World Heritage Sites

Protected Areas and World Heritage

CANAIMA NATIONAL PARK
VENEZUELA

The immense Canaima National Park on the southeastern Venezuelan border with Guyana and Brazil is a spectacular plateau landscape studded with table mountains. Streams cascade from the cliff tops, one of them being the world's highest waterfall. The flora and fauna of the summits is of great richness and high endemism which form a unique archipelago of isolated but related ecosystems.

COUNTRY
Venezuela

NAME
Canaima National Park

NATURAL WORLD HERITAGE SITE
1994: Proposed for inscription on the World Heritage List under Natural Criteria vii, viii, ix and x.

STATEMENT OF OUTSTANDING UNIVERSAL VALUE [pending]

IUCN MANAGEMENT CATEGORY
II National Park

BIOGEOGRAPHICAL PROVINCE
Guyanan (8.04.01)

GEOGRAPHICAL LOCATION
The Park is on the Gran Sabana plateau of southeasternmost Venezuela reaching to the border with Brazil and paralleling the Guyanan border to north of the Sierra da Lema and the Rio Carrao; on the west and south it is bounded by the River Caroni. It is about 200 km south of the city of Ciudad Guyana between 4°41' to 6°29'N and 60°40' to 62° 59'W. The Pan American Highway to Brazil runs down its eastern side.

DATES AND HISTORY OF ESTABLISHMENT
1962: The western (Canaima) sector (1,913,750 ha) established as a National Park by Executive Decree No.770; management is regulated under the Forest Law of Lands and Waters of 1966;

1975: The eastern (Gran Sabana) sector (1,086,250 ha) added by Executive Decree No.1137.

LAND TENURE
Government, in Bolívar State. The traditional inhabitants, the Pemón, claim rights to several lands and properties (Castillo, 2005). Administered by the National Parks Institute (INPARQUES) of the Ministry of Environment and Natural Resources.

AREA
3,000,000 ha

ALTITUDE
450m to 2,810m (Cerro Roraima).

PHYSICAL FEATURES

Canaima National Park stretches over most the southeastern quarter of the Guayana Shield highlands between the Orinoco and the Amazon basins. It covers the rolling upland plains of the Gran Sabana (Great Savanna) at elevations between 800m in the south and 1,500m in the north, the table mountains or *tepuis* 2,000-2,800m high of Roraima, Kukenan and others in the eastern sector, with Chimantá and Auyán-tepui, the largest, amongst others in the west, plus undulating lowlands between 350 and 650m. The Park's landscape is studded with an archipelago of more than thirty spectacularly isolated inselbergs, flat-topped and vertical-sided, rising 1,000-2,000m above the plateau. Their deeply eroded summits are scored by gullies, canyons and sinkholes, some several hundred metres deep. Many are cloud-covered most of the year and several have not yet even been explored. These are the continent's oldest exposed rocks, remnants of the Roraima formation, a largely Precambrian 1.8 billion year old multicolored sandstone tableland 2,500 metres thick that covered the far older gneiss and granite basement rocks of the Guyana Sheild. The layer of sandstone with quartzite intrusions and interlayered with claystone, conglomerate and Mesozoic dykes of diorite, was cracked by tectonic movements and then dissected and eroded for 220 million years. Separation into isolated summits began approximately 180 million years ago, resulting in the present karst landscape of castellated cliffs and table mountains. Water pours off the cliffsides in hundreds of waterfalls, among them the world's tallest, the 979m Angel Falls. The upland soils are highly weathered, acidic, leached and nutrient-poor, especially on the *tepuis;* the lowland and valley soils are richer. The Río Caroní and its many tributary headwaters in the Park supplies the Guri dam 130 km north which provides electricity to much of the east of the country (Government of Venezuela, 1993).

CLIMATE

The climate of the great plateau is temperate, with a mean annual temperature of 24.5°C, but on the *tepuis* temperatures average between 9°-12°C and can fall to 2°C at night. The mean annual rainfall is between 1,800 and 3,000mm varying with local orographic features but is fairly constant though heavier between June and September. The summits are frequently rainy and always humid. They receive from 2,000 to 4,000mm a year, with some being permanently covered in cloud though there is a subtle dry season. In the Park's lowland northwest, there is a weak dry season between December and April. The relative humidity is between 75%-85%. Winds prevail from the northeast and southeast (Sears, 2001b).

