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Apistogramma eremnopyge, a new species of cichlid fish (Teleostei: Cichlidae) from Peru

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Abstract

Apistogramma eremnopyge, new species, is described from the Río Pintuyacu, Río Itaya drainage (Amazon basin) in Peru. *Apistogramma eremnopyge* is unique in the genus in possessing a dark blotch on the lower caudal peduncle. It is otherwise most similar to *A. bitaeniata*, with males possessing extended dorsal fin lappets, and prolonged rays dorsally and ventrally in the caudal fin.

Key words: Amazon basin, Cichlidae, South America, species richness, systematics

Introduction

Species of *Apistogramma* Regan are small South American cichlid fishes, comprising 52 valid species (Kullander, 2003, 2004). Individuals are generally less than 60 mm SL, with males usually larger than females. Sexual dimorphism in both morphology and colour pattern is common in the genus, with males of different species usually more distinct from each other than females. Most species have fairly limited geographical distribution. There have been 11 *Apistogramma* species described from Peru (Kullander, 2003), which represents high species richness for the relative size of the area. However, new collections from the region are still providing material from which new species can be described. Here we describe a new species possessing a unique colour marking shared by both males and females.

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Methods

Measurements and counts were taken as described by Kullander (1980, 1986). Standard length (SL) is measured from the tip of the upper jaw to the middle of the base of the caudal fin. Scales in a horizontal row (E1 row scales) are a count of the scales in the row above that including the lower lateral line. Vertebral counts were taken from radiographs made with a Philips MG-105 low voltage X-ray unit. Statistical analyses were made using SPSS 11.5. Drawings were made with the use of a drawing tube attached to a WILD M5APO dissection microscope. Colour and scale descriptions use the nomenclature of Kullander (1980: 29, 40).

Museum abbreviations: MUSM, Museo de Historia Natural de la Universidad Nacional Mayor de San Marcos, Lima; NRM, Swedish Museum of Natural History, Stockholm.

Apistogramma eremnopyge, new species (Figs. 1–5)

Holotype. MUSM 21214, adult female, 28.2 mm SL; Peru, Province Loreto: Río Itaya drainage, Río Pintuyacu, 48 km on road from Iquitos to Nauta; Jul 2002, O. Lucanus.

FIGURE 1. *Apistogramma eremnopyge*, holotype, MUSM 21214, female, 28.2 mm SL; Peru: Río Itaya drainage, Río Pintuyacu.

FIGURE 2. *Apistogramma eremnopyge*, paratype, NRM 49446, male, 34.4 mm SL.

Paratypes. NRM 49446, 4, 1 adult male, 34.4 mm SL, 3 adult females, 26.1–26.9 mm SL; Same data as holotype.

Comparative Material. *Apistogramma bitaeniata*, NRM 12345, 12346, 12347, Peru; *A. commbrae*, NRM 19104, 19108, Brazil; *A. diplotaenia*, NRM 12345, Brazil; *A. gibbiceps*, NRM 13441, 13453, 14359, Brazil; *A.inconspicua*, NRM 17800, Brazil, NRM 17802, Bolivia; *A. linkei*, NRM 17804, 17805, 17806, Bolivia; and *A. paucisquamis*, NRM 16500, 16670, 16671, Brazil.

Diagnosis. *Apistogramma eremnopyge* is the only *Apistogramma* species with a prominent dark blotch on the lower caudal peduncle (Figs. 1 & 2), present in both males and females. It is further characterized by a narrow lateral band, absence of lateral spot, presence of caudal spot, four dentary lateralis openings, and two post-lachrymal infraorbital lateralis openings. Males with produced anterior dorsal fin lappets, and produced rays dorsally and ventrally in caudal fin.

Description. Based on the holotype, 28.2 mm SL, representing adult females, with comments on variation. Refer to Figs. 1 & 2 for general aspect and Table 1 for measurements. The type series (fixed in alcohol) consists of specimens kept in aquaria and are generally not well preserved. Further material could not be located.

TABLE 1. Morphometry of *Apistogramma eremnopyge*. Measurements are expressed as per cent of SL, except SL (in millimetres). HT= holotype.

