Extended-wing preparation made from a 117- year-old Ivory-billed Woodpecker (Campephilus principalis) specimen

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Extended-wing preparation made from a 117-year-old Ivory-billed Woodpecker (*Campephilus principalis*) specimen.—Despite the many study skins maintained in collections of natural-history museums, skins prepared with wings extended are scarce. Round skins, and to some extent flat skins with partially opened wings, restrict or prohibit the examination of wing surfaces. Extended-wing specimens provide an unobstructed view of shape, color, pattern, and molt on ventral and dorsal surfaces. Characteristics of wing surfaces may be useful in answering taxonomic questions and provide data on wing loading (Spaw 1989). Finally, artists consider extended wings an invaluable resource for accurately depicting form and color.

There are 413 reported Ivory-billed Woodpecker (*Campephilus principalis*) specimens (41 in the American Museum of Natural History [AMNH]) housed among collections of 90 institutions, mostly in North America and Europe (Hahn 1963, Greenway 1967), yet we know of only four extended-wing specimens. In addition to the pelt (*sensu* Merriam-Webster 1994:540) and extended-wing specimen we discuss here, the Academy of Natural Sciences, Philadelphia (ANSP), houses both a flat skin (ANSP 08405) and a life mount (ANSP number not available) with partially spread wings. In Louisiana, Beyer (1900) collected a family group of three and mounted them on the section of tree that housed their nest cavity. They are in the collection of the Louisiana State University Museum of Natural Science (LSUMNS), and one (LSUMZ 60831) is prepared with partially opened wings. Woodpeckers (Picidae) preserved as life mounts are commonly positioned with closed wings, perched on the side of a tree to illustrate their position while foraging, with wing characteristics obscured.

Here, we report the modification of a folded dry pelt of Ivory-billed Woodpecker, following the suggestion (Olson et al. 1987, Dickerman 1989) to maximize the scientific information content, especially of rare bird specimens. The pelt was relaxed; the left wing was removed and extended; and both pelt and wing were pinned, dried, and placed in archival Mylar envelopes.

Materials and methods.—The male specimen we chose for this treatment was collected by Frank M. Chapman on 24 March 1890 in a cypress swamp along the banks of the Suwanee River, Florida, 20 miles north of the Gulf of Mexico (Brewster and Chapman 1891; see also Chapman 1933, Tanner 1942, Hahn 1963, Austin 1967). Chapman (1933) later stated that he never encountered this species again. To the consternation of his field companion, William Brewster (Austin 1967), Chapman removed the skeleton (AMNH 4708) from the specimen and prepared only a folded pelt (AMNH 49569), not a traditional study skin. It is the only skeleton of this taxon in the AMNH collection. Jackson (2004) explained why Chapman might have prepared the specimen this way. According to Jackson, when the photo of Brewster holding the freshly collected specimen (Fig. 1) is enlarged, it appears as if part of the mandible has been damaged by shotgun blast. We examined the skull of this specimen carefully and found that both mandibles are intact and undamaged. Interestingly, Shufeldt (1890), noticing the absence of Ivory-billed Woodpecker skeletons in collections, had suggested to Chapman that he might prepare a skeleton should Chapman obtain a specimen during his Florida expedition.

We photographed the skeleton and pelt for documentation (Fig. 2), then removed the original label from the pelt and placed it in a Mylar envelope for storage. To relax and soften the integument, a humidity chamber with an airtight lid was prepared from a plastic storage container measuring 51 × 35 × 40 cm. The chamber was filled with 2.5 cm of clean, dry play sand. To prevent growth of microorganisms, a 1% solution of phenol (carbolic acid) was used to dampen the sand. We placed a three-sided, plastic-coated wire rack 8 cm above the sand. The entire pelt was arranged dorsal-side-up on the rack, and the lid was secured. The relaxation process was monitored twice daily. The pelt was checked for mold, gently hand-stretched as it softened, and flipped over after each inspection. A daily log was kept of observations and progress. Within 24 h, integument and feathers were moist, and a slight softening of the integument was noticed. In addition to monitoring for mold, we also checked that feathers had not slipped because of overexposure to humidity. After seven days, when the integument reached a point when it was malleable and feathers were still securely embedded, we judged that the specimen was sufficiently relaxed and we removed it from the humidity chamber for the next phase of preparation.

