

This unusual shade-loving parrot is restricted to the Atlantic Forest region of south-east Brazil (two records from Argentina), living in low numbers in the moister valleys although venturing out seasonally to lower areas. Its rarity appears to be related to this habitat preference, combined with overall habitat loss and the particular human exploitation of a favoured palm-fruit.

DISTRIBUTION The Blue-bellied Parrot (see Remarks 1) occurs in south-eastern Brazil from southern Bahia south to northern Rio Grande do Sul (Sick and Teixeira 1979, Ridgely 1981a, Sick 1985, Forshaw 1989, Bernardes *et al.* 1990, Robiller 1990), with two recent records from Misiones, Argentina (see Remarks 2). A record from Mato Grosso do Sul is not accepted here (see Remarks 3).

Brazil Forshaw (1989) pointed out that this species has disappeared from parts of its range in south-east Brazil. In the following account, localities are listed from north to south, with coordinates (unless otherwise stated) derived from Paynter and Traylor (1991).

Bahia Despite the repeated listing of this state (e.g. in all the summarizing texts listed above) the only good evidence of occurrence there appears that of Wied (1831-1833), who found the species near Caravelas and in the woods inland from Mucuri to Morro da Arara (where he noted its curious voice: see Remarks 1), including along the rio Peruípe (see Bokermann 1957), all in the southernmost part of the state; he expressed doubt that it occurred further north. There is a specimen labelled “Bahia” from before 1833 in MHNG.

Minas Gerais The few records are from: Lagoa Santa (Burmeister 1856), a perhaps unreliable site if only because so far into the interior; rio Matipó, July 1919 (Pinto 1938); and on the rio Doce (Pinto 1978), although the basis for this is unknown and it might simply represent an error for the site below under Espírito Santo. Recent field observations are implied, though not specified, by de Mattos *et al.* (1985).

Espírito Santo Records are from: rio Doce, April and August 1906 and at an unspecified later date (von Ihering and von Ihering 1907, Pinto 1938, Aguirre 1947); córrego Cupido, rio Barra Seca, i.e. present-day Sooretama Biological Reserve, April 1939 (Aguirre and Aldrichi 1983); three sites in the adjacent municipalities of Santa Teresa, Santa Leopoldina and Domingos Martins in the middle of the state, recently (D. M. R. Fortaleza *in litt.* 1990), of which the first is evidently in or near the Augusto Ruschi (Nova Lombardia) Biological Reserve, where the species has been seen in small numbers on repeated visits, 1980-1990 (TAP), and the second may be Chaves, as a specimen (in MCZ) was taken there in September 1942; Duas Bocas State Reserve, 400-500 m, near Cariacica (Vitória), where the species was recorded in the 1980s (C. E. Carvalho verbally 1987).

Rio de Janeiro Records are from: Nova Friburgo, nineteenth century (Burmeister 1856, von Ihering 1900a), and in the Macaé de Cima area nearby, where local people reported it in 1984 (J. F. Pacheco *in litt.* 1986); Desengano State Park, since 1986 (J. F. Pacheco *in litt.* 1987); Tapebuçu (south of Macaé: see Bokermann 1957), early in the nineteenth century (Wied 1831-1833); Cantagalo, nineteenth century (von Ihering 1900a); Serra do Tinguá, 700 m, 1980-1981 (Scott and Brooke 1985), and subsequently within this range at Xerém, 120-130 m, 1986 (C. E. Carvalho *in litt.* 1987) and in July and August 1987 (J. F. Pacheco *in litt.* 1987); and Parati, a littoral site from which the species has been recorded in the non-breeding season (Sick 1968, 1985). It is not clear if Angra dos Reis, mentioned under Population, is a known or speculated site.

São Paulo Records are from: Serra da Bocaina National Park, 1,200 m, November 1989 (P. S. M. da Fonseca and J. F. Pacheco *in litt.* 1990); Victoria (now Vitoriana), 570 m, August 1902 (five specimens in AMNH, FMNH); Fazenda Barreiro Rico, c.22°45'S 48°09'W, Anhembi, 500-600 m, in the period 1957-1964, although not detected in a remanescent woodlot of 1,400 ha there on three-day visits nearly every month from March 1975 to August 1977, and presumed extinct (Willis 1979, 1980, whence coordinates); Ipanema, 1820s (von Pelzeln 1868-1871); Ubatuba, February and April 1905 (von Ihering and von Ihering 1907, Pinto 1938); Boracéia, near Salesópolis, since November 1945 (Camargo 1946, C. Yamashita *in litt.* 1987, D. F. Stotz *in litt.* 1988); Alambari, 500-600 m, January 1901 (specimen in AMNH); Itapetininga, May 1869 (specimen in UMZC); São Sebastião, September 1898 (specimen in

