

The biology of Dwarf Tinamou *Taoniscus nanus*, with notes on its breeding in captivity

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Novos registros e observações do *Taoniscus nanus*, tanto silvestre como cativo, são documentados aqui. Descrevemos o seu canto, a coloração dos ovos e construção do ninho em cativeiro. A densidade da população e a variedade das plumas são mencionadas, assim como apresentamos detalhes de ilustrações de biografias anteriores. Propomos a preservação em cativeiro a fim de aumentar o saber e assistir na conservação de *T. nanus*.

Introduction

Dwarf Tinamou *Taoniscus nanus* was described by Temminck in 1815, based on Azara's "Ynambú Carapé". Its type-locality is Misiones in Paraguay⁷, not the province of the same name in north-east Argentina, as is often and erroneously assumed. It may be extinct there, with no confirmed records since 1901³, although it is a cryptic, easily overlooked and, in consequence, poorly known species. *T. nanus* has long been considered rare, is poorly represented in scientific collections³ and, despite its relatively extensive distribution in Brazil, is probably extinct at many localities. In Brazil, *T. nanus* is known from the states of Paraná, São Paulo, Mato Grosso do Sul, Minas Gerais, Goiás and Distrito Federal³. In the last 15 years, the only published records have been by Teixeira & Negret¹⁵, in 1984 at Roncador Biological Reserve (15°55'S 47°52'W) near Brasília (Distrito Federal), and Olmos & Martuscelli¹⁶, from Itapetininga State Park (São Paulo) (23°39'S 47°59'W). G. Bohórquez (pers. comm.) obtained a pair after a grassland fire in Cristalina, Goiás (16°46'S 47°36'W) on 9 March 1994, the same locality as cited by Silveira¹⁴ for 1965. Bohórquez also recorded the species at Brejo do Sr. Luiz, near Bonfinópolis (16°34'S 45°59'W), Minas Gerais, where he observed two individuals on two different dates: 2 October 1996 and 9 June 1997. Another record from Minas Gerais was obtained by LFS, Henrique Rocha Nobre and Juan Mazar Barnett, who tape-recorded one at Serra da Canastra National Park (20°14'S 46°21'W) on 16 December 1996. All localities cited above are presented on the map.

Field observations

In 1990, during a visit to a bird-breeder in Brasília, we were surprised to find, with other birds, a single *Taoniscus nanus*. The birds' keeper informed us that it was obtained in cerrado near Taguatinga, Distrito Federal. With this information and with the aim of increasing our knowledge of the biology

of *Taoniscus nanus*, VJS (initially) made monthly visits to Taguatinga, west of Brasília (15°49'S 48°03'W). The research site is dominated by cerrado (bushy savanna), with gallery forests and campo sujo (scrubby field), habitat similar to that found by Azara¹ and Teixeira & Negret¹⁵, who made field studies of this species. In some areas the terrain is very rocky with canela-de-ema (Velloziaceae) present. *T. nanus* was found in scrubby fields with a few trees and bushes up to 1.5 m high, and in drier areas with Velloziaceae. The species was detected by voice, usually in early morning and late afternoon. After tape-recording the voice (using Panasonic RN 102 and Sony TCM 5000 EV tape-recorders and Sennheiser ME 66 microphone), playback elicited responses from many individuals, allowing spatial distribution and a minimum population for the site to be ascertained.

When disturbed, we found that *T. nanus* would leap c.1.5 m in the air and, on its short wings, fly in a straight line c.1 m above the ground, as noted also by Teixeira & Negret¹⁵. In flight, we noted that it can cover distances of up to 50 m (occasionally more with a tail-wind), different from the 150 m Azara¹ and Teixeira & Negret¹⁵ observed. On landing, *T. nanus* always took cover in bushes and thickets (reconfirming observations of the above).

Four other tinamou species were found in our (c.10 ha) study area, occurring sympatrically with *T. nanus*: Small-billed Tinamou *Crypturellus parvirostris*, Red-winged Tinamou *Rhynchotus r. rufescens*, Spotted Nothura *Nothura maculosa* and Lesser Nothura *N. minor*. *N. minor* prefers bushy habitats with sparse grasses, where *T. nanus* is rarer, whilst *N. maculosa* inhabits campo sujo and is the rarest of the four species at Taguatinga. *R. r. rufescens* is a generalist, recorded in all microhabitats within the study area. *Crypturellus parvirostris* prefers gallery forest edges.