	HT					min	max	mean	SD
SL (mm)	28.2	26.9	26.4	26.1	34.4				
Head length	31.9	34.2	33.0	35.3	33.7	31.9	35.2	33.6	1.26
Snout length	6.7	6.0	7.6	7.7	9.3	5.9	9.3	7.4	1.25
Body depth	32.6	32.0	33.0	34.9	32.0	32.0	34.9	32.9	1.19
Orbit diameter	11.0	11.5	11.4	12.3	11.1	11.0	12.3	11.4	0.51
Head width	15.6	16.4	17.1	18.0	16.9	15.6	18.0	16.8	0.89
Interorbital width	8.5	8.6	11.4	10.0	9.0	8.5	11.4	9.5	1.20
Preorbital depth	3.2	3.7	3.0	3.5	3.8	3.0	3.8	3.4	0.32
Caudal peduncle depth	14.5	15.6	14.4	15.7	13.4	13.4	15.7	14.7	0.97
Caudal peduncle length	12.4	12.6	12.9	14.6	14.8	12.4	14.8	13.5	1.14
Pectoral fin length	23.8	24.9	26.1	24.5	24.4	23.8	26.1	24.7	0.88
Pelvic fin length	28.0	29.0	31.1	29.1	35.8	28.0	35.8	30.6	3.09
Last D spine length	12.4	13.0	15.2	13.4	15.4	12.4	15.4	13.9	1.33
Upper jaw length	9.9	8.6	9.5	8.8	9.9	8.6	9.9	9.3	0.62
Lower jaw length	11.7	12.3	11.4	12.6	12.2	11.4	12.6	12.0	0.50
Sex	Female	Female	Female	Female	Male				

Relatively slender body, dorsal and ventral contours about equally arched (dorsal contour more arched than ventral in male), laterally compressed. Snout short, triangular in lateral aspect, rounded in dorsal aspect. Predorsal contour straight ascending (in male only to above middle of orbit, nape slightly elevated, curved); dorsal fin base slightly arched, sloping. Prepelvic contour slightly curved, as steep as predorsal contour (in male predorsal contour steeper). Interorbital area flat; nape compressed; chest narrowly rounded. Orbit entirely in anterior and mainly in dorsal half of head. Maxilla extending to slightly beyond vertical from anterior margin of orbit. No head bones serrated.

Lateralis pores on head include four dentary, two anguloarticular, six preopercular, four lachrymal, two post-lachrymal infraorbital, five naso-frontal pores, and a coronalis pore (Fig. 3).

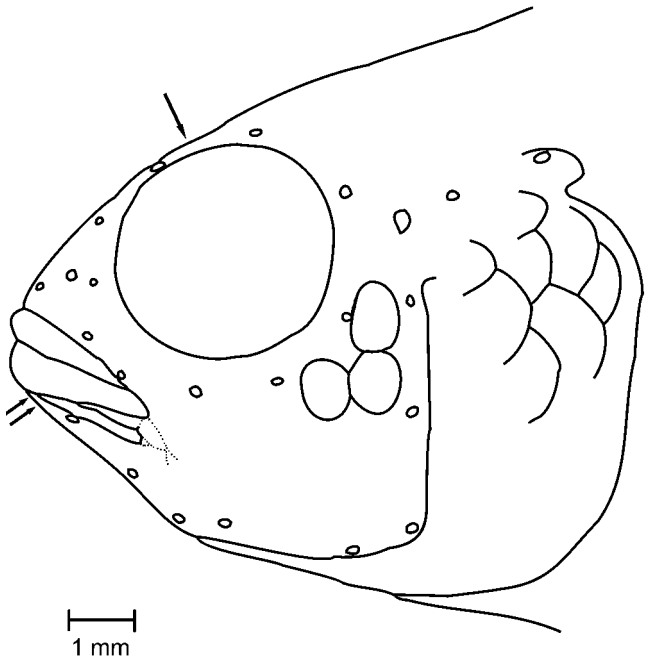

FIGURE 3. *Apistogramma eremnopyge*, paratype, NRM 49446, male, 34.4 mm SL; distribution of lateral line pores on the head. Arrows point to dentary and coronalis pores hidden from view.