VEGETATION

The Park's three dominant ecoregions are the highland Guyanan savanna, the highland Guyanan moist forests, and above 1,500m, the discontinuous *pantepui* association of the table mountains. The Gran Sabana was a Pleistocene plant refuge and dispersal centre and the uplands consequently have great floristic and ecological diversity with high levels of species endemism, especially on the *tepuis* (Sears, 2001a). Its 41 endemic species include the yagrumo *Cecropia kavanayensis*. Canaima is also famous for its diversity of orchids, with an estimated 500 species recorded in the Park (Government of Venezuela, 1993). However, the upland flora remains still largely unexplored.

The formation of savanna has been accelerated on the infertile soils by the natives' traditional practice of land management by fire. The Gran Sabana grasslands can be divided into two types: on poor sandy soils extensive bunchgrass savannas are dominated by *Trachypogon plumosus* and *Axonopus pruinosus;* on patches of damp richer soils, bush savannas of *Stegolepis ptaritepuiensis*, *S. guianensis* and *Brocchinia steyermarkii* occur. In more detail their cover is an intricate mosaic of several types of vegetation. Except for the continuous forests at the foot of the *tepuis,* woodlands occur in small patches surrounded by open grasslands and meadows. There are also groves of the useful moriche palm *Mauritia flexuosa,* shrubby scrub savanna, and intermittent species-rich gallery forests (Dezzeo, 1994; Bonaccorso, 2001).

The Guyanan highland moist forests are of dense evergreen submontane and montane forest, with some scrub savannas, mostly unexplored. The tall evergreen forests 30-40m high with dense crowns and some emergent trees are of the genera *Calophyllum*, *Anacardium*, *Manilkara*, *Protium*, *Inga*, *Parkia*, *Copaifera*, *Erythrina*, and *Dipteryx*. On the plains, abundant trees include *Micropholis melinoniana*, *Dacroydes* sp., *Euterpe precatoria*, and *Quassia cedron.* In the hills, there are fewer emergents and forests of *Newtonia suaveolens*, *Couratari guanensis*, *Alexa* sp.,*Euterpe precatoria* and *Micrandra minor*. The annually flooded riverine forests are similar in both physiognomy and composition to the flooded forests of Amazonia with Amazonian families of Lauraceae, Magnoliaceae, Elaeocarpaceae, Rubiaceae and Myrtaceae (Daly & Mitchell, 2000).

A *tepui* mountain has four distinct vegetation zones: base, talus slope, cliff foot and mountain summit. The base rises out of highland savanna or evergreen rainforest below 500m in an uninterrupted mat of rainforest, with a canopy between 25 and 45m tall, dominated either by lowland Amazonian or Guayanan elements. Above 500m the talus slopes are covered by humid montane forests with trees up to 60m high giving way to montane genera such as *Clusia, Monorobea, Miconia, Graffenrieda, Magnolia, Myrcia, Drimys,* and *Viburnum*. Typically tropical highland or temperate Ericaceae become common in these cloud forests along with ferns. In the cooler, humid forests of the upper talus slopes, species of Andean ancestry have evolved. At the foot of the escarpment cliffs, most plants are hardy species that have adapted to the bare sandstone. Members of the Bromeliaceae pineapple family are particularly successful here, especially in the genera *Cottendorfia, Navia,* and *Brocchinia*.