To determine the number of birds present during an observation period, a tape-recording was played at two points, 400 m apart, and the number

and location of responding individuals noted. Vocalising increases significantly in September–January, which is apparently the breeding season, but only data from February–May were considered, as during the breeding season response-rate increases and territory-size decreases, increasing the possibility of double counting. Outside the breeding season, responses from four birds at one site and three at another were frequently obtained in an area of c.2 ha. *Contra Silveira*¹⁴, who stated that *T. nanus* occurred in groups of up to 12, all of our observations involved single birds or pairs.

Food

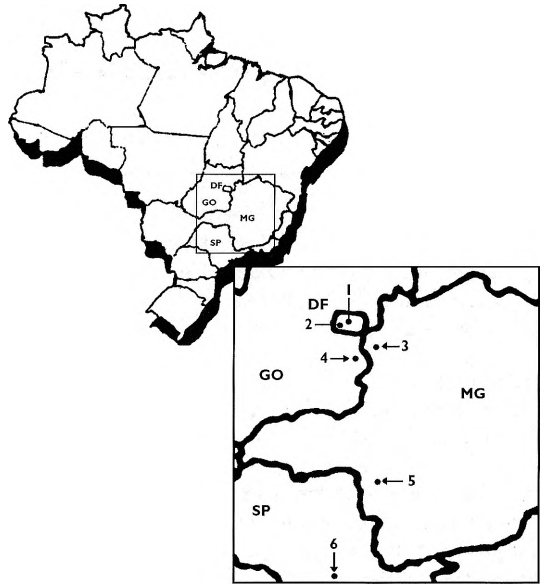
Food was first recorded by Azara¹, who observed captive birds eating spiders and corn. Teixeira & Negret¹⁵ observed *T. nanus* searching for arthropods and seeds of Graminae, and extracting termites from their nests. The two birds obtained by Bohórquez at Cristalina were analysed by us; their stomachs contained small Graminae seeds (not specifically identified) and small stones.

Predators

Potential predators of *T. nanus* recorded during our study included White-tailed Hawk *Buteo albicaudatus* (seen eating a *Nothura minor*, identified by its remains), Aplomado Falcon *Falco femoralis* and American Kestrel *F. sparverius*. Burrowing Owl *Speotyto cunicularia* is also a potential predator, but analysis of 20 pellets around their burrows revealed only beetle and rodent remains.

Captive breeding

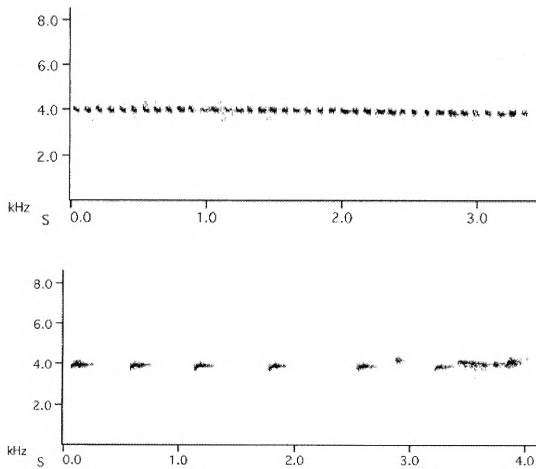
We studied six captive *T. nanus* housed by the same keeper who had apparently captured the bird which prompted this study. The birds were captured by hand, when they landed in bushes and were temporarily unable to fly, a fact also noted by Azara¹. Two were captured in September 1993 and four in September 1995. They were kept in pairs (see plumage discussion), in the hope that they might breed, in an enclosure 1.5 m wide, 3 m long and 2 m high. The enclosure's earth floor was planted with grasses from the cerrado. Contrary to other tinamous, which usually fly into the walls of enclosures and die (pers. obs.), *T. nanus* proved extremely docile in captivity, seeking shelter in the planted grass thickets. They quickly accepted all food items offered (canary-seed, millet and mealworms), principally feeding at dawn. Azara¹, who first kept the species in captivity, had already noted this docile behaviour, comparing *T. nanus* with a "domestic fowl". Within a few months they started singing, principally at dawn and in the evening.



Map showing recent records of Dwarf Tinamou *Taoniscus nanus* in Brazil. Selected states: DF=Federal District; GO=Goiás; MG=Minas Gerais; SP=São Paulo (coordinates from IBGE, 1995⁵): 1. Roncador Bitapological Reserve (15°55'S 47°52'W); 2. Taguatinga (15°49'S 48°03'W); 3. Bonfinópolis (16°34'S 45°59'W); 4. Cristalina (16°46'S 47°36'W); 5. Serra da Canastra National Park (20°14'S 46°21'W); and 6. Itapetininga State Park (23°39'S 47°59'W).

