*Zootaxa* 1925: 31–38 (2008)
www.mapress.com/zootaxa/


ISSN 1175-5326 (print edition)
**ZOOTAXA**
ISSN 1175-5334 (online edition)

# *Apareiodon agmatos*, a new species from the upper Mazaruni river, Guyana (Teleostei: Characiformes: Parodontidae)

DONALD C. TAPHORN B.[1], HERNÁN LÓPEZ-FERNÁNDEZ [2] & CALVIN R. BERNARD[3]

[1]*Museo de Ciencias Naturales de Guanare, BioCentro, UNELLEZ, Mesa de Cavacas, Guanare 3310, Estado Portuguesa, Venezuela. E-mail: taphorn@gmail.com*
[2]*Department of Natural History, Royal Ontario Museum, 100 Queen's Park, Toronto, Ontario M5S 2C6, Canada. E-mail: hernanl@rom.on.ca*
[3]*Center for the Study of Biodiversity, University of Guyana, Georgetown, Guyana. E-mail: calrber@gol.net.gy*

## Abstract

*Apareiodon agmatos*, new species, is described from the upper Mazaruni River and its tributaries, Essequibo Basin, in western Guyana. The new species is distinguishable from all other species of Parodontidae by having an incomplete lateral line. The scales of *A. agmatos* are more numerous than in any previously described parodontid. It has five incisor-like pedunculate teeth on the premaxilla aligned in a straight row, each with a large central spatulate cusp bordered on each side by a minute lateral cusp. The maxilla has two or infrequently three incisors. It shares an unusual pigmentation pattern of one dorsomedial and four lateral black stripes with *A. gransabana*, which was described from the neighboring upper Río Caroní drainage, Orinoco Basin. *Apareiodon agmatos* also shares with *A. gransabana* and *Parodon guyanensis* a higher number (5 versus 4) of teeth than other members of the genus in the premaxillary. *Apareiodon agmatos* and *A. gransabana* may also share an absence of thickening of the anterior pleural ribs noted by Starnes & Schindler (1993) for *A. gransabana*. While beyond the scope of this work, these features may prove sufficient to diagnose this group of species from the genus *Apareiodon* as currently recognized.

**Key words:** Teleostei, freshwater fish, Essequibo, Neotropical, endemism, isolation, biogeography, systematics

## Resumen

*Apareiodon agmatos* especie nueva se describe de la cuenca alta del río Mazaruni y sus afluentes en el oeste de Guyana (cuenca del río Esequibo). La especie nueva se distingue de todas las demás especies de la familia Parodontidae por poseer una línea lateral incompleta. *A. agmatos* tiene escamas más numerosas que cualquier especie de paraodóntido descrita previamente. Tiene cinco dientes incisivos pedunculados en la premaxila dispuestos en línea recta, cada uno con una cúspide central grande espatulada y una cúspide lateral diminuta en cada lado de la base. El maxilar tiene de dos a tres dientes incisivos. Comparte un patrón de pigmentación poco usual de una franja negra en la línea medio dorsal y cuatro franjas laterales oscuras en los flancos con *A. gransabana*, la cual fue descrita de la cuenca vecina del alto río Caroní, cuenca del río Orinoco. *Apareiodon agmatos* también comparte con *A. gransabana* y *Parodon guyanensis* un mayor número (5 en lugar de 4) de dientes premaxilares que el resto del género. *Apareiodon agmatos* y *A. gransabana* podrían también compartir la falta de un engrosamiento en las costillas pleurales anteriores notado por Starnes & Schindler (1993) en *A. gransabana*. Aunque más allá de los objetivos de este trabajo, estos caracteres podrían ser suficientes para diagnosticar este grupo de especies del resto del género *Apareiodon* tal y como se lo define actualmente.

