson's[45] view on the separate position of the agamuroides group is confirmed by the fact that each belongs to a different evolutionary lineage within the broader *Cyrtopodion* clade.[53] Two newly discovered species-*C. golubevi* and *C. persepolense*-were placed within the agamuroides group, suggesting this group may be a larger complex comprising eight to ten as-yet-unknown cryptic species.[54]

Despite the recognized diversity of *Cyrtopodion* on the Iranian Plateau, several taxonomic uncertainties remain, particularly regarding the *agamuroides* group, and comprehensive distribution data are lacking for most species. Furthermore, recent molecular evidence suggests that *Cyrtopodion* sensu lato may not be monophyletic, complicating our understanding of its evolutionary relationships. This study aims to address these gaps by providing a systematic review of the genus across the Iranian Plateau, with an emphasis on clarifying species boundaries, identifying distribution patterns, and highlighting priority areas for conservation.

Materials and methods

The data for this review study were collected from three main sources: original species descriptions available in indexed sources or reputable scientific databases, and articles published in credible international journals. For each species of the genus Cyrtopodion reported to occur on the Iranian Plateau, morphological descriptions were directly extracted and summarized from primary sources. For systematic evaluation, species were separated and compared based on key morphological traits including limb length ratios, dorsal and ventral scalation characteristics, the shape and number of subdigital lamellae, and coloration patterns, following the identification keys available in authoritative references. In cases where species identification was ambiguous, the original descriptions by the authors and the accompanying images in the articles were consulted. Distribution maps were prepared using data downloaded from the Global Biodiversity Information Facility (GBIF). Geographical data were filtered by removing duplicate records, points lacking precise coordinates, and obvious georeferencing errors. The conservation status of species was assessed based on evaluations available on the IUCN Red List. Scientific names and synonyms were updated according to the latest revisions published in the Reptile Database and recent taxonomic articles. Given the review nature of this study, the primary focus was on compiling and synthesizing published morphological, distributional, and conservation data, and the generation of new molecular or phylogenetic data was avoided. Accordingly, the systematic account is based on the most reliable and up-to-date taxonomic revisions available, with emphasis on morphological criteria and distribution records.

Morphological traits were extracted from original species descriptions and standardized for comparative analysis using a predefined character matrix. To verify synonymies and validate taxonomic assignments, we consulted the Reptile Database and relevant taxonomic revisions. Geographic coordinate data obtained from GBIF were cleaned using the CoordinateCleaner package in R (v. 4.2) to remove records with significant errors.

Systematic account

Order Squamata Oppel, 1811[55]

Family Gekkonidae Cuvier 1817[56]

genus *Cyrtopodion* Fitzinger, 1843[7]

i. *Cyrtopodion agamuroides*[58]

Diagnosis: The species lacks subfemoral tubercles; preanal pores are found only on male individuals, and they are situated on scales that are much larger than those surrounding them; the subcaudal plates, which are located one head-width behind the vent, are large and plate-like, arranged in a single median series; caudal tubercles form a terminal ring on each segment; the dorsal tubercles are distinctly smaller than the interspaces between them and not distinctly three-sided; the peritoneum is darkly pigmented; the limbs and tail are long and pointed; there are 24–28 abdominal scales across the mid-belly area (with 14–17 scales across the belly in a measurement equal to the length of the snout) The snout is less than 1.5 times the diameter of the eye.[45]

Conservation Status: The conservation status for this particular species is listed as LC, or Least Concern, on the IUCN website.[59]

Distribution: The Helmand province area of Afghanistan, in addition to Pakistan and eastern Iran, are among the locations where this species has been observed.[60]

ii. *Cyrtopodion brevipes*[62]

Diagnosis: There are no subfemoral tubercles present; males only have (4) preanal pores; the subcaudal scales, which are located one head-width behind the vent, are enlarged, appearing plate-like and arranged in a singular median sequence; caudal tubercles make up the terminal ring of each segment; dorsal tubercles are clearly more prominent than the interspaces, displaying strong keels and a trihedral shape; limbs and tail exhibit a robust build; across the back, the longest transverse series comprises 10 dorsal tubercles; the dorsal tubercles have a width that almost matches the maximum diameter of the ear opening; there are 9 supralabials.[45]

