THE SWORD of TRUTH: *Why the Pinocchio Chameleon has such a Long Nose*

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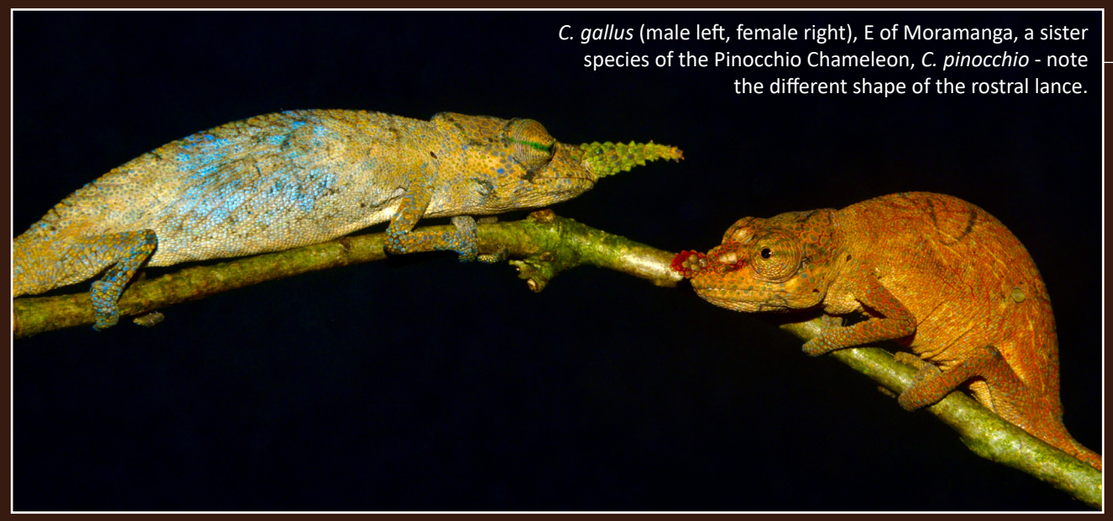
**All photos by the author*

Prologue: a tale of one nose

Deep in the lush rainforests of central eastern Madagascar, where waterfalls whisper secrets and ferns dance in the mist, lives a chameleon so flamboyant it could moonlight as a carnival performer. *Calumma pinocchio* Glaw & al., 2025, the so-called Pinocchio chameleon, is a small but spectacular species whose males sport a lance-shaped rostral appendage — long, flexible, and often dazzlingly decorated in hues of green, blue, and red. It is as if evolution handed them a paintbrush and said, 'Go wild.' It is a recently described sister species of the already 150 years known *Calumma gallus* (Günther, 1877).But why such a nose? To answer that, we must turn to fiction.

Calumma pinocchio male (left) and female (right).



C. gallus (male left, female right), E of Moramanga, a sister species of the Pinocchio Chameleon, *C. pinocchio* - note the different shape of the rostral lance.

The story of Pinocchio, reptile edition

Once upon a time, in a rainforest not so far away, there lived a chameleon named Tanala. Tanala had a problem: he was a compulsive liar. He told the frogs he could fly, the geckos he was a dragon, and the snakes that he was venomous. Each time he fibbed, his nose grew longer, until it rivalled the length of a lemur's tail.

However, unlike Pinocchio, Tanala did not wish to be a real boy; he wished to be a real mate. In the world of chameleons, deception is not just tolerated — it is practically a survival strategy. Chameleons are masters of disguise, illusion, and misdirection; so naturally, Tanala's nose became a badge of honour.

Of course, this tale is fiction, but the real explanation is no less spectacular. As Carlo Collodi (1883) might agree, sometimes the truth is stranger than fiction.

Background: meet *Calumma pinocchio*

Described by Glaw & al. in 2026, it belongs together with a species, for which it was for decades confused, *C. gallus*, to the genus *Calumma*, nested within the informal *C. furcifer* group (Glaw and Vences, 1994). The species name '*gallus*' is Latin for 'rooster', likely referencing the flamboyant, crest-like rostral protrusion of the males. Conversely, the website www.Madcham.de (2014) erroneously states: 'German zoologist Albert Günther, who described *C. gallus* in 1877, never revealed why he chose the Latin word "*gallus*" as the species epithet. The term *gallus* translates to "Gallic" or "Gaul", but its relevance to the chameleon remains unexplained.' While there is confusion concerning the meaning of the name of *C. gallus*, there is no in the case of *C. pinocchio*, named after a notoriously known tale hero with extraordinary nose.

