Flight behaviour and other field characteristics of the genera of Neotropical parrots

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Introduction

Parrots are among the most conspicuous of all birds in Neotropical habitats, but they are also among the most difficult to identify and census. This is particularly unfortunate, because few groups of Neotropical birds have been persecuted as selectively and intensively as have the parrots (see Collar, this issue). In many seasonally dry localities and even in some regions of Amazonia and the Atlantic Forest, large species like macaws and *Amazona* parrots that were until recently common have been completely or virtually extirpated by the relentless efforts of highly skilled trappers, who cut down nest trees (a scarce and highly limiting resource) to remove adults and, especially, young birds. The story is by now familiar: the birds are eventually smuggled to consumers (both domestic and international), with a horrible loss of starved, drugged, and injured birds along the way. Legitimately but nonetheless selectively, macaws and larger parrots are hunted by indigenous peoples in vast areas of Amazonia for meat and ornamental feathers. Despite legislation and increased governmental action to the contrary, these activities continue, albeit at somewhat lower intensity than, say, 20 years ago. Today, however, the list of endangered species among Neotropical bird families (as treated in Collar *et al.*[1]) is headed both proportionately and absolutely by parrots.

There is an urgent need to gather baseline data on the habitat requirements and poorly understood seasonal movements of not only the "threatened species" of parrots, but also the many rare, little-known, and highly localised species and "subspecies" scattered over the Neotropical realm. Over the past 80 years or so, a great deal of valuable information has been gathered from the documentary collections and published work of investigators of Neotropical parrots. In the coming decade we should increase research efforts in the field, as this is the only source of data on the current status of these vanishing species, and really all other birds. It is a question of continuous monitoring, forethought, and action.

This paper has two objectives: to identify from a field perspective the distinguishing visual features and behavioural characteristics of the 120+ species of New World parrots to genus level, and to introduce an important new conservation tool from the Library of Natural Sounds at the Cornell Laboratory of Ornithology, *Voices of the New World parrots*, which presents typical flight and perched vocalisations for almost all of the species and many of the subspecies of Neotropical parrots (available mid-1996). With the publication of *Voices of the New World parrots*, which will be accompanied by this and additional text, comes the opportunity to learn to recognise these birds in the field, and to confirm tentative or doubtful identifications, in a fraction of the time that otherwise would be required. The development of field identification skills across a broad front of observers will greatly advance our collective ability to accurately census parrot populations in many key areas of their distributions.

In spite of all their conspicuous attributes, many parrots are, for a variety of reasons, particularly challenging to identify in the field. They are difficult to observe clearly as they fly over or through the canopy, especially if lighting conditions are not good, and often show the observer little more than a passing, apparently featureless flock or a flapping, screaming silhouette going the other direction as fast as it can. The majority of species are relatively quiet or silent and very well camouflaged when perched in the crown of a leafy, green tree, where shapes and plumage features that are obvious in flight may be entirely hidden from view or hard to see against the sky. Complicating matters further, those vocalisations that are given while perched are often quite different from those delivered in flight. Thus, the observer is faced with learning the various habits and vocalisations of this diverse group of birds two times over! Learning to identify and census parrots requires lots of time in the field, preferably in a variety of localities, and careful attention to distinguishing their voices. Fortunately, loud, species-specific vocalisations are given frequently by most par-

rots, consistently early in the morning and around evening roosts, and when suddenly flushed. Especially in the early stages of investigation, of course, identifications should be visually confirmed as often as possible. The key, in these early stages, is to become familiar with the genera of parrots, by sight and by sound, as if they were your best friends.

The baseline effort directed at conservation of natural resources can have its greatest impact when it stems from local roots. This is easy to say, but complicated in practice not by any shortage of enthusiasm but by a lack of conservation-focused education and of appropriate equipment. With regard to the narrow subject of identifying and assessing the status of Neotropical parrots, the reality is that the overwhelming majority of observers resident in Neotropical countries who want to learn to identify these birds in the field and who are uniquely able to talk to landowners and other parties about local factors, own no or only poor-quality binoculars, and no sound-recording equipment. With this in mind, I have written the following genus diagnoses for the unaided eye.

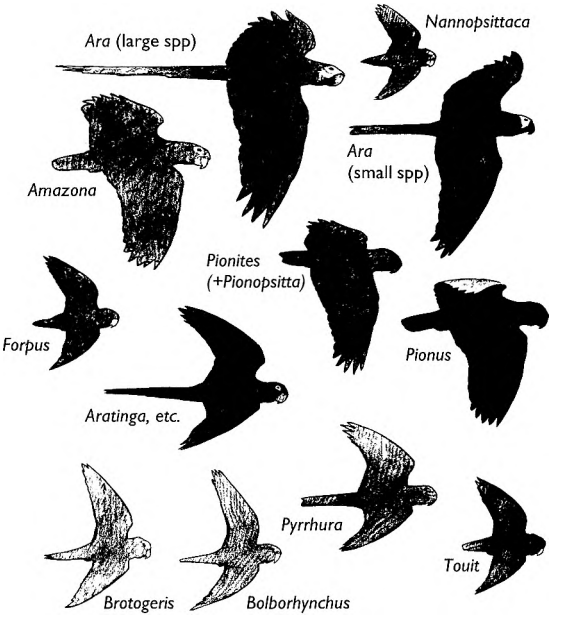
Flight behaviour: a ground-level approach