When singing, the captive *T. nanus* assumed a posture similar to *Nothura* spp., slightly opening its bill and raising its neck. The voice is a series of simple whistles (c.38–40) with a mean duration of 35–40 seconds, starting with an upward trill *pe..pe..pe..pe..* becoming a monotonous *peet..peet..peet..peet..* similar to a cricket, and comprising the longest part of the song (see sonagram). In response to a strange noise, they would lift the neck and body, searching for the source of disturbance, and remain in this posture for several seconds (see photo 1).

In December 1993, the first captured pair laid a clutch of three eggs in a small, spherical nest which the birds had built of grass and small leaves, with a lateral opening (see photo). The eggs were relatively large (mean 36 x 18 mm), ellipsoid, similar to those of *N. maculosa* but slate in colour (see photo). The eggs were placed in an incubator and examined after a week: they were fertile but after 15 days the embryos died. The pair responsible for this clutch died in 1994. Two other birds captured in September 1995 adapted poorly to captivity and died quickly. The final two individuals were paired until late April 1996, having survived 2.5 years in captivity, when during a sudden chill one perished.



Sonograms of Dwarf Tinamou *Taoniscus nanus*.

Two types of voice were recorded. The first is a cricket-like trill composed of short (c.40 ms duration) whistles at c.4 kHz, and delivered at a rate of c.12/s (sonagram 1); and the second is a series of longer (c.0.1 s duration) whistles delivered at the same pitch but more slowly (c.2 notes per second) (sonagram 2). A second bird appears to be the source of the rapid series of shorter notes at the end of this sequence. L. P. Gonzaga prepared the sonagrams in the Laboratory of Bioacoustics at the Department of Zoology of the Federal University of Rio de Janeiro with a Macintosh computer acquired with the support of Fundação Universitária José Bonifácio, using Canary 1.2 software (Bioacoustics Research Program, Cornell Laboratory of Ornithology, USA). Recordings are deposited in the Arquivo Sonoro Elias Coelho [ASEC/LFS 007-A/1/1 (sonagram 1) and ASEC/LFS 007-A/1/3 (sonagram 2)]. Filter Bandwidth: 267 Hz.

The remaining bird survived until the end of our observations. *T. nanus* appears highly susceptible to temperature variation in captivity, presenting symptoms suggestive of respiratory tract infections which cause their swift demise. Azara¹ kept two birds for three days and Silveira¹⁴ kept some in Brasília Zoo, the longest-lived of which survived for at least six months.

Discussion of published illustrations

In published illustrations^{2,4,8,10,11}, *T. nanus* appears to have relatively long legs and toes, like a small *Nothura*. Our observations agree with Teixeira & Negret¹⁵, in that *T. nanus* appears almost to slide over the ground as it walks, due to its short legs. Small size is not apparent in illustrations and size scale errors are also present, *T. nanus* appearing larger than it really is compared to other species depicted on the same plate^{8,10,11}. Iris colour is also incorrectly depicted as red^{10,11}, black^{2,4} and brown⁸.

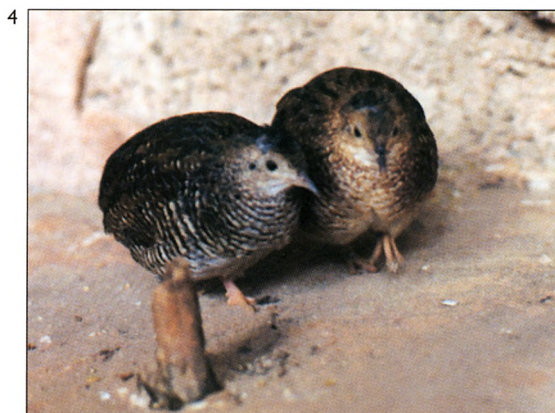
Our observations indicate that the iris is yellow (see photo 3) sometimes being a little lighter or darker but never red, black or brown, thus agreeing with Teixeira & Negret¹⁵. Most authors have never seen a live *T. nanus* or colour photograph of the species, basing their information solely on museum material. These errors have apparently occurred because *T. nanus* is extremely rare in collections and available specimens are old with few notes on soft part coloration on their labels. It is noteworthy that a specimen from the United States National Museum of Natural History (USNM—no. 310543) has the iris colour (yellow) labelled. In most cases, leg (pinkish) and bill (lower mandible light pink, upper mandible black) colour are described or illustrated correctly, with the exception of Blake², where the bill appears wholly black.

