

Some temperatures of birds of Belém, Brazil

YOSHIKA ONIKI
Department of Biology
Princeton University
Princeton, New Jersey

ABSTRACT

Cloacal temperatures are listed for Amazonian birds of Belém, Pará. Eight hundred and two individuals representing 85 species and 23 families were studied. As in birds of temperate zones, large and small birds show low cloacal temperatures and medium-sized birds show high cloacal temperatures.

INTRODUCTION

Wetmore (1921), King and Farner (1961) and McNab (1966) list temperatures of birds from temperate zones. From tropical zones, little data has been available. Only a few hummingbirds (Lasiewski, 1964; Morrison, 1962) and some oceanic birds (Howell and Bartholomew, 1961) have been measured. Supplementing some previous work (Onik, 1972a and MS), the present study lists cloacal temperatures from some birds of Belém, State of Pará.

MATERIAL AND METHODS

Most data was obtained when birds were captured by T. E. Lovejoy III and his group for other ornithological studies, from July to September 1972. Additional data were obtained by E. O. Willis, from April 1972 to May 1973. With the Lovejoy group, the birds were usually captured from 6:00 to 12:00 h. After release from the mist net, the birds were placed in cloth bags to be transported to the field laboratory, where measurements were made. A Schultheis thermometer was then inserted in the cloaca of the bird and the temperature read in degrees Celsius, 30-60 se-

conds after insertion and after the mercury column had stabilized. Soon after, the bird was weighed, molt condition studied, and the bird released. For Willis' work, the birds were always captured in front of a swarm of army ants (*Eciton burchelli*), immediately measured and weighed, and soon released. All the birds were captured in mist nets 2.5 m high.

The nomenclature and order of birds followed here is that of Meyer de Schauensee (1970). Birds were captured in upland forest (terra firme), second growth (Capoeira) and swamp forest (Várzea), all located in the Área de Pesquisas Ecológicas do Guamá, a forest reserve of the Instituto de Pesquisa Agropecuária do Norte (IPEAN), Belém (description of types of forest in Oniki, 1972b).

RESULTS

Eight hundred and two individuals representing 85 species and 23 families of birds are represented in Table 1. Small birds, such as hummingbirds, have low cloacal temperatures. Temperatures increase with weight, but decrease again for large birds. Figure 1 shows that birds up to about 25 g have cloacal temperatures between 38.5 and 42.3°C; birds with weights between 25 and 75 g have cloacal temperatures between 41.0 and 40.0°C. Unfortunately, the number of individuals weighing more than 70 g were too few to show the decrease at high weights.

Cloacal temperatures ranged from 38.5°C (from the hummingbird *Threnetes leucurus*) to 43.8°C (from the grosbeak *Pitylus grossus*).