Parrots are great flyers and, like raptors and swifts, are more often observed in flight than perched. Unlike these other groups, however, parrots do not soar around giving the observer hope of seeing something helpful for identification. Rather, they come blasting over at inopportune moments, raising shouts of panic among the birders below as they scramble to catch a glimpse through the canopy. And then they are gone, leaving the birders either speechless, celebratory, or fighting over bumped heads and conflicting eye-witness accounts (fortunately, someone got the whole thing on tape – right?). Few experiences have such equal potential to make or ruin a morning of tropical birding. So, in an attempt to increase the proportion of celebrations to fights, I present below some basic clues that, if noted in the field, will at the very least allow you to argue persuasively with your friends, and perhaps come to agreement the next time psittacid screams signal an "in-coming". In the genus accounts that follow, all described flight behaviours assume calm conditions (i.e. no strong wind). Terms I frequently use for specific flight behaviours or movements are:

- **wing beat(s)**: a complete up- and down-stroke of the wing, shallow or deep; almost no species elevate the wings above the plane of the back.
- **appression**: the usually partial closure of the wing against the body on the down-stroke, producing a pause in wing beats.
- **undulation**: the variable, roller-coaster-like, up-and-down line of flight caused by momentary appression of the wings.
- **roll**: the tipping of the orientation of the plane of the back with respect to the horizon without lateral movement of the body. Rolls may be **smooth** (over the course of several wing beats), **rapid** (almost instantaneous), **erratic** (irregular or "jerky"), **shallow** (less than about 30°), or **deep** (greater than about 30°). Rolling is often exaggerated when parrots are flushed, and is easiest to judge when birds are flying directly toward or away from you.
- Flight is described as **steady** and **direct** (straight trajectory), or **weaving** (regular, appreciable lateral movement; few species), with or without undulation.
- **Commuters** are birds travelling long distance, such as to and from roosts or widely separated foraging stations. When commuting, most parrots fly somewhat higher than at other times, tend to roll less often, and may be less vocal than when performing shorter flights. Vocalising individuals and flocks are more dynamic in their

Flight silhouettes of some New World parrot genera (Larry McQueen)

Relative sizes approximate



movements than quiet commuters, performing generally more rolls and interactive chases. Parrots mate for life, and travel is mostly in pairs, which means that flocks tend to be even-numbered.

Taxonomy: an "in-life" perspective

Taxonomy and number of species generally follow Sibley & Monroe[5,6]. However, I believe it is informative from an identification and conservation perspective to treat certain discrete groups that are unambiguous in life (i.e. in the field) as separate entities. I favour treating such "in-life groups" as genera because this highlights diversity and facilitates communication among field workers and other scientists, and because I predict that the conservative number of such groups that I identify will generally prove to be monophyletic. In this paper, I recommend resurrection of some previously synonymised but seemingly appropriate generic names (mostly for some macaws), and identify some discrete groups within several currently recognised genera. Interpretation, from biochemical evidence, of how closely related members of "in-life groups" are, and whether or not to recognise them at the generic level, is a subject for future study and philosophical consideration (recognising that the genus is a rather arbitrary grouping), but in any case does not alter the utility of the discriminatory field characters I present here. On the other hand, it should be noted that certain genera of longstanding, especially some of the *Aratinga*-like genera, were described based on diagnostic characters not apparent under field conditions, or which do not appreciably affect field identification at the genus level. In the accounts below, the number of species in each genus is enclosed in brackets.

Macaws: *Anodorhynchus* (2); *Cyanopsitta* (1); *Ara* (13)

The two relictual, extant species in *Anodorhynchus* (*hyacinthinus*, Hyacinth Macaw; and *leari*, Indigo or Lear's Macaw) are large and uniformly dark (appearing blue or black, depending on the light), with rather pointed wings and very long tails. The monotypic *Cyanopsitta* (*spixii*; Little Blue or Spix's Macaw), now represented in the wild by a single individual and a released captive, is like *Anodorhynchus* in shape and in its generally blue colour but is much smaller, pale-headed, and paler below; the tail is strongly graduated and significantly longer than illustrated in Forshaw[2]. See Collar *et al.*[1] for a summary of ecological and conservation information for these species.

There is tremendous size variation among the 13 species currently included in *Ara*. Seven species are large with long, strongly graduated, pointed tails. There are five "medium-sized" species of macaws (*severa*, Chestnut-fronted; *manilata*, Red-bellied; *couloni*, Blue-headed; *maracana*, Blue-winged; and *auricollis* Yellow-collared), and a single small species (*nobilis*, Red-shouldered). Flight of all macaws, especially the larger species, is above the canopy, ranging from low to very high, with slow, steady wing beats, generally without gliding until near the destination. The smaller species have faster wing beats (for *nobilis*, the same as the large species of *Aratinga*) and tend to roll more frequently and deeply. Macaws travel in pairs, trios (with one offspring), or quartets (two offspring), and in groups of multiple pairs, with seldom more than about 20 individuals in a single group; evening roosts and riverine clay licks ("collpas") attract concentrations. They may or may not be vocal in flight, but are most consistently vocal early and late in the day, giving repeated loud, harsh screams occasionally varied to more garbled, musical "conversation". Macaws are generally quiet while feeding (dropping fruit husks and pieces may reveal their presence), but are sometimes very noisy while perched.

