

NEST PREDATION AND INTERSPECIFIC NESTING ASSOCIATIONS INVOLVING PLUMBEOUS KITE (*ICTINIA PLUMBEA*) AND BECARDS (*PACHYRAMPHUS* SPP.)

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Abstract · Interspecific nesting associations are among several strategies employed by birds to reduce the risk of nest predation. Plumbeous Kites (*Ictinia plumbea*) aggressively defend their nest sites from potential predators, and participate in a little-studied nesting association with various species of becards (*Pachyramphus* spp.). Here, we describe nesting associations involving *Ictinia plumbea*, other raptors, wasps, and becards, based on field observations from 1997 to 2016 in two ecoregions of Argentina, the Atlantic Forest and the Humid Chaco. We found 48% of *Ictinia plumbea* nests in close proximity to one or more becard nests. Kite nests were already active when becards began building. Green-backed Becards (*Pachyramphus viridis*) were the most frequent associate, nesting 30–150 cm from active kite nests and sometimes appropriating their nest material. When potential predators came near their nests, becards appeared unable to drive them off, but their warning calls alerted the kites, which drove 13 species of potential nest predators away from kite-becard nesting associations. Two kite nests – both unaccompanied by becards – were confirmed to have failed. At one, a Red-breasted Toucan (*Ramphastos dicolorus*) captured the young kite nestling during a brief absence of both parents. We propose that (1) becards select nest sites near kites and benefit from the kites' aggressive nest defense, and (2) kites tolerate becards, possibly gaining a small advantage from their warning calls. We also found becards nesting beside five other species of raptors, and wasps. Network analysis revealed a higher diversity of protective nesting associations in the Chaco than in the Atlantic Forest, but *Ictinia plumbea* and wasps were the most frequent nest associates of becards in both systems. Quantitative studies of nest-site selection and nest survival in becards and kites are needed to reveal the behavioral mechanisms and fitness costs/benefits of this widespread interspecific nest association.

Resumen · Predación de nidos y asociaciones interespecíficas de nidos involucrando Milano Plomizo (*Ictinia plumbea*) y anambés (*Pachyramphus* spp.)

Las interacciones interespecíficas de nidos se cuentan entre varias estrategias que emplean las aves para reducir el riesgo de la depredación de nidos. Los Milanos Plomizos (*Ictinia plumbea*) protegen agresivamente sus nidos de posibles predadores y participan en una asociación poco estudiada con varias especies de anambés (*Pachyramphus* spp.). Aquí, describimos asociaciones de protección de nidos que involucran *Ictinia plumbea*, otras rapaces, avispas y anambés en base a observaciones de campo entre 1997 y 2016 en dos ecoregiones de la Argentina, la Selva Atlántica y el Chaco Húmedo. El 48% de los nidos de *Ictinia plumbea* se encontraban muy cerca de uno o más nidos de anambé. Los nidos del milano ya estaban activos cuando los anambés empezaron a construir. El Anambé Verdoso (*Pachyramphus viridis*) fue el socio más frecuente, anidando a 30–150 cm de nidos activos del milano, y a veces apropiándose del material de su nido. Cuando se acercaba un potencial predador, los anambés parecían incapaces de alejarlo, pero sus llamadas alertaron a los milanos, que alejaron a 13 especies de posibles predadores de las asociaciones de nidos milano-anambé. Dos nidos de milano – ambos sin acompañamiento de un nido de anambé – se confirmaron como fracasados. En uno, un Tucán de Pico Verde (*Ramphastos dicolorus*) capturó el pichón de milano recién nacido, durante una breve ausencia de ambos padres. Proponemos que (1) los anambés seleccionan sitios para anidar al lado de los milanos y se benefician por la defensa agresiva de estos, y (2) los milanos toleran a los anambés, posiblemente obteniendo una ventaja por sus llamadas de alerta. Además, encontramos anambés anidando junto a otras cinco especies de rapaces, y avispas. Análisis de redes reveló una mayor diversidad de asociaciones de protección de nidos en el Chaco que en la Selva Atlántica, pero *Ictinia plumbea* y avispas fueron los socios más frecuentes de los anambés en ambos sistemas. Se necesitan estudios cuantitativos de selección de sitios para anidar y supervivencia de nidos en

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anambés y milanos para revelar los mecanismos comportamentales, así como también los costos y beneficios en cuanto al éxito reproductivo, de esta asociación interespecífica de nidos.