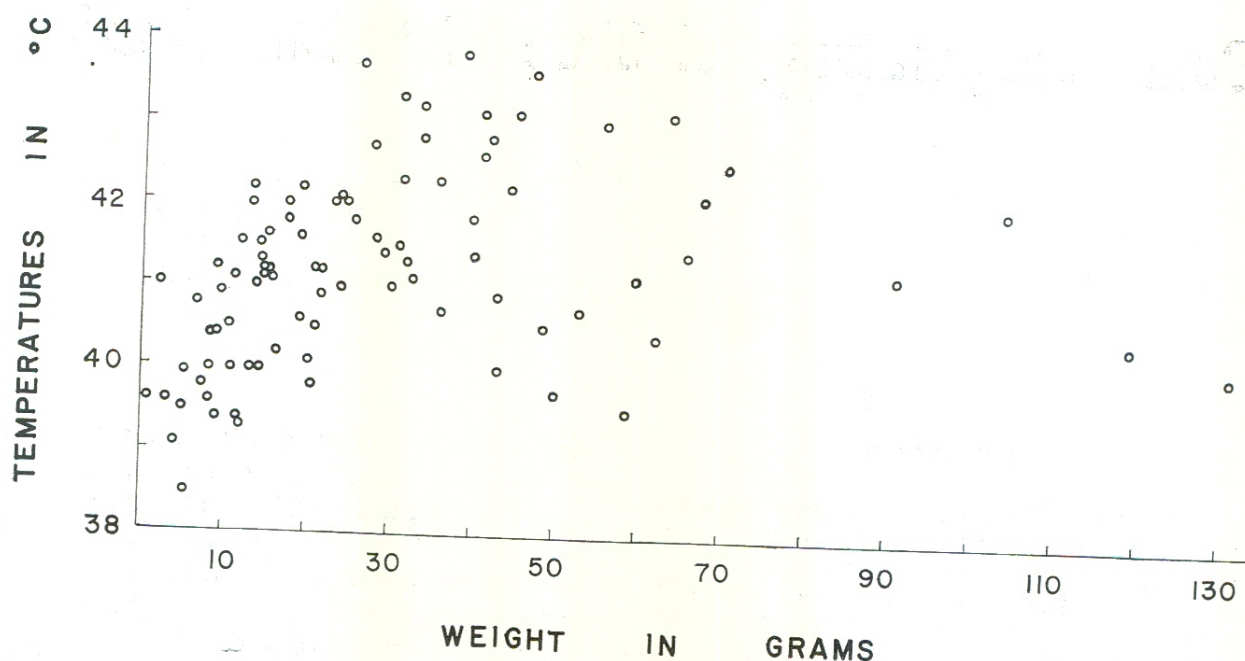


Fig. 1. Temperature of birds according to their weight. Two hawks are not included: one weighing 180 g with cloacal temperature 40°C and another weighing 246 g with cloacal temperature 41.0°C.

In Table 1, the species marked with an asterisk were either captured by Willis, or his data were combined with mine due to the small number of captured individuals (from 1 to 3). With the Lovejoy group, the birds remained quiet in the cloth bag from 2 to 3 hours after being released from the mist net. Consequently, they lost weight but cloacal temperatures probably dropped to normal. Because the birds captured by Willis were measured and weighed immediately after capture, the weight was probably normal but the cloacal temperature a little higher than normal due to the excitement of being captured and fluttering in attempts to escape. This can be seen clearly in those species in Table 1, where the data of Willis are separated: they show high cloacal temperatures and high weights for the woodcreepers, *Dendrocincla fuliginosa*, *Dendrocincla merula* and *Dendrocolaptes certhia* and for the antbirds, *Pyriglena leuconota* and *Phlegopsis nigromaculata*.

The average ambient temperature was 25.6°C (23.2°C — 28.3°C; $n = 27$).

DISCUSSION

Following earlier observations for temperate-zone birds (McNab, 1966), data obtained from these tropical birds show that small birds such as hummingbirds and large birds such as hawks have low cloacal temperatures. Medium-sized birds show high cloacal temperatures, especially the woodcreepers, *Dendrocincla fuliginosa* and *Dendrocincla merula*; the antbird, *Phlegopsis nigromaculata*; and the tanager, *Tachyphonus rufus* and *Eucometis penicillata*. As in Panamá, the tanager *Eucometis penicillata* and the flycatcher *Myiodynastes maculatus* show high cloacal temperatures. Possibly these birds and others with rapid flight present high cloacal temperature so they can move rapidly from one location to the other and in this way obtain food in many places.