Male of *Calumma furcifer.*

Réserve de Vohimana, CE Madagascar:
one of the island's natural jewels.

These chameleons inhabit dense rainforest biotopes in East Madagascar, often along streams and waterfalls, where humidity is high and vegetation is remarkably thick.

C. pinocchio is a small species, measuring approximately 11 cm in total length, but highly active in behaviour. Males are adorned with a long, flexible rostral appendage, whilst females sport a much shorter, leaf-shaped version. Coloration varies from earthy browns to brilliant blues, reds, and greens, depending on season, mood, temperature, and social context (Madamagazine, 2024). Ornamentation in chameleons is not merely for display; it is essential for survival.

Rand's revelations (1961)

A. Stanley Rand's seminal paper, *A Suggested Function of the Ornamentation of East African Forest Chameleons* (1961), proposed that ornamentation in chameleons evolved primarily for species recognition and sexual selection, rather than being arbitrary or vestigial. His key conclusions include:

- Sympatric species (those living in the same area) rarely share identical ornamentation. This suggests ornamentation helps individuals distinguish conspecifics from closely related species.
- Ornamentation is often more developed in males, indicating a role in sexual selection.
- These features are analogous to bird plumage or frog calls, used for social signaling rather than survival mechanics.
- In areas with multiple chameleon species, selection favors divergence in ornamentation to reduce hybridization risk.
- Ornamentation types include annulated horns, rostral projections, occipital lobes, dorsal fins, casques and median and lateral conical scales, each contributing to the visual silhouette used in mate recognition.

Furcifer willsii male (left) and female (right).

Rand's hypothesis was groundbreaking in shifting the interpretation of chameleon morphology from passive traits to active evolutionary tools. This phenomenon is termed 'character displacement'.

Character displacement refers to the evolutionary process whereby closely related species that coexist in the same geographic area (sympatry) evolve distinct traits to minimise competition and avoid hybridisation. In chameleons, this concept is particularly evident in the divergence of head ornamentation, such as horns, casques, crests and occipital lobes. In regions where multiple chameleon species live together (syntopy), head ornamentation serves as a visual cue for species and sex recognition, thereby preventing interbreeding and ensuring mating occurs within the correct species. Movable structures, such as occipital lobes, can be actively deployed in displays for intimidation, courtship, or predator deterrence. These behaviours reinforce species boundaries and reduce competition. Studies demonstrate that within any given chameleon community, no two syntopic species share identical head ornamentation; this non-overlap represents a hallmark of character displacement. The only exception is the dubious pair of recently described *Rhampholeon waynelotteri* and *R. princeeai* by Menegon & al. (2022), which are said to be undistinguishable by morphology (differ only in DNA markers) and despite of it, they live syntopically on an isolated mountain, Mt. Nguru in Tanzania. They either have some other clues how to differ, or their description might be questionable.

Hidden in plain sight: chameleon headgear and the Czech secret weapon

In my 1997 article 'Funkce bizarních útvarů na hlavách a tělech chameleonů' ('The function of bizarre structures on the heads and bodies of chameleons'), published in the Czech journal *Živa* (Nečas, 1997), I delved into the functional utilities of chameleon ornamentation. Beyond serving as dynamic courtship signals, these cranial flourishes facilitate camouflage and combat. Much like Rand (1961), I advanced this functional framework; yet, the paper languished in relative obscurity. This lack of recognition was not a reflection of scientific merit, but rather a consequence of the publication venue: *Živa* does not possess the international reach of Nature, and the Czech language is not widely utilized within mainstream herpetological research. Consequently, this study remained an overlooked contribution — fittingly camouflaged, much like the organisms it celebrated.

Calumma hofreiteri male (left) and female (right).