Key words: Becard · *Ictinia plumbea* · Interspecific network · *Pachyramphus castaneus* · *Pachyramphus polychopterus* · *Pachyramphus validus* · *Pachyramphus viridis* · Protective nest association · *Ramphastos dicolorus* · Raptor

INTRODUCTION

Birds employ a remarkable array of strategies in their efforts to avoid nest predation, the primary cause of avian nest failure (Ricklefs 1969, Collias & Collias 1984, Skutch 1985, Fontaine & Martin 2006). One strategy is to nest in interspecific associations (Janzen 1969, Haemig 2001, Quinn & Ueta 2008). In the Neotropics, the best-known examples of protective nesting associations involve passerines, such as caciques (*Cacicus* spp.), flycatchers (*Tolmomyias* spp.), or becards (*Pachyramphus* spp.), nesting beside wasps or bees (Myers 1929, 1935; Skutch 1969, Haverschmidt 1974, Menezes et al. 2014). The relationship between birds and wasps appears to be commensal: birds benefit from lower rates of nest predation, but there is no effect on the wasps (Robinson 1985, Wunderle & Pollock 1985, Joyce 1993, Beier & Tungbani 2006; but see Almeida & Anjos-Silva 2015). However, little is known about nesting associations among Neotropical passerines and raptors. Passerine-raptor associations may be commensal (only the passerine benefits) or mutualistic (both species cooperate to detect and deter predators; Moreau 1942, Parker 1981, Konrad & Gilmer 1982). Here, we explore a fascinating – but poorly understood – Neotropical nesting association, which involves Plumbeous Kites (*Ictinia plumbea*), other raptors, wasps, and several species of becards.

Ictinia plumbea is distributed and breeds throughout the Neotropics from Mexico to northern Argentina, migrating in winter in the north and south of its range (Yu 2012). The kites forage primarily on insects, which are captured in flight, but they also occasionally consume small vertebrates including lizards, frogs, bats, snakes, and birds (Seavy et al. 1997, Yu 2012). They are not known to depredate bird nests. For breeding, both parents contribute to constructing a shallow saucer of sticks, incubating the eggs, and caring for the single nestling (Skutch 1947, Seavy et al. 1998, Di Giacomo 2005; de la Peña 2013, 2016). Even when the nestlings are feathered and do not require brooding, one parent is almost always near the nest to chase away potential predators (Skutch 1947, Seavy et al. 1998), and no successful nest predators have yet been identified (Yu 2012).

Pachyramphus becards are also distributed throughout the Neotropics (from the southern USA to Uruguay; Mobley 2004). Both parents contribute to building their bulky, globular nests, and to feeding the nestlings (Skutch 1969, Mobley 2004, Di Giacomo 2005, Greeney & Gelis 2008). Of the 16 recognized becard species, at least six – Glossy-backed (*Pachyramphus surinamus*), Cinnamon (*P. cinnamomeus*),

Crested (*P. validus*), White-winged (*P. polychopterus*), Cinereous (*P. rufus*), and Rose-throated Becard (*P. aglaiae*) have been reported nesting beside wasps (Van Rossem 1914, Richards & Richards 1951, Skutch 1969, Mobley 2004, Di Giacomo 2005), and two species – *Pachyramphus validus* and Chestnut-crowned Becard (*Pachyramphus castaneus*) – have been reported nesting in association with Red-rumped Caciques (*Cacicus haemorrhous*; Pizo 2009).

Two studies suggest the existence of a nesting association between becards and *I. plumbea*. First, in an ethno-ornithological study in the Atlantic Forest of Misiones (Argentina), Mbyá Guaraní participants referred to the Green-backed Becard (*Pachyramphus viridis*) as “Chyvy Raityja” (the owner of the nest of *I. plumbea*; Cebolla Badie & Krauczuk 2000). Secondly, at Reserva El Bagual in the Humid Chaco (Formosa, Argentina), Di Giacomo (2005) reported high frequencies of *Pachyramphus* spp. nests adjacent to nests of *I. plumbea*, other raptors, and wasps. Otherwise, the nesting association between *I. plumbea* and *Pachyramphus* spp. has not been recognized in the ornithological literature. Indeed, a global review of protective nesting associations in birds did not report associations involving *I. plumbea* or any other raptor in South America (Quinn & Ueta 2008), and we have found no concrete reports of nesting associations between *I. plumbea* and *Pachyramphus* spp. outside of Reserva El Bagual.