TABLE 1 — Temperatures of birds of Belém

Species		Cloacal Temp. Average (°C)	(Interval)	N. Birds	Weight, g	(Interval)	N. Birds
Accipitridae							
Double-toothed Kite	<i>Harpagus bidentatus</i>	40.0		1	180.0		1
Roadside Hawk	<i>Buteo magnirostris</i>	41.0		1	246.0		1
Rallidae							
Russet-crowned Crane	<i>Laterallus viridis</i>	39.5		1	58.8		1
Columbidae							
Ruddy Quail-Dove	<i>Geotrygon montana</i>	42.0		2	104.3	(94.6-114.0)	2
Psittacidae							
Sapphire-rumped Parrotlet	<i>Touit purpurata</i>	41.1	(40.1-42.0)	6	59.7	(52.6-62.6)	6
Cuculidae							
Squirrel Cuckoo	<i>Piaya cayana</i>	41.2		1	91.0		1
Little Cuckoo	<i>Piaya minuta</i>	40.7	(39.4-42.0)	2	36.4	(35.9-36.9)	2
Pavonine Cuckoo	<i>Dromococyx pavoninus</i>	39.9	(38.4-41.3)	2	43.2	(40.5-45.9)	2
Trochilidae							
Rufous-breasted Hermit	<i>Glaucis hirsuta</i>	39.3		1	5.4		2
Pale-tailed Barbthroat	<i>Threnetes leucurus</i>	38.5	(37.0-40.0)	17	5.5	(5.0-6.2)	20
Long-tailed Hermit	<i>Phaethornis superciliosus</i>	39.5	(37.5-41.6)	9	5.1	(4.8-6.0)	10
Reddish Hermit	<i>Phaethornis ruber</i>	41.0		1	2.3		1
Gray-breasted Sabrewing	<i>Campylopterus largipennis</i>	39.6	(37.8-42.0)	14	8.3	(5.0-10.4)	15
Blue-chinned Sapphire	<i>Chlorestes notatus</i>	39.6		1	3.4		1
Fork-tailed Woodnymph	<i>Thalurania furcata</i>	39.1	(36.7-42.0)	13	4.0	(3.3-4.8)	13
Alcedinidae							
Green-and-Rufous Kingfisher	<i>Chloroceryle inda</i>	40.5	(39.1-41.6)	5	48.7	(46.6-51.2)	5
Pygmy Kingfisher	<i>Chloroceryle aenea</i> *	40.0	(39.0-41.4)	6	13.2	(11.1-16.3)	6
Momotidae							
Blue-crowned Motmot	<i>Momotus momota</i>	40.1	(40.0-40.2)	2	132.8	(131.0-134.5)	2
Galbulidae							
Yellow-billed Jacamar	<i>Galbula albirostris</i>	41.0		1	24.2		1
Bucconidae							
Rufous-necked Puffbird	<i>Malacoptila rufa</i>	40.9	(40.8-41.1)	3	40.3	(36.0-42.6)	3
Picidae							
Waved Woodpecker	<i>Celetes undatus</i>	40.4		1	64.6		1
Dendrocolaptidae							
Plain-brown Woodcreeper	<i>Dendrocincla fuliginosa</i>	41.4	(41.0-42.8)	11	40.3	(30.7-46.0)	11
White-chinned Woodcreeper	<i>Dendrocincla fuliginosa</i> *	43.1	(41.7-44.2)	16	41.4	(36.2-46.8)	16
	<i>Dendrocincla merula</i>	42.3	(41.7-42.9)	2	35.6	(34.6-36.6)	2
	<i>Dendrocincla merula</i> *	43.6	(42.4-44.7)	8	40.7	(38.5-43.2)	9
	<i>Glyphorhynchus spirurus</i>	41.3	(39.2-43.0)	112	14.6	(12.2-16.9)	113

TABLE 1 (Continued)