Tolley & Herrel's Contributions (2013)

In *The Biology of Chameleons*, Tolley & Herrel (2013) reinforce Rand's ideas by exploring sexual dimorphism and ornamentation. They note:

- ornamentation is often linked to male-male competition and female choice;
- these traits are costly to produce and maintain, suggesting strong selective pressure;
- ornamentation may also play a role in territorial displays.

Their synthesis of anatomical, behavioral, and ecological data supports the notion that ornamentation is a multifunctional adaptation, deeply embedded in the chameleon's evolutionary strategy.

The purpose of life: reproduce or be forgotten

In evolutionary biology, the primary objective of life is straightforward: to reproduce and transmit genetic material to subsequent generations (Dawkins, 1976). Chameleons represent no exception to this principle. Every behavioral movement, colour

Furcifer bifidus male.

change, and territorial display is ultimately executed in service of reproduction.

In *C. pinocchio*, males compete for territories, prioritising visibility and proximity to females, whilst females invest heavily in producing high-quality eggs. The rainy season, characterized by elevated temperatures and abundant prey availability, triggers reproductive readiness in both sexes. Precise timing is critical, particularly for a species whose lifespan is probably measured in months.

The superb eyes: vision as a superpower

Chameleons are functionally deaf, and their gustatory, olfactory, and vomeronasal senses are poorly developed; whilst their tactile sense is adequate, it remains secondary to their visual capabilities. Their eyes, conversely, represent an extraordinary evolutionary adaptation.

Each eye rotates independently, providing panoramic vision. During binocular fixation, chameleons achieve depth perception that rivals that of birds of prey (Ott, 2001). The retina is foveated, and their visual acuity is highly specialized for detecting both prey and conspecifics within dense foliage. Consequently, they perceive their environment with exceptional clarity, utilizing independent ocular fields.

The look from below: territorial drama

Male of *C. pinocchio* exhibit territorial behaviour, like almost all arboreal chameleon species. They perch on elevated twigs and foliage, surveying their environment to locate both conspecific rivals and receptive females (Nečas, 1999). Territoriality serves two primary evolutionary functions: maximizing visibility and ensuring resource control. If these specimens occupied the dense underbrush, their visual displays would be rendered ineffective due to the limited light penetration and thick vegetation.

Females, conversely, remain within the lower strata of the vegetation and focus primarily on foraging. Their objective is to accumulate metabolic reserves essential for vitellogenesis before the onset of the rainy season initiates the reproductive period.

Species and sex recognition: the silhouette game

Here's the catch: female chameleons of closely related species often look eerily similar. They usually lack the horns, flaps, and casques that make males so distinguishable, or they have these features underdeveloped. So how do females choose the right mate? Silhouette recognition.

Males perched against the light become shadow puppets. Their rostral appendages, casques, gular and dorsal crests act as species-specific flags. A female *C. pinocchio* knows her mate by his sword-like nose. A *Furcifer willsii* (Günther, 1890) male has two divergent horns; *Calumma hofreiteri* Glaw & al. 2025 sports a rounded, laterally flattened flap; *Calumma furcifer* (Vaillant & Grandidier, 1880) flaunts a bifurcated spike. It's a jungle version of Tinder, swipe left if the nose is wrong.

Furcifer bifidus pair - female (left) and male (right).

A rare encounter: sleeping pair of *C. furcifer* in the breeding season.

Chameleon Cenoses: A crowded neighborhood

In Madagascar's moist forests, chameleons don't live alone. They form cenoses, communities of multiple species sharing the same habitat. In the forests of Vohimana, Madagascar, the same area as *C. pinocchio*, you'll find *Calumma brevicorne*, *C. furcifer*, *C. hofreiteri*, *C. parsonii*, *Furcifer bifidus*, *F. oustaleti*, *F. pardalis*, *F. willsii* and several *Brookesia* species: *Brookesia ramanantsoai*, *B. superciliaris*, *B. therezieni* and *B thieli*.

While size differences prevent crossbreeding with giants (*C. brevicorne, C. parsonii; F. bifidus, F. oustaleti*) or dwarfs (*Brookesia* species), species like *F. willsii*, *C. hofreiteri*, and *C. furcifer* pose a real risk. Their females are nearly indistinguishable. Hence, the need for males to wear their identity on their noses (or silhouettes in general).