**Palabras claves:** Teleostei, pez de agua dulce, Esequibo, Neotropical, endemismo, aislamiento, biogeografía, sistemática

*Accepted by M. R. de. Carvalho: 1 Oct. 2008; published: 7 Nov. 2008*

## Introduction

The Parodontidae, as defined by Roberts (1974), is a relatively small family with only three recognized and still poorly defined genera. *Parodon* Valenciennes in Cuvier & Valenciennes includes 11 species (Pavanelli, 2003; Ingenito & Buckup, 2005). *Saccodon* Kner is the smallest of the genera, with only three valid species and is distinguished by having only three teeth on each premaxilla, arranged in a stairstep fashion vs 4 or 5 teeth aligned in a straight line in all other parodontids. With 14 described species, *Apareiodon* Eigenmann is the most species-rich genus of the family Parodontidae. Species-level phylogenetic relationships are unresolved (Ingenito & Buckup, 2005) and generic definitions need clarification. Traditionally *Parodon* is separated from *Apareiodon* and *Saccodon* by the presence of teeth on the lower jaw, (vs absent) and this is still the case, but Ingenito & Buckup (2005) assigned their new species, *P. moreirai*, to *Parodon* even though some adults lacked dentary teeth, thus further clouding the distinction between genera.

Although very little scientific collecting has been undertaken in the upper Mazaruni River portion of the Essequibo basin in western Guyana, this basin is already known to harbor extraordinary fishes. Among the few specimens available for study from the system, three endemic species, each in a monotypic genus, have been described from its waters: a cichlid *Mazarunia mazarunii* Kullander, 1990, a lebiasinid *Derhamia hoffmanorum* Géry & Zarske, 2002 and a crenuchid, *Skiotocharax meison* Presswell, et al., 2000. The high degree of endemism appears to be a result of isolation of the upper reaches of the river by a long series of waterfalls and rapids, which effectively prevent lowland fishes from reaching the headwaters.

Motivated by previous findings in the region, we organized a collecting expedition to survey freshwater fishes in the mainstem upper Mazaruni River and several of its major tributaries. We herein describe a previously unknown parodontid that appears to be endemic to the upper Mazaruni River drainage. We provisionally assign this taxon to *Apareiodon* based on previously published diagnoses of that genus. However, this assignment may change with ongoing revisionary studies of Parodontidae by L. F. S. Ingenito, C. S. Pavanelli, W. C. Starnes and possibly others.

## Materials and methods

This description is based on the holotype plus 19 measured specimens with additional observations from 257 paratypes plus comparative material of several other species and all parodontid genera. Measurements were made point-to-point to the nearest 0.1 mm with digital calipers on the left side of specimens whenever possible. Measurements are given in Table 1. Head length is from tip of snout to posterior margin of opercle excluding membrane. Body depth is measured at dorsal-fin origin; horizontal orbital diameter and interorbital width are measured from bony edge of orbit. Meristic data are presented in the text followed by their frequency in parentheses. An asterisk indicates count for the holotype. Scale counts include all scales and parts thereof between indicated points (we do not count any scales as 1/2). Lateral scales include scales extending from rear of opercle onto the base of the caudal fin. Pored scales are those of the lateral series perforated by lateral line sensory canals. Scales below the lateral series are counted to pelvic-fin origin. Scales above lateral series are counted to dorsal-fin origin. Predorsal scales are counted from posterior tip of supraoccipital spine to dorsal-fin origin. Scales counted between dorsal and adipose fins include irregular scales. Post-adipose fin scales are from the posterior edge of adipose-fin base to caudal fin, and includes those continuing onto caudal fin. Scales from isthmus to anus includes modified scales, as does the count from anus to anal fin. Unbranched fin rays are represented by lower case Roman numerals, branched rays by Arabic numbers. Total vertebrae were counted from radiographs of five paratypes. We counted the last half-centrum as one element and the vertebrae of the Weberian apparatus as four. Specimens were fixed in 10% formalin and preserved in 70% ethanol.

Museum abbreviations: AUM, Auburn University Museum; ANSP, Academy of Natural Sciences of Philadelphia; FMNH, Field Museum of Natural History, Chicago; CSBD, Centre for the Study of Biological Diversity, University of Guyana, Georgetown; MBUCV, Museo de Biología de la Universidad Central de Venezuela, Caracas; MCNG, Museo de Ciencias Naturales de la UNELLEZ, Guanare; MNRJ, Museu Nacional do Rio de Janeiro; NCSM, North Carolina Museum of Natural Sciences, Raleigh; NUP, Núcleo de Pesquisas em Limnologia Ictiologia e Aqüicultura, Universidade Estadual de Maringá, ROM, Royal Ontario Museum, Toronto. We used Eschmeyer (2008) as a reference to check names, dates and citations.