The left wing was severed from the pelt at the shoulder, then extended and pinned on Styrofoam board, with primary slots opened (see Winker 2000). The pelt was then spread and pinned on Styrofoam board. Lastly, the wing and pelt were dried under a small fan at low speed for 10 days. We note that at some point during previous handling, before our preparation, the tail had become detached from the

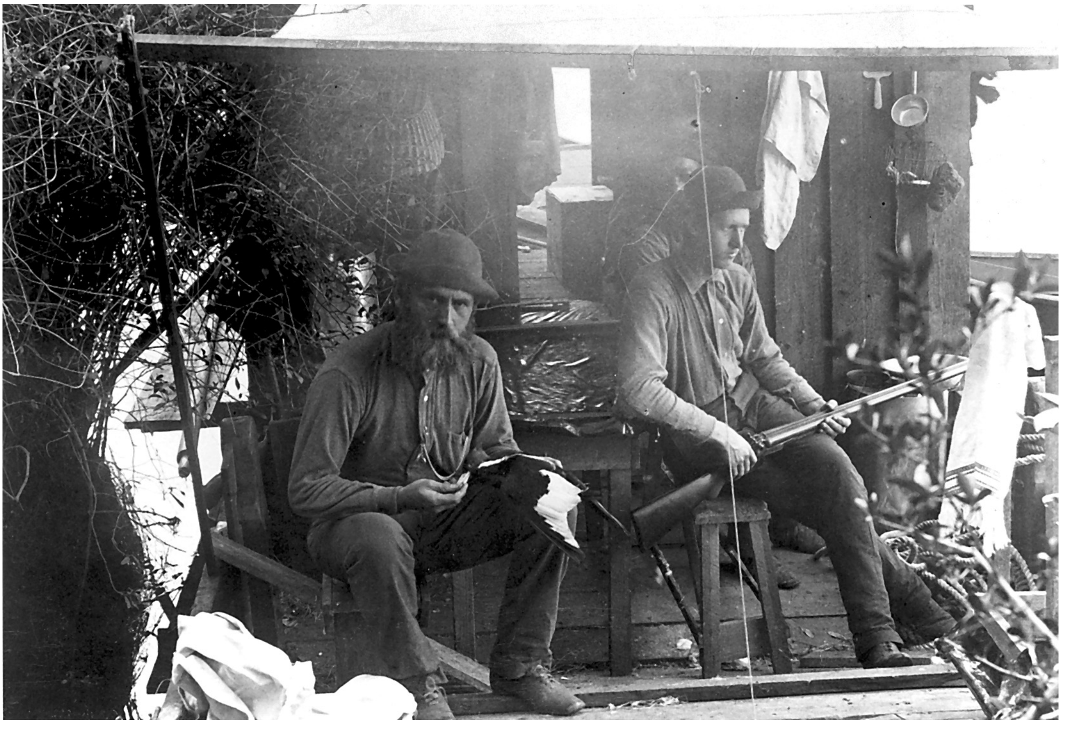

Fig. 1. William Brewster holding the Ivory-billed Woodpecker collected by Frank M. Chapman on their 1890 expedition to Florida. Courtesy of Ernst Mayr Library Archives, Museum of Comparative Zoology, Harvard University.

body at its base but had remained associated with the specimen. Thus, before pinning the pelt, we stitched the tail to it with waxed thread. The original label was encapsulated in Mylar and fastened onto the head of the pelt. A new label, bearing the identical number (AMNH 49569) and data as the pelt, was attached to the extended wing. A cross-reference to the skeleton was noted on both labels, and the original entry regarding this specimen in the museum's catalogues was updated. Two Mylar envelopes measuring 41 × 22.5 cm and 31 × 23.5 cm were constructed to store the wing and pelt separately (Fig. 3).

Description of specimen.—Unlike most modern spread-wing specimen preparations, Chapman's removal of wing bones created an unstable region between the primaries and secondaries along the wing's leading edge. The normal complement of 10 primaries, including the foreshortened (Short 1982) primary (P10), and 10 secondaries, however, remained intact. The wing measures 260 mm in length from point of origin to longest primary (P6) and 170 mm in width from the alular feathers to the tip of the first secondary (S1). We caution that mensural characters in such an unstable wing preparation may be subject to distortion as a result of original and subsequent manipulations. The wing is somewhat rounded. Dorsally, P5 to P10 are uniformly dark in color, whereas P1 to P4 have varying degrees of white distally (Figs. 3 and 4). All 10 secondaries are dark to the midpoint, from which they become white distally (Figs. 3 and 4). Two white tertials are present. All white portions of the feathers show slight discoloration.