Conservation Status: According to data maintained on the IUCN website, this species is listed as LC, which stands for Least Concern in terms of its conservation status.[59]

Distribution: It follows from[60] that the type locality of this species is in Gedrosia, Baluchistan, and the species ranges within Iran: Aptan, Baluchistan.

iii. *Cyrtopodion golubevi*[54]

Diagnosis: The tail length ranges from 53 to 79 mm, while the distance between the vent and the snout is 43. 3 to 59 mm. The eyes are particularly big, and the muzzle is somewhat rounded and pointed. The middle of the body has ten longitudinal rows of rounded, smooth dorsal tubercles that run from the back of the head to the center of the sacrum, with 23–26 tubercles in each row. The tail consists of segments made up of half rings of bigger, somewhat keeled, spherical nodules. In non-regenerated tails, the subcaudal plates are organized in a single row along the midline, are wider than they are tall, and do not divide at the tip. The mid-belly has 22 to 30 abdominal scales, while the belly has 115 to 141 midventral scales. On enlarged scales, males have 3 to 6 (usually 4) very noticeable preanal pores in a row. There are 8 to 11 infralabial scales and 12 to 14 supralabial scales. The mental plate is large and has three pairs of submental scales, the first pair of which has a broad contact surface. There is a noticeable enlargement of the nasal shields. The tail and all four limbs are exceptionally thin and tapered. The dorsum features a pattern of six to eight transverse, thin dark bands, with the width of the spaces in between them being greater than the width of the bands themselves. The tail's tip is either light or white, with no transverse curves. This is a mature male specimen with the number ZMMU R-12624 (RAN 316). The snout-vent length is 47. 5 mm. The head is noticeably separated from the slender neck and is neither flattened (HeadH/HL ratio of 0. 45), particularly wide (HeadW/HeadL ratio of 0. 7), nor exceptionally long (with a HeadL/SVL ratio of 0. 27). With a SnEye/HeadL ratio of 0. 4, the snout is longer than the eye's diameter (OrbD/SnEye ratio of 0. 58) and has a somewhat pointed, rounded shape. The forehead and nose have tiny, spherical, granular, and consistent scales. The snout's scales are larger than those in the occipital area. With an OrbD/HeadL ratio of 0. 23, the eye is big, and its vertical pupil has serrated borders. The supraciliaries are short, with minute conical spines pointing backwards. The exterior ear hole has a vertical orientation and is tiny (Earl. /HeadL ratio of 0. 08) and oval in shape. The distance between the eye and ear is greater than the eye's diameter (EyeEar/OrbD ratio of 1. 06). The rostral scale is bisected to its midpoint by a longitudinal groove, and its width (1. 4 mm) is greater than its height (0. 9 mm). Two supranasals are separated by one large scale. The rostral scale is in touch with the first supralabial, the two supranasals, and the scale that lies in between them. Each nostril is round and bordered by a supranasal, a rostral, the first supralabial, and two enlarged postnasals, which are about the same size as the supranasals. The nasal shields are obviously enlarged. The orbit is separated from the supralabials by a single row of tiny scales. The mental scale is triangular, with a height (1. 8 mm) and width (1. 8 mm) that are equal. The first pair of enlarged postmentals makes broad contact, and there are three pairs overall. The trunk has nine infralabials and twelve supralabials. With poorly defined ventrolateral folds, the trunk is somewhat flattened and elongated (TrunkL/SVL ratio of 0. 46). Small granular to weakly conical scales cover the dorsal surface of the trunk. Smooth, rounded bumps, four to five times larger than the surrounding scales, are evenly spaced from the back of the head down the back and onto the base of the tail. There are about ten rows around the middle of the body but none on the sides. Belly scales are much larger than those on the back, smooth, and somewhat overlapping; their edges are smooth and rounded; the scales anterior to the vent are larger than those in the middle of the belly; there are 26 rows of belly scales across the middle of the belly reaching the ventrolateral folds; there are 123 scales in the middle row along the belly; throat scales are generally uniform and smooth. The four preanal pores are in larger scales compared to the surrounding ones; there are no femoral pores or enlarged femoral scales, or subfemoral bumps. The fore and back legs are extremely long, narrow, and thin (the ratio of fore leg to snout-vent length is 0. 53; the ratio of crus to snout-vent length is 0. 68); fingers are of average length and thickness; the fourth finger has 18 subdigital lamellae; the fourth toe has 25 subdigital lamellae. The tail is very long and extends beyond the length from snout to vent (ratio of tail to snout-vent length is 1. 19), is thin, tapers to a point, and shows evident segments because of the half rings of somewhat rounded tubercles with weak keels; the underside of the tail has one line of large subcaudal plates.[54]

