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Perspectives

Kuno National Park is not yet ready for Cheetahs

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Abstract: Ecology is a science, and the ecosystem runs on a set of principles; there is no denying this. The last Indian Cheetah was shot in 1952 in its habitat, which was more open with grassland and shrubs in the arid and sub-arid ecosystem. Over time the habitat was altered, and the last Cheetah is reported to take refuge in the wooded Sal (*Shorea robusta*) forest of the then Madhya Pradesh. The situation has worsened since then; let us admit it. Introducing Cheetahs (*Acinonyx jubatus*) from Namibia is a decision taken in haste without considering its guild ecology. This action will not only distract our attention from the deteriorating forest ecosystem of the country but also from other pressing and critical conservation priorities. Five females and three males were relocated to Kuno National Park (KNP) on 17th September 2022. It was decided earlier that Asiatic lions would be relocated to KNP. Still, it was shelved, and the introduction of Cheetahs was put on a fast track despite the Supreme Court's earlier decision against the introduction of Cheetahs in KNP. The Supreme Court (SC) stated in its order way back in 2013 that "The decision taken by MoEF (Ministry of Environment and Forest) for introduction of African Cheetahs first to Kuno and then Asiatic lion, is arbitrary, an illegal and clear violation of the statutory requirements provided under the Wildlife Protection Act. The order of MoEF to introduce African Cheetahs into Kuno cannot stand in the eye of the law, and the same is quashed". A survey was conducted to relocate Cheetahs, and out of the three locations, KNP was chosen; the other two were: Shahgarh Landscape in Jaisalmer and Nauradehi Wildlife Sanctuary in Madhya Pradesh. The Supreme Court, in its order in 2020, permitted Cheetah introduction on an experimental basis. The stated objective of the ministry of environment and forest in this project is: "Establish viable Cheetah meta-population in India that allows the Cheetah to perform its functional role as a top predator and provides space for the expansion of the Cheetah within its historical range, thereby contributing to its global conservation efforts". However, the stated goal will not be able to fulfill its desired purpose.

Keywords: Kuno National Park; Asiatic Cheetah; forest compartments; grassland; savannah; woodland; open forest; Southern tropical dry deciduous forest; population viability analysis; genetic variability

1. Introduction

Cheetah is said to have originated from an ancient word in Sanskrit, "chitraka", which translates as "spotted" in English. The presence of Cheetahs in India dates back to 2500 to 2300 BCE in the form of paintings in the Kharvai, Khairabad, and Chambal valleys in the states of Madhya Pradesh. Many reports suggest that the Cheetah had its footprint in almost every part of the country, from West Bengal to the united provinces, Punjab, Rajputana, and central India to Deccan, to name a few. There were enough reasons why Cheetahs grew and roamed throughout the length and breadth of the country in the old time. The ecosystem was adequately stocked with a prey base, and the un-fragmented habitat they needed to hide, hunt, and regulate body temperature was available in plenty. The last Cheetah was sighted way back in 1952, and since then, the habitat it used to live in has also changed abundantly, from huge grassland to woodlands. The Action plan on Cheetahs states that one of the objectives of the Cheetah introduction is to revive India's grassland of India, but this may not be as simple as stated. Kuno National Park (KNP) has a very high density of leopards, and some say 9 per 100 sq. km. In a fenced enclosure, the leopards may threaten the Cheetahs and compete with them for prey, which looks pretty natural with the home advantages lying with the leopards. The fencing is 12 km long and 9 feet high with eight compartments to house as many as 12 Cheetahs in the first phase, and possibly this is done to stop leopards coming into the Cheetah's enclosures. The leopards will be collared to enable park authorities to monitor their movement and control an inter-specific fight in the initial stages. Cheetahs are planned to be gender segregated in the first phase but will be kept in the adjoining compartments to develop a likeness for each other before setting them free in the open.

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The compartment size will range from 0.7 to 1.1 sq. km, and the entire area of 6 sq. km will be watched 24×7 through multiple high-resolution CCTV cameras.

2. Methodology

The methodology to assess the impact of ecology on the introduction of Cheetahs in KNP was the perusal of scientific papers, reports on this animal, and my personal experience as Director of Dudhwa National Park and Director of Lucknow Zoo while translocating some wild animals.