We believe that this specimen is an adult on the basis of its acutely pointed mandibles (Jackson 2004). The fresh, velvety, bluish-black lesser secondary coverts, in contrast to brownish, faded, worn primaries, secondaries, and remaining coverts, suggest partial molt. Faint horizontal striations, or growth bars (Michener and Michener 1938, Grubb 1989), are sparsely distributed among multiple feathers over several feather tracts. The alular feathers are fresh but otherwise unremarkable. Ventrally, P5 to P10 are dark overall, whereas P1 to P4 are dark proximally, with varying degrees of white distally (Fig. 4). All 10 secondaries are dark to the midpoint, from which they become white distally; underwing coverts are entirely white (Fig. 4).

Conclusion.—The preparation of a skeleton, pelt, and extended-wing specimen gleaned from an Ivory-billed Woodpecker collected 117 years ago increases its already high scientific value. The availability of such an extended-wing specimen, showing the characteristic Ivory-billed Woodpecker wing

Fig. 2. Skeleton (AMNH 4708) and flat, folded dry pelt (AMNH 49569) of male Ivory-billed Woodpecker collected by Frank M. Chapman in Florida on 24 March 1890. Notice detached tail. Photograph by Shannon P. Kenney and Jeff Groth (AMNH).

pattern, also allows for comparative study among members of Picidae, such as the sympatric Pileated Woodpecker (*Dryocopus pileatus*; Fig. 4).

Acknowledgments.—We thank S. C. Quinn (AMNH) for his advice regarding procedures used to relax dried study skins. C. Chesek and J. Groth (AMNH) kindly prepared photos for this piece. H. Meng (State University of New York, New Paltz) generously loaned us extended-wing specimens of Pileated Woodpecker. We are grateful to D. Fisher and the staff of the Ernst Mayr Library, Museum of Comparative Zoology, Harvard University, for allowing us to reproduce a photo from their archives. For reviewing and commenting on various drafts of the manuscript, we extend our gratitude to D. D. Gibson, D. S. Künstler, K. Winker, and C. A. Young. For extensive review of the manuscript, we are indebted to F. Vuilleumier (AMNH). B. R. Harrison (Oakwood College, Huntsville, Alabama) kindly provided us with a key article. Thanks go to S. W. Cardiff (LSUMNS) for providing specimen label data, to N. Rice (ANSP) for sending data and a photograph of an Ivory-billed Woodpecker from the ANSP collection, and to the Patricia Stryker Joseph Fund (AMNH) for making the publication of color plates possible.—Peter Capainolo, *Division of Vertebrate Zoology, Department of Ornithology, American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024, USA, and Department of Biology, The City College of The City University of New York, Marshak Science Building, Room J-526, Convent Avenue at 138th Street, New York, New York, 10031, USA (e-mail: pcap@amnh.org);* Shannon P. Kenney, *Division of Vertebrate Zoology, Department of Ornithology, American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024, USA;* and Paul R. Sweet, *Division of Vertebrate Zoology, Department of Ornithology, American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024, USA.*

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Fig. 3. Detached, extended wing and relaxed pelt of Chapman's Ivory-billed Woodpecker specimen in protective Mylar envelopes. Notice reattached tail. Photograph by Craig Chesek (AMNH).

Fig. 4. Dorsal (left) and ventral (right) surfaces of left wing of male Ivory-billed Woodpecker (above) and Pileated Woodpecker (below). Photograph by Craig Chesek (AMNH).

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Spelling, authorship, and date of the name of the Pacific Eider (*Somateria mollissima v-nigrum*).—The name "*v-nigra* Gray, 1856" is commonly used in most recent comprehensive works for the Pacific Eider, a subspecies of the Common Eider (*Somateria mollissima*) that ranges from eastern Siberia to northwestern North America (Johnsgard 1979, Carboneras 1992, Dickinson 2003). The modified spelling "*v-nigrum* Gray, 1856" is used by the American Ornithologists' Union (AOU 1998) and Goudie et al. (2000).

