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SPECIFIC SUPRAOCULAR SCUTELLATION PATTERNS AS SIGNIFICANT DIAGNOSTIC CHARACTERS: A TAXONOMIC INTER AND INTRAGENERIC "FINGER-PRINT" IN LACERTILIA

José M. CEI[1]

RESUMEN: Prolongadas observaciones morfológicas en centenares de especímenes de lacertilian, demuestran en cada taxon una significativa peculiaridad de los patrones de distribución de las escamas supraoculares, desde un nivel específico a categorías superiores como género, familia, orden. Se analizan, con dibujos detallados, diferentes patrones propios de ejemplares de géneros pertenecientes a familias de Iguania, como Leiosauridae, Tropiduridae, Liolaemidae, comparándolos con patrones de Teiidae, familia del orden Scleroglossa. Los patrones de los taxa intragenéricos de la familia Leiosauridae evidencian una afinidad inconfundible, examinando la lepidosis supraocular característica de las especies de *Pristidactylus*, *Diplolaemus*, *Leiosaurus*. Hay un patrón exclusivo de cada género que establece a simple vista una separación intergenérica de indudable valor diagnóstico. Estas observaciones se repiten en Tropiduridae, con los taxa de los géneros *Uranoscodon*, *Tropidurus* y *Ophryoessoides*: las acompañan consideraciones sistemáticas en cada caso. Lo mismo ocurre con la familia Liolaemidae, con análoga diferenciación específica de las supraoculares en *Phymaturus* y en las numerosas formas de *Liolaemus*. Según el significado general de las peculiaridades morfológicas encontradas, se verifica un llamativo contraste entre los anteriores hallazgos en Iguania y la lepidosis supraocular de Teiidos de los géneros *Dicrodon* y *Kentropyx*, del distinto orden Scleroglossa. Se llega a concluir que la citada constancia de la lepidosis supraocular, además de constituir un notable atributo morfológico de cada taxon –casi definible como un curiosos "finger-print" de lagartos y lagartijas- también puede ser un elemento diagnóstico complementario para una identificación preliminar de ejemplares desconocidos.

ABSTRACT: The specificity of the supraocular patterns in lacertilian is recognized and analysed. Inter and intrageneric specific differences in lizards belonging to families of Iguania as Leiosauridae, Tropiduridae, Liolaemidae are pointed out. A significant comparison with the very different supraocular scutellations of teiid genera *Dicrodon* and *Kentropyx* is carried out. The suitable diagnostic use of this morphological trend of systematic value is put in evidence. Its peculiar structure and unquestionable specificity give to it a physiognomy of some unusual kind of herpetological "finger-print".

Palabras claves: patrón específico, lacertilian, lepidosis, diagnosis
Key words: specific pattern, Lacertilia, scutellation, diagnosis

INTRODUCTION

Through four decades of comparative research on several hundreds of specimens belonging to different orders, families and species of Lacertilia, conclusive observations lead to point out a clear-cut peculiarity of their supraocular scutellations. The patterns of the latter structures show a distinct morphological expression in accordance with the different systematic levels of any observed specimen. In fact, for example, a characteristic supraocular pattern can be put in evidence for all the lizards of the family Leiosauridae, as well as for any other lizard belonging to other families, as Polychroti-

(1) Departamento de Ciencias Naturales, Universidad Nacional de Rio Cuarto, Córdoba y Facultad de Ciencias Agrarias, Universidad Nacional de Cuyo, Mendoza, Argentina.
Hilario Cuadros 81, (5501) Godoy Cruz, Mendoza. E-mail: fvidela@lab.cricyt.edu.ar

dae, Tropiduridae, Liolaemidae, etc. Any taxon included in each genus of every family shows, moreover, a specific supraocular pattern, with a relatively moderate or insignificant individual variation. Of course, major distinctive differences may also be found comparing species registered at a more elevated systematic rank, as the Iguania or Scleroglossa orders. The general taxonomic interest of this localized but peculiar morphological trend cannot be disregarded and its suitable application in diagnostic examination of herpetological samples must be taken into account.