Here, we provide information about nest predation and nest associations involving *Ictinia plumbea* and four species of *Pachyramphus* in two ecoregions of Argentina: the Atlantic Forest (province of Misiones) and the Humid Chaco (province of Chaco). We describe how *Ictinia plumbea* responded to potential nest predators, and how a Red-breasted Toucan (*Ramphastos dicolorus*) overcame the kites’ nest defense to capture and consume a nestling. To highlight the role of *Ictinia plumbea* in nesting associations with four species of *Pachyramphus*, we present interspecific nest association networks that illustrate community-level interactions among raptors, wasps, and *Pachyramphus* spp. in northern Argentina.

METHODS

We did not search specifically for nests of *Ictinia plumbea* or *Pachyramphus* spp., but found these nests over two decades (1997–2016) while conducting site inventories and other bird studies in Misiones and Chaco (e.g., Bodrati 2005, Bodrati et al. 2010, Cockle et al. 2015). In Misiones, we found nests at Parque Provincial Cruce Caballero (26°31’S, 53°58’W), Tobuna (26°28’S, 53°53’W), Parque Nacional Iguazú

(25°42'S, 54°22'W), Puerto Bemberg (25°55'S, 54°37'W), Área Experimental y Reserva Guaraní (26°56'S, 54°13'W), Parque Provincial Caá Yari (26°52'S, 54°13'W), Reserva Privada Itaovy (26°40'S, 54°15'W), Reserva Privada Yaguaroundi (26°42'S, 54°16'W), and Parque Provincial de la Araucaria (26°38'S, 54°07'W). In Chaco, we found nests at Parque Provincial Pampa del Indio (26°16'S, 59°58'W), Parque Nacional Chaco (26°48'S, 59°36'W), and Reserva Natural Educativa Colonia Benítez (27°19'S, 58°57'W). We made occasional observations from the ground, recording noteworthy behaviors and proximity to nests of other species. To describe nest materials and contents, we observed the interior of eight nests of *Ictinia plumbea*: four using a small camera mounted on a telescoping pole, two from cliff tops, one from a ladder, and one by climbing an adjacent tree. Although we did not monitor nests systematically, we considered a nest to have failed if we directly observed predation or if parental activity ceased long before the nestlings could have fledged.

We used the bipartite package (Dormann et al. 2008) in R version 3.2.2 (R Core Team 2015) to construct quantitative interspecific interaction networks of *Pachyramphus* spp. and their nest protectors based on our data from Misiones and Chaco, and Di Giacomo's (2005) observations in Formosa. To construct these three networks, we built matrices comprised of *Pachyramphus* spp. (upper level, in columns) and nest protectors (raptors and wasps; lower level, in rows). Each cell contained the number of interactions between each species pair, i.e., the number of times the two species were found nesting together (0–25 m away, without obstructions to visibility), regardless of whether any other species was also present. We used the bipartite package to calculate Shannon's diversity of interactions for each network.

RESULTS & DISCUSSION

In Misiones, we found 23 nests of *Ictinia plumbea*, 23 nests of *Pachyramphus viridis*, 3 nests of *P. validus*, and 12 nests of *P. castaneus*. In Chaco, we found 21 nests of *I. plumbea*, 19 nests of *P. viridis*, 18 nests of *P. validus*, and 14 nests of *P. polychopterus*.

Nests of *Ictinia plumbea*. We found active nests of *Ictinia plumbea* in Misiones from 24 September (nest under construction in Parque Provincial de la Araucaria in 2008) to 2 February (nest with young nestling in Parque Provincial de la Araucaria in 2005). These observations coincide generally with those of de la Peña (2004, 2013, 2016), who reports extreme dates of 21 September (nest in construction) and 9 February (nestlings) for Misiones. We found active nests in Chaco from 26 September (nest in advanced construction at Parque Nacional Chaco in 2000) to 18 February (nest with nestling close to fledging in Parque Nacional Chaco in 1997). These dates extend the breeding season of *I. plumbea* in the Chaco ecoregion; in the province of Formosa, Argentina, Di

Giacomo (2005) found active nests between 28 October and 1 February.