Conservation status: The conservation status of this particular species has not yet been assessed on the IUCN Red List of Threatened Species.[59]

Distribution: The holotype specimens used to first describe *Cyrtopodion* golubevi are from the Sistan and Baluchestan Province in southeast Iran. Iran, Sistan-Baluchestan Province, about 100 kilometers northwest of Iranshehr, near Bazman, is where the species was first discovered (at 27°52' North latitude, 60°06' East longitude, and an altitude of 1060 meters).[60]

iv. *Cyrtopodion hormozganum*[63]

Diagnosis: These geckos are little, with a snout-vent length of 40 to 46 mm and an original tail length of 58 to 61. 8 mm. Their backs are covered with noticeable, sharply ridged, three-sided humps that create 10 to 14 longitudinal lines in the center of their body, with just 1 to 3 little scales dividing these lines. The tail has distinct sections made up of half-rings of huge, notably ridged oblong bumps, and there are 20–24 bumps between the back of the head and the center of the sacrum. The tail's underside has a single row of plates in the middle that are wider than they are tall, and the original tail's scales are split in two at the end. There are between 18 and 23 scales covering the middle of the stomach, and between 92 and 112 scales covering the center of the underside of the body. Within scales of comparable size to those surrounding them, males have 16 to 22 precloacal and femoral pores arranged in a single line. The preanal pores form a row that makes an obtuse angle. 9 to 11 scales can be seen above the top lip, while bottom lip has 8 to 9 scales. The mental plate is big, and the first pair of three pairs of scales that lie behind it makes extensive contact. There are 6 to 8 wide, black stripes on the tail's underside.[63]

Conservation status: Currently, the IUCN has not yet established a conservation status for *Cyrtopodion hormozganum*.[59]

Distribution: The species' distribution, according to the original specimens, is in the Hormozgan Province of Iran. To be more precise, the location where the original specimen was discovered is described as 27 kilometers northwest of Minab in Iran's Hormozgan Province (27°24' N, 56°57' E) at an altitude of 77 meters above sea level.[60]

v. *Cyrtopodion kachhense*[64]

Diagnosis: The anterior pair has larger postmental shields that touch each other behind the mental groove. Subfemoral tubercles are absent. Males only have preanal pores. The subcaudal scales are tiny and smooth, rather than big or plate-like; they are located one head-width behind the vent. Each annulus terminates in a terminal ring of caudal tubercles, and the rows of larger dorsal tubercles are free of any scattered tiny tubercles (Fig. 73). Due to their intense pigmentation, the lower viscera are frequently seen as a dark patch via the abdominal skin.[45]

Conservation status: This species is listed as LC on the IUCN website, which denotes that it is of Least Concern.[59]

Distribution: Pakistan's Balochistan, Sindh, and Cutch, Iran, and nearby areas of India (Kachchh, Gujarat) are all included in the distribution. ingoldby: This species description's original location is "Ladha" (= Ladha, Dera Ismael Khan District, southeastern NWFP, Pakistan), which is widely distributed throughout the Sulaiman Range, extending into the Waziristan Hills, and along Pakistan's western border with Punjab. kachhense: Discovered in Pakistan (Sind, Cutch, Baluchistan); Ladha, Dera Ismael Khan, in the southeast of the Northwestern Frontier Province, Pakistan, is where this species was initially described. watsoni: Discovered in Pakistan (Northwestern Frontier Province); Quetta is where this species was originally described.[60]

vi. *Cyrtopodion kiabii*[65]