Sexual dimorphism and colour variation

Vent colour varies from pure white to ochraceous yellow. In the nesting pair, this difference was striking (see photo), leading us initially to speculate that the difference was due to sexual dimorphism, the male being that with the ochraceous vent (see photo). Two unsexed specimens in the Museu de Zoologia da Universidade de São Paulo—MZUSP (nos. 9653 and 10953) have the belly ochraceous, one of which (no. 10953, from Bartira, São Paulo) is labelled as having “female characters” written in a different letter type and clearly post-dating the original label. The other lacks locality and sex data, it being labelled as “from museum exposition”. The breeding female had a near white belly. Two specimens examined by H. Alvarenga (pers. comm.) at the USNM have white abdomens (specimen no. 308890 is labelled male and no. 310543 is unsexed). Azara¹ observed six birds, all apparently with white vents. Miranda-Ribeiro⁶ noted sexual dimorphism based on the size of the uppertail-coverts, those of the male being longer. Teixeira & Negret¹⁵ noted no significant sexual differences in *T. nanus*, reporting that both sexes “have more or less the same general pattern”. *T. nanus* may have plumage morphs, as we have observed in other tinamous, e.g. *Nothura minor* and *N. maculosa*, but information to clarify or confirm this is lacking. Another plumage variation, observed by Teixeira & Negret¹⁵ is the colour of the primaries, plain ashy black or slightly marbled.

Threats

At the study site, *T. nanus* is threatened by the extension of a highway running alongside the cerrado (and by the consequent increase in machinery and domestic traffic), which will destroy a



1. Dwarf Tinamou *Taoniscus nanus* in alert position (Roberto Murta)
2. Nest and egg of Dwarf Tinamou *Taoniscus nanus* (Valter Silveira)
3. Close-up of Dwarf Tinamou *Taoniscus nanus*, showing bill colour and yellow iris (Roberto Murta)
4. Breeding pair of Dwarf Tinamou *Taoniscus nanus*, showing individual plumage differences (Valter Silveira)

significant area of the species' habitat. To what extent the local population will be affected by such encroachment is unknown. Brasília and its satellite cities suffer from illegal land development and in the study site some invasions have occurred in recent years, further reducing the available habitat. Another threat comes from collectors of "minhocuçu" (*Rhinodrilus alatus*—*Oligochaeta*) who, in groups of up to 20 with shovels and hoes, can damage up to c.20 m² of cerrado in a day, digging for this worm (which is used to catch fish). *T. nanus* and other tinamids are sensitive to such disturbance, never singing in areas of upturned soil and only returning once the vegetation has recovered. *T. nanus* is also at risk from illegal fires lit in the area, which have been known to burn 70 % of the total area of cerrado (pers. obs., August 1997).

The status of *T. nanus* requires clarification throughout its range. Its small size and the lack of knowledge of its vocalisations has probably resulted in the species going under-recorded, and its critical situation receiving less notice. The greatest threat facing *T. nanus* is cerrado destruction in central Brazil, caused by the expansion of soyabean and corn monocultures, and tree-felling for the coal industry³.

In the same area as *T. nanus*, other threatened (T) or near-threatened (N) species³ were observed:

Lesser Nothura (T), Sharp-tailed Tyrant *Culicivora caudacuta* (N), Cock-tailed Tyrant *Alectrurus tricolor* (N) and Black-bellied Seedeater *Sporophila melanogaster* (N). Other cerrado specialists also occur in the area, e.g. White-rumped Tanager *Cypsnagra hirundinacea*, Collared Crescentchest *Melanopareia torquata* and Plumbeous *Sporophila plumbea* and White-bellied Seedeaters *S. leucoptera*. More extensive studies and a conservation plan are required to ensure this important area does not disappear. As pointed out by Silva¹³, the conservation of biological resources in the cerrado region has received little attention in recent decades. It is very important that international conservation agencies include cerrado among the highest priorities for conservation in the Neotropics.

Conclusions

The attempt to breed *T. nanus* in captivity was worthwhile, despite the problems encountered. Systematic breeding of the species in captivity should be attempted as a means to conserve the species. Captive breeding can be efficient in maintaining threatened species, e.g. Red-billed Curassow *Crax blumembachii* and Solitary Tinamou *Tinamus s. solitarius*, which have been proven to breed in the wild, following their reintroduction (Roberto Azeredo pers. comm.). The

possibility of keeping *T. nanus* in captivity requires consideration, on the basis of our experience. Support from experienced breeders and zoos would be fundamental to obtain success, and could ensure the species' conservation. The tape-recorded voice (deposited at Arquivo Sonoro Prof. Elias Coelho, Rio de Janeiro, RJ) could increase the chances of discovering the species in other areas, through the use of playback.

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