

## Life of Moo Deng, the internet sensation Pygmy

### Hippopotamus: An overview of the biology and conservation breeding program in Thailand

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#### **Abstract**

The hippopotamus, commonly known as the hippo, is classified into two extant species: the common hippopotamus (*Hippopotamus amphibius*) and the pygmy hippopotamus (*Choeropsis liberiensis*). Pygmy hippos are fascinating creatures native to the forests and swamps of West Africa. Their survival is increasingly threatened by habitat loss resulting from agricultural expansion and urban development. As the population declines, zoological institutions play a crucial role in conservation by acting as genetic reservoirs and promoting public awareness of wildlife and environmental protection. "Moo Deng", a pygmy hippo, whose name in Thai has gained international recognition, represents a notable success story of the Zoological Park Organization of Thailand's conservation breeding program. This initiative aims to sustain the population of this endangered species. This article focuses on the biology, reproduction, and conservation of the pygmy hippo under human care. It explores the reproductive biology of the species, with a detailed look into Moo Deng's life. Topics addressed include mating behavior, gestation, and parental and veterinary managements.

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**Keywords:** biology, conservation breeding, Moo Deng, Pygmy hippopotamus

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## Introduction

The term "hippopotamus" originates from the Ancient Greek word *hippopotamos*, combining *hippos* (horse) and *potamós* (river). Hippopotamus literally translates to "river horse," aptly describing the animal's large size and semi-aquatic lifestyle (Etymology World Online, 2025). The shortened term "hippo" is a colloquial abbreviation of "hippopotamus". There are two extant species of hippos: the common hippopotamus (*Hippopotamus amphibius*) and the pygmy hippopotamus (*Choeropsis liberiensis*). Pygmy hippos are significantly smaller than their larger relatives, typically weighing between 160 to 270 kg and standing 75 to 100 cm tall at the shoulder (Houwald *et al.*, 2020). They have a stocky body, short legs, and a relatively large head. In contrast to the common hippos, pygmy hippos are more solitary, less aggressive, and spend a greater proportion of their time on land.

The pygmy hippo was formerly classified under the genus *Hexaprotodon* but a review of the taxonomy and phylogeny of the hippopotamids has since restricted *Hexaprotodon* to extinct species from India and Southeast Asia, and revalidated *Choeropsis* for the extant pygmy hippo (Boisserie, 2005). Pygmy hippos are native to both forests and swamps of West Africa, where dense vegetation and proximity to water are essential to their survival. Their current distribution has been significantly reduced (approximately 5,000 km<sup>2</sup>) from historic levels, primarily due to the conversion of forested habitat to agricultural land and urban areas (Erazo-Mera *et al.*, 2024). Today, pygmy hippos are found in four West African countries: Côte d'Ivoire, Guinea, Liberia, and Sierra Leone but have been extinct in Nigeria (Mallon *et al.*, 2011). The Taï National Park, in Côte d'Ivoire, is recognized as one of the most important habitats and a stronghold for the species. The pygmy hippo has been classified as "Endangered" by the IUCN since 2008. The most recent population estimate cited 2,000 to 2,499 individuals in the 2015 IUCN Red List assessment (Ransom *et al.*, 2015), underscoring the urgent need for conservation efforts.

## Biology of pygmy hippos

Pygmy hippos are herbivorous, primarily feeding on grasses, fruits, and leaves. They are nocturnal grazers, foraging at night. In the wild, they forage for approximately 5.8 to 6.0 h per day, between mid-afternoon and midnight (Robinson, 1981; Eltringham, 1999). Their diet includes ferns, tender roots, grasses, herbs, stems and leaves of young trees, vegetables, and fallen fruits. They have also been observed eating sweet potato leaves, okra, pepper plants, cassava, and the tender shoots of young rice plants in plantations and farms along forest edges (Robinson, 1970; 1996). Pygmy hippos are considered pseudoruminant, possessing a four-chambered stomach. The first three chambers are covered with tough, keratinized epithelium, while only the final chamber contains glandular epithelial tissue. This mode of digestive morphology is usually considered an adaptation to a highly fibrous, generally "low-quality" plant-based diet (Langer, 1988). A recent study revealed that pygmy hippos are intermediate

feeders. Their diet was based on at least seven species of monocotyledon, dicotyledon, and fern groups, along with a preference for a limited number of specific plant species (Hendier *et al.*, 2021).