The *pantepui* ecoregion is characterized by diversity with floristic associations varying from mountain to mountain. There is an extraordinary degree of species richness on these isolated mountaintops, and they have some of the highest plant endemism in northern South America (eg, 20 species of the endemic bamboo *Myriocladus).* Of the 2,322 species of vascular plants in 630 genera in the floristic province, 766 (33%) are endemic to the province, and 65 are restricted to the Guayana Shield (Sears, 2001b). On the summits, there are five vegetation types: 1) forests of mainly dwarfed trees, on stream sides, depressions and gullies; 2) forest epiphytes; 3) rock crevices, bluffs and ledges; 4) wet or dry open savanna; and 5) rock outcrops and open sand or rock. The vegetation, isolated for millennia on infertile soils, is characterized by endemism and carnivory, eg: *Heliamphora* spp.,*Drosera roraima* and *Utricularia humboldtii*. 18 of these endemic taxa have been identified on the *tepuis* Summit endemics occur on most or all mountains, others are highly localized to a single summit, and on Auyántepui for example, 900 species of higher plants have been recorded many endemic to that massif. And the cloud forest on the low *tepui* of Sierra de Lema is one of the most richly endemic areas in Venezuela. Summit forests are low (8-15m) and species-poor; their leaves are almost entirely coriaceous. Some low forest associations are *Bonnetia neblinae* and *Neotatea neblinae*; *Podocarpus roraimae*, *Schefflera umbellata*, *Daphnopsis steyermarkii*, *Psychotria jauaensis*, *Befaria sprucei*, and *Weinmannia velutina*; and the endemic-dominated association on the Cerro Yapacana of *Bonnetia tristyla*, *Tepuianthus yapacanensis*, *Symplocos yapacanensis*, and *Gongylolepis yapacana.* Tree ferns and palms such as *Geonoma appuniana* and *Euterpe caatinga* grow well and Bromeliaceae and Eriocaulaceae grow in the understorey (Castillo, 2005; Sears, 2001b).

The ecoregion as a whole has four distinct phytogeographic districts each grouped into mountain blocks, and each with its own characteristic and endemic taxa. The eastern district is delimited by the distribution of the endemic treelet *Bonnetia roraimae;* some genera endemic to this district include *Quelchia*, a shrubby member of the sunflower family, *Connellia*, in the Bromeliaceae, and *Tepuia* in the Ericaceae. The southern district, along the eastern Venezuela-Brazil border, has extensive shrublands, meadows, and frequent low forests also the highest number of flowering plants within one endemic family, the Saccifoliaceae. and twelve endemic genera. The western district is the most extensive, hosting the characteristic red-flowered *Kunhardtia rhodantha*, shrubby melastomes of the genera *Graffenrieda* and *Meriania*, and a number of endemic *Phyllanthus* species. The northern, Jaua-Duida, district comprises widespread summits sharing genera such as *Tyleria*, *Neotatea* and *Tepuianthus*, as well as the dominant meadow species *Stegolepis grandis*. (Sears, 2001b).

FAUNA

The wildlife of this region has been poorly surveyed because of its remoteness, and species are continually being discovered. The large intact grasslands of the savanna and surrounding habitats support diverse mammal populations which include giant anteater *Myrmecophaga tridactyla* (VU), giant armadillo *Priodontes maximus* (VU), giant otter *Pteronura brasiliensis* (EN), jaguar *Panthera onca,* puma *Puma concolor* and Brazilian tapir *Tapirus terrestris* (VU). In the Park's Guayanan highland moist forests 145 mammals have been recorded (ParksWatch, 2004). Many are widespread Amazonian species including pale-throated three-toed sloth *Bradypus tridactylus*, southern tamandua or collared anteater *Tamandua tetradactyla*, the rodents capybara *Hydrochaeris hydrochaeris*, paca *Cuniuculus paca* and red-rumped agouti *Dasyprocta leporina*, bush dog *Speothos venaticus* (VU), coatimundi *Nasua nasua*, kinkajou *Potus flavus,* the kinkajou-like olingo *Bassaricyon beddardi,* jaguar, puma, tapir, collared and whitelipped peccaries *Tayassu tajacu*, and *T. pecari* and deer *Mazama* species. Other mammals with a restricted distribution include several opossums, including white-eared opossum *Didelphis albiventris*, and the Venezuelan endemic Tyler's mouse opossum *Marmosa tyleriana*. The fauna of the *tepui* is also diverse, with 186 mammal species. The nine primates include Colombian red howler monkey *Alouatta seniculus*, northern night monkey *Aotus trivirgatus*, collared titi monkey *Callicebus torquatus*, golden-backed black uakari *Cacajao melanocephalus*, weeper capuchins *Cebus*

olivaceus, and white-faced sakis *Pithecia pithecia*. The little water opossum *Lutreolina crassicaudata*, giant anteater and giant armadillo are found there, also bush dog, crab-eating fox *Cerdocyon thous*, long-tailed weasel *Mustela frenata*, jaguarundi *Puma yagouaroundi*, jaguar, puma, oncilla *Leopardus tigrinus* (VU) and margay *L. weidii.* There is a great variety of bats; rodents include the Venezuelan endemic Roraima mouse *Podoxymys roraimae* (VU), short-tailed cane mouse *Zygodontomys brevicauda*, three climbing rats in the genus *Rhipidomys*, and two guinea pigs *Cavia* species. (Sears, 2001b; Huber & Febres, 2000).