Bruce and McAllan (1990), however, have shown (see also International Commission of Zoological Nomenclature [ICZN] 2003) that Gray's (1856) *v-nigra* is the most junior of the four names established for the taxon within a span of less than four months; they listed: (1) *Somateria v. nigrum* Bonaparte, "not earlier than Oct. 22," 1855, *Comptes Rendus de l' Academie des Sciences, Paris* 41:665 ["665" was an error for 661]; (2) *S*[*omateria*]. *V. nigram* Gray, 1 December 1855, *The Athenaeum* 1466:1404; (3) *Somateria V. nigrum* Gray, 22 December 1855, *The Literary Gazette* 2031:819; and (4) *Somateria V-nigra* Gray, 5 February 1856, *Proceedings of the Zoological Society, London* [PZS] 1855:212.

It is apparent that Gray's communication at a meeting of the Zoological Society of London on 27 November 1855 was reported in three different British periodicals (with three different spellings). Gray had discussed details of his proposed new species with Bonaparte during the latter's visit to the British Museum earlier in 1855 and, as a consequence, Bonaparte's (1855) report antedated all the published accounts of Gray's communication to the Zoological Society.

For the next 100 years, however, Bonaparte's name went unreported in print inasmuch as it is buried at the very end of a paper where he made extensive comments on Gray's newly published *Catalogue of Genera and Subgenera* (Gray 1855). Although numerous earlier works covering the history of the name and its authorship (invariably Gray) could be cited, we are mostly concerned here with confusion in recent usage. The name of the Pacific Eider was thus cited from Gray (1855 or 1856, in PZS), either verbatim (as *v-nigra* or *V-nigra*) or modified to "*v-nigrum*" (e.g., Salvadori 1895, AOU 1931, Peters 1931, Hellmayr and Conover 1948a, Dement'ev and Gladkov 1967, Livezey 1995). Moreover, Bonaparte (1856) later contributed to the oversight of his senior name by using "*v. nigrum* Gr." This subsequent action also demonstrates that Bonaparte was not trying to pre-empt Gray's name, but it merely happened to appear first in his report to the French Academy of Sciences in Paris.

The name "*v. nigrum* Bonaparte, 1855" has priority and is not an unused senior synonym after 1899 (ICZN 1999, art. 23.9.1). AOU (1955) announced that "*Somateria mollissima v-nigra* Gray, 1856 is to be listed as *Somateria mollissima v. nigra* Bonaparte, from *Somateria v. nigrum* Bonaparte, Comptes Rendus Acad. Sci. (Paris), vol. 41, no. 17 (not earlier than Oct. 22), 1855, p. 661"; the name was carried by AOU (1957) and further corrected to "*v-nigra*" by AOU (1973). It is obvious that the proposed change was founded on the then unpublished annotations contained in "Richmond's Index," given that AOU (1955, 1957) repeat the exact wording used by Richmond (1992) (*fide* A. P. Peterson). This explains why later works, such as Johnsgard (1975), Palmer (1976), and Godfrey (1986), used "*v-nigra* Bonaparte." In addition, Vaurie (1965) cited Bonaparte's "*v. nigrum*" and used "*v.* [-] *nigrum*," and Cramp and Simmons (1977), as well as Stepanyan (1975, 2003), also used "*v-nigrum* Bonaparte." However, Johnsgard (1979) used "*v-nigra* Gray 1856," with the result that this citation in such an influential work has caused some confusion, but we have failed to find a published justification for the subsequent reuse of Gray's name. Perhaps this action was based on Delacour (1959, the standard work on waterfowl at the time), who cited Gray, presumably following Peters (1931).

Furthermore, the results of our research demonstrate that the publication date of Bonaparte's *v. nigrum* is actually 29 October 1855, a date that still awards it seniority. We also have concluded that authorship must be attributed to Bonaparte and Gray.