Pygmy hippos reach sexual maturity between 3 to 5 years of age (Lang, 1975). The testes are partially descended and remain within the inguinal canal (Eltringham, 1999). Males typically reach puberty at around 4 years of age, as evidenced by libido behaviors such as penile protrusion and mounting, while females first exhibit estrus at approximately 7 years of age. In animals under human care, the estrous cycle has been shown to average  $31.8 \pm 7.4$  days, based on peaks in fecal estrogen metabolites (Flacke *et al.*, 2017), with estrus itself lasting 24 to 48 h (Lang, 1975; Tobler, 1991). Although pygmy hippos are capable of breeding year-round, environmental conditions may influence the timing and frequency of estrus (Tobler, 1991). Hormonal analysis of estrogen and progestogen metabolites indicates that the pygmy hippos are non-seasonally polyestrous breeders (Flacke *et al.*, 2017). Mating usually occurs in the water over a period of 1 to 2 days with multiple copulations per day (Lang, 1975).

To confirm pregnancy, an initial examination can be conducted during the female's next estrus cycle. If estrus does not resume within one-month post-mating, there is a possibility of pregnancy. A follow-up examination should be performed in the second month. The absence of estrus for two consecutive months following mating strongly suggests pregnancy is likely. The gestation length in pygmy hippos is  $203 \pm 4$  days or around 6 to 7 months (Flacke *et al.*, 2017). Females usually give birth to a single calf. Twin births are rare, occurring at an estimated frequency of one in every 200 births (Hlavacek *et al.*, 2005). Calves may be born either on land or underwater. At birth, they weigh around 4.5 to 6.8 kg and are relatively well-developed (Eltringham, 1999). The mother exhibits strong protective behavior and nurses the calf for several months. Calves typically start eating solid food within a few weeks but continue to nurse for about 6 to 12 months. Weaning occurs from 6 to 8 months of age (Eltringham, 1999). However, if not separated, calves may continue to suckle milk until 3 to 4 years old. The maximum recorded lifespan of pygmy hippos under human care is approximately 35 to 40 years while no data exists for wild animals (Flacke *et al.*, 2016). However, the individual under our care is a 43-year-and-9-month-old male (studbook no.292). Furthermore, the oldest known pygmy hippo in captivity was a male who lived for over 50 years (studbook no.241) (Houwald *et al.*, 2020).

## Conservation for the pygmy hippos

**Conservation Action:** The pygmy hippo is listed in Appendix II of CITES, indicating that international trade in this species is regulated to ensure it does not endanger the species' survival or overexploitation. In 2011, the IUCN SSC Hippo Specialist Group's Pygmy Hippo Subgroup, in collaboration with key stakeholders, developed the Regional Pygmy Hippo Conservation Strategy to guide conservation and research activities in all four range countries (Mallon *et al.*, 2011). Multiple *in situ* and *ex situ* conservation and research programs have been implemented. These include studies on sex

ratio analysis, the use of conservation detection dogs for fecal sample collection in forest habitats, investigations into reproductive cycles, and assessments of welfare under human care (IBREAM, 2025).

**Conservation Breeding:** Zoos serve as insurance against species extinction and play an essential role in raising public awareness about wildlife and environmental conservation. As of March 20, 2025, the Species360 Zoological Information Management System (ZIMS) recorded 318 living pygmy hippos maintained across 116 institutions in six regions. The skewed sex ratio was noted, with 129 males (40.57%) and 189 females (59.43%). The age structure of the captive population appears healthy, with the majority (214 individuals; 67.30%) under 20 years of age. Specifically, 122 individuals (38.36%) are younger than 10 years, and 92 individuals (28.93%) are between 11 and 20 years old (Species360 ZIMS, 2025). Under the management of the Zoological Park Organization of Thailand (ZPOT), 19 pygmy hippos (6 males and 13 females) are housed in five zoos: Chiang Mai Zoo, Khon Kaen Zoo, Nakhon Ratchasima Zoo, Ubon Ratchathani Zoo, and Khao Kheow Open Zoo.