Nests of *Ictinia plumbea* were generally constructed high above the ground (8–22 m in Misiones; 7–19 m in Chaco) and exposed, in emergent trees, whose crowns did not touch their neighbors, similar to the nest placement described by Skutch (1947) and Seavy et al. (1998). Occasionally nests were somewhat obscured by surrounding epiphytes, as described by Di Giacomo (2005) and de la Peña (2013, 2016).

Kite nests were comprised primarily of sticks. In Misiones, but not in Chaco, most nests were overflowing with abundant green moss and pieces of green vines. In Chaco, the sticks were often covered with lichens, and the nest interior (2 nests) was lined with leaves, *Tillandsia* spp., and grass, coinciding with the descriptions of Di Giacomo (2005) and de la Peña (2013, 2016). The shallow structure of *Ictinia plumbea* nests allowed us to observe, from below, adults and large nestlings. Both sexes contributed to construction, incubation, and nest defense, as described previously (Skutch 1947, Seavy et al. 1998, Di Giacomo 2005).

Interspecific nest associations. At 21 nests of *Ictinia plumbea* (48%) we observed one or more becard nests within 0.3–25 m, with a clear line of sight between nests (Figure 1). We observed *Pachyramphus viridis* and *P. polychopterus* constructing nests beside active nests of *I. plumbea* (e.g., with incubating adults) suggesting that the kites were already there when the becards selected their nest site. The kites always appeared tolerant toward the becards, and did not attempt to chase them away or destroy their nest contents.

In Misiones, the most common nest associate of *Ictinia plumbea* was *Pachyramphus viridis*, which nested 30–150 cm from the kites' nests, sometimes using the same horizontal branch. In one case the nests were so close that whenever a kite left its nest suddenly, it would flush the incubating becard. We observed *P. viridis* adults removing green moss from the rim and interior of nearby nests of *I. plumbea* to use in construction of their own nests. They took advantage of moments when the kites were away from their nest, sometimes taking nest material several times within an hour. This appropriation of nest material may be the inspiration for the Mbyá Guaraní name “the owner of the nest of *I. plumbea*” (*sensu* Cebolla Badie & Krauczuk 2000).

We found two nests of *Pachyramphus castaneus* associated with *Ictinia plumbea* nests in Misiones. In both cases, *P. viridis* nests were also present, 30–100 cm from the kite nests. The nests of *P. castaneus* were 6–12 m from the nests of *I. plumbea* and *P. viridis*, in one case in the same tree and in another case in a neighboring tree. *P. castaneus* has not previously been mentioned nesting in association with raptors, and it appears to do so infrequently (Figure 1).

