

et al. 2001), lo cual concuerda con lo descrito por Jawets et al. (1990), quien también menciona que esta especie produce infecciones sólo cuando abandona el tubo intestinal. Referente a los aislamientos bacterianos de *Citrobacter koseri* realizados, Koneman et al. (2001) menciona que pueden encontrarse en orina, nariz, esputo y heridas, causa rara de meningitis y abscesos cerebrales en neonatos y han sido obtenidos predominantemente de materia fecal.

En cuanto al aislamiento de *Acinetobacter sp.* Koneman et al. (2001), reporta el aislamiento de esta especie bacteriana en infecciones de heridas de piel y nosocomiales, neumonías, peritonitis, y bacteriemias en humanos. La frecuencia de aislamientos bacterianos en heces fueron altos en *Tapirus bairdii*, lo cual puede ser debido al hábito alimentario (dieta variada y rica en fibra de tallos y hojas) que quizás no sea muy fermentable. Esto difiere de lo descrito por Hojberg et al. (2003) en un estudio sobre la capacidad catabólica microbiana gastrointestinal de cerdos con dietas fermentables líquidas o fibrosas secas, quienes observaron una disminución de la población microbiana (microbiota residente) probablemente por el efecto bactericida del ácido láctico y bajo pH.

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SCIENTIFIC REPORTS

2007: Two major Steps for Tapir Conservation in French Guiana

By Benoit de Thoisy

The Guianas host a single contiguous forest block that represents more than one third of remaining Neotropical forest coverage, with expected good conservation status of several large mammals, including the Jaguar (Marieb 2006), the Giant Otter (Groenendijk 1998), and the Lowland Tapir (Taber et al. 2006). Conservation policy remained nevertheless for long insufficient to protect large mammal populations, including tapirs. unsatisfactory, with evident lack of ambition and means for implementation on the field for distinct reasons. Guyana and Suriname have faced decades of politic, economic and social difficulties, relaying biodiversity conservation at lower priority levels.

In contrast, French Guiana has a high economic level. But due to its status as a French administrative unit, many judiciary decrees related to nature conservancy remain either inappropriate for application on the territory, or legally inapplicable. Also, divergent ambitions between local (i.e., French Guianan) authorities and national (i.e., French) government agencies complicate the political implementation of a conservation vision for the country. Two major milestones have nevertheless been reached in 2007: the National Park, a new protected area in the south of the country, and a decree prohibiting the sale of several game species, including the Lowland tapir.

The National Park, a process initiated 15 years ago

At the Rio conference in 1992, the French president proclaimed his will to create the "Amazonian National Park" in French Guiana. Fifteen years later, the decree was signed. The road has been long until this success, and has exhausted many persons. Conflicting interests between national and local authorities, between high biodiversity value spots and gold mining lobbies (Hammond et al. 2007), and the lack of traditional communities' rights in the French laws resulted in two aborted projects before the successful one signed in

February 2007. With this new protected area of 20,000 km², French Guiana presently contains a comprehensive and well configured network of protected areas. The other significant biodiversity conservation interest is entirely regional: the aggregate comprised by the Tumucumaque National Park (3,8 millions ha), the Ecological Station of Grão-Pará (4,3 millions ha) and the Maicuru Reserve (1,2 millions ha) are now under a single coordinated legal protection legislation, the responsibility of both France and Brazil. It is the largest tropical forest area in the world, with more than 12,000,000 hectares.

However, the Guianan National Park still awaits IUCN endorsement, since I-IV IUCN protected areas status is not reached with current park regulations. Indeed, all the area remains legally open to hunting practices by tribal communities, and extractive activities of natural resources are controlled by the same French decrees than outside the park. The single change brought the decree is that no species can be sold or bought within the Park. This decision was controversial, but the Park proposition contends that the rationale for both scientific monitoring and respect of aborigine livelihoods are parts of the solution for natural resource conservation in remote, inhabited Amazonian forests. An innovative concept of National Park may have thus been implemented, but important difficulties remain: intense illegal gold mining pressure on the Park territory, conflicts among communities inhabiting the Park (e.g., Bush negroes and Amerindians), recurrent denial of the Park by several local elected politicians, logistic needs to implement the regulations for the daily functioning of the park, etc.