***Apareiodon agmatos*, new species**
(Figs. 1–2, Table 1)

**Holotype**. CSBD F1650, 66.3 mm SL; Guyana: Mazaruni River: sandy beach on right bank, downstream from village of Kamarang (5º56'10.1" N, 60º36'53.8" W); H. López-Fernández, D. C. Taphorn, E. Liverpool, K. Kramer, C. Thierens; 24 Apr 2008.

**Paratypes**. All specimens from Guyana, Mazaruni River drainage: ROM 83874, 2, 24.7–46.0 mm SL; collected with holotype. ROM 83755, 236, 21.4–63.2 mm SL; sandy beach and embayment on right bank, upstream from village of Jawalla (5º41'35.4" N, 60º28'11.8" W); H. López-Fernández, D. C. Taphorn, E. Liverpool, K. Kramer, C. Thierens; 18 Apr 2008. ROM 83765, 1, 42.0 mm SL; Kukui River approximately 1.5 km from confluence with Mazaruni (5º39'11.5" N, 60º28'12.3" W); H. López-Fernández, D. C. Taphorn, E. Liverpool; 19 Apr 2008. ROM 83750, 3, 61.2–80.4 mm SL; Ata Creek near its confluence with Mazaruni (5º41'23" N 60º28'14.4" W); D. C. Taphorn, H. López-Fernández, E. Liverpool; 18 Apr 2008. ROM 83736, 4, 38.8–46.8 mm SL; sandy beach opposite to the mouth of Kukui River at village of Jawalla (5º40'21.2" N, 60º28'58.6" W); H. López-Fernández, E. Liverpool, D. C. Taphorn, C. Thierens; 17 Apr 2008. AUM 47714 (ex ROM 83755), 5, 40.6–57.7 mm SL. ANSP 187448 (ex ROM 83755), 5, 42.8–51.7 mm SL. FMNH 117790 (ex ROM 83755), 5, 43.7–49.4 mm SL. MBUCV-V-35375 (ex ROM 83755), 5, 43.2–52.5 mm SL. CSBD F1651 (ex ROM 83755), 5, 39.3–45.5 mm SL. MCNG 56000 (ex ROM 83755), 5, 39.2–50.1 mm SL. MNRJ 32486 (ex ROM 83755), 5, 44.0–48.9 mm SL. NUP 5950 (ex ROM 83755), 5, 41.6–49.1 mm SL. NCSM 48264 (ex ROM 83755), 5, 38.1–45.2 mm SL.

**Additional material examined:** Radiographs of *Apareiodon gransabana* USNM 267917. *Apareiodon gransabana* AUM 36502, 1; *Apareiodon itapicuruensis* AUM 20598, 14; *Apareiodon orinocensis* AUM 43479, 4; 43479, 3; 43629, 3; *Parodon apolinari* AUM 36536, 3; 22766, 1; 35433, 1; *Parodon bifasciatus* AUM 36813, 15; 36814, 1; 36815, 1; 38265, 1; *Parodon pongoense* AUM 46665, 3; *Parodon guyanensis* AUM 38766, 50; 38981, 19; 39007, 9; 38159, 50; *Parodon suborbitalis* MCNG 4624, 20; 7802, 27; 8681, 22; *Saccodon caucae* MCNG 47833, 3; *Saccodon wagneri* AUM 4229, 2; 21558, 1.

**Diagnosis:** *Apareiodon agmatos* is distinguished from all other known parodontid species by having an incomplete lateral line with only the anterior five to 14 scales perforated by the lateral line canal. The species is also distinguished by having more numerous scales than all congeners: 19–25 predorsal scales vs. 16 or fewer and 16–17 transverse scales vs. nine to 11. The new species can be further distinguished from all its congeners (except *A. gransabana)* by its color pattern, consisting of a dark stripe along the dorsal midline (present in most *Apareiodon* species) combined with four additional narrow lateral stripes on the sides. The second stripe on the midlateral surface includes the perforated lateral series of scales and is the widest and darkest. It continues anteriorly through the eye onto the snout and posteriorly onto the middle caudal-fin rays. Each premaxilla has five teeth, a character it shares only with *Apareiodon gransabana* and *Parodon guyanensis*. The premaxillary teeth usually have one large central spatulate cusp bordered on each side by one (two in one individual examined) minute lateral cusp on either side vs. more than 9 cusps in all other species of the family.