The date given by AOU (1955, 1957) of "not earlier than" 22 October 1855 is based on the weekly meetings of the *Académie des Sciences* at which Bonaparte's paper was read. The 26 individual *Compte rendu* (note the singular) of a semester make up the *Comptes rendus* (note the plural) that forms a tome, as indicated by its general title. The head page of each individual *Compte rendu* bears at the bottom an identifier, and that of the meeting of 22 October 1855 (p. 613) is "C. R., 1855, 2^{me} Semestre (T. XLI, No 17.)." In the *Compte rendu* of the meeting held 29 October 1855, the *Académie* (p. 729) acknowledges the receipt of recent publications, the first of which is the *Compte rendu* labeled "2^{e} semestre 1855; n^{o} 17; in-4^{o}." This information clearly establishes that 29 October 1855 is "the earliest day on which the work is demonstrated to be in existence" (ICZN, 1999, arts. 21.3, 21.5). Accordingly, by accepting this method of dating parts of this journal, which is not a new approach (cf. Richmond 1917), other names may be affected, and a more detailed review is needed of all of Bonaparte's works from this source in the 1850s.

In the case of the paper in question here, Bonaparte (1855) established several other new names in addition to *v. nigrum*, including "*Ninox jardinii,* Bp." (p. 654), "*Ninox theomacha,* Bp." (p. 654) and "Ma *Ninox philippensis,* que je n'ai jamais décrite…[My *Ninox philippensis,* that I have not yet described…]" (p. 655). Bonaparte (p. 660) also related that he obtained details of a new snipe from Jardine while visiting him in Edinburgh, Scotland, and stated that they agreed to name it "*Xylocota jamesoni,* Jard. et Bp.," but although this proposed co-authorship by Bonaparte is listed in quotation marks in major works, the subsequent treatment of authorship was attributed to Bonaparte alone (cf. Peters 1934, Hellmayr and Conover 1948b). We propose that the original co-authorship as provided by Bonaparte should be reinstated.

As for *v. nigrum,* the text devoted to it reads, as translated from the French:

> Mr. Hardy of Dieppe had brought to my attention an eider of his collection that showed under the chin the characteristic mark of *Somateria spectabilis.* But it was an immature or perhaps even an hybrid!...Very recently in London, in the custody of Mr. Gray, I saw several adult specimens that prove that it belongs to a distinct species. The species inhabits the borealmost parts of America, where before being collected it was sketched from nature through the telescope, with a different duck that escaped capture. I agree with Mr. Gray [that it is a distinct species], and like Linnaeus who has named a butterfly in the same manner, we have named it *Somateria v. nigrum.*

We read then that Bonaparte stated that he agreed with Gray that the material at the British Museum, London, under Gray's custody, represented a new species, and that they were naming it "*Somateria v. nigrum*."

Because the *Comptes rendus* are minutes of meetings, including lengthy papers that were read at the meetings, we therefore recognize that the "person responsible for the name" (ICZN 1999: art. 50.2) encompasses both Bonaparte and Gray as authors of *v. nigrum.* In choosing this combination for co-authorship, rather than "Gray and Bonaparte," we acknowledge that this does not accord with Bonaparte's evident preference, as given for the name of the snipe, but we also note that "we have named it" (p. 661) is as explicit as "My *Ninox philippensis*" (p. 655). Bonaparte did not specify his preference for *v. nigrum* and, thus, Bonaparte, as author of the paper, is the senior author of the name. It could be argued that authorship should be Bonaparte's alone; however, this is an unusual case, in that both authors are associated with the name, as opposed to the more common situation of a new name merely being cited as a previous manuscript name, such as that provided by a collector or a museum worker.

The original spelling, "*v. nigrum* Bonaparte and Gray, 1855," must be corrected to "*v-nigrum*" (ICZN 1999: art. 32.5.2.4.3), and its ending must not be changed to agree in gender with the generic name, because it is a compound noun (arts. 31.2.1, 34.2.1).

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"Kleptoptily": How the Fork-tailed Palm-Swift Feathers Its Nest.—Birds use a remarkable variety of materials in constructing their nests and almost always employ materials readily available near the nest site. Many species include insulative feathers in the nest lining to improve energy budgets of adults and young (Møller 1991, Winkler 1993, Lombardo et al. 1995). Among the species that incorporate large numbers of feathers in nests is the Fork-tailed Palm-Swift (*Tachornis squamata*; hereafter "palm-swift") of tropical South America, which uses "fresh body feathers…of middle-sized birds, especially pigeons" (Sick 1948:170), supposedly collected as airborne detritus (Carvalho 1962, Collias and Collias 1984, Chantler 1999). Made of feathers and a small amount of plant matter, the nest is glued with the bird's saliva to the inside of dead, folded, pendant leaves of the widespread palm *Mauritia flexuosa* (Sick 1948) or, in far northeastern Brazil where *M. flexuosa* is absent, the palm *Copernicia prunifera* (B. M. Whitney pers. obs.). Although palm-swifts have a closely corresponding, wide distribution, few nests have been examined, because these palms tend to grow in swamps and it is difficult to inspect the hanging leaves. Carvalho (1962) provided detailed descriptions of nesting behaviors and chick development of palm-swifts based on observations of several nests constructed on the undersides of live leaves of the palm *Livistona chinensis* in the city of Belém, Pará, Brazil. This palm is exotic in the New World, but possesses leaves morphologically similar to those of the above-mentioned, native palms.