Scales in E1 row 22 (3), 23 (2); predorsal scales 8–11, prepelvic scales 5–9. Scales ctenoid on flanks, cycloid predorsally and on side of head (larger posterodorsal cheek and opercular scales feebly ctenoid). Chest fully scaled in male; in females naked anteriorly. Cheek naked on anteroventral 2/3, otherwise 1 (4), or 2 (1) rows of scales. Caudal fin scales ctenoid, squamation with straight vertical hind margin and covering nearly 1/6 of fin length. Upper lateral line with 11–12 tubed and 1–3 pored scales, lower lateral line with 2–4 pored and 3–6 tubed scales, 0–1 tubed scale on caudal fin; total counts of lateral line scales 13/6(1), 14/9 (1), 15/7 (2), 15/8 (1). Scales separating upper lateral line and dorsal fin 2 anteriorly, 1/2 posteriorly.

D. XVI.7 (5). Dorsal fin spines increasing in length rapidly to 4th, beyond slowly to last; first spine 2/5 length of last. In females, anterior 6 dorsal spines with pointed lappets, posteriorly rounded, short; soft dorsal fin rounded, reaching little beyond caudal fin base. In male, dorsal spines 3–9 with long lappets, up to same length as spines; soft dorsal fin pointed, 2nd ray longest. Caudal fin subtruncate in females, in male with dorsal and ventral prolongations with rays D4 and V3 longest. A. III.6 (3), III.7 (2). Anal fin rounded or subacuminate in females, reaching little beyond caudal fin base; in male, anal fin pointed, 3rd ray longest, filamentously extended to near end of caudal fin. P. 11 (2), 12 (3). Pectoral fin rounded, rays 5–6 longest, extending to anterior of genital papilla; Pelvic fin in females pointed, first ray longest, reaching to genital papilla or shorter; in male, pelvic fin pointed, first ray with filamentous extension reaching to posterior of genital papilla.

Gill rakers externally on first gill arch, 4 on lobe, 1 in angle, and 1 (5) on ceratobranchial; on lateral margin of lower pharyngeal jaw, 11 (2), 12 (1), 13 (1).

Premaxilla has one long tooth row along rim of entire jaw with teeth in one hemiseries 17 (1), 20 (1), 23 (1), 24 (1) and one short inner row along anterior half of jaw rim. Dentary has one long tooth row with 20 (1), 24 (1), 25 (2) teeth in one hemiseries, and one inner series anteriorly (in male an additional short inner row anteriorly). All teeth unicuspid, pointed, strongly curved linguad.

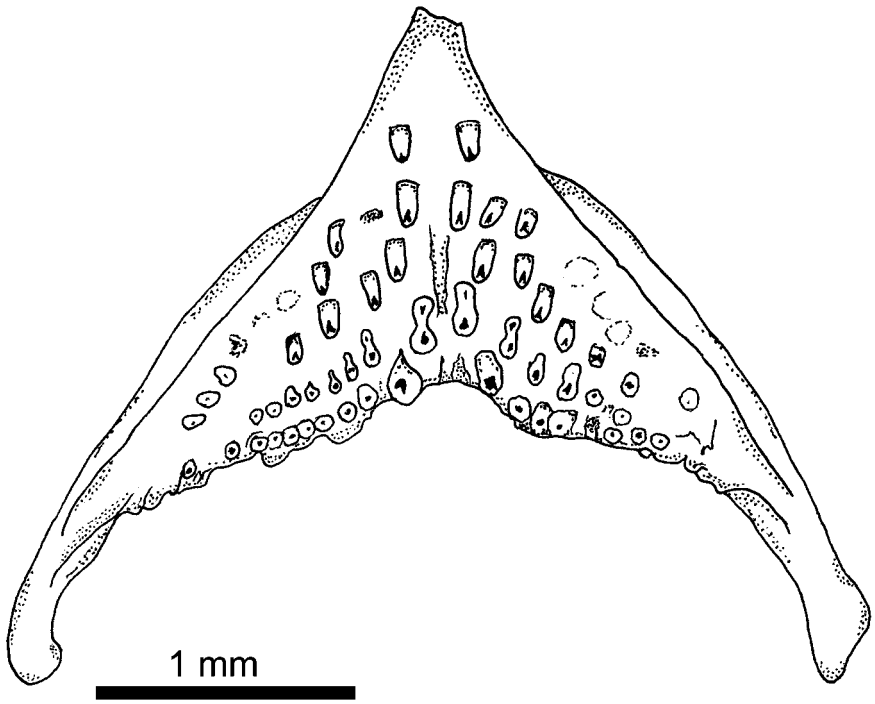

FIGURE 4. *Apistogramma eremnopyge*, paratype, NRM 49446, 26.1 mm SL; lower pharyngeal jaw in occlusal view.