The vocalisations of the large *Ara* macaws in particular are quite similar and require much practice on a site-by-site basis to separate in the field, especially in the vast region in which three species occur together; it is best to confirm aural identifications by actually seeing the vocalising birds whenever possible. Even visual identification can be problematic. For just one example, the distinctly blue-and-yellow *ararauna* can, at a distance and against the light (a common set of circumstances, exacerbated by the use of dirty or low-quality binoculars, also a frequent condition), appear so dark that the mind perceives it as monochromatic — or even red! There are a few clues that can be helpful in distinguishing the large red macaws in flight. For example, Charles Munn (pers. comm.) has pointed out, and I have also noted, that the tail of *Ara macao* (Scarlet Macaw) is relatively longer than that of *A. chloropterus* (Red-and-green Macaw), and that the extreme tip of the tail of *macao* tends to wiggle up and down in flight whereas the tail tips of the other large species do not (or do not wiggle in the same rapid manner). Additionally, Munn has determined that when viewed from below,

the tip of the tail of *macao* looks red while the tail tip of *chloropterus* appears dark like the rest of the tail.

Most forest-based macaws feed in tall fruiting trees in and at the borders of forest, frequenting a variety of palms and occasionally going to the ground (the last more typical of *Anodorhynchus* than *Ara*). In more open habitats in the southern portion of its range, *Ara ararauna* more frequently goes to the ground, and *A. rubrogenys* (Red-fronted Macaw) of the dry inter-Andean valleys of central Bolivia often feeds on the ground (especially on crops). Nests are generally in cavities in tree trunks or very large limbs (live or dead), in many areas of Amazonia especially in tall palm trunks and stubs, with a few species known to nest on cliffs. At least some of the large macaws perform large-scale seasonal/temporal movements, usually involving habitat shifts. Although such movements are in some regions conspicuous, they are poorly understood, and need to be studied on a site-by-site basis to permit a baseline analysis of the factors involved. Such information has particularly important implications for habitat conservation.

From a field perspective, it is apparent that there is more than one genus-level taxon included in *Ara*[7] (pers. obs.). The seven large species, and perhaps the smaller but otherwise quite similar *severa*, form a cohesive group in *Ara* (the type of the genus being *macao*); the others are less clearly related. Of the remaining five species, *manilata* is quite distinct in its morphology, vocalisations, and behaviour, and should occupy the monotypic genus *Orthopsittaca* Ridgway 1912 which was established for it. Its flight profile, in which the wings are swept back and "paddled", and the small-billed, flat-backed head protrudes from a full, rounded chest that tapers sharply back to the tail tip, is unique and immediately recognisable with minimal practice. All of its vocalisations, and its strict habitat preference for stands of *Mauritia* spp. palms ("aguajales" or "moretes" [Spanish] or "buritizais" [Portuguese]) likewise set it a measure apart from other macaws. The very small *nobilis* is also highly distinctive, in its flight behaviour and some vocalisations resembling more the large species of *Aratinga* than the other macaws. In combination with its size and distinctly red "shoulders", the bare face and characteristic vocalisations of *nobilis* are diagnostic field characters. The monotypic genus *Diopsittaca* Ridgway 1912, which was established for it, should be resurrected. The remaining three macaws (*couloni*, *maracana*, and *auricollis*) appear to be allospecies (they are so treated in[5]) and are, in any case, quite similar to each other. The genus *Propyrrhura* Miranda-Ribeiro 1920 (type *maracana*) is available for them, and provides a useful "generic" handle with which to refer to the group.

There seems to be a manageable number (from a field perspective) of definable evolutionary units involved in the broad group of macaws (taking into account also *Rhynchopsitta*, *Ognorhynchus*, and *Aratinga*), even with the resurrection of some genera as suggested above. A biochemical analysis of relationships is desirable, but it should be noted that a number of interpretations of such data are likely to result, depending upon the level of resolution provided by the analysis.

Aratinga (21)

This widespread genus is well represented in the Andes and lowlands. *Aratinga* parakeets generally are not birds of extensive, closed forest, rather inhabiting principally open, wooded country. In forested regions they tend to concentrate at borders (including waterways) and in second-growth/successional habitats. Two broad groups encompass most of the species: large species (nine or ten, almost all of which have red on the otherwise green head), and the rest, which are significantly smaller (most having yellow, orange, or brown on the head), with perhaps a third group comprising the three members of the *A. solstitialis* (Sun Parakeet) complex. The large and morphologically unique "*Aratinga*" *guarouba* (Golden Parakeet) should occupy the monotypic genus *Guaruba* Lesson 1831[1,7], which was described for it more than 160 years ago!

Notwithstanding significant variation in size, the general shape within *Aratinga* is consistent, like a miniature macaw with proportionately narrower tail and wing. The tail tapers to a sharp tip. Flight may be low or very high, and is almost always well above the canopy in forest habitats. Wing beats are steady and rapid, producing no undulation, with smaller species tending to fly lower and roll more frequently, erratically, and deeply. Flushed birds tend to roll more erratically than commuters. *Aratinga* parakeets generally travel in flocks, rather infrequently as few as one or two pairs, and may occur in the hundreds. Larger species regularly travel to and from evening roosts in high, waving fronts (like waterfowl), with direct, steady flight (little rolling unless individuals are interacting, i.e. squabbling, chasing, etc.). In

comparison with *Pyrrhura* parakeets, which are of basically similar shape, flock orientation of *Aratinga* tends to be more wingtip-to-wingtip than head-to-tail. Additionally, *Aratinga* species seem to forage on *Cecropia* spp. fruits much less regularly than do most species of *Pyrrhura*. Many species of *Aratinga* form massive evening roosts, in some areas (especially islands in Amazonia) intermixed with other species of parrots.