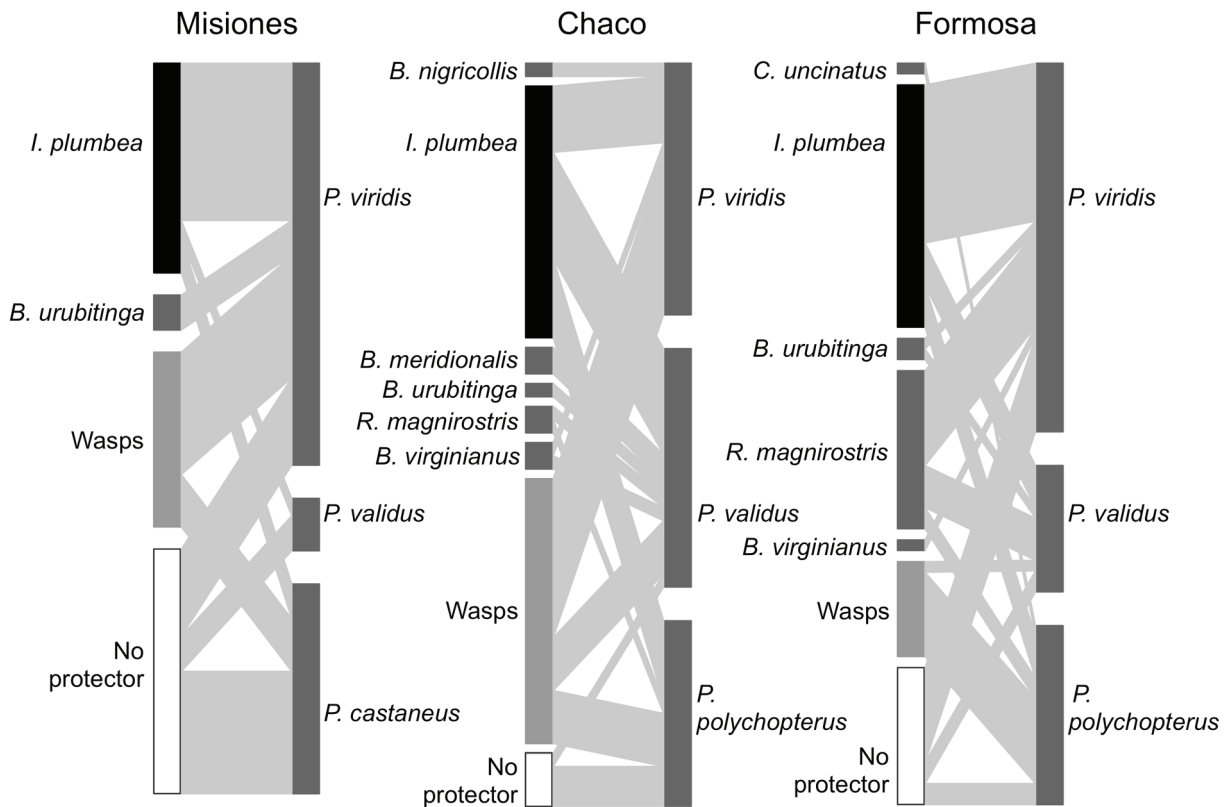


Figure 1. Protective nest association networks involving Plumbeous Kite (*Ictinia plumbea*), other raptors, wasps, and *Pachyramphus* spp., in Misiones (our data: 38 *Pachyramphus* nests), Chaco (our data: 51 *Pachyramphus* nests), and Formosa (data from Di Giacomo 2005; 90 *Pachyramphus* nests), Argentina. Light grey lines indicate links between protector species (left side of each network) and *Pachyramphus* species (right side of each network); their width indicates the number of times a nest association was observed between the two species. Height of each species' box reflects the number of nest associations in which that species was found. White boxes indicate becard nests not found near a raptor or wasp nest; these nests are included for illustrative purposes here, but were excluded from the calculation of Shannon's interaction diversity. Misiones is within the Atlantic Forest ecoregion; Chaco and Formosa are within the Chaco ecoregion. Raptor species: Plumbeous Kite (*Ictinia plumbea*), Great Black Hawk (*Buteogallus urubitinga*), Black-collared Hawk (*Busarellus nigricollis*), Savanna Hawk (*Buteogallus meridionalis*), Roadside Hawk (*Rupornis magnirostris*), Great Horned Owl (*Bubo virginianus*), and Hook-billed Kite (*Chondrohierax uncinatus*).

On many occasions, in both Misiones and Chaco, we observed *Ictinia plumbea* adults chasing potential nest predators and other animals away from the vicinity of their nests, effectively protecting the nearby nests of *Pachyramphus* spp. as well. We saw the following species driven away from *Pachyramphus* spp. nests by *I. plumbea*: *Ramphastos dicolorus*, Chestnut-eared Aracari (*Pteroglossus castanotis*), Saffron Toucanet (*Pteroglossus bailloni*), Plush-crested Jay (*Cyanocorax chrysops*), Roadside Hawk (*Rupornis magnirostris*), Swallow-tailed Kites (*Elanoides forficatus*), and black capuchin monkeys (*Sapajus nigritus*) in Misiones, and Yellow-headed Caracara (*Milvago chimachima*), Great Black Hawk (*Buteogallus urubitinga*), Black-collared Hawk (*Busarellus nigricollis*), Southern Caracara (*Caracara plancus*), Bat Falcon (*Falco ruficularis*), and coatí (*Nasua nasua*) in Chaco. Nesting *I. plumbea* adults have been observed elsewhere in the Neotropics to pursue and/or attack several of the same species (*Elanoides forficatus*, *Rupornis magnirostris*, *Caracara plancus*, and *Falco ruficularis*) as well as Yellow-headed Vulture