**FIGURE 1.** Holotype of *Apareiodon agmatos* CSBD F1650 66.3 mm SL; Guyana: Mazaruni River: sandy beach on right bank, downstream from village of Kamarang (5º56'10.1" N, 60º36'53.8" W).

**Description:** Morphometric data are presented in Table 1. Aspects of body shape in lateral profile are evident in Figure 1. Dorsal profile convex from tip of snout to dorsal-fin origin and straight to gently concave from posterior limit of dorsal-fin base to adipose fin, concave from adipose fin to upper margin of caudal fin. Ventral profile convex from snout to pelvic fin, concave at pelvic-fin insertion then convex from this point to anal fin, strongly concave from anal fin to caudal fin. Body rounded dorsally in cross section, ventral profile generally rounded. Caudal peduncle slightly compressed. Snout broad and rounded. Eyes on lateral surface of head, edge of orbit with slight development of adipose eyelid, strongest along antero-dorsal margin. Mouth sub-terminal. Upper lip indistinct from and continuous with snout skin (sometimes described as "absent"). Nostrils adjacent, the anterior opening horizontally oval and encircled by skin fold which projects slightly

**TABLE 1.** Selected morphometrics of *Apareiodon agmatos* (n=20). Measurements are percentages of Standard length (SL) or Head length (HL) as indicated.

| | Holotype | n | Mean | Minimum | Maximum |
|---|---|---|---|---|---|
| SL | 66.3 | 19 | 52.6 | 40.0 | 81.0 |
| Percent SL | | | | | |
| Head length | 21.9 | 19 | 23.1 | 21.6 | 25.3 |
| Predorsal length | 48.9 | 19 | 50.0 | 48.5 | 52.5 |
| Caudal peduncle length | 16.6 | 19 | 18.0 | 15.2 | 20.9 |
| Least caudal peduncle depth | 9.7 | 19 | 8.7 | 7.8 | 9.8 |
| Body depth at dorsal-fin origin | 20.8 | 19 | 21.0 | 18.1 | 22.2 |
| Dorsal-fin length | 18.4 | 19 | 19.1 | 17.7 | 20.6 |
| Anal-fin length | 11.8 | 18 | 12.9 | 11.7 | 15.7 |
| Pectoral-fin length | 15.4 | 19 | 16.1 | 13.4 | 17.6 |
| Pelvic-fin length | 11.9 | 19 | 13.3 | 11.6 | 16.4 |
| Pre-anal length | 76.2 | 19 | 76.0 | 74.7 | 79.0 |
| Percent HL | | | | | |
| Snout length | 29.7 | 19 | 29.7 | 26.1 | 33.0 |
| Orbital diameter | 32.4 | 19 | 32.1 | 29.2 | 35.7 |
| Interorbital diameter | 34.5 | 19 | 31.5 | 26.0 | 35.4 |
| Head width | 48.3 | 19 | 47.6 | 43.5 | 50.9 |
| Lower jaw width | 23.4 | 19 | 18.8 | 17.6 | 23.2 |
| Head depth | 66.9 | 19 | 64.1 | 58.7 | 68.2 |

over round to oval larger posterior opening which lacks skin fold. Breeding tubercles not observed. Gill membranes joined together but not connected to isthmus; isthmus scaled. Gill rakers very thin, lamellar, very close together. Epibranchial gill rakers 64–85, ceratobranchial gill rakers 66–74 (counted in paratypes only to avoid damage to holotype). Total vertebrae: 39(1), 40(4), 41(1), holotype not radiographed.

Premaxilla with 5*(20) teeth, maxillary with 2*(19), 3(1) teeth. Premaxillary teeth spatulate, peduncle not much exposed, one or two minute lateral cusps present on either side of large central cusp. Teeth flattened in cross-section, with cutting edge flat. In a few individuals, one tooth bilobed. Maxillary teeth aligned in straight line, similar to premaxillary teeth and aligned with them in smaller specimens, rarely with cutting margin divided into two unequal shallow lobes (Fig. 2). In most adult parodontids the premaxillary teeth have an unusual orientation, lying flat along the horizontal axis of the body with the tips pointing back (caudad). In *A. agmatos* the teeth are in a more typical position for fish, that is in a vertical position perpendicular to the horizontal axis of the body with the tips pointing down (ventrally). Lower jaw edentulous and with straight anterior border.