***Nandayus* (1)**

Distribution of *Nandayus nenday* (Nanday or Black-hooded Parakeet) is centred on the pantanal, the vast, seasonally flooded basin of the upper Río Paraguay in south-central Brazil and Paraguay. Its shape is much like that of *Aratinga*, but its long, rather thin bill and largely black head are distinctive features. These parakeets generally travel in flocks of four to about 16, occasionally as single pairs or in flocks of up to about 30. Flight is also much like *Aratinga* with shallow to deep rolls and is usually low, seldom higher than about 15 m above ground unless commuting. Flocks of *Nandayus* sometimes perch on power lines or fence wires, at which times other flock members are often foraging on the ground nearby. *Nandayus* regularly nests in holes close to the ground, often in fencepost holes (R. S. Ridgely pers. comm.). Roosts usually comprise fewer than about 20 individuals.

***Leptosittaca* (1)**

The single member of this genus, *L. branickii* (Golden-plumed Parakeet), inhabits humid-temperate "cloud-forest" and edge in the Andes, and is most frequently encountered in the vicinity of treeline. It appears to be local and uncommon (occurring in a given locality irregularly), and R. S. Ridgely (pers. comm.) suggested that it may be nomadic. Its shape is like that of a large *Aratinga*, but its voice, high-elevation distribution, and facial plumes are unique. Generally travelling in flocks of about six to 20, the flight of *Leptosittaca* is also like a large *Aratinga*, usually rather low over the canopy, seldom more than about 15 m above the treetops (unless crossing a valley, for instance). Noisy flocks gather at localised food resources, but are generally quiet while feeding. See Collar *et al.*[1] for ecological and conservation information.

***Ognorhynchus* (1)**

This genus comprises a single, distinctive species, *O. icterotis* (Yellow-eared Parrot), which in size and shape is like a small macaw. Very poorly known in life, there are no data available on flight behaviour except to note that they generally travel in small flocks. *Ognorhynchus* inhabits forest primarily at subtropical elevations in the Central and West Andes of Colombia, and the west slope of the Andes in N Ecuador, and is now rare and very local. See Collar *et al.*[1] for a summary of information on this species. A colony of *Ognorhynchus* has recently been discovered in Ecuador (N. Krabbe pers. comm.), and details of the natural history of this rare parrot are forthcoming.

***Rhynchopsitta* (2)**

The two species of *Rhynchopsitta* are highly localised in coniferous forests of NW and NE Mexico, and in shape and flight behaviour are much like small, stocky, short-tailed macaws. They often form large, noisy, high-flying flocks that travel in a long, waving front (like waterfowl), and congregate at large evening roosts, at least seasonally. See Collar *et al.*[1] for a summary of ecological and conservation information for both species, and for more detailed references.

***Cyanoliseus* (1)**

This genus, as currently recognised, contains a single species (*patagonus*, Burrowing Parakeet), with three quite different (especially *andinus*), widely allopatric subspecies in the dry "prepuna" valleys of the NW Argentine Andes, northern Argentine Patagonia, and certain arid valleys of central Chile. *Cyanoliseus* is shaped like a small macaw/large *Aratinga* with a proportionately small bill. Flight is steady and direct, usually without much rolling. Birds generally travel in flocks of about six to 30, flying low over their arid or semi-arid habitat, with larger numbers travelling together to and from roosts, when they tend to fly higher. They forage in low trees and shrubs, regularly going to the ground (where they appear to feed mainly or entirely on grass seeds; R. S. Ridgely pers. comm.). They sometimes perch on power lines, fence wires, and the tops of columnar cacti. Local distribution of populations is probably limited by the availability of suitable vertical cliff faces, where the birds nest colonially in burrows.

***Pyrrhura* (18)**

This widespread South American genus, as currently defined, comprises 18 species, and is wellrepresented in the Andes and forested low-

lands. There are several highly local species and subspecies, with two endemics reaching southern Middle America. *Pyrrhura* parakeets are forest birds, being largely absent from open-country habitats (except gallery woodland), and overall are not as edge-oriented as *Aratinga*, although they are most frequently observed at forest borders. They are shaped much like *Aratinga*, but the tail is less tapered and more blunt-tipped. The end of the tail is usually somewhat abraded, however, which contributes to the appearance of a pointed tip. Additionally, the tail is largely reddish in most species, but note that the central pair of feathers, which overlay the rest from above, are mostly green.

Pyrrhura parakeets usually travel in tight flocks of about six to 14 birds, less frequently in solitary pairs or in flocks of up to about 24 individuals. Flight behaviour and characteristics of *Pyrrhura* are quite different from those of *Aratinga*: flocks are tighter and tend to be oriented more head-to-tail than wingtip-to-wingtip; and flight is through the canopy/subcanopy or just above the treetops (inspiring the local Spanish name "torpedos" for members of this genus), virtually never in high flocks, although J. Rowlett (pers. comm.) has suggested that *P. albipectus* (White-necked Parakeet) is more often observed in higher flight because of the steep slopes it inhabits. Perhaps the most diagnostic difference in flight characteristics between the two genera, however, is that all species of *Pyrrhura* fly with shallow undulations produced by a fairly frequent, incomplete rearward appression of the wings; they may roll shallowly or deeply. *Pyrrhura* are highly vocal in flight, especially when flushed, but are usually quiet when perched or feeding. Many species are fond of the fruits of *Cecropia* spp. They roost in the same small flocks in which they travel during the day, often (usually?) in tree cavities, which probably accelerates abrasion of the tail tip. *Pyrrhura* parakeets never form huge evening roosts like those of many species of *Aratinga* and *Brotogeris*.