Lower pharyngeal jaw in 26.1 mm specimen (Fig. 4) wider than long, dorsoventrally compressed. Teeth sparse, but several teeth about to emerge. Posteromedial teeth larger than rest, with posterior antrorse cusp and anterior shelf, mostly abraded apically; teeth in 4–5 irregular rows, gradually smaller caudolaterally, slightly compressed laterally, bicuspid with posterior antrorse pointed cusp and anterior blunt projection; anterior teeth slender, unicuspid, subconical, inclined laterad.

Vertebrae 12+13=25 (5).

Colour pattern in alcohol. Holotype (Fig. 1), an adult female with whitish ground colour, slightly darker, brownish, dorsally. Lateral band most prominent flank marking, consisting of a melanic blotch basal on each E1 row scale. Vertical bars absent. Indistinctly delimited dark grey blotch on caudal peduncle covering scales in rows H1 and H2, but also parts of adjacent scales.

Supraorbital stripe in females only, light brown, starting at about 1400h position of orbit, extremely short, not attaining dorsal midline. Postorbital stripe fading before joining lateral band at posterodorsal margin of opercle. Indistinct, short suborbital stripe extending ventrally onto adjacent margins of subopercle and interopercle. Preorbital stripe very faint, light brownish, not contrasted. No markings on opercle. No midventral markings.

Two anteriormost dorsal fin membranes blackish, rest of fin without distinct colour pattern except for three faint vertical stripes in soft-rayed portion of fin. Caudal fin with indistinct dark midbasal blotch and indistinct pigment distally. Anal fin hyaline. Pelvic fin lightly pigmented along anterior margin. Minute blackish blotch dorsally on pectoral fin base.

Male (Fig. 2) with lateral band consisting of dark pigment limited to E1 scales. Head with brown preorbital stripe, supraorbital stripe absent, and faint brown suborbital stripe from posteroventral orbital margin to preopercle just above angle. Postorbital stripe joining lateral band. Chin and adjacent lower lip black.

Dorsal fin smoky, with anteriormost two membranes black; produced lappets white. Anal fin smoky; posterior interradial membranes greyish with no pattern. Caudal fin smoky with about six faint vertical lines; caudal spot black, midbasal, distinct. Pelvic fin light brownish, anterior margin white.

Live colors. Based on photographs provided by O. Lucanus. Male with light brown dorsum, an iridescent broad band along middle of flank, ventral flanks whitish; scale margins blackish on flanks. Lateral band and caudal peduncle blotch blackish. Gill cover and cheek with iridescent blue spots and lines alternating with red spots and lines. Base of dorsal fin maroon; produced dorsal fin lappets orange; rest of dorsal fin bluish.

Red pigmentation was still observed on the caudal margin of some flank scales of the male specimen of the type series. These were predominantly in scale rows E3, 0 and H1.

Distribution. The type locality is in the Río Pintuyacu, a tributary of the Río Itaya, close to Iquitos (Fig. 5). We have no further information on the habitat or associated fauna.