Diagnosis: With the final 26 mm having regrown, the tail measures 46. 3 mm, and the distance between the snout and vent is 46. 9 mm. The length of the front legs (as measured from the shoulder to the wrist) is approximately half the distance between the mouth and the vent, while the length of the back legs (as measured from the pelvic joint to the wrist) is two-thirds of that distance. The head's width is twice that of the neck, and its length is 1. 6 times greater than its width. In terms of size, the eye socket is about the same length as the snout. The nostril is surrounded by three lesser nasal scales and is located just above the junction of the rostral and first labial scales, touching both. The nostril's scales seem to be swollen. The rostral scale is large, with a noticeable groove that extends from its back edge all the way to the tip of the snout. The rostral is bordered at its rear by three internals, the middle one of which is partially tucked into the rostral groove. There are twelve supralabial scales on the right side and eleven on the left; there are ten infralabial scales on either side. The mental shield is a massive figure that might be triangular or pentagonal in shape, and it is followed in the back by three pairs of enormous postmental scales, with a little scale separating the middle pair. From the mental scale to the cloaca, there are twelve ventral scales that run across the midbody and a series of 104 ventral scales that line the center. There are 22 subdigital lamellae under the fourth finger and 26 under the fourth toe. This obviously mature male specimen lacks femoral pores but has four functioning preanal pores situated within noticeably big scales, and the subfemoral scales exhibit enlargement. The scales that are immediately adjacent to the preanal pores also seem larger when compared to the surrounding scales. At the base of the tail, on each side, there are two postcloacal tubercles. Nine lines of dorsal tubercles run along the spine's center. These tubercles are rounded and frequently have a little keel. The distance between tubercles is equal to or greater than the size of the tubercles. The surface of the femur is additionally textured by round tubercles. With two of these appearing each segment, the original tail shows a row of plate-like, wider than tall subcaudal scales. The tail's dorsal and lateral scales are varied, with tiny, granular scales mixed in with larger, three-sided tubercles. The latter are organized into rows of six tubercles each around the tail. The tubercles that make up the last row of each segment are the most noticeable.[65]

Conservation status: As of right now, *Cyrtopodion kiabii* is not listed on the IUCN Red List, which means that, according to that system, it does not have a formal conservation evaluation.[59]

Distribution: This specific species is known to dwell in Iran's southern regions, particularly in the southern part of Bushehr Province. The precise place where this species was originally discovered is about 4.

5 kilometers southwest of Nayband village, close to the Persian Gulf coast, at an elevation of 108 meters.[60] (27°21′9. 5″ N, 52°37′56. 5″ E).

vii. *Cyrtopodion kirmanense*[58]

Diagnosis: The foremost set of expanded postmental shields touch each other; there are seemingly no tubercles beneath the femurs; males exhibit 4 pores in front of the vent; the scales underneath the tail, situated a head-width after the vent, are broadened, resembling plates, with a smooth texture, arranged in 2 rows lengthwise featuring scales of varying sizes; the bumps on the back are noticeably more pronounced than the areas between them; the snout's length is 2 to 2.25 times the eye's diameter.[60]

Conservation Status: According to the data documented on the IUCN site, this species is categorized as LC, meaning it poses the Least Concern for conservation.[59]

Distribution: This species inhabits the eastern regions of Iran, notably the Kerman Province. The original location where this species was identified is noted as 'Mons Ku-i-Tuftan in Sargado, Kirmanum orientale' and also as 'Kuh-e Taftan, Sargad, Iran, as well as eastern Kerman, Iran'.[45]

viii. *Cyrtopodion persepolense*[54]

Diagnosis: The body length from snout to vent ranges from 33.7 to 51 mm, while the tail length extends between 39 and 55 mm; smooth, rounded bumps on the back create 10 to 12 lines running lengthwise along the body's center, and the quantity of these bumps in each line (measured from the back of the head to the middle of the sacrum) varies from 25 to 30; the tail consists of sections shaped by half-rings of bigger bumps with ridges, the scales underneath the tail are split, with two pairs for each tail section; across the belly's middle, there are 28 to 35 abdominal scales, and lengthwise along the belly, there are 114 to 132 midventral scales. Males possess 2 to 6 (typically 4) very noticeable pores located before the anal area, arranged in a consistent line on enlarged scales. The count of infralabial scales ranges from 9 to 11, and supralabial scales from 10 to 12. The scales found on the inner part of the femur are uniformly small. The mental plate is of significant size, featuring 3 pairs of submental scales, with the initial pair either separated by a tiny scale or touching at a single point. The limbs and tail are slender and tapered.[54]