Males adorned with royal signs

In this silhouette-based dating game, male ornamentation is everything. Each species has its own signature:

- *Furcifer willsii*: two divergent pointed horns,
- *Calumma hofreiteri*: rounded, laterally flattened nasal flap,
- *Calumma furcifer*: thin, bifurcated spike,
- *Calumma pinocchio*: sword-like, flamboyant lance.

These features aren't just decorative, they're functional. They prevent reproductive mishaps and ensure genetic integrity (Rand, 1961).

Caution is advised: the guarding ritual and pair bonding

Before mating, male *C. pinocchio* often enters a phase of mate guarding, where he remains in close proximity to a receptive female. This pre-copulatory vigil can last several days, during which the male and female sleep near each other, perch within the same square meter, and maintain visual contact. It's a slow-burn romance, minus the candlelight.

This behavior, while not yet documented in *C. pinocchio*, is not unique. In a landmark study, Toxopeus & al. (1988) documented stable pair bonds in *Trioceros jacksonii* (Boulenger, 1896) and *Trioceros hoehnelii* (Steindachner, 1891), lasting up to 85 days, even continuing through pregnancy. Males were seen defending females from rival suitors, suggesting a mate-guarding strategy to ensure reproductive success.

In Malagasy species like *F. oustaleti*, *F. pardalis*, *Furcifer petteri*, *Calumma boettgeri*, *Calumma linotum*, *Brookesia antakarana*, *Brookesia ebenaui*, *Brookesia stumpffi*, temporary pair bonding has also been observed during the rainy season, when reproductive activity peaks (Necas, pers. obs.). Males may remain with

Furcifer oustaleti male (left) and female (right).

C. brevicorne male.

C. parsonii male (left) and female (right).

females post-mating, sometimes even hitching a ride on their backs in smaller species like *Brookesia minima* (Necas, 1999), a behavior that's equal parts romantic and energy-efficient.

Although permanent monogamy has not been confirmed in chameleons, these observations hint at a more complex social structure than previously assumed. Pair bonding or female guarding, whether brief or extended, appears to represent a strategic adaptation designed to maximise mating opportunities and minimise sperm competition.

Consequently, whilst *C. pinocchio* does not exhibit complex social attachment, males demonstrate distinct mate-guarding behaviours during critical reproductive windows.

The absurd double trickster transgender

Among the ferns and dripping branches of the eastern rainforest, the smallest males of *C. pinocchio* practice a deception so outrageous it borders on sorcery. They are not fighters. They are not landlords. They are wanderers — too young, too light, too hormonally unprepared to defend territory or claim mates. Yet they must cross the domains of dominant males to reach food, water, and safety. And crossing those borders is a dangerous act.

The adult male stands guard with the proud colors of his sword: a green base rising into a vivid blaze of robin-blue and violet. It is a banner of dominance, a warning to rivals, a declaration carved in light. When two mature males meet, their swords flare, and the forest witnesses a noble confrontation of posture and color. But the small male cannot join that duel. He would lose before the first display. So, he invents a strategy evolution rarely grants: he becomes someone else. To pass unharmed, he must become the only creature the dominant male will tolerate — a female. But to avoid being courted, mounted, or harassed, he must also signal non-receptivity. Only this combination grants safe passage.

A non-receptive female is recognized by two signals: the body, which shifts into dull, cryptic tones that say „not ready to mate," and the nose, which flushes in crimson — a color that unmistakably declares „I am a female." And so the small male transforms. His body shifts into the muted palette of a female. His sword, still undeveloped and lacking the vivid tones of adulthood, turns red as well, glowing like a drop of blood on a twig. He becomes a transgender illusion — a double trickster wearing the mask of femininity with perfect precision. The dominant male may approach, evaluating the intruder. But seeing the red nose, he hesitates.