Species	Cloacal Temp. Average (°C)	(Interval)	N. Birds	Weight, g	(Interval)	N. Birds
Barred Woodcreeper	41.4		1	60.6		1
Striped Woodcreeper	43.1	(42.8-43.3)	4	64.0	(61.3-68.9)	3
Spix's Woodcreeper	42.7		1	28.2		1
Buff-throated Woodcreeper	41.5	(40.2-42.4)	17	31.2	(27.2-36.2)	17
Furnariidae	43.0		1	55.7		1
Ruddy Spinetail						
Cinnamon-rumped Foliage-Gleaner	41.6	(41.2-41.8)	3	19.3	(19.0-19.9)	3
Olive-backed Foliage-Gleaner	41.6	(41.1-42.1)	2	28.3	(26.6-30.0)	2
Chestnut-crowned Foliage-Gleaner	41.1	(40.0-42.0)	11	32.9	(30.2-36.2)	11
Plain Xenops	41.3		1	32.0		1
Short-billed Leafscraper	41.1	(39.9-42.2)	16	10.6	(8.2-11.4)	16
Formicariidae	40.5	(40.0-41.2)	6	21.3	(20.2-23.0)	6
Lined Antshrike						
White-shouldered Antshrike	42.0		1	23.3		1
Amazonian Antshriks	40.9	(39.8-42.4)	6	21.7	(20.0-23.0)	6
Plain Antvireo	41.2	(40.4-42.0)	5	21.1	(19.3-24.4)	5
Cinereous Antshrike	39.3	(39.0-41.1)	3	12.1	(11.0-13.2)	3
Plain-throated Antwren	41.2	(40.2-41.6)	5	15.9	(15.2-16.8)	5
White-flanked Antwren	40.5	(39.1-41.6)	23	10.7	(8.0-16.0)	23
Long-winged Antwren	40.4	(39.3-41.0)	8	8.2	(7.3-8.8)	8
Gray Antwren	41.2	(41.0-41.4)	2	9.2		2
Dusky Antbird	40.0		1	8.4		1
White-backed Fire-eye	39.8	(36.0-40.8)	7	14.3	(13.6-15.6)	7
Band-tailed Antbird	41.4	(39.0-42.8)	27	29.4	(26.2-34.2)	28
Silvered Antbird	42.8	(41.2-44.1)	57	33.9	(29.4-37.5)	50
Scale-backed Antbird	41.5	(40.0-43.0)	2	14.5	(14.2-14.7)	2
Black-spotted Bare-eye	41.2		1	22.0		1
	41.8		1	17.7		1
Black-faced Anthrush	42.8	(42.2-43.5)	9	42.2	(38.0-44.6)	9
Hooded Gnateater	43.1	(41.9-43.8)	37	45.1	(39.2-53.0)	36
Cotingidae	40.7	(39.0-42.1)	10	53.0	(47.8-54.6)	10
Screaming Piha	39.8		1	20.8		1
Pipridae						
Red-headed Manakin	42.5		1	70.6		1
White-crowned Manakin	41.5	(40.2-42.3)	16	12.0	(10.2-13.0)	17
Band-tailed Manakin	41.1	(40.0-42.0)	8	11.2	(10.0-13.9)	8
	42.0	(42.0-42.1)	2	13.4	(12.2-14.6)	2

TABLE 1 (Continued)

	Cloacal Temp. Average (°C)	(Interval)	N. Birds	Weight, g	(Interval)	N. Birds
Blue-backed Manakin	40.6	(38.5-41.6)	7	19.2	(18.4-21.2)	7
White-bearded Manakin	41.1	(38.7-43.2)	44	15.0	(12.2-18.1)	44
Thrush-like Manakin	41.0	(38.5-42.5)	3	30.3	(30.0-30.7)	3
Tyrannidae						
Streaked Flycatcher	42.6	(42.2-43.0)	2	41.2	(37.2-45.2)	2
Bright-rumped Attila	42.3	(41.0-43.1)	4	31.2	(29.9-31.6)	4
Short-crested Flycatcher	43.7		1	26.3		1
Ruddy-tailed Flycatcher	39.8	(39.0-40.6)	2	7.4		2
Royal Flycatcher	41.0	(38.9-42.5)	13	14.0	(9.7-16.2)	13
Cinnamon-crested Spadebill	40.0	(38.6-40.8)	3	11.0	(8.8-15.0)	3
Olivaceous Flatbill	40.1	(40.0-40.2)	2	20.2		2
Black-chested Tyrant	40.4		1	9.4		1
Helmeted Pygmy-tyrant	40.8	(40.6-41.0)	2	6.7	(6.2-7.2)	3
Ochre bellied Flycatcher	40.9	(38.4-43.3)	29	9.8	(8.4-11.0)	29
McConnell's Flycatcher	41.6		1	15.5		1
Ringed Antpitt	41.2	(40.0-42.1)	3	14.6	(14.0-14.9)	3
Troglodytidae						
Moustached Wren	42.2	(41.5-42.6)	8	19.3	(16.2-22.8)	8
Nightingale Wren	40.2	(39.2-41.4)	6	16.5	(13.3-19.0)	6
Turdidae						
Cocoa Thrush	42.1	(41.0-43.2)	19	67.8	(62.6-76.6)	19
White-necked Thrush	42.2	(40.8-43.1)	8	41.6	(38.6-52.0)	8
Parulidae						
River Warbler	42.2	(41.8-42.5)	2	13.2	(12.4-14.0)	2
Coerebidae						
Bananaquit	39.4	(38.4-40.6)	3	9.2	(8.8-9.6)	3
Thraupidae						
Golden-sided Euphonia	39.4		1	11.8		1
Silver-beaked Tanager	42.1	(40.3-44.2)	15	24.0	(20.4-26.8)	15
White-lined Tanager	43.2		1	33.6		1
Fulvous-crested Tanager	42.0		1	17.8		1
Gray-headed Tanager	43.3	(42.2-44.1)	13	31.0	(26.2-34.3)	13
Fringillidae						
Buff-throated Saltator	41.8	(39.6-43.8)	11	39.9	(36.0-44.0)	11
Slate-colored Grosbeak	43.8		1	39.0		1
Blue-black Grosbeak	41.8	(40.2-42.8)	18	25.8	(21.4-27.7)	17
Pectoral Sparrow	42.0	(40.4-43.1)	42	34.8	(22.0-27.8)	42
Chiroxiphia pareola						
Manacus manacus *						
Schiffornis turdinus						
Myiodynastes maculatus						
Attila spadiceus						
Myiarchus ferox *						
Terenotriccus erythrurus						
Onychorhynchus coronatus *						
Platyrinchus saturatus						
Rhynchochocycus olivaceus						
Taeniotriccus andrei						
Colaptes galeatus						
Pipromorpha oleaginea *						
Pipromorpha macconnelli						
Cerythopsis torquata						
Thryothorus genibarbis						
Microcerculus marginatus						
Turdus fumigatus						
Turdus albicollis						
Basileuterus rivularis						
Coereba flaveola						
Euphonia cayennensis						
Ramphocelus carbo *						
Tachyphonus rufus						
Tachyphonus surinamus						
Eucometis penicillata *						
Saltator maximus *						
Pitylus grossus						
Cyanocopsa cyanoides						
Arremon taciturnus						