The purpose of this short note is to exemplify the specific supraocular scutellation arrangements in representative taxa of Neotropical lizards, carefully reported in original comparative drawings from living or well preserved specimens. The here illustrated significant species were ordered, in our figures, following their systematic affinities. A concise discussion will follow, with some detailed remarks on my findings.

MATERIALS AND METHODS

Given the purposes of the work, a list of all the examined specimens should be prolix and unneessary. Morphological details were drawn under a dissecting microscope. Approximate magnifications of the supraocular lepidosis were indicated (in mm) in some drawings by lines along ciliary eye borders. For herpetological nomenclature the Peter's Dictionary (1964) was a reference. Acronyms of Scientific Institutions or Personal Herp. Collections,

cited in labeled drawn specimens are: MACN-Mus. Argent. Cie. Nat. Bs.As.; MMHN-SR-Mus. Munic. Hist. Nat. S. Rafael, Mza.; MZUSP- Mus. Zool. Univ. S. Paulo; KU-Univ. Kansas Nat. Hist. Mus.; MRSN-Mus. Regional Sci. Nat. Torino. It.; JMC-DC- J.M. Cei Diagnostic Collection; MNHN-Mus. Nat. Hist. Nat. Paris.

Morphological and systematic remarks and conclusions

Reports on Saurian supraocular region, between the circumorbitals and superciliaries, evidently are frequent in the whole herpetological literature. Many records and figures could be cited, but a whole systematic interpretation and a true critical valuation of the specific supraocular scutellation is unreported to my knowledge. In the paper by Frost y Etheridge (1989) on phylogenetic analysis of iguanian lizards, only transformations of superciliary scales and subocular scales are remembered. But in Frost's taxonomic revision of the *Tropidurus* group of lizards (1992) the interest of the circumorbitals in one row or in two rows between the supraoculars and the median head shield was emphasized, given its suitable diagnostic value to discriminate the genera *Uranoscodon*, *Microlophus*, *Plesiomicrolophus* and *Tropidurus*. Likely, in a former comparative research (Etheridge, 1970), systematic differences of superciliaries produced vertically, or not or only weakly produced, to form a longitudinal crest, have been suitably applied to discriminate taxonomically *Plica* and *Uranoscodon* from the other members of the *Tropidurus* group.

As anticipated in the introduction, my present paper try to point out graphically the peculiar specific arrangement of supraocular scales, following a significant systematic pattern for several families, genera and species of iguanian lizards, and for few contrasting genera of Scleroglossa Teiids.

In fig. 1 the drawings A-D are applied to representative species of *Pristidactylus*, a cis-trans-Andean genus recently analysed by Cei *et al*. (2001): a member of the austral South American family Leiosauridae, separated from Polychrotidae by Frost *et al*. (2001). The drawings E,F, belong to the genus *Diplolaemus*, the drawings G-I to the genus *Leiosaurus*. Specific differences in scutellation patterns are clearly exhibited by

Pristidactylus scapulatus, *P. araucanus*, *P. nigroiugulus* and mainly by *P. fasciatus*, phyletically the most differentiated form of the genus. Extant but minor diversity is shown by *Diplolaemus darwini* and *D. bibroni*, however in the genus *Leiosaurus* a fundamental pattern similarity is modified by specific peculiarities, such as the poorly distinct circumorbitals in *L. belli*, or the enlarged scale rows bordering the superciliaries of *L. catamarcensis*.