He believes he is facing a female not in reproductive condition. And by the ancient etiquette of chameleon knights, he lets the stranger pass. The trickster slips through the kingdom unharmed. Time moves. Food is found. Hormones rise. The small male grows — strengthened by deception, prepared for the day when he will no longer need to pretend. And then the sword changes. The red deception fades. The neutral horn begins to shift. For the first time, blue and violet emerge — not restored, but created, blooming along the lance like fire

A juvenile male of *C. pinocchio,* with female-like red coloured snout protrusion.

Dominant male of *C. pinocchio* (right) does not attack the juvenile male (left) doing female-mimicry

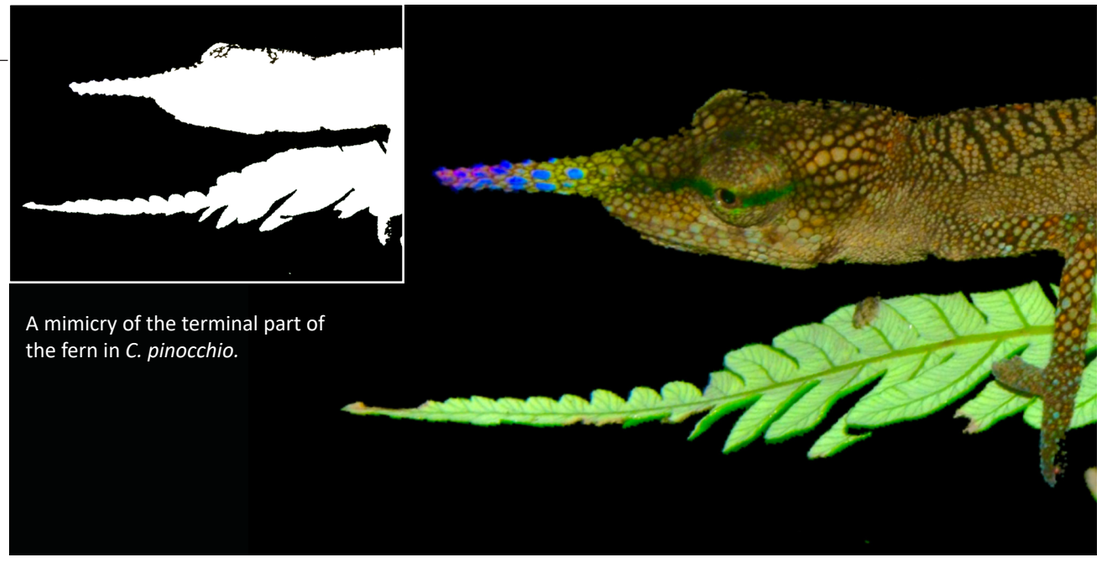
awakening in a forged blade. The transgender trickster becomes a warrior. This strategy is not simple mimicry. It is a layered illusion — body, horn, behavior — all rewritten to survive. A lie so perfect it becomes its own evolutionary truth. In a world where identity is a weapon and visibility is peril, these chameleons discovered a path between danger and destiny. They learned that survival sometimes demands transformation, that weakness can be masked, and that deception can be a bridge to strength.

The absurd double trickster transgender chameleon is proof that nature does not merely adapt — it invents. It writes stories in color and shadow, granting the smallest creatures the most audacious tricks, until the day they stand tall with a sword no longer borrowed, but earned.

Beyond the bling: secondary functions of cranial ornamentation

While cranial protuberances in chameleons are primarily associated with species recognition and sexual selection (Rand, 1961; Nečas, 1992, 1997, 1999; Tolley and Herrel, 2013), their extravagant headgear is not exclusively utilized for courtship displays. These structures are energetically costly to produce and maintain, suggesting they must serve additional adaptive functions to justify their evolutionary expense.