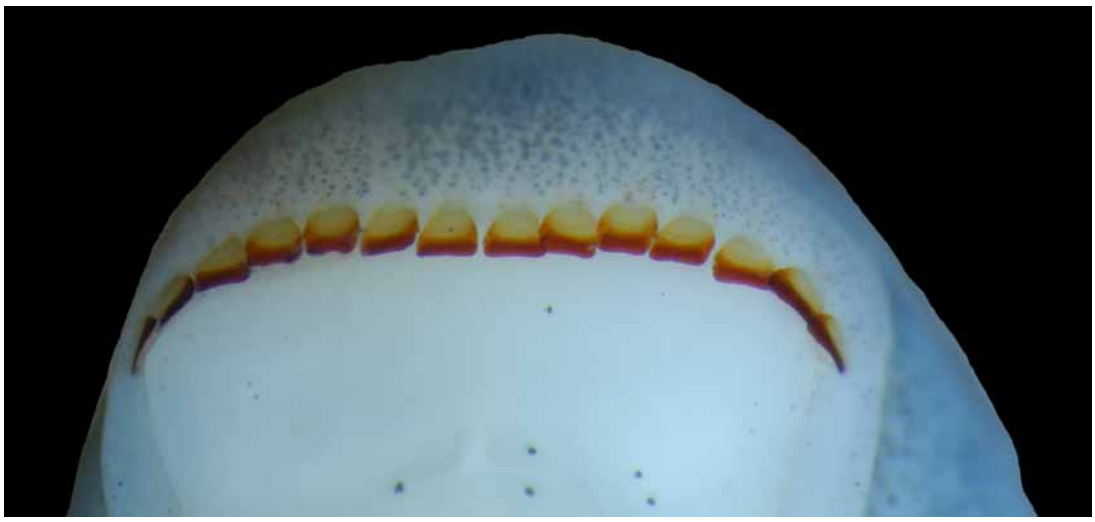

**FIGURE 2.** *Apareiodon agmatos* n. sp. Teeth in ventral view. ROM 83755, 49.0 mm SL.

Dorsal-fin rays ii,9(20); anal ii,5(1), ii,6(2), ii,7(15)*, ii,8(1); pectoral i,8(1), i,9(11)*, i,10(7), i,11(1); pelvic i,6(1), ii,7(19)*; caudal-fin rays 10 upper lobe, 9 lower (20). Dorsal-fin origin anterior to vertical through pelvic-fin insertion and slightly nearer to snout than to base of caudal fin; tip of depressed dorsal-fin rays reaching slightly posterior of vertical line through tips of depressed pelvic-fin rays, but not reaching adipose fin. Pectoral fin short and pointed, neither its rays nor the membranes are thickened or enlarged as in some species of *Parodon*. Tip of longest pectoral-fin ray reaching posteriorly more than half distance to vertical through dorsal-fin origin. Anal-fin base short, distal margin slightly rounded or straight. Adipose fin well developed, inserted just behind vertical through posterior margin of anal-fin base. Caudal fin with broad, equal lobes, not strongly forked, middle rays more than half length of longest ray.

Body scales cycloid, regularly distributed on predorsal region, less regular on ventrum between isthmus and anus. Lateral scales 46(1), 47(1), 48(3), 49(6)*, 50(4), 51(1), 52(2), 53(1), 54(1); predorsal 19(1), 21(3), 22(5), 23(8)*, 24(1), 25(1); tube-bearing lateral scales 5(1), 8(4), 9(3), 10(2)*, 11(2), 12(2), 13(4), 14(2). Scales between lateral line and dorsal-fin origin 8(20). Scales between lateral line and pelvic-fin origin 8(20). Circumpeduncular scales 20(2), 22(12)*, 24(5). Scales from rear limit of dorsal-fin base to adipose fin 12(1), 14(1), 15(6), 16(5), 17( 6)*, 19(1). Scales from adipose to caudal fin 7(6), 8(6), 9(4)*, 10(4). Scales from isthmus to anterior margin of anus 36(1), 37(2), 38(2), 39(2), 40(4)*, 41(4), 42(1), 43(2), 44(1), 45(1). Scales between anus and anal-fin origin 0(9)*, 1(11). Small axillary scale present, its tip extending about three scales posteriorly. Base of caudal fin covered by two to four rows of scales. Anal-fin rays anteriorly covered by a

row of three or four scales forming narrow sheath.