In Fig. 2 significant specific samples of the family Tropiduridae are presented. The drawing A point out the unusual pattern of the Amazonian *Uranoscodon*, whose supraocular scutellation is unique. The drawing B belongs to *Microlophus peruvianus*, a representative taxon of a trans-Andean genus of tropidurid lizards, whose relationships with the cis-Andean genus *Tropidurus* are notorious (drawings C-J). In spite of a remarkable specific differentiation, marked by the variable longitudinal row of larger transversal supraocular scales, an unmistakable "*Tropidurus* pattern" is evident in the several taxa of the figure, as well as in the many other omitted members of this vigorous phyletic line. In the cited Frost's revision (1992) some related genera were included in the genus *Tropidurus*, such as *Plica*, whose taxon *Plica umbra* Linnaeus, 1758 was here reported with the drawing K. Several differences in supraocular scutellation can be observed, comparing *Tropidurus umbra* (Linnaeus, 1758) with the *Tropidurus* drawing C-J of the Fig. 2. Another of the various genera of the family Tropiduridae is also shown by the drawing L: the Ecuadorian *Ophryoessoides iridescens*, synonymized under the genus *Stenocercus* in the same Frost's paper (1992). The generic and specific peculiarities of such a supraocular pattern can be again pointed out.

In Fig. 3 two genera of the family Liolaemidae (Frost *et al.*, 2001) are reported: *Phymaturus* and *Liolaemus*, a very successful evolutionary branch having more than 160 recognized taxa, still in post-glacial speciation. Two main groups of *Phymaturus* were proposed by Etheridge (1995), apparently as well supported by the karyological research (Cei and Videla, 2003: in press). A *Phymaturus patagonicus* group, exemplified in the drawing A, including six taxa (*patagonicus*, *somuncurensis*, *zapalensis*, *payuniae*, *nevadoi*, *indistinctus*), and a "*palluma*" (= *flagellifer*) group with several taxa from Northern and Central Argentina (*antofagastensis*, *mallimaccii*, *punae*,

adrianae), represented by the drawings B,C in the Fig. 3. Dissimilarity between these group can be likely supported by their supraocular patterns, being controlled on a number of specimens of all the described taxa of the genus. All the lizards of the *patagonicus* group can be referred to the drawing A for their supraocular scutellation, of course with some specific variation, as in any similar intrageneric relationship. Superciliaries, e.g., are rather produced in *P. somuncurensis*, *P. zapalensis*, *P. payuniae;* circumorbitals are poorly distinct in *P. payuniae*, reduced in *P. somuncurensis* and *P. zapalensis*. General features of the group are shown by any form of the other *Phymaturus* line, however some specific characteristics can be pointed out, mainly for the relative size of circumorbitals. A comparison between *P. mallimaccii* (drawing B) and *P. punae* (drawing C) may indicate such a minor divergence.