3. History of Cheetah introduction in India

A study was carried out to find out the chronology of the project Cheetah introduction since the early days, and this was Zafar Futeh Ali, honorary secretary of WWF in the early 1980s, took up the issue and made the then prime minister Mrs. Indira Gandhi aware of the fact that there is a necessity to initiate the process of bringing some Cheetah to India and start their conservation program on an urgent basis. The study also reveals that Rann of Kutch was chosen to release them, and this idea looks better than the area selected from in KNP. The ministry of environment and forest also requested the Iranian government to lend a few Cheetahs, which was a reasonable proposition and seemed a viable option on account of Cheetahs being of Asian stock and having the same genetic stock. In addition, the Kenyan government was also requested to send a few Cheetahs; possibly, this was an act to prevent breeding. This is not as if there were no dissents then; the paper reveals that the late Dr. T.N. Khosoo, an eminent environmentalist, wrote a letter to the then Prime Minister stating that the introduction plans of Cheetah are an exercise in futility. This shows strong opposition to this idea by eminent environmentalists of the country from 1971 till the death of Mrs. Gandhi in 1984. This idea was again revived in 2009 by the then minister of environment and forest and moved forward by requesting again to the government of Iran to lend a few Cheetahs, but seemingly Iran always looked hesitant to commit to this idea. The paper further states that in 2010, the WII prepared a "feasibility report on Cheetah introduction in India" jointly with the Wildlife Trust of India and the report was put in the public domain. Three sites were selected, but KNP was chosen out of them because of two facts; first, the area available was larger than the other two options, and second, the process of relocating villagers from the KNP in the advanced stage. KNP has been preparing for lion relocation since the beginning. Initially, this was thought to have relocated 27 Cheetahs in an area of 347 sq. km from where they are likely to move and spread in an area of 3,200 sq. km of KNP [1].

4. Ecology of Kuno National Park

The ecology of KNP is not what it was long ago; the anthropogenic factors have led to many irreversible changes in its habitat, and it will not let Cheetahs grow naturally. The temperature has gone up to 48°C, and summer has become very harsh for rest of the animals to live. The summer temperature ranges between 38°C and 48°C, whereas the minimum temperature goes down to 6°C and even lower. In their classification of Indian forest in 1968, Champion and Seth found six forest types on KNP: Northern tropical dry deciduous forest, Southern tropical dry deciduous forest, *Anogeissus pendula* forest, Scrub Boswellia forest, Butea forest, dry Savannah Forest grassland and tropical riverine forest [2]. The dominant tree species that occur in the KNP landscape are Khair (*Acacia catechu*), Kardhai (*Anogeissus pendula*), salai (*Boswellia serrata*), Tendu (*Diospyros melanoxylon*), Palash (*Butea monosperma*), and Safed babool (*Accacia leucocephaia*). The grass species found commonly are *Desmostachya bipinnata*, *Themada quadrivavis*, *Cenchrus cilliaris*, *Apluda mutica*, etc. The wildlife that is common in this area is *Mellivora capensis* (Ratel), *Canis lupus* (Gray wolf), *Tetracerus quadricornis* (Chousingha or Four-horned antelope), *Ursus melursinus* (Sloth bear), *Hyaena hyaena* (Striped hyaena), *Axis axis* (Chital), *Sus scrofa* (Wild pig), *Lepus nigricollis* (Indian hare), *Gazella bennetii* (Chinkara), *Boselaphus tragocamelus* (Nilgai), *Canis aureus* (Golden jackal), *Semnopethicus dussumieri* (Southern plains gray langur), *Hystrix indica* (Indian crested porcupine), *Vulpes bengalensis* (Indian fox), *Antilope cervicapra* (Blackbuck), *Rusa unicolor* (Sambar) and *Panthera pardus* (Leopard). Sometimes, a tiger was spotted to have migrated from Ranthambhore Tiger Reserve, which gave sleepless nights to the forest bureaucracy. This migration may have jeopardized Cheetah's relocation because of inter-specific guild fights. Based on the prey base survey by the Wildlife Institute of India (WII) and the World Wildlife Fund (WWF) in Kuno wildlife sanctuary in 2013, chital is the most abundant prey with a density estimate of 69.36/ km^2 ± 10.51. The density estimates of sambar, nilgai, wild pig, and chinkara are 4.85/ km^2 ± 1.19, 3.92/ km^2 ± 0.97, 3.05/ km^2 ± 0.78 and 0.86/ km^2 ± 0.28 respectively. In yet another study by National Tiger Conservation Authority (NTCA), chital is the most abundant wild prey in KNP with a population density of 38.48 individuals per km^2 and 51.58 animals per km^2 for all potential Cheetah prey species [3].