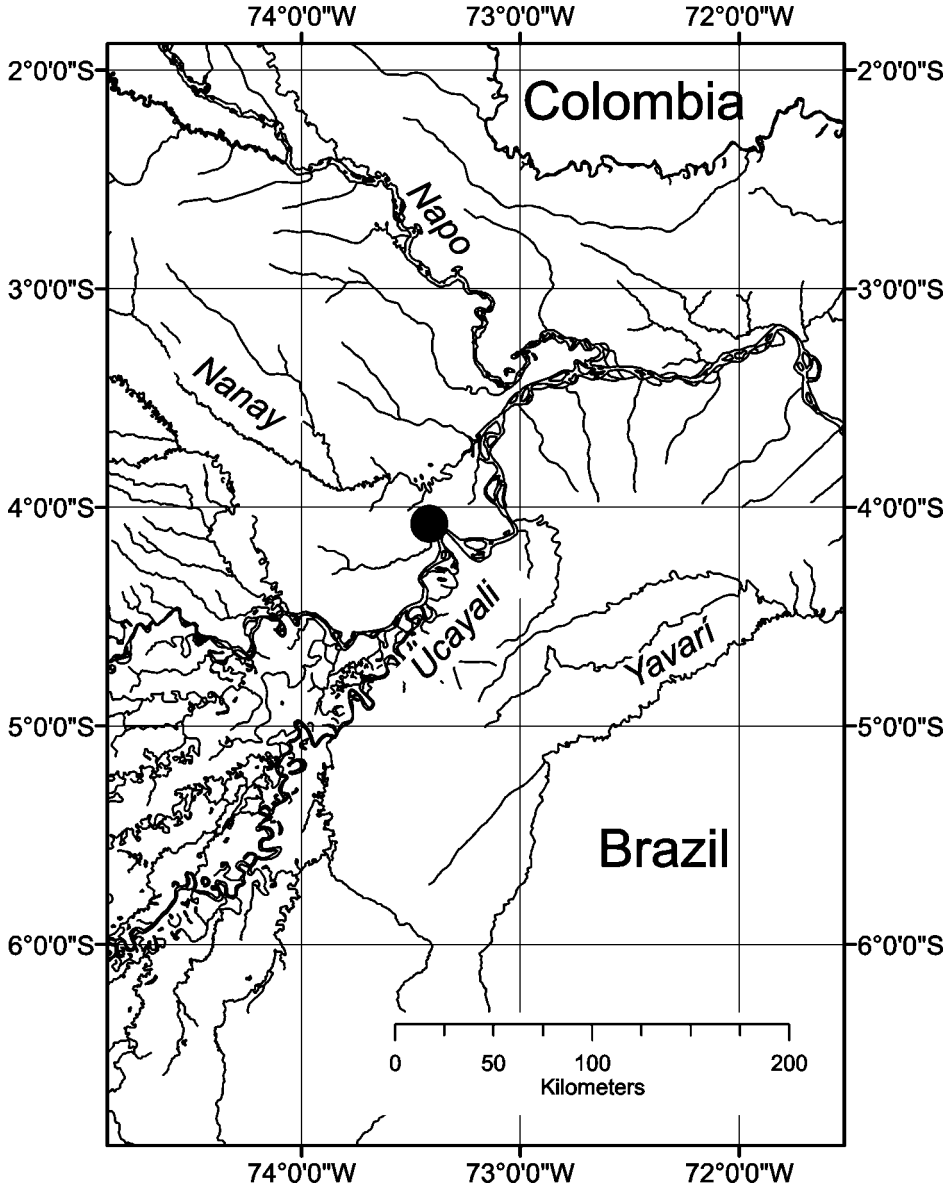

FIGURE 5. Northeastern Peru and the only know locality (dot) for *Apistogramma eremnopyge*.

Etymology. The species is named with reference to the identifying mark of a dark blotch on the lower caudal peduncle. The name is a noun in apposition composed of the Greek words ερεμνοζ (eremnos) meaning black, swarthy or dark, and πυγη (pyge) meaning rump or buttocks.

Discussion

Apistogramma eremnopyge, *A. bitaeniata* Pellegrin and *A. gibbiceps* Meinken are the only three species in the genus to share in combination the characters of: male fin morphology (produced anterior dorsal fin lappets and produced dorsal and ventral caudal fin rays); a low number of infraorbital pores (2 openings posterior to that shared with lachrymal); and a low number of dental lateralis pores (4 openings). Each of these character states occur in other *Apistogramma* species, but the combination is unique for these three species. *Apistogramma gibbiceps* occurs in the Rio Negro drainage in Brazil; *A. bitaeniata* inhabits northeastern Peruvian blackwaters and adjacent Colombia and Brazil eastward to the lower Rio Tefé (Kullander, 1986).

Apistogramma gibbiceps is distinguished from *A. eremnopyge* by the presence of a fully scaled cheek, a wide lateral band more than one scale deep, a series of dark blotches along the abdominal flank, a prominent dark suborbital stripe, and absence of a dark blotch at the caudal fin base.