**Color in alcohol (Fig. 1):** Ground color of body white, tan or light yellow. Head dark dorsally, white ventrally. Dorsal region darker along midline, with scales outlined in black ventrally to first lateral stripe. Dorsal most of four dark lateral stripes originates on head, one scale row dorsal to edge of operculum and extends to upper caudal-fin base, sometimes continuing onto fin. Second lateral stripe darkest and widest, covering lateral line series and ¼ of series above and below that series, originating on snout, passing through eye across opercle and continuous along midlateral surface to middle caudal-fin rays. Pored lateral-line scales run through middle of stripe. Third stripe very narrow, originating behind middle posterior margin of opercle, located two scale rows below pored lateral line scales, forming a zigzag along scale margins and continuing caudally to vertical through adipose fin origin. Fourth stripe originates behind pectoral-fin base, five or six scales below pored lateral line scales. Stripe narrow, often forming zigzag along scale margins; often faint, extending caudally to above anal-fin base which it parallels, then curving along postero-lateral edge of caudal peduncle to terminate at base of lower most caudal-fin rays, sometimes continuing onto rays. Dorsal, pectoral, pelvic and anal fins hyaline to whitish. Caudal-fin lobes dusky with pigment concentrated along rays. Concentration of pigment forming irregular blotch at bases of upper most and lower most caudal-fin lobes (an extension of the dark lateral stripes). Five to seven broad, faint transverse bars between first and second lateral stripes sometimes visible.

**Distribution:** Figure 3. *Apareiodon agmatos* is known from the upper Mazaruni River basin in Guyana.

**Etymology:** *Agmatos* is a Greek noun meaning “fragment”, derived from agmos, meaning break or fracture, in reference to the incomplete lateral line that distinguishes *Apareiodon agmatos* from all other parodontids. To be regarded as an adjective in masculine form.

**Ecological notes.** Contrary to most other species of *Apareiodon* and most Parodontidae, *Apareiodon agmatos* appears to inhabit backwaters or streams with little or no current. Substrate was generally a mixture of sand and mud, frequently with abundant flocculent sediments and leaf litter. Finer sediments were dominant in a quiet side embayment of the Mazaruni River where the fish were collected from large schools. Radiographs revealed an extremely long intestinal tract, which along with the unusually high gill-raker counts and the habitat preferences, suggest a detritivorous diet (e.g. Kramer & Bryant, 1995). This is in contrast with other taxa in the family which are generally thought to be periphyton scrapers (e.g. Flecker 1992).

## Discussion

*Apareiodon agmatos* is a derived taxon with a number of morphological attributes not shared with any other known parodontid. Based on the absence of dentary teeth and the presence of a single unbranched pectoral-fin ray we have assigned the new species to *Apareiodon*. However, it is possible that *A. agmatos* along with *A. gransabana* Starnes & Schindler 1993 and possibly *Parodon guyanensis* Géry 1959 constitute a clade diagnosable from *Apareiodon*. *Apareiodon agmatos* is similar to *A. gransabana* in color pattern, and shares with it and *P. guyanensis* a higher number (five vs. four) of teeth than other members of the genus in the premaxillary. *Apareiodon agmatos* and *A. gransabana* may also share an absence of thickening of the anterior pleural ribs noted by Starnes & Schindler (1993) for *A. gransabana*. Although a reduction in this sexually dimorphic character has been noted in a several other species, *A. gransabana* may present an extreme reduction. Radiographs of *A. agmatos* did not reveal any thickening of the anterior ribs, which suggests a possible shared character with *A. gransabana*. It is also possible that this absence of thickening could represent a basal rather than derived condition. *Apareiodon agmatos* differs from *A. gransabana* and *P. guyanensis* in having a reduced number of cusps (up to five) on its teeth (Fig. 2), versus 10–12 in *A. gransabana* and 14–15 in *P. guyanensis*, and in having an incomplete lateral line, which is unique for the entire family.