Distribution: This species can be found inhabiting the southwestern region of Iran, specifically within the Fars Province. Its original discovery location is about 60 km to the northeast of Shiraz, in the vicinity of Takht-e-Jamshid (Persepolis), positioned at coordinates 29°55′ N, 52°53′ E, and at a height of 590 meters above sea level.[60]

Conservation Status: At present, *Cyrtopodion persepolense* has not been included in the IUCN Red List, and there has been no official conservation standing designated to this particular species.[59]

ix. *Cyrtopodion scabrum*[66]

Diagnosis: The digits possess claws and are elongated, with the last two or three segments bending at an angle from the main section. Underneath the digits, you'll find smooth, transverse rows of lamellae positioned one after the other. The end section of each digit shows minimal or no flattening on the sides. Generally, the sides of the digits have three or more rows of scales without any fringes or jagged edges. A lengthwise dip on the front part of the head is either not there or only slightly noticeable. Typically, the count of scales positioned between the midpoints of the eyes stays at or below 30. The pupil has a vertical shape featuring notched edges in both the front and back. Usually, you'll find two or three pairs of shields after the mental shield, with the initial pair touching behind the mental shield. Males have pores located either before the anus or on the femurs. Distinct segmentation is apparent in the tail structure.[67]

Conservation Status: The IUCN Red List data indicates this species' conservation status as Least Concern (LC).[59]

Distribution: *Cyrtopodion scabrum* has a widespread habitat covering regions in the Middle East, North Africa, and South Asia. This species is found in areas such as Turkey, Egypt (Siwa Oasis, Red Sea coast), Sinai (Tor), Israel, Iraq, Iran, Saudi Arabia, Oman, Yemen, the United Arab Emirates (UAE), Kuwait, Qatar, Eritrea, Sudan's coastal areas, India (especially Gujarat and Jammu & Kashmir), Pakistan, Jordan, and Afghanistan. The subspecies basoglui is solely found in Turkey. The original location was specified as "Umgebung von Tor (Sinai)".[68] Confirmed sightings show *C. scabrum* living across a large area, particularly with many living in the dry and somewhat dry parts of southwestern Asia. Furthermore, populations that have been introduced are known to exist in the western and central parts of North America, including certain areas within the United States.[61]

x. *Cyrtopodion sistanense*[69]

Diagnosis: The tail length of the snout-vent SVL ranges from 54 to 57 mm, while the tail length of the LCD is between 68 and 78 mm. There are 24 to 29 tubercles between the occiput and the center of the sacrum, and 14 to 16 longitudinal rows of large, strongly keeled trihedral dorsum tubercles in the middle of the body. On each segment, semi-rings of large, greatly keeled oblong tubercles create the tail's pronounced segments. The main and additional (less advanced) subcaudal plates are located in a single median series, and the width of the subcaudal scales in the last third of the non-regenerated tail is bifid; there are 24 to 42 abdominal scales across the middle of the belly and 120 to 156 midventral scales along the trunk. Males have six highly pronounced preanal pores arranged in a regular row on scales, which are practically the same size as the other scales that are not large or uniform. There are between 9 and 10 infralabial scales and 10 and 12 supralabial scales. The mental plate is big, with three to four pairs of submental scales, the first pair of which is in wide contact.[69]

Conservation Status: The IUCN website's recorded information shows that the conservation status of this species is categorized as Least Concern or LC.[59]

Distribution: This species is found in southeastern Iran, particularly in the province of Sistan and Baluchistan. The type locality is located close to Nosratabad, around 90 kilometers west of Zahedan, at an altitude of 1300 meters above sea level at coordinates 29°50' N, 59°53' E.[60]

Results

In this review, the existing species of the genus *Cyrtopodion* with confirmed distribution on the Iranian Plateau were summarized and examined. Some species showed the widest distribution, while some species are found only in limited areas of Iranian provinces. Morphologically, diversity in morphological traits such as the sharpness of dorsal tubercles and slenderness of limbs is noteworthy. Assessment of conservation status based on IUCN showed that only a few species are classified as Least Concern, while other species still lack a conservation assessment. According to GBIF data, the highest density of occurrence points is concentrated in the southern half of Iranian provinces.