In September 1995, I found two palm-swift nests in a pile of dead *M. flexuosa* leaves gathered on the grounds of the Tropical Hotel in Manaus, Amazonas, Brazil, and noted that, as had been reported (Sick 1948, Carvalho 1962), they were made mostly of contour feathers of several other species of birds. The palm-swift is airborne during most of its life, alighting only inside palm leaves to roost and nest, and it never travels far from palm groves. This led me to wonder how the birds could possibly gather such a large number of small feathers in a circumscribed area. A few hours of observation revealed the answer: palm-swifts attack other species of birds flying near palm groves, forcibly ripping feathers from their backs (see Fig. 1). Across the palm-swift's extensive range, its modus operandi appears to be well ingrained: on calm mornings (but also at other times of day), palm-swifts attain heights, often in excess of ~100 m, near their palm grove and circle, waiting. When birds from the size of piping-guans to that of pigeons come by in level flight, or even some smaller species with undulating flight (e.g., some parrots, woodpeckers, flycatchers, and thrushes), the palm-swifts rapidly stoop from above and behind, sometimes in tandem, striking their victim in the middle of the back and tugging at feathers with the bill for about 1–3 s to dislodge a mouthful; the legs are used only to help stabilize the attack. The birds may then play with feathers, allowing some to float free to be picked up in a subsequent pass, or carry them directly to nest sites. Most of the victims react only slightly, but some individuals, perhaps those with prior experience and most small birds, initiate evasive flight behaviors at the first stoop of the palm-swifts or quickly dive to hide in trees.

Most of the attacks I have observed were directed at parrots and pigeons. Two nests I examined near Presidente Figueiredo, Amazonas, Brazil, consisted almost entirely of contour feathers of Dusky Parrots (*Pionus fuscus*) and pigeons (*Patagioenas* spp.), and all other nests described to date have contained feathers mostly from these two families of birds. Pigeons and ground-doves must make especially difficult, perhaps even dangerous, targets for palm-swifts, because they are some of the fastest flyers among Neotropical birds and also roll erratically in the course of flight. Taking feathers from most parrots, on the other hand, is probably relatively uncomplicated, because parrots fly more slowly than most other above-canopy Neotropical birds, and the larger species, in particular, have less erratic flight trajectories and wing movements. Several species of Amazonian columbids, psittacids, and icterids (especially oropendolas) form large evening roosts, commuting in straight-line flight-paths twice daily, with many individuals regularly passing groves of *M. flexuosa*, where they present dependable feather sources for palm-swifts.

The piratic behavior of palm-swifts probably evolved as the most efficient means of predictably obtaining insulative material that increased survivorship of naked nestlings; selective pressure certainly would have been heightened during glacial epochs and is maintained today in southern and central Amazonia by regular austral cold fronts that last for several days. It is noteworthy that the tent-like, pendant leaves of palms that are the exclusive nest sites of palm-swifts are perhaps the most exposed to the elements (especially cold and wind) of any apodine nest sites worldwide (others being inside caves, rock crevices, hollow trunks, chimneys, buildings, elaborate tubes of plant material, etc.). These pendant palm leaves offer the overwhelming advantage,