495 birds have been recorded in the Gran Sabana ecoregion where the endemism is high (Castillo, 2005). They include the harpy eagle *Harpia harpyja*, the largest raptor in South America, the savanna hawk *Buteogallus meridionalis,* the jabiru *Jabiru mycteria*, a large water bird; and the great tinamou, *Tinamus major* a large land bird, also the tepui tinamou *Crypturellus ptaritepui*. Other birds sometimes seen here include the black-faced hawk *Leucopternis melanops*, red-shouldered macaw *Diopsittaca nobilis*, painted parakeet *Pyrrhura picta* and savannah seedeaters *Sporophila* spp. Northern migratory species winter in the savanna, such as spotted sandpiper *Actitis macularia*, barn swallow *Hirundo rustica* and blackpoll warbler *Dendroica striata*. The moist forests also have great diversity, including white-cheeked pintail *Anas bahamensis*, aplomado falcon *Falco femoralis*, brown-throated parakeet *Aratinga pertinax*, pavonine cuckoo *Dromococcyx pavoninus,* vermiculated screech owl *Megascops guatemalae*, burrowing owl *Athene cunicularia*, five species of emeralds and hummingbirds, chestnut-tipped toucanet *Aulacorhynchus derbianus*, smoke-colored pewee *Contopus fumigatus*, orange-crowned oriole *Icterus auricapillus*, gray seedeater *Sporophila intermedia,* two-banded warbler *Basileuterus bivittatus* and black-backed water-tyrant *Fluvicola albiventer* (Sears 2001a) . Most of the 36 endemic birds of the Guyanan Highlands are totally restricted to the vicinity of the *tepuis*, mainly to the humid forest on the piedmont slopes above 600 m (Huber 1997). Some examples are the tepui swift *Streptoprocne phelpsi* in the montane evergreen forest, cliffs, rocky canyon, grasslands and savannas, the tepui goldenthroat *Polytmus milleri* in the forest edge, low seasonally wet grassland and scrub, and the tepui wren *Troglodites rufulus* on montane evergreen forest edge, elfin forest, scrub and savanna (Stattersfield et al., 1998; Bonaccorso, 2001). In the west the bird population is as varied and numerous and includes the bell bird *Procnias alba,* screaming piha *Lipaugus vocifernas,* toucans *Ramphastos* spp., and a multitude of hummingbirds (Castillo, 2005).

The *Pantepui* avifauna is rich, with 628 species, 41 species being endemic including the tepui tinamou *Crypturellus ptaritepui* which is known only from two tepuis, fiery-shouldered parakeet *Pyrrhura egregia*, tepui parrotlet *Nannopsittaca panychlora*, Roraiman nightjar *Caprimulgus whitelyi*, tepui swift, rufous-breasted and buff-breasted sabrewings *Campylopterus hyperythrus* and *C. duidae*, peacock coquette *Lophornis pavoninus*, velvet-browed brilliants *Heliodoxa xanthogonys*, tepui goldenthroats, white-throated foliage-gleaner *Syndactyla roraimae*, tepui antpittas *Myrmothera simplex*, red-banded fruiteaters *Pipreola whitelyi*, three manakins white-crowned *Pipra pipra*, olive *Xenopipo uniformis* and *Pipra cornutai* among many others (Sears, 2001b).