ACKNOWLEDGEMENTS

Financial support from the National Science Foundation (GB-32921) and Conselho Nacional de Pesquisa (TC n.º 6998-71) made possible the present study. My husband, E. O. Willis helped me with the field work. I thank T. E. Lovejoy III and his group, who graciously permitted the use of captured birds, and to IPEAN for the use of the forest reserve.

SUMÁRIO

É apresentada uma lista de temperaturas cloacais para aves tropicais de Belém, Pará, Brasil. Como foi obtido para as aves de zonas temperadas, as aves pequenas e grandes mostram baixa temperatura cloacal enquanto as aves de tamanho médio alta temperatura cloacal.

BIBLIOTECA CITADA

HOWELL, T. R. & BARTHOLOMEW, G. A.

- 1961 — Temperature regulation in Laysan and Black-footed Albatrosses. *Condor*, 63: 185-197.

KING, J. R. & FARNER, D. S.

- 1961 — Energy metabolism, thermoregulation, and body temperature. In: Marshall,

A. J. ed. — *Biology and comparative physiology of birds*. London, Academic Press.

LASIEWSKI, R. C.

- 1964 — Body temperatures, heart and breathing rate, and evaporative water loss in hummingbirds. *Physiol. Zool.*, 37: 212-223.

MACNAB, B. K.

- 1966 — An analysis of the body temperatures of birds. *Condor*, 68:47-55.

MEYER DE SCHAUENSEE, R.

- 1970 — *A guide to the birds of South America*. Wynnewood, Pa., Livingston Publ. Co.

MORRISON, P. R.

- 1962 — Modification of body temperature by activity in Brazilian hummnigbirds. *Condor*, 64:215-223.

ONIKI, Y.

- 1972a — Some temperatures of Panamanian birds. *Condor*, 74:209-215.

- 1972b — Studies of the guild of ant-following birds at Belém, Brazil. *Acta Amazonica*, Manaus, 2(1):59-79.

- MS — Some temperatures of Puerto Rican birds, with special note of low temperatures in Todies (*Todus mexicanus*).

WELTMORE, A.

- 1921 — A study of the body temperature of birds. *Smithsonian Misc. Coll.*, Washington, 72:1-51.