Mainly as an aid to field identification in areas where two species occur together, it is helpful to recognise two broad groups within *Pyrrhura*: (1) small ones with screechy voices and more tapered tails (like the various forms of *picta* and *leucotis*, Painted and White-eared Parakeets respectively), and (2) large ones with less screechy voices and broader tails (like *cruentata*, and *perlata/rhodogaster*; Blue-throated and Pearly/Crimson-bellied, respectively). In SE Peru and adjacent areas, *picta* and the similarly sized *rupicola* (Black-capped or Rock Parakeet) occur together; their different voices serve to distinguish them immediately. With the exception of a very limited area near the northern terminus of the Serra do Mar in central Rio de Janeiro state, Brazil, there is no known locality at which more than two species of *Pyrrhura* occur together, and many regions have only one.

Enicognathus (2)

There are two species in temperate forests (especially *Nothofagus* spp.) of far southern South America. *Enicognathus* are dark parakeets shaped much like *Aratinga*, and have steady, direct flight that is usually fairly low (especially *ferrugineus*, Austral Parakeet), seldom more than about 30 m above ground unless flocks are commuting to/from roosts. They sometimes occur in large flocks (especially near communal roost sites), around orchards and certain cultivated fields (where their depredations on crops can be extensive, especially *leptorhynchus*; Slender-billed Parakeet) or other localised or seasonal food resources such as the seeds of *Araucaria* and *Nothofagus*. R. S. Ridgely (pers. comm.) has also seen them feeding on leaves of *Nothofagus* and on mistletoe. Both species often come to the ground to feed on grass seeds or ripening grain crops. Further documentation of the exact manner of flight of these species is desirable.

Myiopsitta (1)

This monotypic genus inhabits seasonally dry woodlands and open country in south-central South America (southern pantanal, wooded coastal lowlands from Rio Grande do Sul south, and most of the chaco and pampas west to the foothills of the Argentine Andes), with a population(s) isolated in arid inter-Andean valleys of central Bolivia. The Monk Parakeet *M. monachus* has spread widely with the clearance of closed woodlands, and in fact seems most common close to human habitation, where it may be seen perched on virtually anything. *Myiopsitta* is shaped generally like *Aratinga*, and flies with *Aratinga*-like wingbeats and frequent rolls, generally low and in pairs or small flocks. It nests colonially in trees or on utility poles (etc.), constructing sometimes enormous, tightly woven, multi-chambered nests (i.e. several pairs per structure, unique among Neotropical parrots) of dry, often thorny sticks, which are used year-round as roost sites. The subspecies *luchsi* of the arid central valleys of Cochabamba, Bolivia,

places its nests on cliff ledges[4]. Monk Parakeets are noisy around colonies and call frequently in flight, but are often inconspicuous while feeding.

***Bolborhynchus* (5)**

This genus currently comprises five species of small, montane parakeets with medium-length to rather long, sharply pointed tails. There are two quite different groups within *Bolborhynchus*: (1) southern *aymara* and *aurifrons* (Grey-hooded and Mountain Parakeets); and (2) more northerly *lineola*, *orbygnesius*, and *ferrugineifrons* (Barred, Andean, and Rufous-fronted, respectively).

Group 1 inhabits brush and scrubby woodland at high elevation (mostly temperate), generally in dry valleys and on dry, rocky slopes, and has a long, sharply pointed tail. They travel in tight groups of two to about 20, mostly two to about 12, flying generally low, seldom higher than about 30 m above ground unless crossing a canyon. Flight is direct, ***with undulation*** and minimal roll. Calls are harsh, rapid chatters. They are often observed perched atop or inside bushes and low trees, or (especially *aurifrons*) on rocks or on the ground.

Group 2 is forest-based, mostly subtropical and forested temperate, and has a much shorter and more rounded tail. These birds are often associated with bamboo (most of the evidence for this involves *lineola*), are apparently highly nomadic, and are most frequently encountered in high flight above slopes and ridges (up to several hundred meters above ground) in tight flocks of two to about 30 in which individual orders and distances are rather closely maintained (like shorebirds), occasionally in flocks of up to several hundred. Large flocks sometimes wheel around and up and down widely like shorebirds, but without extensive erratic rolls. Flight is rapid and direct with deep, powerful, steady wing beats, ***no undulation***, and shallow to occasionally deep, smooth rolls. Birds are usually highly vocal in flight, flocks giving a loud din of rather musical chatter. Members of group 2 are seldom observed perched, especially away from fruiting bamboo.

These two groups are obviously different in the field, and each is probably monophyletic. Group 1 should be separated in the genus *Psilopsiagon* Ridgway 1912 (type *aurifrons*). Group 2 would continue as *Bolborhynchus* (type *lineola*). A biochemical analysis of their relationship to each other and to other such groups as *Brotogeris* (both groups), *Forpus* (especially group 1), and *Nannopsittaca* (especially group 2) would make an interesting and informative study.

***Forpus* (7)**

This genus of very small, stubby-looking, wedge-tailed parrotlets, as currently considered, comprises seven species. The genus shows remarkably little morphological variation: all are predominantly bright green with a variable amount of blue in the primaries, and all are sexually dimorphic. Males have bright blue primary coverts, rumps, and underwing coverts (rather turquoise or opalescent blue in *F. passerinus*, Green-rumped Parrotlet). Females have bright green rumps and underwings, and are somewhat paler and more yellowish in the frontal region and face.