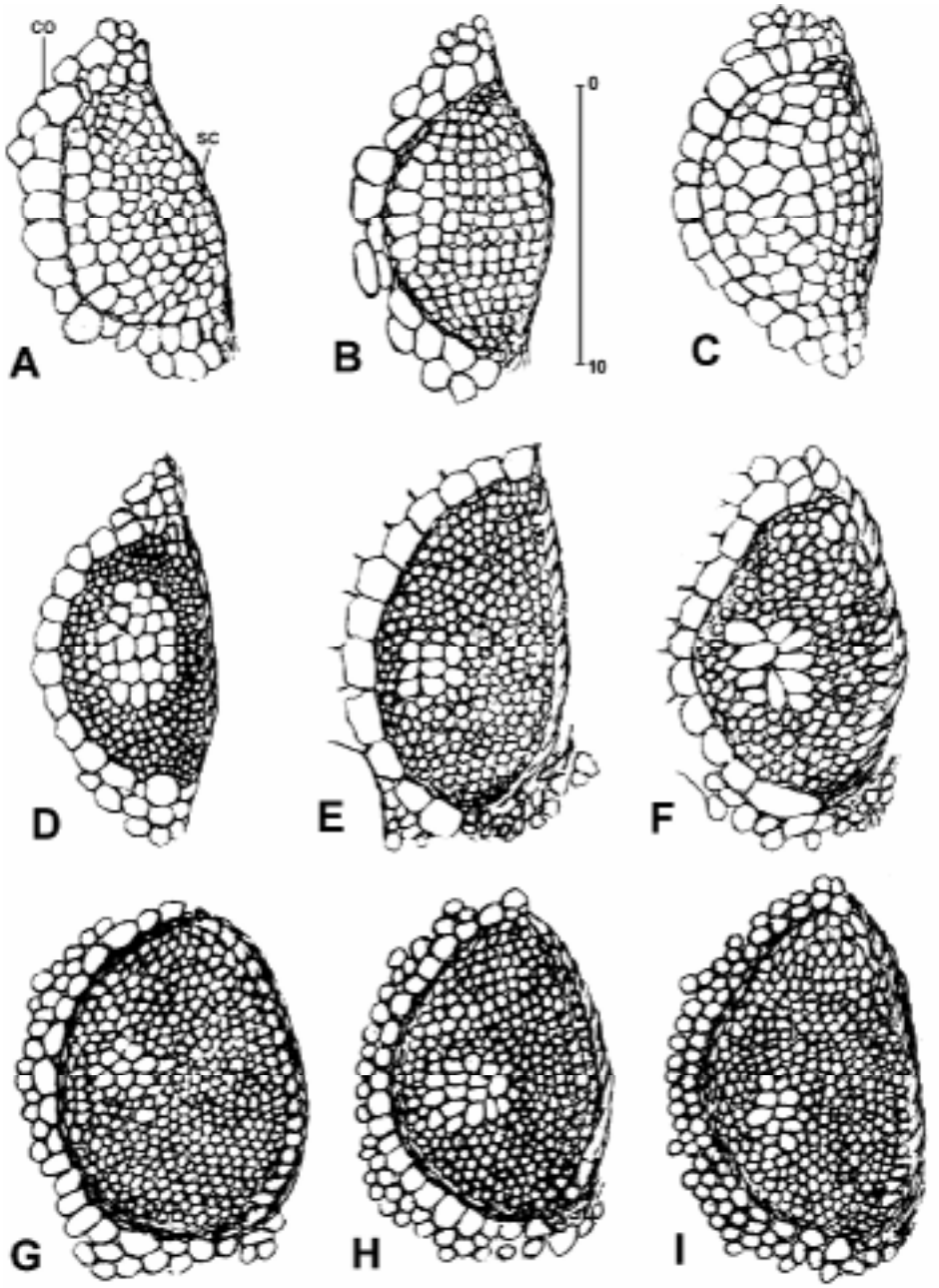

Fig. 1: Supraocular scutellation patterns in species of the Iguanian family Leiosauridae: A- *Pristidactylus scapulatus* (Burmeister, 1861), male, from Paramillo, Uspallata, 3000 m.a.s.l., Mendoza Province (JMC-DC, 631); B- *P. araucanus* (Gallardo, 1964), male, from Laguna Blanca, Zapala, 1200 m.a.s.l., Neuquén Province (MACN, 17702); C- *P. nigroingulus* Cei, Scolaro, Videla, 2001, male, from Telsen, 1000 m.a.s.l., Chubut Province (MACN, 37092); D- *P. fasciatus* (Dorbigny, 1837), male, from Cerro Nevado, Mendoza Province (MMSR, H-800); E- *Diplolaemus bibroni* Bell, 1843, male, from Ea. Vizcaina, S Lago, Buenos Aires, Santa Cruz Province (UMC-DC, 540); F- *D. darwini* Bell, 1843, male, from Puerto Deseado, Santa Cruz Province (JMC-DC, 536); G- *Leiosaurus catamarcensis* (Koslowsky, 1898), male, from 60 km S Iglesias, San Juan Province (JMC-DC, 005); H- *L. paronae* (Peracca, 1897), male, from Nacuñán, Santa Rosa Dept., Mendoza Province (JMC-DC, 824); I- *L. belli* Duméril & Bibron, 1837, male, from 15 km S Nihuil, Mendoza Province (JMC-DC, 006).