5. KNP Cheetah project will not meet its objective

A calculation says that we would undoubtedly need a vast area to establish a viable population in the wild. An estimate explains that to have 100 Cheetahs in the wild, the forest department should allocate around 10,000 sq. km area, essentially free of dogs, goats, sheep, etc., and there is no such area in India. Losses of introduced animals, which are genetically weak and coming from different habitats, will be very high and unsustainable. All this is far too expensive and impractical. The action plan made is unreasonable and lacks substance. The action plan says that 3,200 sq. km will be enough to house 100 Cheetahs, but there are many studies on this; one study suggests that 12,700 sq. km would be needed for 100 Cheetahs, if not less. The other research indicates that Cheetahs like to live in very low densities, and on average, a male Cheetah needs 100 sq. km, whereas an average female Cheetah needs 750 sq. km as her home range. The habitat is crucially essential to form a healthy prey base. A close examination of the action plan reveals that the densities of different prey animals are not very

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scientifically based on the number of sightings; their densities at different locations are not shown. Other questions need to be spelled out in the action plan.

In the face of rapid climate change, the translocation of around 25 villages has left their farmlands unattended, and they have converted into woodlands with species like *Ziziphus nummularia*, *Accacia leucophloea*, and *Dichrostachys cinerea*. Likewise, several types of grass have come up in this area, which are not palatable, like *Desmostachya bipinnata*. Worst of all, this has replaced edible species like *Dichanthium annulatum*. The most critical issue which is not discussed anywhere is genetic pollution; when breeding begins in a genetically homogenous population of one stock, many problems come in with this and the includes death of wildlife also. One such example is the Rhino translocation from Assam to Dudhwa national park in 1984; on account of breeding amongst themselves, many diseases have crept into them today, which are found to be uncontrollable and life-taking. The other problem that always arises with the cat family members is their uncanny sense of homing instincts, and it takes a very long time for them to settle down properly in a new environment. This is the first translocation of its kind in the world; therefore, much depends on their successful breeding and acceptance by the ecosystem. The odds are stacked against Cheetahs.

6. Reasons for project failure

The "introduction of a Cheetah" has all the ingredients which make it an extremely difficult proponent to succeed. The Cheetah should not have been introduced until all the issues plaguing its ecosystem are appropriately addressed to satisfaction. The present package does not deal with scientific parameters, and the Cheetah needs drier and open grasslands with bushes and isolated trees to survive well. Many issues need immediate attention regarding policy linkages in general and open grassland policy in particular. Habitat fragmentation is a severe component of any protected area management. It has been seen that 2% of the forest land is under consistent encroachment, and its annual growth rate is 20,000 hectares per annum, which is exceptionally high by any standard. The approval rate for linear projects in protected areas (PAs) in India is more than 99%; therefore, the chances of wildlife growth in this country are highly precarious. Besides, many issues need a careful study before launching a 'rewilding policy' in India. The status of forests in India is deplorable, the degradation of forest land is unstoppable, and despite massive plantation drive in our country, the wasteland has been increasing at a rate of 0.57% therefore, some of the issues have been flagged which are not yet conducive for rewilding KNP with Cheetahs [4].