Forpus occupies a wide variety of habitats, from humid forest borders and the edges of watercourses in Amazonia to dry woodland and brush in the valley of the Río Marañón and on the west slope of the Andes in southern Ecuador and northern Peru (with one species endemic in NW Mexico). They thrive in natural successional habitats and second growth, especially where there is water and taller forest nearby. Most species, perhaps all, are particularly fond of the fruits of *Cecropia* spp. Flight is direct or weaving, rather slow, deeply undulating, and usually not high above the local canopy level. Birds travel mostly in flocks of about six to 15 birds, less frequently as pairs or in flocks of up to about 40. Their characteristic single-note chirps and gravelly chatters are often the first sign of their presence.

The most distinctive member of *Forpus* is *sclateri* (Dusky-billed Parrotlet), in which sexual dimorphism, as described above, is heightened, and it has a blackish instead of pinkish upper mandible and a particularly thin, squeaky voice. *Forpus sclateri* is also the only species that significantly overlaps the range of another species (i.e. outside the range of *sclateri*, few localities have more than a single species of *Forpus*). Field identification of *Forpus* seems to be complicated only in lower Amazonia near the Amazon where *xanthopterygius* (Blue-winged Parrotlet) and *passerinus* might overlap. This needs further study.

***Brotogeris* (8)**

This tropical lowland genus comprises eight species. *Brotogeris* parakeets are small, with medium-length, sharply tapering, pointed tails

(three with elongated central feathers). They usually travel in pairs or small flocks of about six to 20 individuals, but sometimes congregate in the hundreds. Flight is rapid, direct or sometimes weaving, and weakly undulating in fairly tight flocks, occasionally up to 150 m above ground. Voice is rather uniform across the genus, and it requires much practice to differentiate species in areas of overlap in Amazonia; it is best to confirm identification visually. Most species form massive evening roosts, often with other species of parrots.

Nannopsittaca (2)

The two species in this apparently relictual genus are widely separated in the forested highland areas of eastern Venezuela (*panychlora*, Tepui Parrotlet; mostly Pantepui, with recent sight reports from lowland Amazonas, Venezuela, on the Río Ventuari [J. Arvin and D. Stejskal, pers. comm.]), and lowland river-terrace bamboo thickets in SE Peru (*dachilleae*, Amazonian Parrotlet), an unusual distribution pattern. *Nannopsittaca* are small parrotlets with short, square tails, and rather pointed wings. My limited observations of flight behaviour are conflicting, and more study is needed before an adequate description can be provided. Usually seen in high flight (*panychlora*) or low over the trees near rivers (*dachilleae*), both species travel in fairly tight flocks of from 10 to about 30 individuals.

Touit (8)

Touit is perhaps the most poorly known group of Neotropical parrots, being generally uncommon or even locally absent in apparently suitable habitat, and inconspicuous when present. These are the largest and stockiest of the "parrotlets", and have short, square-tipped or slightly rounded tails, and rather broad-looking wings. The genus is widespread in humid lowland and foothill forest in southern Middle America and northern South America, with two endemic species in the mountains and lowlands of the Atlantic Forest of Brazil. Flight is rapid and usually direct, with deep, steady wing beats and no undualtion but with frequent, smooth rolls. Although wing beats are steady, there is an occasional very brief pause on the downstroke – not enough to cause an undulation – when the birds are flying in tight flocks. *Touit* parrotlets regularly perform long-distance flights well above the canopy. Shorter flights (e.g., less than about 300 m) may be low over the trees or through the canopy and subcanopy. They sometimes perform fairly steep dives (apparently to examine individual trees), maintaining rapid wing beats, then rise through the same angle, sometimes circling widely high over the canopy before finally plummeting into selected trees.

Touit species usually travel in groups of one to three pairs, occasionally in groups of 12 or so, rarely in larger groups (as, for example, around a "collpa"). R. S. Ridgely (pers. comm.) has regularly seen *T. huetii* (Scarlet-shouldered Parrotlet) in flocks of 20 to 40 birds. It is also fairly common to hear a *Touit* vocalisation overhead, and look up to see a single individual in high, direct flight. They are most frequently heard bursting away from a tree in which they were quietly perched, or flying above the canopy, at which times they are usually highly vocal. When feeding they keep to the interior of tree crowns and the forest midstorey and are generally silent, rarely giving loud or prolonged bouts of vocalisation until preparing to fly. Voices of *Touit* species have a distinctive quality that is difficult to describe in words, but which, once learned, is unlikely to be confused. In order to detect, identify, and begin to census *Touit* parrotlets accurately, it is extremely important to become "automatic" with their vocalisations – perhaps more so than for any other group of Neotropical parrots. Voices for almost all of the species of *Touit* will be presented on *Voices of the New World parrots*.

Pionites (2)

The two members of *Pionites* replace each other across the Amazon/Solimões. These are rather small, stocky parrots with short, squared tails, and rather short-looking wings. In flight they seem slightly front-heavy. Both species are forest birds, and are far more often heard than seen. *Pionites* travel in pairs or groups of up to eight, almost never more than this. Flight is rapid and direct, with little rolling, usually a short distance above the canopy, rarely very high, even when commuting. They fly with rapid ("buzzing"), steady wing beats in which the wing tips do not nearly touch below the body, and which seem to come slightly above the plane of the back on the upstroke (which is usually difficult to determine from the ground!). The wings make a distinctive whirring sound in flight (much like that made by some species of diving ducks), especially audible just after the birds fly from a perch. They are usually highly vocal in flight, delivering far-carrying, high-pitched squeals and screams.

Similar vocalisations and an inventive variety of more musical notes and phrases (often "unparrot-like") are delivered from perches in the canopy, usually inside tall tree crowns, less often from exposed branches. They roost in the same small groups in which they travel during the day, often in tree cavities.