Apistogramma bitaeniata is similar to *A. eremnopyge* in absence of scales anteriorly on the cheek, faint suborbital stripe, and presence of a dark spot at the caudal fin base. It differs from *A. eremnopyge* by a wide lateral band covering the E1 scales and parts of adjacent scales, whereas that of *A. eremnopyge* is at most only one scale row in height; and in having a distinct horizontal stripe along the abdominal side caudad onto the caudal peduncle. Both *A. gibbiceps* and *A. bitaeniata* possess a lateral spot, i.e., a dark blotch in anteriorly on the side and crossed by the lateral band, but not *A. eremnopyge*. A lateral spot is absent in *A. regani* group species, but is typically present in all other *Apistogramma* species.

We homologize the diagnostic caudal peduncle marking in *A. eremnopyge* (present on caudal peduncle scale rows H1 and H2, pigmentation on H2 more distinct in males) with the ventral lateral band diagnostic of *A. bitaeniata* (on scale rows H1 and H2, H2 pigmentation more distinct). The caudal peduncle marking differs from that of *A. commbrae* (Regan), *A. inconspicua* Kullander, and *A. linkei* Koslowski, which possess a dark spot on the caudal peduncle confluent with the caudal base spot and situated in the middle of the caudal peduncle (Kullander, 1982) instead of separate from the caudal spot and situated ventrally with a distinct space separating it from the lateral band as in *A. eremnopyge* and *A. bitaeniata*.

Apistogramma species with a second dark lateral band ventral to the midaxial lateral band include, besides *A. bitaeniata*, *A. paucisquamis* Kullander & Staeck, and *A. diplotaenia* Kullander.

Apistogramma paucisquamis differs from both *A. bitaeniata* and *A. eremnopyge* in possessing only 12 vs. 16 circumpeduncular scales, short dorsal fin lappets in males, a large mouth with pronounced positive size allometry shared exclusively with *A. cacatuoides* group species vs. normal sized mouth for the genus, and a unique wide branchiostegal membrane correlated with short gill cover (Kullander & Staeck, 1988).

Apistogramma diplotaenia has a low dorsal fin and rounded caudal fin, scaleless anterior chest region, and serrated posttemporal, supracleithrum and preopercle (Kullander, 1987), distinguishing it from both *A. eremnopyge* and *A. bitaeniata*. In *A. diplotaenia* the lower lateral band is not distinct from the principal band, but confluent with it anteriorly and posteriorly.

Kullander (1980, 1986, 2003) synonymized *A. kleei* Meinken, *A. klausewitzi* Meinken, and *A. sweglesi* Meinken with *A. bitaeniata*. Except *A. klausewitzi (*from the Igarapé Preto, upper Rio Solimões, Brazil) all those species were described on the basis of aquarium material of uncertain origin. The type material of *A. sweglesi* is lost. Original descriptions and accompanying figures show that none of these taxa display the characteristic coloration of *A. eremnopyge*, but instead have a broad lateral band and a continuous dark stripe along the abdominal side.

The area near Iquitos contains some of the ichthyologically best known rivers in Peru (Kullander 1986: 15), yet it is still possible to find new species there with quite distinct patterns. Many lakes exist in this area, though most are seasonally flooded allowing fish to mix (Kullander 1986: 15). Similar habitats exist over much of the range of the genus *Apistogramma*, but many of these areas have yet to be explored. As such the species richness of this genus is likely to continue to rise as more material is made available. There were previously 11 species of *Apistogramma* described from Peru, the addition of *A. eremnopyge* makes this 12. The valid number of species in the genus is therefore now 53. As such, Peruvian species account for more than 20 percent of all *Apistogramma*. The combined area of the Ucayali, Içá-Putumayo and Marañón sub-basins found in Peru is approximately 874,565 square kilometers, while the combined area of the Amazon and Orinoco watersheds is 7,098,325 square kilometers (Revenga *et al.*, 1998). The Peruvian distribution accounts for just over 12.3 percent of this area. However, the distribution of *Apistogramma* is larger than the Amazon and Orinoco watersheds. Therefore over 20 percent of species in the genus are described from roughly 10 percent of its geographical distribution. This relatively high species richness may be representative of true biological diversity in the region, or may represent a collection deficit in regions elsewhere which are more remote. The Andean Amazon has been recognized as the number one hotspot for terrestrial biodiversity with 20,000 endemic plant species (Mittermeier *et al.*, 1998). The region may also be a major hotspot for freshwater biodiversity.

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