6.1 Population viability analysis

A population viability analysis (PVA) is a critical computer simulation and simple mathematical model that tells us the interactions between different known factors in an ecosystem to assess the likelihood of a population becoming extinct in a specified time frame under a particular situation. The model input is stated in annexure 4 of the action plan. Still, a perusal may indicate that genetic diversity has not been considered while finalizing the PVA. Many unknown environmental factors become more important than the known factors during the process of extinction of a species, which is not endogenous but brought from a place with a different set of ecological conditions not yet known to us today. The action plan document 2021, says that the individual Cheetah population with a carrying capacity of over 25 individuals has a higher chance of persistence over the long term with appropriate augmentation and management. This further reveal that managing different site populations as a meta-population enhanced their chances for long-term survival and maintaining genetic diversity. Many studies indicate that Cheetahs are genetically weak stock. In a survey of the genomic legacy of the African Cheetah, *Acinonyx jubatus*, this has been found that as a species, this animal shows a sharp decline in genetic variability shown by multiple genetic markers. This has been found in a study that ability to accept skin grafts from another unrelated Cheetah is at a minimal level. The genetic depletion has also led to multiple problems in the captive breeding of this majestic animal. The genetic weakness has come from the in-breeding in a population with a weaker genetic base, as seen in other wild animals where in-breeding has been allowed to be carried out without understanding its consequences [5].

The project area of 748 km² within the national park is almost free of human settlements. Twenty-five villages, which were within the national park, were relocated outside the boundaries of the Protected Area in 1998 [6]; therefore, man-animal conflict is bound to take place if not today, then in time to come. The action plan also states that the national park has an approximate population of 500 feral cattle, which the villagers leave behind during their course of relocation outside the boundaries of the national park. The action plan further revealed that this population might form a prey base for the Cheetah without understanding that they may act as multiple foci for various infections, as is happening in Gir National Park, leading to the deaths of lions. Therefore, all the predictions may fail once an infection of an unknown nature sets in the Cheetah population, wiping out the entire population in no time. The action plan states that KNP's carrying capacity will reach its fullest with the Cheetah population in about 15 years if every ecosystem parameter goes well. In another 30-40 years, the landscape level carrying capacity will reach 36 Cheetahs. The ecosystem does not work like a mathematical calculation in biological science.

An experiment was conducted in Junagarh Zoo in 2009 where four Cheetahs were brought from Singapore, and all died by the end of 2013. The action plan categorically prohibits the dispersal of the Cheetah in the initial years of its introduction (5-6 years) to sink, or a population which is less than 18-20 adult Cheetahs may not be allowed to disperse for a reason best known to the project authorities. Cheetahs may be caught and brought back to KNP or other release sites if that happens. The ideal situation would have been providing adequate connectivity for these populations to disperse freely and adapt to the habitat. This would be

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proper to add that the Cheetahs, which are to be brought in from Namibia, have a very narrow band of gene variability, and persistent inbreeding may further weaken it, as it happened in the case of Rhinos in Dudhwa. A study was carried out in 1985 on the African Cheetah's genetic variability, demonstrating that Cheetahs are very susceptible to covid-19 compared to other cat family members. This has also been reported that in other domestic cats, the morbidity is around 1% but may decimate the entire population of Cheetahs if infected. There is a research deficit worldwide in the forestry and wildlife sector; therefore, forest bureaucracy always gropes in the dark. There have been many challenges in conserving Cheetahs worldwide because of multiple factors. Still, the real reason is that we cannot get the desired result in captive breeding because of its weak genetic base. The genetic depletion results in deformities in sperm heads and higher mortality rates in Juvenile states. This has been found that 90% of the cubs die at the Juvenile stage only [7]. The introduction plan of Cheetah has been the brainchild of a former bureaucrat turned forester who has been advising Supreme Court without formal training in forestry and wildlife.

6.2 Cheetah genetically weak amongst cat family

A study was carried out on the conservation genetics of the Cheetah, and this was observed that captive breeding in Cheetahs has not been very successful, rarely exceedingly more than a 15% success rate. The weak genetic base of Cheetahs has been amply reflected in deformities of their spermatozoon structure and breeding. There are multiple studies on this subject, which reveals that sperm count has been reduced ten folds in Cheetahs and has also been found that 70-75% of Cheetah sperm have large heads, small heads, and coiled tails, which explains their sterility by any standard of science. Cheetahs have shown around 90-90% less genetic diversity than any other cats in the wild [8]. Let us also understand the behavioral aspects of Cheetahs; female Cheetahs are solitary in their overall behavior and live alone with offspring, unlike their male counterparts, who may like to be a part of overlapping territories.