### Who is Moo Deng?

Most of the pygmy hippo population in Thailand is managed under the ZPOT Population Collection Plan Committees to support breeding and conservation efforts. Khao Kheow Open Zoo in Si Racha, Chonburi Province, serves as a major breeding center and currently houses nine individuals. On July 10, 2024, a female calf was born to parents Tony and Jonah at Khao Kheow Open Zoo. She gained widespread public attention at two months of age when images of her went viral online in September 2024. Her name, "Moo Deng", meaning "bouncy pork" or "bouncy pig" in Thai, was chosen through a public poll with over 20,000 participants. The zoo shared photos of Moo Deng through its official Facebook pages, "Ka Moo and the Gang" and "Khao Kheow Open Zoo", where she quickly became a public favorite. Moo Deng is noted for being more playful and energetic than typical pygmy hippos, which are often shy and solitary. She has three

full siblings (Ko, Nadet, and Moo Tun) and three half-siblings (Kanya, Phalo, and Moo Wan). Moo Deng is part of a breeding program aimed at conserving the species. She and her family are provided with high standards of care, including enclosures designed to mimic their natural habitat, access to water features, plenty of vegetation for grazing, attentive caretakers, regular veterinary care and enrichment activities to facilitate their natural behaviors and mental well-being. In response to her popularity, Moo Deng now serves as an ambassador for her species, helping to raise public awareness about the endangered status of pygmy hippos, the threats they face, including habitat destruction and poaching, and the importance of ongoing conservation efforts.

### How was Moo Deng born?

Moo Deng represents a successful outcome of the ZPOT conservation breeding program, which aims to preserve the population of this globally endangered species. Tony and Jonah are the only founders of the pygmy hippo population at Khao Kheow Open Zoo. In December 2023, Jonah, aged 24, was housed with her 4-year-old son, Moo Tun, who was still nursing. During this period, the animal caretaker, Mr. Benz, observed signs of estrus in Jonah, including increased interest in Tony, the 22-year-old breeding male housed in the adjacent den. Gradual introductions between Jonah and Tony were initiated. Jonah responded positively to the male, showing no signs of aggression toward the male. The pair was allowed to stay together for three days during Jonah's estrus period until the estrus behaviors subsided. Daytime observations revealed that the pair copulated on land on the first day of introduction. However, copulation in pygmy hippos may occur both on land and in water (Houwald *et al.*, 2020). During mating, Jonah was observed crouching and contracting her abdomen repeatedly to raise her hindquarters, allowing the male to nuzzle and sniff around her vulva while she was wagging her tail. As the male investigated, he exhibited signs of libido, including penile protrusion prior to erection, followed by mounting behavior (Fig. 1).



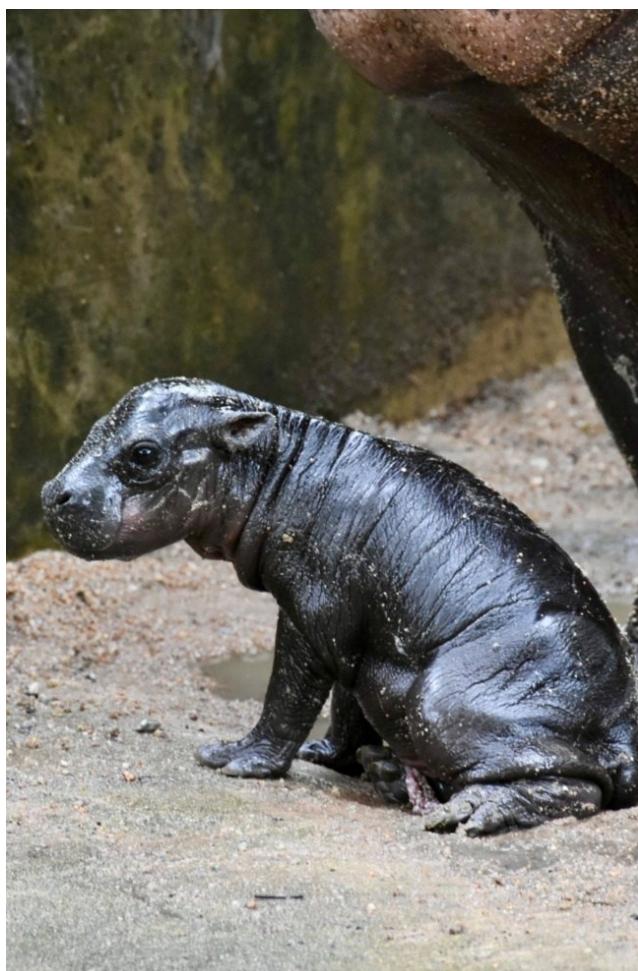
**Figure 1** Copulation in pygmy hippopotamus. The female crouched down and contracted her abdomen several times, lifting her hindquarters to allow the male to nuzzle and sniff around her vulva while she was wagging her tail. The male exhibited sexual