F. pardalis male, Vohimana.

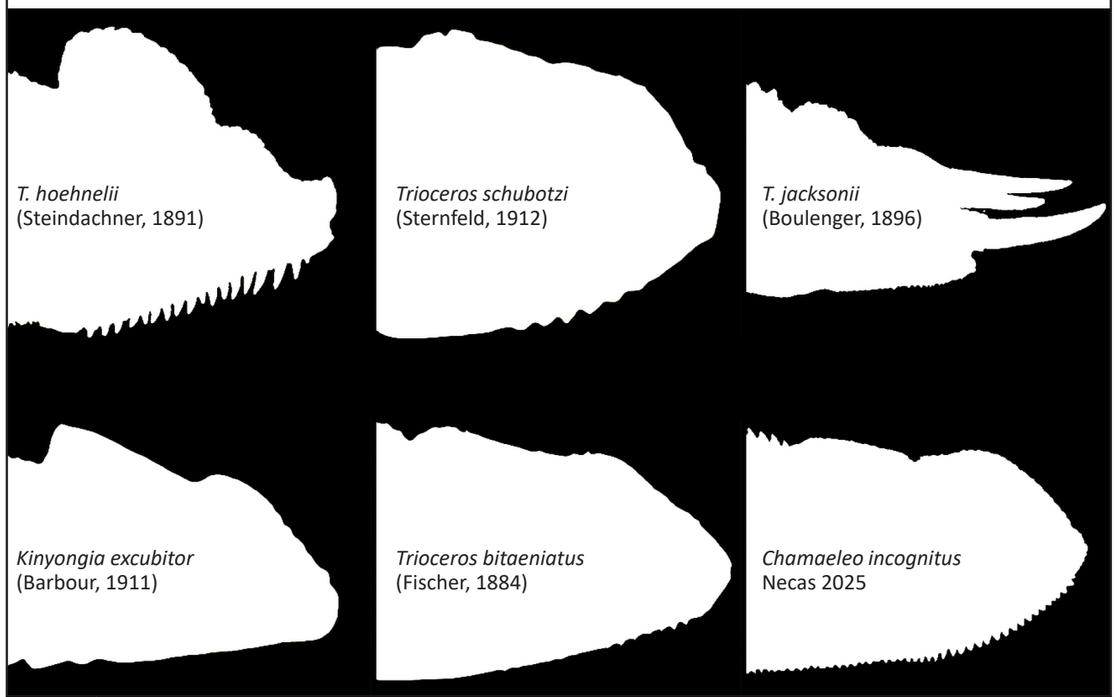


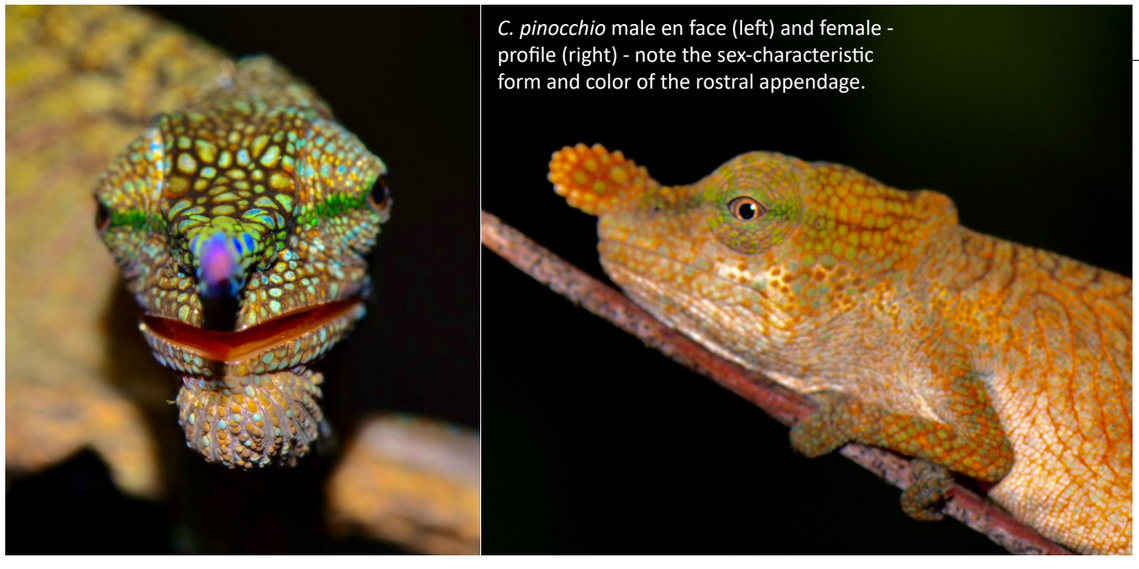
A mimicry of the terminal part of the fern in *C. pinocchio.*

Camouflage by convergence

In *C. pinocchio*, the lance-like rostral appendage is not only a visual signature, it's a botanical impersonator. Males often perch among dense ferns and slender twigs above creeks, and their snout extensions mimic the terminal fronds of local fern species, blending seamlessly into the rainforest tapestry (www.Madcham.de 2014; Madamagazine, 2024). This cryptic resemblance helps them avoid detection by predators and nosy herpetologists alike. It's not just camouflage, it's costume design.