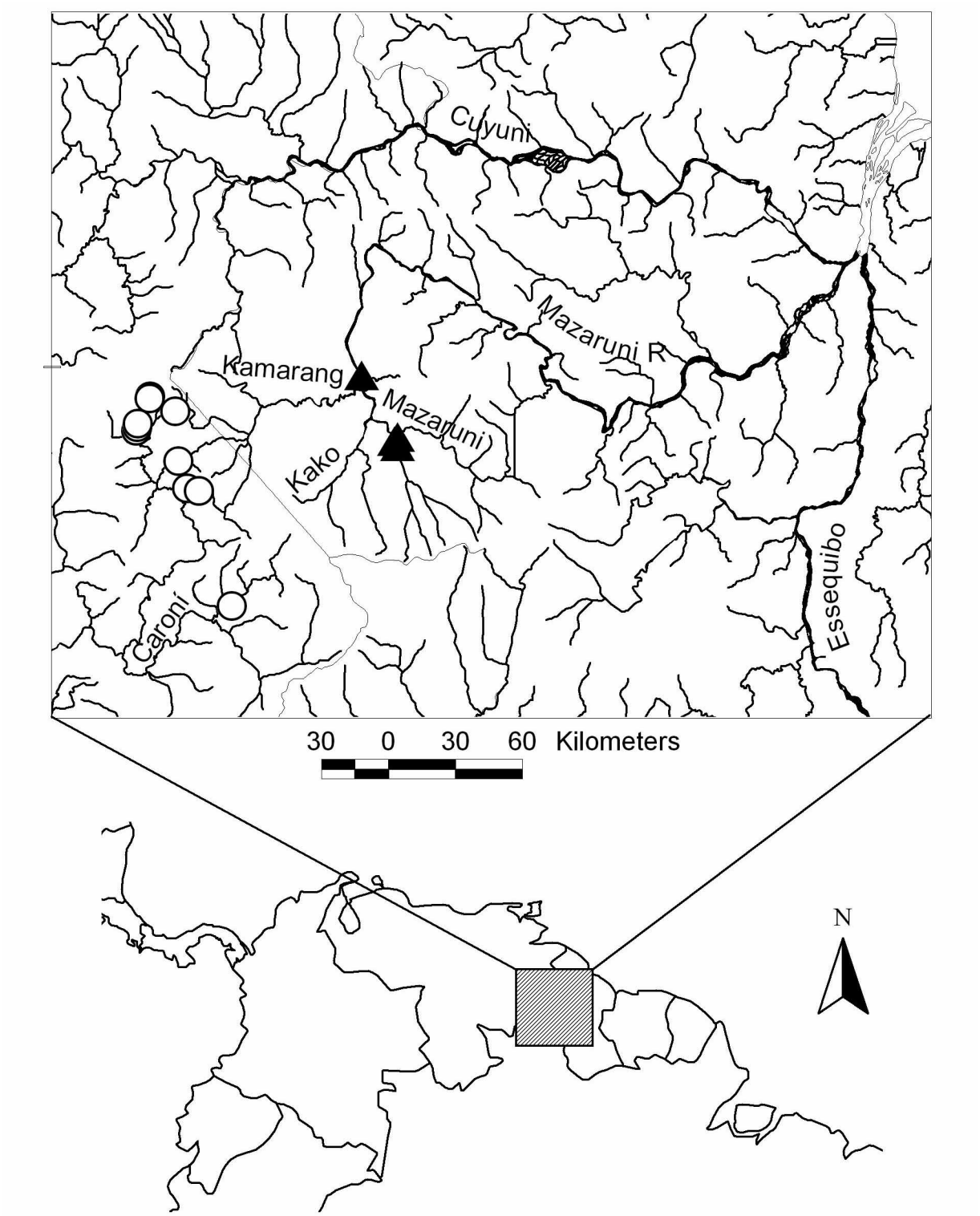


**FIGURE 3.** Known distribution of *Apareiodon agmatos* in the upper Mazaruni river basin (black triangles). Records of *A. gransabana* represented by specimens deposited at MCNG (circles) are provided for comparison. Notice the proximity of the upper Mazaruni river and upper Río Caroní drainages. One symbol may represent more than one collection locality.