(*Cathartes burrovianus*), Savanna Hawk (*Buteogallus meridionalis*), Keel-billed Toucan (*Ramphastos sulfuratus*), White-throated Toucan (*Ramphastos tucanus*), Brown Jay (*Psilorhinus morio*), Black Vulture (*Coragyps atratus*), and Short-tailed Hawk (*Buteo brachyurus*; Skutch 1947, Seavy et al. 1998, Di Giacomo 2005). Additionally, when their nests are low, *I. plumbea* adults sometimes fly at approaching people, whether these are researchers intending to study the nest or casual passers-by (Di Giacomo 2005; de la Peña 2004, 2013, 2016; pers. observ.). Although we frequently saw becards benefitting from the protection offered by *I. plumbea*, rarely have we seen them actively helping to chase off a potential nest predator. In Misiones, we have observed *Pachyramphus viridis* emitting alarm calls when *Ramphastos dicolorus* or *Cyanocorax chrysops* came near their nest, after which *I. plumbea* chased away the predators. On one occasion, in Chaco, AB observed a male *P. viridis* flying at an adult *Milvago chimachima* that was perched in its nest tree, but it did not achieve any success in driving off this intruder until an *I. plumbea*

arrived and chased it away. Thus, if becards contribute to protecting the nest association, it is mostly through alerting the kites, rather than helping to drive off predators.

In Misiones and Chaco, *Ictinia plumbea* was among the most frequent nest-associates of *Pachyramphus* spp.; however, *Pachyramphus* nests were also associated with the nests of many other raptors and wasps, as indicated by Di Giacomo (2005) for Formosa (Figure 1). Across Misiones, Chaco, and Formosa (Di Giacomo 2005), 30% of *Pachyramphus* nests were associated with nests of *I. plumbea* (*P. viridis*: 29%, *P. validus*: 36%, *P. castaneus*: 17%, *P. polychopterus*: 31%), 22% were associated with wasp nests (*P. viridis*: 19%, *P. validus*: 14%, *P. castaneus*: 25%, *P. polychopterus*: 38%), and 17% were found without any apparent protector (*P. viridis*: 14%, *P. validus*: 14%, *P. castaneus*: 58%, *P. polychopterus*: 16%; Figure 1). Because we did not specifically search for *Pachyramphus* nests, many of these nests were discovered precisely because of raptor activity nearby, and we may have overestimated the proportion of *Pachyramphus* nests constructed near raptors.

We found a somewhat lower diversity of nest associations in the Atlantic Forest (Misiones: 1.53) compared to the Chaco ecoregion (Shannon Interaction Diversity: Chaco = 2.20, Formosa = 2.27), mainly resulting from differences in the number of raptor species that participated (Misiones: 2 species, Chaco: 6 species, Formosa: 5 species; Figure 1). Although these differences could be a product of sampling (we found fewer *Pachyramphus* nests in Misiones, and raptor nests may be harder to spot there), it is also possible that becards in Misiones prefer to nest beside *Ictinia plumbea* nests, or that the other raptor species present in Misiones make unsuitable partners for protective nesting associations. It is somewhat surprising that becards chose, as nesting associates, several species of raptors known to depredate passerine nests, including *Buteogallus urubitinga* and *Rupornis magnirostris* (Robinson 1985, Menezes & Marini 2017). Although *I. plumbea* are not known to depredate nests, AB has seen them hunting at large flocks of ca. 60 young (< 3 months post-fledging) Chestnut-vented Conebills (*Conirostrum speciosum*) and Tropical Parulas (*Setophaga pitiayumi*) in the summers of 1998 and 1999 in Parque Nacional Chaco, and CA Ferreyra and MR Gómez (pers. comm.) saw one consuming a fledgling *Cacicus haemorrhous* in spring of 2016 at Parque Provincial Cruce Caballero.