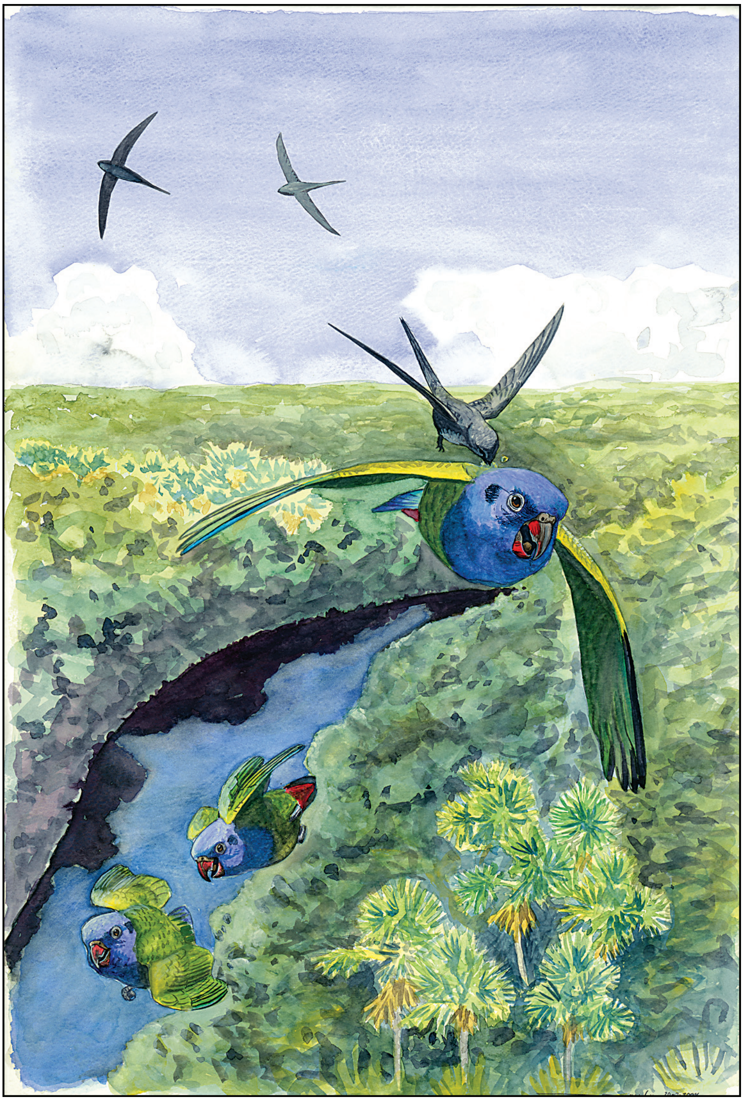

Fig. 1. A Fork-tailed Palm-Swift attacks Blue-headed Parrots (*Pionus menstruus*). Painting by Daniel F. Lane.

however, of being practically inaccessible to vertebrate predators, including primates and snakes. Construction of nests inside these dead palm leaves may have required the use of ultra-lightweight, flexible material with high insulative properties that could be structured with saliva. Feathers from other birds, especially those of pigeons and parrots, emerged as the evolutionarily ideal resource for these fast-flying, agile swifts. Indeed, many apodine swifts, in their very narrow wings and long, forked tails appear to be built for aerial piracy, which is remarkably convergent with frigatebirds (*Fregata* spp.; Thomas and Balmford 1995), which obtain a fair amount of their food by chasing and out-maneuvering other birds.

The fact that it takes a pair of palm-swifts one to three months to construct a nest (Carvalho 1962) is probably a corollary of the time it takes to pirate a sufficient number of individual feathers from other birds; only small amounts of plant material have been reported from any nest. Having observed palm-swifts attacking ~50 species of birds representing 21 families (Table 1), including characteristically aggressive kingbirds (*Tyrannus* spp.), I expect that almost any bird flying by can become an unwilling feather donor. I have never observed an attack on a perched bird.

Other reports of birds taking feathers for their nests from the bodies of other, live birds involve

Table 1. Species of birds attacked by Fork-tailed Palm-Swifts attempting to collect feathers for nest construction.