The Gran Sabana has more than 60 amphibian and more than 70 reptile species. The less mobile orders, the amphibians, reptiles and fish of the *tepuis* exhibit higher levels of endemism and on their summits and slopes the same species of reptiles and amphibians are also abundant. Notable endemic species are those of the toad genus *Oreophrynella,* the *Tepuihyla* genus of white-lipped frogs, and the small lizard of the genus *Riolama* among others (Gorzula & Señaris 1998, Huber & Febres 2000; Sears, 2001b). Some species found only there are the sapito sabanero *Leptodactylus sabanensis* and the *Scinax exiguuus.* Most of its endemic species are restricted to the forest of La Escalera including *Colostetus parkerae*, *Stefania scalae*, *Scinax danae*, *Tepuihyla rodriguezi* and *Eleutherodactylus pulvinatus*. *Tepuihyla rimarum* (VU) is found on Tepui Ptaritepui; *Tepuihyla galani* is found in savannas and also on certain tepuis (Gorzula & Señaris,1998; Bonaccorso, 2001). Reptiles and amphibians are abundant in the moist forests. The more ferocious snakes here include fer-de-lance *Bothrops asper*, coral snake *Micrurus* spp.,boa constrictor *Boa constrictor*, palm pit-viper *Bothriechis* spp. and bushmaster *Lachesis muta*. Iguanas *Iguana iguana* are ubiquitous and tegus lizards *Tupinambis* spp. common.

CONSERVATION VALUE

Canaima National Park exhibits a spectacular geomorphology with many waterfalls and great richness of endemic flora and fauna: the species found on the summits of the *tepuis* constitute the biogeographically unique *pantepui* association. The Park protects the headwaters of the Río Caroní, source of 60% of the nation's hydroelectricity. It lies within a WWF Global Freshwater 200 Eco-region, a WWF/IUCN Centre of Plant Diversity and a BirdLife-designated Endemic Bird Area.

CULTURAL HERITAGE

The forests and savannas have been occupied for 10,000 years by various groups of Amerindians: two archaeological sites have been found in the Park containing hand-fashioned stone tools estimated to be 9,000 years old. The area was the goal of adventurers seeking El Dorado but otherwise not well known. The present Pemón tribes are of Carib origin who settled only about 300 years ago. To them the tepuis are the sacred home of mawari spirits, guardians of the savanna, and they never climbed them till recently. They are the 'lost worlds' of legend. The savanna of the Gran Sabana is almost certainly a product of regular burning by their inhabitants from prehistoric times. From the 18th century Capuchin missionaries intermittently evangelised in the region (Government of Venezuela, 1993).

LOCAL HUMAN POPULATION

The Park is relatively remote and sparsely inhabited due probably to the poverty of the soils, by the Pemón, who inhabit mainly the more humid eastern sector. Between 1982 and 2005 the population doubled to its present total of about 11,840, living in scattered communities of 40-100 people mostly along the rivers, though now tending to live in larger groups of 100-300 (Castillo, 2005). Many maintain a traditional swidden agriculture, with hunter-gathering and trading in artefacts; some today also live on mining and tourism. Most transport within the Park has been by light plane or by foot and canoe.

VISITORS AND VISITOR FACILITIES

In 1993 the Park was said to receive 100,000 visitors a year, 90% visiting the plateau (Government of Venezuela, 1993). Tourism is encouraged but generally restricted to designated areas such as Roraima, and Auyantepuy, the only *tepuis* accessible to visitors, and the Laguna de Canaima in the west which can only be reached by air and where are lodges, campsites and recreational services. There is a visitor centre with conference centre, a members house, recreation area and the CVG-Edelca operations office at Luepa on the main road from Ciudad Guyana to Brazil which runs along the eastern border of the Park, cutting off its southeast corner and tourist facilities are being developed along this road. There are no other metalled roads within the Park and much of the rest is only accessible by air via four airstrips built by Capuchin missionaries. There is an airport at Santa Elena de Uairén 20 km south.

SCIENTIFIC RESEARCH AND FACILITIES

The first scientific research expeditions were made by the naturalist Sir Robert Schomburgk in 1833-44. The first *tepui* summit was reached in 1884, and research on the area has continued ever since because of the diversity and richness of its species: 135 past research projects were noted by Castillo in 2005. The work of the botanist O. Huber on the flora of *tepuis* was especially useful. Recent research has covered restoration of degraded soils using mycorrhizae, the characterization of savannah-forest vegetation, auto-ecology of vegetative species, wildfire effects on floral permanence and composition and atmosphere-biosphere interactions. Most of this is run from the Parupa Scientific Station near Luepa founded in 1995, which promotes research in the upper Caroní river basin, training local people and disseminating information to ensure resource conservation and sustainable use. The Instituto Venezolano de Investigaciones Científicas and Simón Bolívar University have participated in the research.