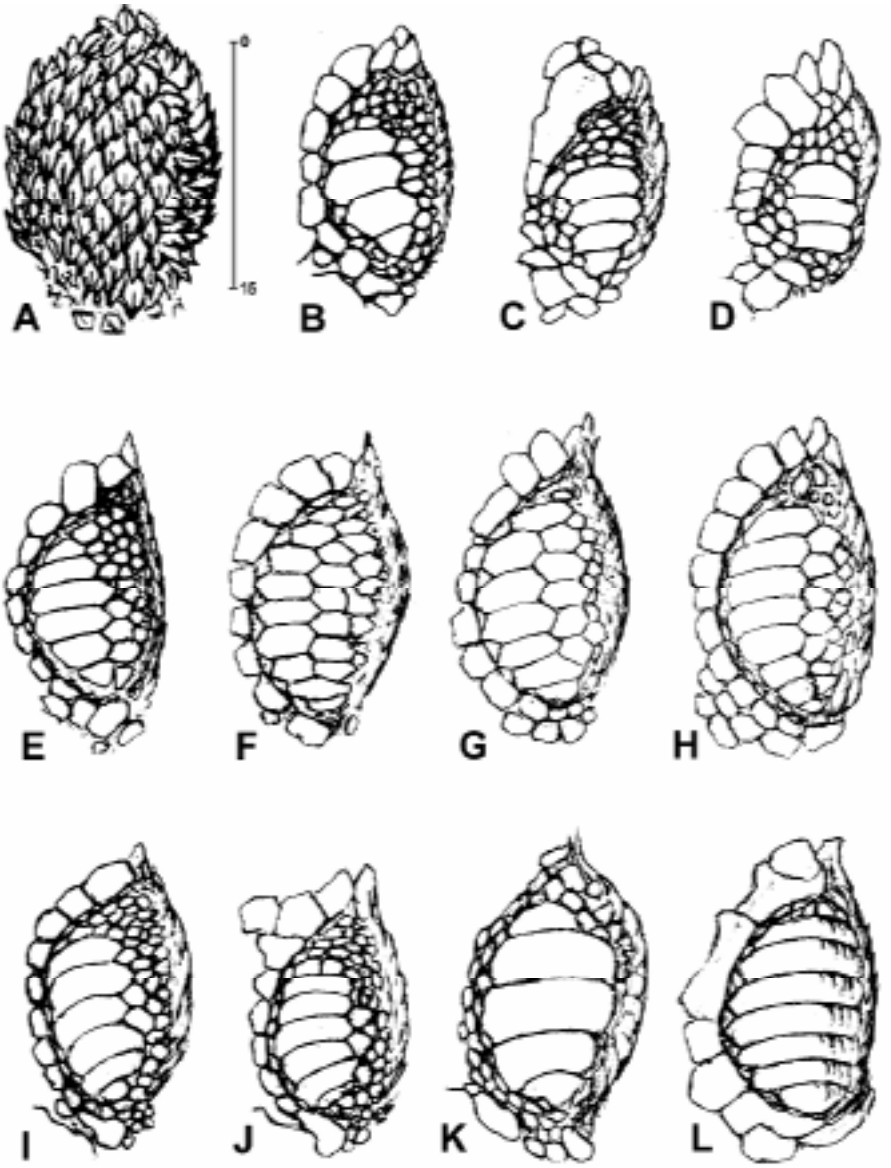

Fig. 2: Supraocular scutellation patterns in species of the Iguanian family Tropiduridae: A- *Uranoscodon superciliosus* (Lesson 1758), male, from Trois Sants, Guyane Française (from MNHN-Paris, JMC-DC, 362); B- *Microlophus peruvianus* Lesson, 1831, male, from Rio S. José, Arica, Chile (from Lab. Gen. Univ. Chile, JMC-DC, 631); C- *Tropidurus spinulosus* (Cope, 1862), male, from El Durazno, Tanti, 1130 m.a.s.l., Córdoba Province (JMC-DC, 062); D- *T. spinulosus* (Cope, 1862), male, from Palmar Largo, Formosa Province (MRSN, R-0172); E- *T. hispidus* (Cope, 1862), male, from Machurucutu, Estado Miranda, Venezuela (JMC-DC, 682); F- *T. catalanensis* Gudynas & Skuk, 1983, male, from Puerto Iguazú, Misiones Province (JMC-DC, 1103); G- *T. torquatus* Wied-Neuwied, 1825, male, Cabo Frio, Rio de Janeiro, Brasil (from MZUSP-39512, JMC-DC, 486); H- *T. etheridgei* Cei, 1982, male, from Mina Clavero, 900 m.a.s.l., Córdoba Province (MRSN, R-0374); I- *T. melanopleurus pictus* Müller, 1923, female, Quebrada Acambuco, Dique Itiyra, Salta Province (JMC-DC, 457); J- *T. melanopleurus pictus* Müller, 1923, male, from Angosto del Pescado, 600 m.a.s.l., Salta Province (JMC-DC, 458); K- *T.* (*Plica*) *umbra* (Linnaeus, 1758), male, from Crique Elespaning, Guyane Française (from MNHN-Paris, JMC-DC, 359); L- *Ophryoessoides iridescens* (Günther, 1859), male, from Esmeralda, Ecuador (from UK, 142685, JMC-DC, 777).