Ardeidae	**Cuculidae**
Striated Heron (*Butorides striata*)	Squirrel Cuckoo (*Piaya cayana*)
Anatidae	**Caprimulgidae**
White-faced Whistling-Duck (*Dendrocygna viduata*)	Nacunda Nighthawk (*Podager nacunda*)
Cathartidae	**Alcedinidae**
Turkey Vulture (*Cathartes aura*)	Ringed Kingfisher (*Megaceryle torquata*)
Accipitridae	**Ramphastidae**
Crane Hawk (*Geranospiza caerulescens*)	Chestnut-eared Aracari (*Pteroglossus castanotis*)
Savanna Hawk (*Buteogallus meridionalis*)	Toco Toucan (*Ramphastos toco*)
Roadside Hawk (*Buteo magnirostris*)	**Picidae**
Falconidae	*Celeus* sp. woodpecker
Yellow-headed Caracara (*Milvago chimachima*)	Crimson-crested Woodpecker (*Campephilus melanoleucos*)
Aplomado Falcon (*Falco femoralis*)	**Furnariidae**
Cracidae	Long-billed Woodcreeper (*Nasica longirostris*)
Blue-throated Piping-Guan (*Pipile cumanensis*)	Woodcreeper sp.
Charadriidae	**Cotingidae**
Southern Lapwing (*Vanellus chilensis*)	Bare-necked Fruitcrow (*Gymnoderus foetidus*)
Laridae	Amazonian Umbrellabird (*Cephalopterus ornatus*)
Large-billed Tern (*Phaetusa simplex*)	**Tyrannidae**
Columbidae	*Myiarchus* sp. flycatcher
Rock Pigeon (*Columba livia*)	Boat-billed Flycatcher (*Megarynchus pitangua*)
Scaled Pigeon (*Patagioenas speciosa*)	Variegated Flycatcher (*Empidonomus varius*)
Picazuro Pigeon (*P. picazuro*)	White-throated Kingbird (*Tyrannus albogularis*)
Pale-vented Pigeon (*P. cayennensis*)	Tropical Kingbird (*T. melancholicus*)
Ruddy Pigeon (*P. subvinacea*)	Fork-tailed Flycatcher (*T. savana*)
Ruddy Ground-Dove (*Columbina talpacoti*)	*Pachyramphus* sp. becard
White-tipped Dove (*Leptotila verreauxi*)	*Tityra* sp. tityra
Psittacidae	**Turdidae**
Blue-and-yellow Macaw (*Ara ararauna*)	*Turdus* sp. thrush
Red-bellied Macaw (*Orthopsittaca manilata*)	**Corvidae**
Peach-fronted Parakeet (*Aratinga aurea*)	Violaceous Jay (*Cyanocorax violaceus*)
Yellow-chevroned Parakeet (*Brotogeris chiriri*)	**Icteridae**
Blue-headed Parrot (*Pionus menstruus*)	Yellow-rumped Cacique (*Cacicus cela*)
Dusky Parrot (*P. fuscus*)	Crested Oropendola (*Psarocolius decumanus*)
Blue-fronted Parrot (*Amazona aestiva*)	Green Oropendola (*P. viridis*)
Orange-winged Parrot (*A. amazonica*)	
Mealy Parrot (*A. farinosa*)	

House Sparrows (*Passer domesticus*) plucking feathers from doves and other birds in cities (Summers-Smith 1963, Stidolph 1974, Leruth 1984, Bell 1994); these are probably opportunistic endeavors by this notoriously adaptive species. Similarly, diverse species of birds, not including swifts, have been observed taking hairs from live mammals, even humans, for nest material (e.g., Bent 1946, Goertz 1962, George 1985, Cody 1991). The palm-swift, however, has evolved a highly efficient strategy and procedure for harvesting feathers of other species of birds as a reliable source of nest insulation. It is to be expected that palm-swifts would also take advantage of any easy source of suitable, windblown feathers (e.g., preening birds dislodging some feathers, raptors tearing apart avian prey as suggested by Carvalho [1962], etc.).

Feather thievery from live birds as practiced by palm-swifts, which I term "kleptoptily," is a novel form of kleptoparasitism. In birds, kleptoparasitism has heretofore been limited to piracy of resources such as food (Campbell and Lack 1985) or, in the well-known case of Piratic Flycatcher (*Legatus leucophaius*), finished nests of other birds. I predict that the closest Neotropical relatives of *T. squamata*, and other species of swifts around the world, especially those with forked tails that construct nests containing feathers, such as the widespread African Palm-Swift (*Cypsiurus parvus*), Asian Palm-Swift (*C. balasiensis*), and other apodines, will soon be exposed as proficient kleptoptilists as well. For example, a report of two Alpine Swifts (*Tachymarptis melba*) attacking a Rock Dove (*Columba livia*), one on the back and one on the belly, and riding it to the ground ("causing the pigeon serious injury"), was interpreted as simple aggression (Chantler 1999) but was perhaps more likely a dramatic instance of kleptoptily.

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