Further complicating the associations among raptors, becards, and wasps, we often found more than two nests in the same tree (e.g., *Ictinia plumbea* with two or three species of *Pachyramphus*). We found at least six nests of *I. plumbea* beside wasp nests, all in the Chaco and all accompanied by one or two becard nests, suggesting that *I. plumbea* adults occasionally take advantage of the protection offered by wasps, as has been reported for Mississippi Kite (*I. mississippiensis*; Parker 1981). In one case, in two adjacent

trees at Parque Provincial Pampa del Indio (Chaco), we found a nest of *I. plumbea*, a wasp nest, a nest of *Pachyramphus validus*, and two nests of *P. polychopterus*. In Chaco, but not in Misiones, we observed Boat-billed Flycatchers (*Megarynchus pitangua*) and Great Kiskadee (*Pitangus sulphuratus*) occasionally joining the interspecific nesting arrangement between raptors, bees, and becards, as described by Di Giacomo (2005) for several species of passerines in Formosa.

***Ictinia plumbea* nest failure.** Although we did not keep track of nest survival, we saw many (> 25) kite nests with feathered nestlings. We confirmed two failures, both of them solitary nests (unaccompanied by becards or any other nesting associate) at Parque Provincial Cruce Caballero. One of these failed nests was found near the park entrance in 2013, and initially contained an egg. Then, parental activity stopped and no nestlings were ever observed. The second nest was found in primary forest, less than 100 m northwest of the camping area, in 2016. Below we describe its depredation by an adult *Ramphastos dicolorus*.

The kite nest was placed in a vertical fork of four thick branches, 21 m above the ground, in an emergent *Anadenanthera colubrina* (Fabaceae). When we found it on 26 November 2016, there was always one adult on the nest, apparently incubating. We noticed the kites at their nest on several occasions between 26 November and 7 December, while we were watching a nest of the Buff-bellied Puffbird (*Notharchus swainsoni*) about 50 m away. During this time, the kites were frequently seen driving off two *Ramphastos dicolorus* adults.

On 7 December at 17:45 h, AB watched a single adult *Ramphastos dicolorus* dive from the highest part of the nest tree toward the crown of a *Peltoporum dubium* (Fabaceae) about 30 m away and closer to the ground. It carried, in its bill, a nestling covered in short white down, with yellow legs, cere, and gape flanges. The nestling still showed signs of life, moving its head and feet. The toucan landed on a thick branch, against which it began to beat the nestling. One of the adult kites arrived at the nest a minute later, but it did not appear to see the toucan, which was now in the midstory, hidden from above by foliage.

For about 8 min the toucan continued to beat the nestling against the branch. The nestling was inert and the toucan made various attempts to swallow it, before carrying it to another part of the same tree, where it was hidden from view. After 2 min of searching, AB found the toucan on a higher branch of the same tree, from which it dropped a part of the nestling, which fell to the ground. It was the lower half of a kite nestling; the toucan had apparently swallowed the head and upper body.

On the following days we did not observe any activity at the kite nest. We surmise that the depredated nestling was the only one in the nest, consider-

ing also that the usual clutch size for this species is a single egg (Skutch 1947, Di Giacomo 2005, de la Peña 2013, 2016; but see Hartert & Venturi 1909).

Our observation appears to be the first to identify a successful nest predator of *Ictinia plumbea*. We suspect that the toucan was able to overcome the kites' vigilance and aggression through persistent visits to the same nest, over various days. Toucans frequently use this strategy, and are the most common nest predators that we have observed in Misiones (Cockle et al. 2016). Conceivably, if becards had been nesting beside this kite nest, their warning calls could have alerted the adult kites to the presence of the toucan, allowing them to save their nestling.

Conclusion. Across two ecoregions of northeastern Argentina, we have shown that adult *Pachyramphus* spp. frequently nested beside the nests of both wasps and raptors, including the highly vigilant *Ictinia plumbea*, which drove away potential nest predators. Although becards might occasionally benefit from robbing nest materials, and kites might benefit from the becards' warning calls, the primary driver of these nesting associations appears to be nest-site selection by becards to reduce the risk of nest predation. We encourage quantitative studies of nest-site selection and nest survival in becards and kites to reveal the behavioral mechanisms, as well as the fitness costs and benefits, of this widespread interspecific nest association.

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