interest by sniffing her vulva, and a protrusion of the penis was observed prior to erection, followed by mounting of the female.

After copulations, the estrus behavior was not observed for 2 to 3 months, although it typically recurs monthly. The animal caretaker suspected pregnancy. By 4 to 5 months post-mating, Jonah's abdomen was visibly enlarged. The amount of food provided remained unchanged during this period. Moo Deng, a female pygmy hippo was born in the early morning of July 10, 2024, after a gestation period of 197 days (Fig. 2A). Parturition and placental expulsion were completed in the den (Fig. 2B). The placenta of the pygmy hippopotamus is classified as epitheliochorial (Benirschke, 2025).

After parturition, Jonah exhibited heightened aggression and territorial behavior, characteristic of maternal protection. However, tolerated the presence of caretakers performing routine duties and allowed close observation of both herself and the neonate. The veterinary team and animal caretakers closely monitored Moo Deng's health and behavior. Jonah spent most of the day resting and nursing her calf (pygmy hippos possess two nipples). She experienced temporary inappetence for a few days but returned to normal appetite by day 5 postpartum. Her grass ration was doubled to 16 kg per day, which she consumed entirely. Nursing occurred both in water and on land.

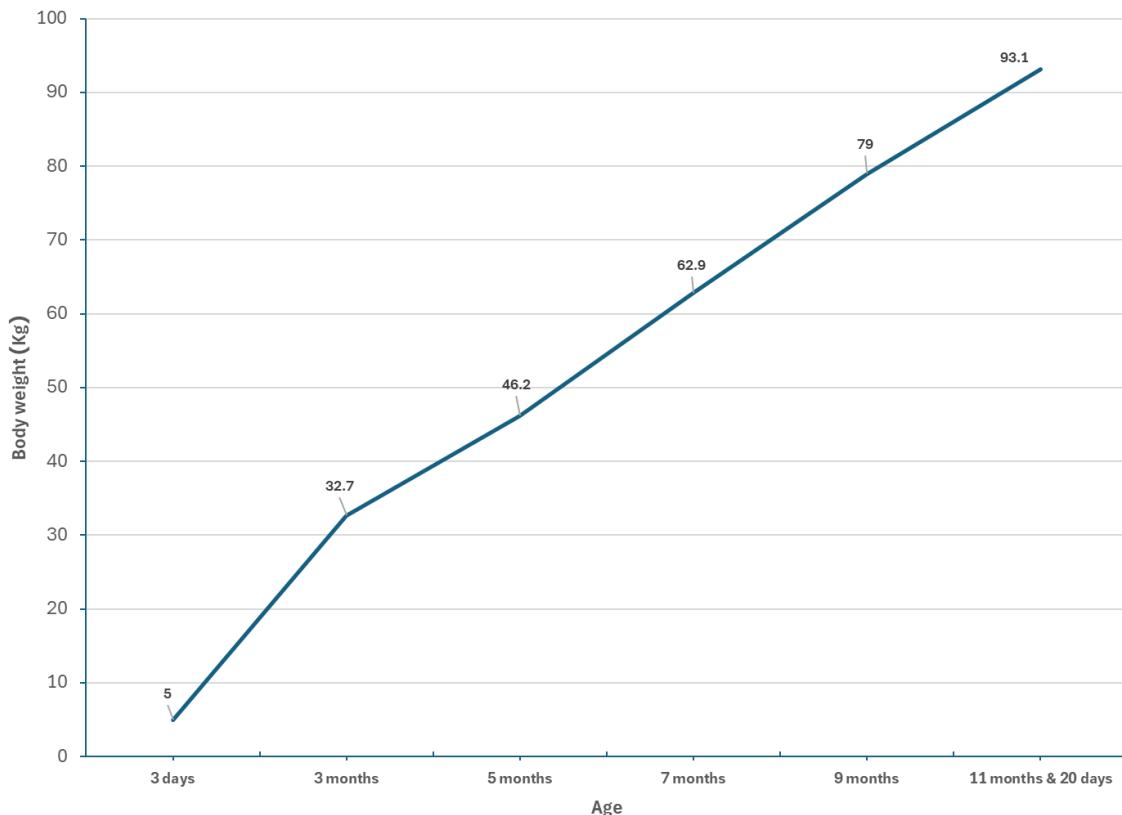
On day 3 after birth, a basic health check was conducted by veterinary staff and the animal caretaker (Fig. 3). The examination included inspection of the soft palate and umbilical cord, body measurements, weighing, and microchipping that was conducted by veterinary staff and the animal caretaker. At this time, Moo Deng weighed 5.0 kg and measured 27 cm in height. By 3 months of age, she had reached 32.7 kg in weight and 46 cm in height. Additional measurements at 3 months, included a chest length of 87 cm, ear length of 4 cm, nose-to-tail base length of 80 cm, and tail length of 9 cm. At 5 months old, Moo Deng was successfully trained by her caretaker to walk onto a weighing scale using positive reinforcement. At this time, she weighed 46.2 kg and stood 48 cm tall. Her measurements included a chest length of 92 cm, ear length of 5 cm, nose-to-tail base length of 88 cm, and tail length of 10.5 cm. At 7 months, her chest length increased to 106.5 cm, ear length to 6 cm, nose-to-tail base length to 109 cm, and tail length to 12 cm. She weighed 62.9 kg and stood 51 cm tall. Currently, as of June 30, 2025, her chest length increased to 114 cm, ear length to 6 cm, nose-to-tail base length to 119 cm, and tail length to 13 cm. She weighed 93.1 kg and stood 62 cm tall (Table 1). Her average daily weight gain during this period was approximately 249 g (Fig. 4).