6.3 KNP is ecologically not ready for Cheetahs

The project in question can never be called a reintroduction of Cheetahs, as the action plan states, but this is an introduction of exotic species (African Cheetah) in technical terms. A study on the mitochondrial DNA (mt DNA) of Indian Cheetahs and African Cheetahs has been quite conclusive. An analysis of 139 base pairs (bp) of mt DNA has led us to believe that the Indian Cheetah is distinctly different as a subspecies [9]. It is *Acinonyx jubatus venaticus*. Many studies have also found that around 72 KYA separated Indian and African Cheetahs. The ecosystem of KNP is quite different from that of the African grassland where Cheetahs are found abundantly, and this does not have a suitable habitat in KNP nor the right kind of prey base for Cheetahs to survive; therefore, it is not possible to see long-term viability for them in India. They need strategic and operational interventions on every single step if they have to survive in KNP, which is neither possible nor economical. If we examine the habitat and ecosystem of Koriya, where the last Cheetah was shot in 1952, it had an ecosystem perfectly suited to the Cheetahs. The grasslands were huge, with an interspersed tree here and there and bushes all around. The prey base was adequate, but today almost all of them are either gone or converted to woodland or fragmented. The introduction of Cheetahs is a misplaced priority today.

On the contrary, we should focus on restoring the ecosystem and stopping the fragmentation of tiger habitats so that the forest capital is intact. The original plan to translocate lions into KNP was perfect and in order, but politics won over science. In an ecosystem, all the components are interactive. A slight alteration may bring about a disastrous change, which may not be known today but has wider repercussions in the coming. When the Cheetah population is not sustainable, how can an ecosystem be expected to be balanced. The Judiciary also buckled under pressure from politics and allowed Cheetah introduction on an experimental basis despite its scathing remarks in 2013. KNP was never a prospective home for exotics like Cheetah. Most of the grasslands in KNP are “manmade”, and nature’s play is conspicuous by its absence. The grassland ecosystem is a very complex issue and has not been studied in detail across the world, aside from India; therefore, along with the “cultured grass”, many invasive species have also come up which have not been a part of this system before.

6.4 Cheetah’s speed is its weakness in KNP woodlands

Cheetahs reach speeds of up to 113 km/h, accelerating from zero to 96 km/h in 3 seconds, and its main prey base is considered to be chital in KNP. Many studies suggest that Cheetahs adjust their speed per the speed of their prey base, and literature reveals that the chital runs at the maximum speed of 65 km/h, but a chase in woodlands may not favor carnivores like Cheetahs in KNP. There was a time when Cheetahs dominated the forest landscape in the world, and today its population has been estimated at around 7100, which constitutes 90% lesser than what it was a century before. Many studies indicate a reduction in its habitat to 9% and 80% of the Cheetahs living outside the protected area (PAs) [10]. A study was carried out in central India, which reveals that connectivity for the tiger movement is highly fragmented and overlaps with the urban and rural settlements. Therefore, the same fate will be meted out to project Cheetah as seen in the case of tigers. It is clear that despite the hype in project tiger, the general forest departments across the states and MP, in particular, could not stop fragmentation in the wildlife habitat [11].

6.5 Preferred prey base for Cheetahs is inadequate in KNP

There are plenty of studies on the preferred prey base of the African Cheetahs, and this raises a red flag when they are proposed to be translocated to KNP because the prey available here, chital (*Axis axis*), may not be called a preferred prey base for them. Multiple reports state that the main prey base for the Indian Cheetah consists of blackbuck (*Antilope cervicapra*) and chinkara (*Gazella bennettii*), and

sometimes it kills chital but is never able to kill nilgai (*Boselaphus tragocamelus*). Blackbucks used to inhabit KNP once upon a time, but they disappeared over the years on account of changes in the vegetation. Tall grasses invaded the open areas like *Themeda triandra*, which gave way to shrubland and, finally, woodland, which led to the complete disappearance of blackbuck from the site. Chinkara was also found in good numbers in KNP, and the earlier data suggests that in 2004 they were 4-5/ km^2 which rose to 6-10/ km^2 in 2007, but their numbers started to decline since then. The last report published in 2016 suggested that the population of Chinkaras declined to 0.9/ km^2, simply translating to a clear message that the prey base is fragile and this is not weak because people have killed their prey base mercilessly, but another factor has also come into play, and this is shrinkage in its habitat, change in grass composition and ecological succession of vegetation. The intra-guild competition will be fierce between leopards and Cheetahs because several studies have revealed that male leopard activity levels peaked during evening twilight or moonlight. Cheetahs also showed extensive temporal overlap with them. They also show positive associations with moonlight availability; therefore, there is the possibility that tigers and leopards being assertive and aggressive animals, may drive Cheetahs to the outskirts of the national park, where they may not have any option but to bank upon the goats, lambs, and calves of the villagers as their feed [12].