The Decree of July 23th, 2007

In French Guiana, the legal protection of terrestrial vertebrates was restricted to a national decree signed in 1986. This decree is still in course for most species; it categorizes species with two protection levels: (i) some species are fully protected, e.g. the Giant Otter, the Spider Monkey, the Giant Armadillo; and (ii) some species are prohibited to sale and/or buy, e.g. the Capuchin Monkey, the Howler Monkey, the two Brocket Deers (we have *M. gouazoubira* and *M. americana*). Consequently, species not listed, including the tapir, were not protected and could then be killed and commercialized. In 1995 the government established by decree a "positive list" of species that could be regularly commercialized: the tapir was included in this decree.

In 2002, the "National Action Plan for the Management of Fauna and its Habitats" was implemented under the responsibility of the Ministry of Environment. The key idea of this initiative was to bring together managers, scientists, NGOs, communi-

ties representatives, and social work professionals to initiate discussions on the status of fauna and to reach consensus recommendations for its conservation. Improvements of existing laws was one goal, but not the exclusive points to deal with. During four years, public-open working groups included several topics: awareness and education, hunting practices and regulation, forest management, non extractive uses of forest (e.g., tourism), etc. After hundreds hours of discussions, often getting lively since conflicting points of view were addressed, some consensus points were reached. The necessity to retrieve the tapir and three frugivorous birds (*Psophia crepitans*, *Crax alector* and *Penelope marail*) from the list of commercial species was one of those points, and the first approved with a decree. Forthcoming working groups cessions will be focused on hunting periods, quotas, and other management details. Indeed, the status of many sensitive species remains precarious: despite the National Park, only 3% of the territory is under strong protection, where hunting is totally prohibited. Elsewhere, subsistence hunting is allowed, and several species are under a strong risk of overharvesting (e.g., monkeys and tapirs, de Thoisy & Vogel 2002; de Thoisy et al. 2005).

The weakness of the legal status of the tapir in French Guiana was highlighted during the TSG meeting at Sorocaba, 2007 (Working group "Human conflicts", objective 2, action 2.2). The involvement of, and implications for many Guianan peoples has to be acknowledged for this first but indispensable review step for large vertebrate conservation in French Guiana.

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New Fossil Discoveries and the History of *Tapirus*

By Matthew Colbert

Fossil tapirs tell a fascinating tale of intercontinental dispersal, extinction, and evolution. While their current geographic range is confined to Southeast Asia, South America, and Central America, fossil tapirs prove that as recently as a few thousand years ago they ranged across North America, Europe, and Asia. Fossil evidence also suggests that tapirs were not present in South America until at most a few million years ago.

But how did this geographic pattern emerge? And what is the relationship of these ancient tapirs to living species? Recent discoveries of fossil tapirs in South and North America, and an improved understanding of their evolutionary relationships, have started to shed some light on these questions. Here I briefly review some of these new discoveries of fossil *Tapirus*, and discuss some of the outstanding issues related to the evolution of *Tapirus*.

In North America, major fossil discoveries of tapirs have recently been reported from the southeastern United States. These studies have shown the existence of new species of *Tapirus*, and have also provided material for a much more thorough documentation of formerly poorly known species. Most of the description and interpretation of these has been the work of paleontologist Richard Hulbert from the Florida Museum of Natural History.

Hulbert's work suggests that there were at least six extinct species of *Tapirus* from the late Miocene to

CONTRIBUTED PAPERS

Tabla 1. Distribución proporcional de la frecuencia de aislamientos bacterianos a partir de coprocultivos en Tapir Centroamericano de las Reservas de la Biosfera "El Triunfo" y "La Sepultura" en la Sierra Madre de Chiapas.