MANAGEMENT

The Park is currently under the administration of the National Parks Institute (INPARQUES) and is divided into eastern and western sectors for administrative purposes. The main administrative centre is the town of Santa Elena de Uairén, 20 km south. A management plan and regulations for the eastern section were issued under Decree No.1,640 of 1991. It divided the Park into seven zones: 1) Integral Protection Zone which is strictly protected with only environmental monitoring and scientific research permitted. In the eastern sector this includes the primary forests at the base of Roraima; the Ptari, Kukenán, Apauraí, Sororopán and Cerro Venamo *tepuis*; the Lema Range and the headwaters of several rivers, including the Kukenán, Arabopó and Aponwao. 2) Primitive Zone: tolerant of moderate use including research, environmental education, hiking and camping; 3) Naturally Managed Environment Zone where low-impact activities are permitted - most of the eastern sector; 4) Recreation Zone: 23 sites are zoned this way along five routes; 5) Special Use Zone: the largest and most important indigenous communities, religious missions and public works sites; 6) Historic-Cultural Interest Zone which includes 13 indigenous communities; 7) Natural Recuperation Zone for natural recovery or restoration of the vegetation (Castillo, 2005). The plan's objectives include provisions for indigenous agricultural production under strict regulation, for natural areas where recreation, educational activities and research are encouraged and sites for Pemón ethnic cultural protection and

promotion. Other activities were to be strictly controlled, and hunting and collection of wildlife forbidden. There was initially no management plan for the western sector of the Park, but a plan for both sectors together is being finalised which aims to improve the control of tourist traffic along the Highway and to Cerro Roraima. In 2004 CVG-Edelca completed an environmental and management strategy for the whole Caroni basin (CVG-Edelca, 2004a).

Since the Park protects the headwaters of the Rio Caroni and the Guri dam, the national electricity company, the Corporación Venezolana de Guayana - Electrificación del Caroní (CVG-EDELCA), is actively supporting INPARQUES and NGOs, inrestoring and reforesting degraded areas, controlling fires and developing tourist facilities. Charging entry fees and their local use is being considered. There is a conservation project by INPARQUES with the NGO Vitalis supported by UNESCO and IUCN to manage, monitor and train staff for the World Heritage site. The NGO Provita with Conservation International, the Indigenous Federation and the Bolívar State Government is designing tourist facilities along Highway Troncal 10, and may train indigenous communities in their use. EcoNatura and The Nature Conservancy projects train members of the Pemón community as ecotourism guides, provide a conflict resolution program between Park staff and locals, is evaluating tourism impact and documenting the oral traditions and culture of the Pemón people (Castillo, 2005).

MANAGEMENT CONSTRAINTS

Most of the threats to the Park result from poor on-site management control due to insufficient funding and lack of qualified staff. The main problems are tourist pressure, wildfires, population growth which is stressing resources, incompatible infrastructure like powerlines and conflicts with the native people over land. Increasing unregulated tourism leads to soil erosion and compaction, littering and destructive off-road driving. In 1995-6 INPARQUES closed Roraima to allow for restoration and the dependent local people burnt down the guard station in protest. This trouble is aggravated by Troncal 10 (the Pan-American Highway) on the Park's eastern flank which was finally paved in 1989. The growing mass tourism, road construction, illegal airstrips, and helicopter flights are opening up areas previously inaccessible. There is great risk of fire accidentally spreading from campsites and mining sites and from the traditional burning practices of the local people (WWF & IUCN, 1997). Large-scale gold mining started north of the Park in the 1990s leading to deforestation and river contamination by silt and mercury (IUCN, 1997). Five more dams are proposed along the Caroni. From 1997-2002 the Government built a series of powerlines across the Park from the Guri Dam to Brazil without consulting the local people or preparing an adequate Environmental Impact Assessment. Further mining and logging in the Park may follow.

STAFF

Under the Director and his assistant there was a team of 5 park guards, all Pemón, and 2 technicians in 2004 - fewer than in 1996 – with 4 guard stations, but this is an inadequate staff to effectively patrol so large an area (Castillo, 2005).

BUDGET

For the year 1982 the budget was Bs.150,466 (US$37,000) (IUCN, 1982). More recent information is not available. The income from entry fees, if charged, will be used to support the Park and local communities (Castillo, 2005).

LOCAL ADDRESS

El Director, Parque Nacional de Canaima, Santa Elena de Uairén, Provinica Bolivar, Venezuela.

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