Pictures of silhouettes (in white): the sympatric chameleons of Mt Kenya massif, Kenya demonstrate the same character displacement like the chameleons from other regions, where they occur sympatrically:





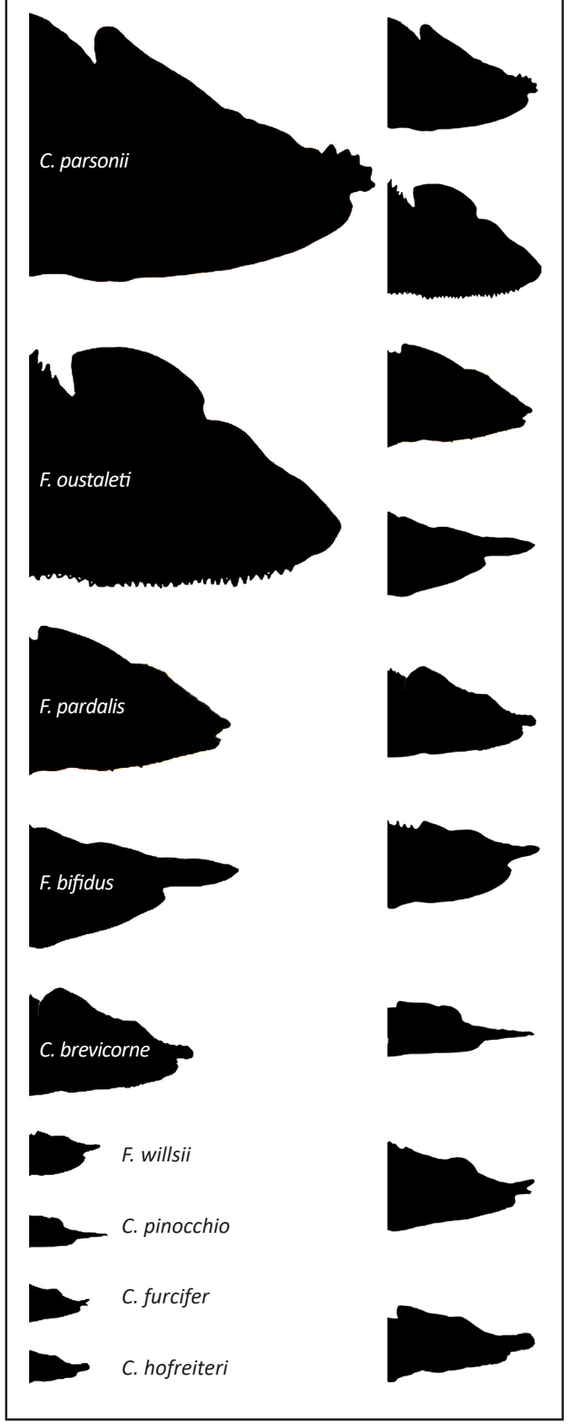
C. pinocchio male en face (left) and female - profile (right) - note the sex-characteristic form and color of the rostral appendage.

Weaponized wits: the case of *Trioceros jacksonii*

In species with rigid, ossified horns, such as *T. jacksonii*, ornamentation doubles as combat gear. Males engage in ritualized battles, using their horns to push rivals off branches, a strategy that's less about brute force and more about gravity-assisted eviction (Nečas, 1999; Ott et al., 1998). These jousts are part of territorial disputes and mate competition, where the goal is not to injure but to dislodge. The loser doesn't bleed, he just falls.

Combat of *T. jacksonii* from Machakos, Kenya using the horns to push each other off the branch.