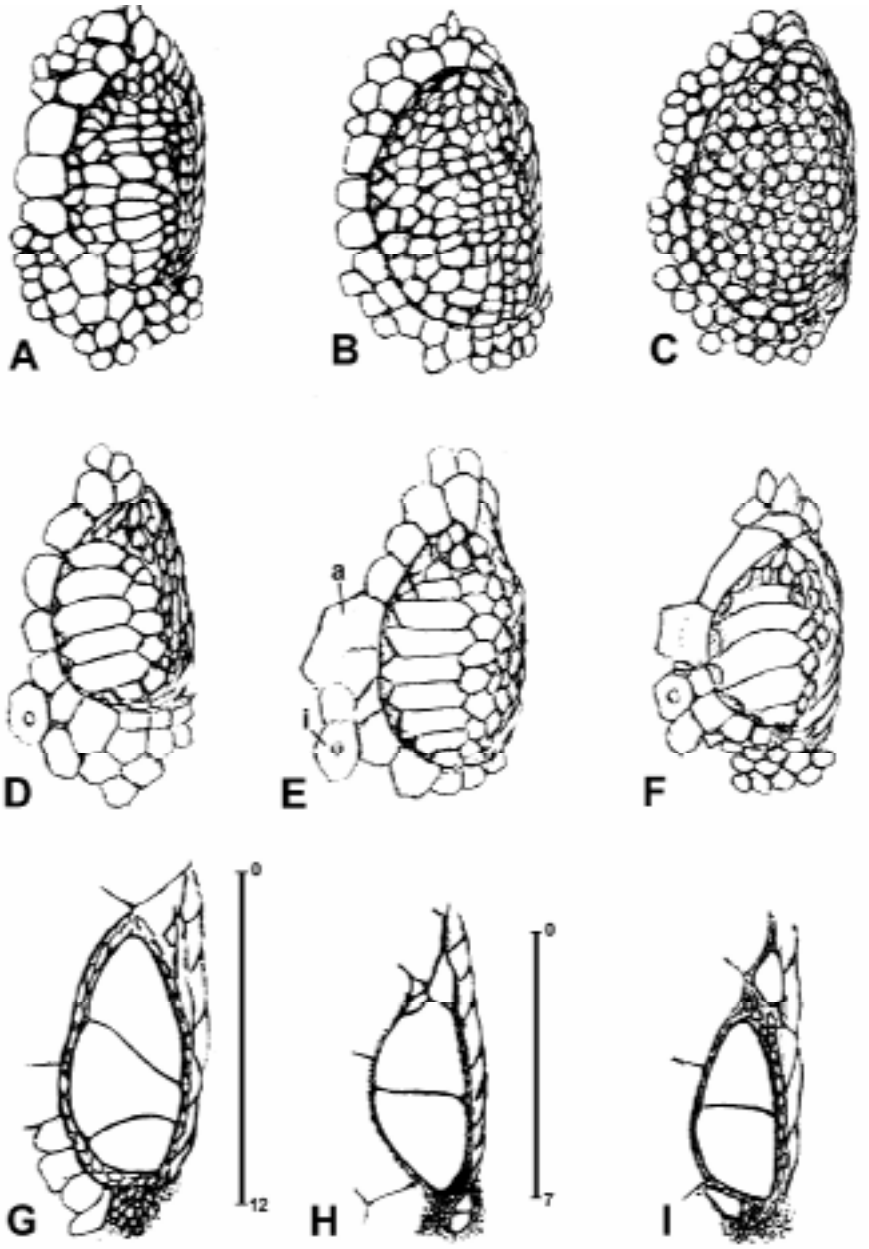

Fig. 3: Supraocular scutellation patterns in species of the Iguanian family Liolaemidae and the Scleroglossa family Teiidae: A- *Phymaturus patagonicus* Koslowsky, 1896, male, from 30 km W Dolavon, Chubut Province (JMC-DC, 335); B- *P. mallimaccii* Cei, 1980, male, from Sierra Famatina, 3400 m.a.s.l., La Rioja Province (JMC-DC, 073); C- *P. punae* Cei, Etheridge & Videla, 1983, male, from Casarones, 3500 m.a.s.l., San Guillermo highlands, San Juan Province (JMC-DC 802); D- *Liolaemus kingi* Bell, 1843, male, from Isla Pingüinos, Rio San Julián, Santa Cruz Province (JMC-DC, 1188); E- *L. fitzingeri* Duméril & Bibron, 1837, male, from 20 km W Chacay, Chubut Province (JMC-DC, 1217); F- *L.* (*Vilcunia*) *silvanae* Donoso Barros & Cei, male, from Puesto Lebrun, 1400 m.a.s.l., Meseta Lago Buenos Aires, Santa Cruz Province (JMC-DC, 603); G- *Dicrodon guttulatum* Duméril & Bibron, 1839, male, from Playas de Guayas, Ecuador (from UK, 142773, JMC-DC, 786); H- *Kentropyx viridistriga* Boulenger, 1894, female, from Laguna Brava, Corrientes Province (JMC-DC, 1078); I- *K. lagartija* Gallardo 1962, female, from Rio Salí, Tucumán Province (JMC-DC, 036).

Three significant example of the widespread genus *Liolaemus*, all Patagonian lizards, are shown in Fig. 3, drawing D (*Liolaemus kingi*), drawing E (*L. fitzingeri*) and drawing F (*L. silvanae*). The *Liolaemus* pattern exhibits wide circumorbitals, often segment of median interorbital azygos, as well as, longitudinally, larger, transversal supraocular scale rows, bordered by few smaller scale rows along the