Discussion

The findings of this review indicate that the genus *Cyrtopodion* on the Iranian Plateau possesses considerable diversity, but its classification still faces serious ambiguities, and one of the main challenges is its taxonomic placement. The *agamuroides* group, in particular, remains poorly defined, with unresolved phylogenetic relationships to other subgenera such as *Tenuidactylus* and *Mediodactylus*.

The placement of *C. agamuroides* and *C. gastropholis* as *incertae sedis* further complicates the picture, highlighting the need for integrative taxonomic approaches combining molecular and morphological data.

The distributional findings of this study show that certain species are mainly restricted to southeastern Iran and exhibit many similarities to each other, a pattern that may be due to geographic isolation caused by mountain ranges and central deserts. This suggests that the Iranian Plateau has served as both a barrier and a corridor for the diversification of this genus, a pattern observed in other Palearctic reptiles as well. In contrast, some species have a much wider distribution and have been reported beyond the borders of Iran, which may be due to higher ecological flexibility and adaptability to different environmental conditions, including varying altitudes and climatic regimes. Species such as *C. scabrum*, for example, are known to thrive in human-modified habitats, which may facilitate their spread across the region. These ecological differences between widespread and endemic species suggest different evolutionary trajectories and conservation priorities within the genus.

A major limitation of this review is the severe lack of conservation data for most species of this genus. Among all the species reviewed, only a few have been assessed on the IUCN Red List, while the rest lack any conservation status. This issue is particularly concerning for endemic species, because due to their limited distribution, they are more vulnerable to human threats such as road development, mining, climate change, and habitat destruction. The absence of basic ecological data, including population size and trends, further hinders any conservation planning. Therefore, we recommend that future studies prioritize field surveys and ecological assessments for the most range-restricted and data-deficient species.

The main limitation of this study is its reliance on data available in public databases. These data may not cover all information, such as the actual distribution points of the species, and may also contain sampling errors, including misidentification of species due to outdated taxonomy or incorrect georeferencing. Nevertheless, in the absence of integrated and up-to-date field data, using these databases is the best available option for outlining the distribution landscape of the species. Future efforts should aim to fill these gaps through targeted field expeditions and molecular confirmation of doubtful records. Despite these limitations, this review provides a baseline framework for future taxonomic and conservation research on *Cyrtopodion* in the Iranian Plateau.

Conclusion

This comprehensive review of the genus *Cyrtopodion* on the Iranian Plateau confirms the presence of at least 10 species, with distribution patterns concentrated in the hot and arid regions of the southern half of the country. While some species, such as *C. scabrum* and *C. kachhense*, are widely distributed and ecologically flexible, others-including *C. golubevi*, *C. kiabii*, and *C. hormozganum*-are narrow-range endemics, each adapted to specific arid or semi-arid environments. The taxonomy of the genus remains uncertain, particularly for the *agamuroides* group, and molecular evidence has revealed paraphyly within *Cyrtopodion* sensu lato, underscoring the need for integrative taxonomic approaches combining molecular, morphological, and osteological data. From a conservation perspective, the majority of Iranian *Cyrtopodion* species lack formal IUCN assessments, a gap that is especially concerning for range-restricted species vulnerable to habitat destruction, climate change, and human activities. The presence of introduced *C. scabrum* populations in North America further highlights the ecological adaptability of some members of the genus. In summary, the Iranian Plateau stands out as a key center of diversity and endemism for *Cyrtopodion*, offering a unique opportunity for future research. Targeted field surveys, combined with molecular and morphological analyses, are essential to resolve taxonomic uncertainties, document hidden diversity, and guide effective conservation strategies in one of the most biogeographically significant regions of the Palearctic realm.

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Conflicts of interest

The author declares that there are no conflicts of interest.

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