Pionopsitta (6) and *Gypopsitta* (1)

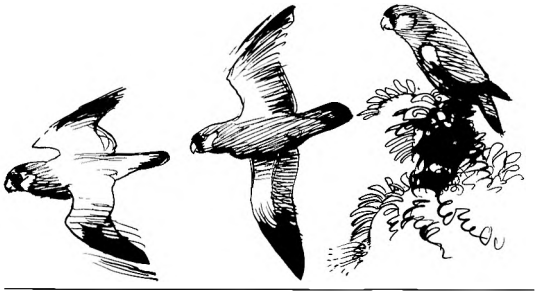
Vocalisations, flight characteristics, and overall morphology of the monotypic *Gypopsitta* (represented by the distinctive species *vulturina*, Vulturine Parrot) are well within the variation found among the six species of *Pionopsitta*, and it replaces *Pionopsitta* in the region between the Rio Madeira and western Maranhão south to southern Pará. From a field perspective, I recommend merging it with *Pionopsitta*, as was originally suggested by Haffer[3] based on morphology and the above-mentioned biogeography of the group. The following comments apply to the seven members of the group.

Pionopsitta inhabits forest primarily in the lowlands and lower subtropical zone. They are shaped much like *Pionus*, but are smaller with proportionately shorter wings and, in relation to the wing, proportionately longer tails. Flight is rapid and direct, usually just above the canopy, with commuters sometimes high overhead. They sometimes perform weaving flights through broken forest canopy, just below the level of the tree crowns. These parrots fly with deep, powerful, steady wing beats (no undulation), and roll regularly and deeply, sometimes erratically. They travel in small groups (often solitary pairs, rarely more than eight) and are usually noisy in flight, delivering single or paired sharp, far-carrying, discordant notes with a burry quality, but they are generally quiet and secretive while perched. They typically perch in the interior of densely foliated trees, but flock sentinels may sometimes sit on exposed dead branches for extended periods.

In its morphology and vocalisations, *P. pileata* (Pileated Parrot) is the most aberrant member of the genus. Although of similar overall size, it is shorter-winged than the others and has a proportionately longer tail. It almost always flies very high (to 300+ m above ground) and rapidly, often rolling erratically, as singles or in groups of up to four birds, delivering a jumble of repeated musical squeaks and low notes. When descending to perch, birds come down rapidly to swoop into the subcanopy of densely foliated trees where they generally forage silently. *P. pileata* is primarily a montane species (descending to about 300 m in the far southern portion of its range, like many other birds with basically similar distributions), and may represent an "intermediate link" in the *Pionopsitta/Hapalopsittaca* complex.

Hapalopsittaca (4)

The four currently recognised species in this genus are patchily distributed through the upper subtropical and temperate "cloud-forests" of the Andes. The three northern species in particular are rarely seen, and are among the most poorly known of Neotropical parrots (see Toyne & Flanagan, this issue). Flight and behaviour is as described for *Pionopsitta* (above). *Hapalopsittaca* is proportionately longer-tailed than *Pionopsitta*, but is obviously closely related to that genus. Recordings of any of the members of *Hapalopsittaca* are quite rare.



Red-faced Parrot *Hapalopsittaca pyrrhops* (Jon Fjeldså)

Graydidascalus (1)

This monotypic genus is represented by *G. brachyurus* (Short-tailed Parrot), and is restricted to várzea and river-edge vegetation, mostly along the Amazon/Solimões and the lower reaches of its major tributaries (well up the Napo and a few other rivers), and is especially common around older river islands. Its yellow-edged, green wings, heavy black bill, and stubby, rather square-tipped tail are distinctive. Short-tailed Parrots typically travel in groups of two to 12, less often as singles or in larger numbers. Flight may be low or high, with rapid, *Pionus*-like wing beats, and frequent, erratic rolls. Its vocalizations are loud and harsh. *Graydidascalus* forms huge evening roosts on river islands, often alongside other species of parrots.

Pionus (7)

Widespread in lowland and subtropical forests, *Pionus* are medium-sized, dark-looking, stocky

parrots with rather short, squared tails and bulbous heads. They are proportionately longer-winged and, in relation to the wing, proportionately shorter-tailed than *Pionopsitta* species. The flight of most of the species is direct with deep wing beats in which the wing tips drop below the level of the body, but do not approach the plane of the back. The upper portion of the wing, from the back to the wrist, remains mostly immobile, with most of the characteristic, deep "flap" occurring from the wrist out to the tip. In general, *Pionus* flies without much rolling. The small, dark, short-winged *P. fuscus* (Dusky Parrot), however, has shallower and more rapid wing beats, and tends to roll frequently, which is readily appreciated in comparison with the sympatric *P. menstruus* (Blue-headed Parrot). Species of *Pionus* travel in pairs, small flocks, or scattered groups of up to about 60, occasionally more, and singles are seen more often than for most other genera. When flying in pairs, the two members are often separated by 5 m or more. Flight is usually high above the canopy (especially commuters) unless close to a perch. *Pionus* usually do not fan the tail appreciably until just before landing. They descend from a height to land with rapid, swerving flight. *Pionus* is highly vocal in flight, less so when perched. Voices are not especially varied across the genus, with flight calls mainly a sharp, far-carrying single or bisyllabic screech repeated at a regular interval. *Pionus* parrots do not form massive evening roosts, apparently spending the night in small flocks perched in tree crowns.