strongly produced superciliaries. Between the several specific peculiarities the very irregular circumorbitals of *Liolaemus archeforus* can be remembered, or the rather anomalous scutellation pattern of *L. silvanae*, a taxon formerly reported at a generic or subgeneric rank (*Vilcunia silvanae*).

Finally, to stress the most outstanding differences, in accordance with still major systematic categories, contrasting supraocular scutellations of some Scleroglossa teiids are shown in drawing G-I. An unmistakable "teiid" pattern stands out in the robust *Dicrodon guttulatum* from Ecuador, as well as in *Kentropyx viridistriga* and *K. lagartija* from North eastern and Northwestern Argentina, two good although very similar species synonymized by former authors (Tedesco and Cei, 1997).

Concluding my remarks, the emphasized specific distinctiveness of lacertilian supraocular lepidosis, and its agreement with the systematic position of the most different taxa, is a noticeable anatomical condition, suitable for diagnostic purposes. It can be considered as a curious kind of reptilian "finger-prints", giving at first sight a quick approximation for identifying unknown specimens. Its easy localization makes it then a simple even valuable discriminative tool for preliminary classifications. I hope that the necessarily limited samples presented here could be sufficient for understanding utility and boundaries of this finding. The scutellation traits involved support undoubtedly a genetic interference within the speciation process of every taxon.

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