Pictures of silhouettes (in black): the sympatric chameleons of Vohimana, CE Madagascar and immediate surroundings:



The mimicry picture of *C. pinocchio* hanging on a long bamboo stick

The nose knows

Why, therefore, does the Pinocchio chameleon possess such an elongated rostral appendage? In an environment governed by visual deception, specific morphology must be discernible from a twig-top silhouette. Rather than an anatomical anomaly, this structure represents a phenotypic investment in reproductive success, structurally supported by cartilage.

Its remarkable dual functionality — facilitating both crypsis and sexual selection — adds significant layers of evolutionary complexity to cranial ornamentation. This rostral protrusion operates not merely as a passive anatomical feature, but rather as a highly adapted, multifunctional evolutionary tool.

Epilogue: chameleons tricked us again, a tool for visibility and invisibility at the same time

So here we stand, jungle leaves rustling, raindrops suspended midair, and *Calumma pinocchio* perched confidently on a vine, nose extended like a declaration of evolutionary wit. If Pinocchio's nose grew from dishonesty, the Pinocchio chameleon's nose grew from brilliance: a tool **to be seen when it matters, and to disappear when it doesn't.**

It's the ultimate paradox. A feature so flamboyant it screams "look at me!" during breeding season... yet so refined it melts into the background when predators lurk. Visibility and invisibility crafted in one elegant rostral appendage. A natural optical illusion, perfected by millions of years of selective pressure. Just as Pinocchio longed to be more than he appeared, *C. pinocchio* became everything it needed to be: a symbol of authenticity cloaked in deception, science disguised as fiction, nature wielding humor with purpose. In the dance of mating rituals and rainforest survival, these lizards mastered the art of dual identity. And that, perhaps, is the lesson here. The nose knows. Because sometimes, the most honest thing in nature... is a lie beautifully told.

C. pinocchio in face.

The full version of this article:

www.responsibleherpetoculture.foundation

References

Dawkins, R. (1976). *The Selfish Gene*. Oxford: Oxford University Press. 224pp.

Glaw, F., Agne, S., Prötzel, D., Gehring, P.-S., Köhler, J., Preick, M., Ratsoavina, F. M., Straube, N., Wollenberg Valero, K., Crottini, A. & Vences, M. (2025). *Towards a revision of the Malagasy chameleons of the Calumma gallus complex: Redefinition of Calumma nasutum based on a museomics approach and descriptions of two new species.* Salamandra, 61(4): 442–466.

Glaw, F. & M. Vences. (1994). *A Field Guide to the Amphibians and Reptiles of Madagascar*. Cologne: Vences & Glaw Verlag. 480pp.

Günther, A. (1877). *Descriptions of Some New Species of Reptiles from Madagascar.* Annals and Magazine of Natural History 19:313–317.

Menegon, M., Lyakurwa, J. V., Loader, S. P. & Tolley, K. A. (2022). *Cryptic diversity in pygmy chameleons (Chamaeleonidae: Rhampholeon) of the Eastern Arc Mountains of Tanzania, with description of six new species.* Acta Herpetologica 17(2): 85–113.

Nečas, P. (1997). *Funkce bizarních útvarů na hlavách a tělech chameleonů.* Živa 2: 84-87.

Nečas, P. (1999). *Chameleons: Nature's Hidden Jewels*. Frankfurt: Edition Chimaira. 348pp.

Ott, M. & F. Schaeffel. (1995). *A Negatively Powered Lens in the Chameleon*. Nature 373(6516): 692–694.

Ott, M., F. Schaeffel, & W. Kirmse. (1998). *Binocular Vision and Accommodation in Prey-Catching Chameleons.* Journal of Comparative Physiology 182(3): 319–330.

Rand, A. S. (1961). *A Suggested Function of the Ornamentation of East African Forest Chameleons.* Copeia 1961(4): 411–414.

Tolley, K. A. & A. Herrel (2013). *The Biology of Chameleons*. Berkeley: University of California Press. 312pp.

Toxopeus, A. G., J. P. Kruijt, & D. Hillenius. (1988). *Pair-Bonding in Chameleons.* Naturwissenschaften 75(5): 268–269.