7. Discussion & Conclusion

The introduction of Cheetahs in KNP dates back to 2009. The proposal was first floated in 2009, and when the Supreme Court examined the entire translocation process in 2013, it found erroneous mistakes. The court observed: "The decision to introduce African Cheetahs into the same proposed habitat chosen for the reintroduction of Asiatic lion has not been placed before the Standing Committee of the National Board for Wild Life, nor has there been a consistent decision. In our view, MoEF&CC (Ministry of Environment and Forest) has not conducted any detailed study before passing the order to introduce foreign Cheetah to KNP. KNP is not a historical habitat for African Cheetahs. No materials have been placed before us to establish that fact. We may indicate that our top priority is protecting Asiatic lions, an endangered species, and providing them a second home. Crores of rupees have been spent by the Government of India and the State of Madhya Pradesh for reintroduction of Asiatic lion to KNP. At this stage, in our view, the decision taken by MoEF&CC for introduction of African Cheetahs first to KNP and then Asiatic lion is arbitrary and illegal and a clear violation of the statutory requirements provided under the Wild Life Protection Act. The order of MoEF&CC to introduce African Cheetahs into KNP cannot stand in the eye of the law, and the same is quashed" [13].

The irony is that neither the lions have been brought nor the plan for introducing the Cheetahs has ceased. The other fact also surprises the scientific world that an expert committee formed by the Supreme Court in 2013 on lion translocation to KNP has not met once since 2016 till this date even though in the expert committee's meeting, members were of the firm opinion that KNP is ready for lion translocation, but none of the governments, both central and state government of Gujarat took any decision to translocations to KNP. The National Tiger Conservation Authority, a constitutional body, did not act decisively and, in an affidavit to the Supreme Court, stated that the introduction of lions in KNP would not impact lion translocation. It was expected from NTCA that it would have gone by the earlier decision of SC. In its 2020 order, the SC stated, "It is submitted that African Cheetahs would be introduced on an experimental basis in a careful chosen habitat and nurtured and watched to see whether it can adapt to the Indian conditions. In case there are some difficulties noticed about the location in which it is introduced, we are informed that the location would be changed to another forest which is more habitable for the animals". The SC again appointed another expert committee to help NTCA, and the expert committee was to submit its report every four months to the SC to apprise the court. Still, nothing in the public domain suggests that the expert committee has submitted any statement to the Supreme Court while stating its updates in 2020. WII prepared a comprehensive report in January 2021 detailing the site visits in 2020 during which the potential sites for introducing Cheetahs in two states were assessed, namely, Mukundara Hills Tiger Reserve, Shergarh Wildlife Sanctuary, Gandhi Sagar Wildlife Sanctuary, KNP, Madhav National Park, and Nauradehi Wildlife Sanctuary. This is surprising to see how hurried the expert team was that in 12 days, the field assessments of six sites were finalized, with some locations seen and assessed in less than a day. KNP, the best-studied site, took four days, and this seems that the expert team had already made up their mind about KNP. We say with full responsibility at our command as foresters that this is not how assessments are done in the forest area to decide the relocation of a species, which is genetically and ecologically distinctly different. The action plan states, "Once a Cheetah population is established in KNP, reintroduction of the lion or colonization by tigers would not be detrimental for Cheetah persistence." Therefore, the action plan accepts that the introduction of lions and tigers may be destabilizing factors for the Cheetah introduction and its stability and survival in the ecosystem. Still, in my view, leopards are far more critical and may pose a much more severe problem for the Cheetah. KNP is on its way to becoming glorified fenced safari parks rather than wildlife landscapes with self-sustaining populations.

Declarations

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