**Figure 2** Moo Deng, the female pygmy hippopotamus, was born in the early morning of July 10, 2024, at 197 days of gestation (A). The placenta was found in the den shortly after birth (B).



**Figure 3** Basic health checks done included body measurements and weighing performed by veterinary staff and the animal caretaker. Assessments were conducted at 3 days old (A) and 3 months old (B). Through positive reinforcement training, Moo Deng cooperated for weighing at 5 months old (C) and 7 months old (D) and for body measurements at 7 months old (E) and 20 days old (F).



**Figure 4** Moo Deng growth curve. At 11 months and 20 days of age, she weighed approximately 19 times her birth weight.

**Table 1** Body weight and measurements of Moo Deng from 3 days old to 11 months and 20 days old

Age	Weight (kg)	Height (cm)	Chest length (cm)	Nose to the base of the tail (cm)	Tail length (cm)	Ear length (cm)
3 days	5.0	27	-	-	-	-
3 months	32.7	46	87	80	9	4
5 months	46.2	48	92	88	10.5	5
7 months	62.9	51	106.5	109	12	6
11 months and 20 days	93.1	62	114	119	13	6

Moo Deng spent most of her time resting and nursing during the first month of life. She began exhibiting playful behavior within a few weeks. During the first month, she was fed solely with her mother's milk. By two months of age (Fig. 5), she began mimicking her mother's feeding, and by 3 to 4 months (Fig. 6), she could swallow ripe bananas. During this period, her solid food consumption remained minimal and was shared with her mother. At the age of 6 months, she transitioned to eating independently from her tray, showing a noticeable increase in food intake. Her diet was gradually introduced and included corn kernels, bananas, long beans, grass, small pieces of carrot and pumpkin, and occasionally small amounts of watermelon. Initially, she preferred long beans and bananas. However, her preferences have since broadened to include all items provided, with corn being her favorite, followed by long beans, and smaller portions of other vegetables. All food types are provided under controlled dietary guidelines to prevent overfeeding. Although she has begun eating independently, Moo Deng has not yet been completely weaned and is occasionally observed suckling milk. Generally, an adult pygmy hippo consumes approximately 15 to 20 kg of food per day, with grass

comprising the bulk of the diet (approximately 8 to 10 kg), supplemented by leaves and various types of fruits and vegetables.