Amazona (31)

Amazona is the most speciose and widespread genus of Neotropical parrots, inhabiting a broad spectrum of forested habitats from extreme southern Texas, U.S.A., south to northern Argentina, including most of the Caribbean and the Atlantic Forest of Brazil. Only one species, *A. mercenaria* (Scaly-naped Parrot), reaches the temperate zone north of southern Bolivia. These are generally large, heavy-bodied, parrots with short, square or gently rounded tails and broad, somewhat square-tipped wings (individual primary feathers are often discernible in flight). All continental species are predominantly green with a discrete patch of red, orange, or yellow somewhere in the plumage, most often on the forehead or wing speculum. Among continental species, two broad groups may be recognised within *Amazona*: large species based in humid forest and small species of more open, often semideciduous woodlands and more open country. The smaller species are usually somewhat "masked" in appearance, while larger ones tend to look "wide-eyed" or eye-ringed. Note that juveniles of some large, eye-ringed species like *A. ochrocephala* (Yellow-crowned Parrot) and *A. farinosa* (Mealy Parrot) may not have eye-rings.

The flight of *Amazona* parrots is direct, rather slow (slower than *Pionus*, for instance) and measured, with minimal (larger species) to moderate (smaller species, especially when flushed) roll. *Amazona* parrots fly with steady wing beats in which the wing is moved through a stiff, shallow arc with the wing tips dropping slightly below the level of the body and not elevated above the plane of the back. *Pionus* species show more bend at the wrist, producing a more articulated (less flattened and stiff) and slightly deeper wing beat. *Amazona*s often partially fan the tail in flight, especially during low or short-distance flights. Flight may be low to very high for commuters. The typical flight pattern for flocks is irregularly spaced, but discrete pairs are obvious within a movement of eight to 40 birds.

Amazona parrots are highly vocal and have a wide, inventive repertoire, which for most (if not all) species includes a characteristic "yodel"-like vocalisation ("song") given mostly by perched pairs, and occasionally in flight. Flight calls are also highly species-specific, and usually are composed of bisyllabic or trisyllabic phrases repeated at brief intervals. Birds are generally quiet while feeding, and often are detected only by the patter of fruit husks and pieces falling to the forest floor. Where not persecuted, many species of *Amazona* form huge, incredibly noisy evening roosts, in Amazonia often on river islands.

Deroptyus (1)

With regard to both morphology and behaviour, *Deroptyus* is a highly distinctive genus comprising a single species (*D. accipitrinus*, Red-fan Parrot) with two subspecies that replace each other across the lower Amazon (nominate *accipitrinus* north, and *fuscifrons* south), inhabiting mostly terra firme forest. *Deroptyus* has an *Accipiter*-like shape (hence the Latin epithet for "hawk-like"), with a long, untapered, blunt-tipped tail and rather rounded wing tips. Flight is direct and rather slow, and is also *Accipiter*-like, with several stiff, steady wing beats interspersed with occasional glides in which the final flaps are forceful enough to elevate the bird (upward swoop) into a smooth, descending glide before the next series of wing beats. Upon leav-

"Many parrots often show the observer little more than a passing, apparently featureless flock or a flapping, screaming silhouette going the other direction as fast as it can"

From left to right: Lear's Macaw *Anodorhynchus leari* (M. Pearman), Maroon-fronted Parrot *Rhynchopsitta terrisi* (G. Lasley/VIREO), Red-masked Parakeet *Aratinga erythrogenys* (Steven Holt/VIREO)

ing a perch, a longer series of steady, momentum-building wing-beats is given. Flight is level, without rolling. *Deroptyus* travels in pairs or small groups of up to about six individuals, seldom more, usually flying at approximately canopy height, never very high above the treetops. The distinctive, loud, repetitive, screeches and squeals in flight or perched are almost always the first sign of the presence of Red-fans. They typically perch in tree crowns, usually on or just under the canopy, occasionally on exposed snags. They roost inside densely foliated tree crowns in the same small groups in which they travel during the day.

Although obviously sharing a common ancestor, the two replacement "subspecies" of *D. accipitrinus* are probably best treated as full species (Northern and Southern Red-fan parrots), as they differ markedly in plumage and vocalisations, on the order of magnitude displayed by the two species of *Pionites*.

Triclaria (1)

This monotypic genus is endemic to the humid, forested lowlands and especially seaward slopes (very few records from farther inland) of the Atlantic Forest region of Brazil. *T. malachitacea* (Blue-bellied Parrot) is basically uniform dark green with rather short wings and a proportionately long tail with a slightly rounded tip. Flight is usually short-distance and under the canopy. When crossing openings, birds fly below canopy level, rapidly and directly with steady, shallow wing beats, and deep, erratic rolls. *Triclaria* is secretive and poorly known, spending most of the day perched and foraging quietly in the forest midstorey and subcanopy, and is rarely observed or tape-recorded. It does not seem to form flocks, although there are old reports of concentrations feeding on fruit in orchards. Its rarely heard/identified song is an amazing, thrush-like or *Saltator*-like series of clear, varied, whistled phrases. Indeed, its Portuguese name (which is derived from the Tupi Indian language) is "sabiácica", which means "like a thrush". Flight calls are choppy, harsh, repeated notes. There is some evidence that *Triclaria* descends from foothill elevations to the lowlands in winter, as do many species of birds in SE Brazil.

Acknowledgements

I thank J. F. Pacheco, J. V. Remsen, Jr., J. L. Rowlett, and R. E. Webster for their timely and helpful criticisms of the manuscript. H. Mudd also provided several suggestions for the improvement of the manuscript. I am especially grateful to R. S. Ridgely for his careful review and many informed and thought-provoking insights.

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