| Familia / Grupo | Bacteria | % Familia / Grupo | No. Cepas | % |
|--------------------|-------------------------------|-------------------|-----------|--------|
| Aeromonadaceae | <i>Aeromonas hydrophila</i> | 4.96 | 13 | 4.96 |
| | <i>Alcaligenes</i> sp. | 11.83 | 14 | 5.34 |
| | <i>Acinetobacter</i> sp. | | 17 | 6.48 |
| Enterobacteriaceae | <i>Citrobacter</i> sp. | 75.19 | 3 | 1.14 |
| | <i>Citrobacter braakii</i> | | 12 | 4.58 |
| | <i>Citrobacter freundii</i> | | 13 | 4.96 |
| | <i>Enterobacter aerogenes</i> | | 5 | 1.90 |
| | <i>Enterobacter amnigenus</i> | | 5 | 1.90 |
| | <i>Enterobacter cloacae</i> | | 4 | 1.52 |
| | <i>Escherichia coli</i> | | 83 | 31.67 |
| | <i>Klebsiella oxytoca</i> | | 10 | 3.81 |
| | <i>Klebsiella planticola</i> | | 14 | 5.34 |
| | <i>Klebsiella pneumoniae</i> | | 8 | 3.05 |
| | <i>Kluyvera</i> sp. | | 10 | 3.81 |
| | <i>Proteus mirabilis</i> | | 7 | 2.67 |
| | <i>Proteus penneri</i> | | 5 | 1.90 |
| | <i>Serratia marcencens</i> | | 7 | 2.67 |
| | <i>Serratia odorifera</i> 1 | | 11 | 4.19 |
| Micrococcaceae | <i>Micrococcus</i> sp. | 8.01 | 7 | 2.67 |
| | <i>Staphylococcus</i> sp. | | 10 | 3.81 |
| | <i>Staphylococcus latus</i> | | 4 | 1.52 |
| | | 100% | 262 | 100.00 |

Miguel Álvarez del Toro, en Tuxtla Gutiérrez, Chiapas, México. En un estudio de caso de Bronconeumonía en *Tapirus bairdii* del estado de Chiapas, al realizar aislamientos de vías respiratorias y digestivas, Güiris et al. (2002) reportan: *Enterococcus faecalis*, un estreptococo intestinal aislado en faringe, *Escherichia coli* y *Citrobacter freundii* aislado de intestino, lo que sugiere que una bacteria (*Enterococcus* sp.) de la microbiota intestinal de caballo o tapir puede actuar como un patógeno potencial en vías respiratorias. Por otra parte, Carter y Chengappa (1991) reportan aislamientos de *Escherichia coli* en Caballo. Pérez (2005) también encontró *Escherichia coli*, *Klebsiella pneumoniae*, *Enterobacter cloacae* y *Kluyvera* sp. en tapir, caballo y mula, aparentemente sanos. Esto sugiere que dichas bacterias forman parte de la microbiota residente del intestino de estos Perisodáctilos. Con respecto a *Alcaligenes* sp. y *Klebsiella planticola*, aislados en excretas de tapir, pueden estas bacterias estar supeditadas posiblemente a los hábitos alimentarios del tapir, dado que esta bacteria se encuentra en suelo o plantas (Koneman et al. 2001). La mayor frecuencia

de aislamientos bacterianos en Tapir fue para la especie *Escherichia coli* en un 31.67%. cifra que concuerda con lo encontrado por Güiris et al. 2001. que reportan un 57.0% de aislamientos de la especie en tracto digestivo de tapires en el Zoológico Miguel Álvarez del Toro en Tuxtla Gutiérrez, Chiapas.

El grupo *Serratia liquefaciens* es clasificada no como una especie única, sino como una colección de muchos grupos de hibridación de DNA bacterianos, la cual se aísla del ambiente y de humanos (Koneman et al. 2001).

En la presente investigación se identificaron las siguientes especies: *Escherichia coli*, *Kluyvera* sp., grupo *Serratia liquefaciens*, *Citrobacter koseri*, *Pantoea agglomerans*, *Proteus vulgaris* y *Acinetobacter* sp. Dicho resultado con-

cuerda con lo descrito por Koneman et al. (2001) en donde cita que *Escherichia coli* es uno de los aislamientos bacterianos más comúnmente realizados en el laboratorio de muestras de tracto gastrointestinal. Por otra parte *Kluyvera* sp. es raramente identificada en muestras de heces de humanos (Koneman et al. 2001). En tanto que el aislamiento de *Pantoea agglomerans* concuerda con lo descrito por Koneman et al. (2001), en donde citan que esta especie bacteriana ha sido aislada de fuentes biofísicas diversas (plantas, animales, humanos, agua) y de heridas, sangre, orina y órganos internos. Mientras que *Proteus vulgaris*, se encuentra en aislamientos recuperados con más frecuencia de muestras clínicas y son distribuidos en la naturaleza en forma amplia, estos microorganismos se encuentran en el suelo y el agua, sobre las plantas y como lo indica el nombre de la familia, dentro del tracto intestinal de los seres humanos y animales. Es parte de la microbiota intestinal de mamíferos, y ha sido recuperado con mayor frecuencia en huéspedes inmuno-suprimidos, en particular aquellos que han recibido tratamientos prolongados con antibióticos (Koneman