Through a behavioral study employing a closed-circuit television (CCTV) system, the daily activities of Moo Deng were analyzed over a 24-h period from December 2024 to January 2025. The video analysis revealed that she spent 77.05% of her time resting, 9.79% feeding, 11.96% engaged in locomotion, and 1.20% in other activities. At the age of 10 months, she rarely suckles milk from her mother but has increased her intake of fruits, vegetables, and grass (Fig. 7). As of June 30, 2025, Moo Deng is almost one year old (Fig. 8). She remains healthy and playful and prefers to rest in the water for most of the day. Based on our experience young pygmy hippos are typically playful up to the age of one year, thereafter they tend to spend most of their day resting and feeding.

Enrichment programs for stimulating the pygmy hippos' natural behaviors and enhancing psychological well-being include suspending bunches of grass at various locations in their environment/habitat, providing plastic balls to play with, and placing watermelons in the pool to encourage foraging behavior underwater.



**Figure 5** Moo Deng, a popular internet meme at two months of age, following the viral spread of her images in September 2024. She became popular worldwide due to her shiny, rounded body, innocent eyes, adorable pink cheeks, tiny ears, and distinctive personality.



**Figure 6** Moo Deng spent most of her time with her mother. Within the first month, she began to show her playful behavior and unique character. By 3 months of age, she could eat some fruits.



**Figure 7** Moo Deng celebrated her 10-month-old birthday with her mother and her favorite caretaker. A special birthday cake, made from vegetables and a variety of fruits, was prepared by Mr. Benz in her honor.



**Figure 8** Moo Deng, an ambassador for her species, at almost one year old. She remains healthy and playful.

### Veterinary care of pygmy hippos

The health care of the pygmy hippos is generally similar to that of the common hippos. At Khao Kheow Open Zoo, a comprehensive health monitoring program is in place, designed to minimize disturbance. Routine fecal screenings for parasites are conducted every four months, and antiparasitic treatments are administered based on diagnostic results (Miller, 2003). In the case of the pregnant pygmy hippo, the animal care team worked closely with the veterinary team to monitor maternal health, especially as parturition approached, which required close observation. Moo Deng was born healthy and without the need for intervention. However, it has been reported that neonatal mortality was high, with perinatal causes, such as stillbirth, failure to thrive, and neonatal weakness, accounting for 51.8% of early losses (Flacke *et al.*, 2016). One reported cause of stillbirths in captive populations is uterine inertia, as diagnosed in a 27-year-old female. In such cases, the induction of parturition has been successfully performed using cloprostetol and betamethasone on day 200 of gestation, followed by oxytocin administration (Phillips *et al.*, 2024).

A pygmy hippo calf usually nurses from its mother either on land or underwater. For newborns, routine health checks include body measurements, weighing, microchip implantation, and examination of the soft

palate and umbilical region for signs of infection or inflammation. Postpartum behavioral monitoring is essential, particularly in assessing feeding and nursing behavior. If the mother does not exhibit nursing behavior and the calf's health appears to decline, or if blood tests indicate inadequate milk intake, hand-rearing may be considered as an alternative. The health and behavior of the newborn are closely monitored until weaning. Weaning occurs between 6 to 8 months of age (Miller, 2003). The calf grows rapidly, and by 5 months of age, typically reaches approximately 10 times its birth weight (San Diego Zoo, 2025). To support lactation, the zoo nutritionist increased the mother's food intake to meet her heightened energy and nutritional demands. As the calf started to consume solid food similar to the mother's diet, the food quantities for both were adjusted to support the calf's growth and developmental needs.

Physical examination can be impeded due to limited access for sample collection. Procedures include thorough oral and ophthalmic examinations, as well as visual and limited tactile evaluation of the skin and superficial structures, including palpation of the surface of joints, toenails, and feet (Rebecca, 2008). Diseases in pygmy hippos include wounds, skin infections, and ocular and dental problems. Treatment options range from oral and injectable medications, often administered via darting, to immobilization when more invasive procedures, such as ocular staining or dental work, are

required. However, through positive reinforcement training by the animal caretakers, animals can be conditioned to cooperate with physical examinations and treatment without immobilization.

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