*Apareiodon agmatos* adds another component to the already extraordinary endemic fish fauna of the upper Mazaruni River. Isolation from adjacent basins by the presence of numerous rapids and the massive rocky formations of the Guiana Shield seem to have fostered an incomparable amount of divergence in fishes from the basin. The biogeography of the Mazaruni basin and its possible associations with the upper Caroni,

Cuyuni and Essequibo basins remains essentially unstudied. The region, unfortunately, is not exempt from extensive human impacts. Gold-mining is widespread in the channel of the Mazaruni River and numerous tributaries. Aerial and satellite images reveal vast areas of devastated riparian forests. Gold dredges have increased water turbidity, sedimentation and severely altered streambeds. The associated communities of aquatic benthic organisms are known to be susceptible to the multiple negative effects of these impacts (Biller, 1994; Mol & Ouboter, 2004; Nico & Taphorn, 1994).

**Acknowledgements**

This work is part of a collective effort by scientists from the Center for the Study of Biological Diversity of the University of Guyana, the Royal Ontario Museum, Texas A&M University, Auburn University, and UNELLEZ to assemble a complete inventory of the freshwater fishes of Guyana. We thank E. Liverpool, K. Kramer, L. George and C. Thierens for help in the field. We are especially thankful to the captains of the villages of Philippai, Jawalla, Kako and Kamarang for providing us with permits for fishing and invaluable logistic support. E. Holm and D. Stacey provided curatorial help in processing and cataloguing specimens at the ROM. Carla Pavanelli and Wayne Starnes were kind enough to provide us with radiographs of A. *gransabana* and a number of comments to improve the manuscript. N. Lujan found and shared obscure references and thoughts on Guyana Shield biogeography. R. Winterbottom kindly photographed the mouth of *A. agmatos*. We are most grateful to Richard Vari, César Román Valencia, Heraldo Britski and two anonymous reviewers for their helpful comments. Funding for field work in the Mazaruni River was provided by the United States National Science Foundation grant DEB 0516831 to K.O. Winemiller, R.L. Honeycutt and HLF. Field equipment was partially funded by a grant to DCT from the NSF Planetary Biodiversity Inventory DEB 0315963 “All Catfish Species Inventory” and startup funds to HLF from the ROM Research General Endowment Fund. Fishing permits were provided by the Environmental Protection Agency of the Government of Guyana and access to Amerindian territories in the upper Mazaruni was kindly provided by the Ministry of Amerindian affairs.

**References**

Biller, D. (1994) Informal gold mining and mercury pollution in Brazil. Policy Research Working Paper 1304, The World Bank: Public Economics Division, Washington, DC.

Eschmeyer, W.N. (ed.) (2008). Catalog of Fishes (electronic version), http://www.calacademy.org/research/ichthyology/catalog/fishcatsearch.html, (accessed 18 September 2008).

Flecker, A. (1992) Fish trophic guilds and the structure of a tropical stream: weak direct vs. strong indirect effects. *Ecology*, 73, 927–940.

Ingenito, L. & Buckup, P. (2005) A new species of *Parodon* from the Serra da Mantiqueira, Brazil (Teleostei: Characiformes: Parodontidae). *Copeia*, (4), 765–771.

Kramer, D. & Bryant, M. (1995) Intestine length in the fishes of a tropical stream: 1. Relationships to diet – the long and short of a convoluted issue. *Environmental Biology of Fishes*, 42, 129–141.

Mol, J. & Ouboter, P. (2004) Downstream effects of erosion from small-scale gold mining on the instream habitat and fish community of a small Neotropical rainforest stream. *Conservation Biology*, 18, 201–214.

Nico, L. & Taphorn, D (1994) Mercury in fish from gold-mining regions in the upper Cuyuni river system, Venezuela. *Fresenius Environmental Bulletin*, 3, 287–292.

Pavanelli, C. (2003) Family Parodontidae, p. 46-50. In: Check List of the Freshwater Fishes of South and Central America. R.E. Reis, S. O. Kullander, & C.J. Ferraris (eds.) Edipucrs, Porto Alegre, Brazil.

Roberts, T. (1974) Osteology and classification of the neotropical characoid fishes of the families Hemiodontidae (including Anodontidae) and Parodontidae. *Bulletin of the Museum of Comparative Zoology*, 146, 411–471.

Starnes, W. & Schindler, D. (1993) Comments on the genus *Apareiodon* Eigenmann (Characiformes: Parodontidae) with the description of a new species from the Gran Sabana region of Eastern Venezuela. *Copeia*, 1993, 754–762.