AMNH); Sítio Irapuã, near Juquitiba, 600-900 m, 1983-1988 (R. Antonelli Filho verbally 1988); the 38,000 ha Fazenda Intervales, Capão Bonito, December 1989 to August 1990 (I. Simão, M. A. Pizo and M. Galetti *in litt.* 1991); Carlos Botelho State Park, 24°04'S 47°58'W, March 1992 (Straube and Scherer Neto *in prep.*); Pedro de Toledo, December 1957 (specimens in LACM); Boa Vista and Barra do Veado, close together on the rio Ipiranga (former at 24°35'S 47°38'W), August 1960 (specimens in FMNH); "Porto V. Travessão" (untraced, but also on the Ipiranga), March 1957 (specimen in YPM); Fazenda Bela Vista, Taquarussu, Iguape, 24°43'S 47°33'W (as given on labels), May 1956 (specimens in LACM); Ilha do Cardoso, March 1905 and August 1934 (Pinto 1938), where still resident in the state park of the same name (P. Martuscelli *in litt.* 1991). It is possible that the species has been recorded at Campo Grande (see Remarks 3).

Paraná Although all the descriptions of the species's range cited in the opening paragraph of this section indicate its extension from Bahia to Rio Grande do Sul, records from Paraná are all very recent: Mananciais da Serra, Piraquara, 950 m, July 1991, six birds; Limeira, Guaratuba, 420 m, May 1992, two birds; Barra do Saí, Guaratuba, January 1991, by local report (all from Straube and Scherer Neto *in prep.*).

Santa Catarina Records are all from the north-east of the state, at: Palmital (now Garuva), June 1929 (specimen in AMNH); São Francisco do Sul (on Ilha de São Francisco), July 1899 (von Ihering and von Ihering 1907, Pinto 1938); Hansa (now Corupá), 75 m, July 1929 (specimens in AMNH). There are apparently no field observations (Sick *et al.* 1981).

Rio Grande do Sul The map in Belton (1984-1985) shows a range extending inland as far as 53°W but restricted latitudinally to between 29 and 30°S. Records, all consonant with this distribution, are from Cambará do Sul, just north of Aparados da Serra National Park (C. Yamashita *in litt.* 1987); Lagoa do Forno (29°20'S 49°53'W in Belton 1984-1985), near Torres, at sea level, October and November 1928 (specimens in AMNH); Poço das Antas, 29°27'S 51°40'W, in the municipality of São João de Montenegro (Gliesch 1930); Sinimbu, 250 m, September 1928 (specimen in AMNH; see Remarks 4); Sapiranga, 60 m, August 1928 (specimen in AMNH), with birds present there (specifically at Picada Verão) in the 1970s and in May 1992 (M. Sander and G. A. Bencke *in litt.* 1992); Taquara (do Mundo Novo), 1882-1883 (von Berlepsch and von Ihering 1885); Monte Alverne, 29°33'S 52°20'W, near Santa Cruz do Sul, August 1991 and January 1992 (G. A. Bencke *in litt.* 1992, including coordinates).

Argentina A bird was observed in a flock of Reddish-bellied Parakeets *Pyrrhura frontalis* near the falls in Iguazú National Park, Misiones, in April 1983 (Rumboll 1990), and another was seen in the upper basin of the arroyo Urugua-í, November 1986 (Canevari *et al.* 1991), the precise site being inside Urugua-í Provincial Park 30 km west of Bernardo de Irigoyen in General Belgrano department (R. J. Straneck and M. Castelino *per* J. C. Chebez *in litt.* 1992).

POPULATION Considerable difficulty attends the evaluation of the status of this species, partly because of its unobtrusive behaviour – it remains largely silent after dawn (TAP), is extremely shy and keeps motionless on the perch when frightened (Descourtilz 1854-1856, also Ridgely 1981a) and flies at or below canopy level (C. Yamashita *in litt.* 1987) – but also because it appears to be either a low-density species or perhaps one that always occurred very patchily throughout its fairly broad range within the Brazilian Atlantic Forest belt. It has been described as "locally common" (Forshaw 1989) and "often fairly common" (Ridgely 1981a), and the latter authority has judged that while some declines have surely occurred, at least in Espírito Santo and probably elsewhere, the species has suffered less than many other parrots with similar ranges. However, the paucity of modern records, with most stemming from the reserves at Augusto Ruschi (Nova Lombardia) and Boracéia, suggests that some specific habitat requirements may be in play that further restrict the species (see Ecology).

Wied (1831-1833) found it not infrequent at the localities he named (four in Bahia and one in Rio de Janeiro), but indicated it belonged overall to the less abundant birds of these regions. In the 1940s the bird was still common in the mountainous part of Espírito Santo, although even then it was recognized as a threatened species (Pinto 1946). In Augusto Ruschi (Nova Lombardia) it is uncommon, not being recorded on every day of surveys between 1977 and 1986 (TAP). It was uncommon (i.e. occasionally encountered in appropriate habitat) in Serra do Tinguá (Scott and Brooke 1985). The main population

probably now occurs on the eastern slopes of the Serra do Mar between Angra dos Reis in Rio de Janeiro and Ubatuba in São Paulo (C. Yamashita *in litt.* 1987). However, immediately to the west of this area, at Boracéia Biological Station, birds seem limited by the availability of nesting sites, being seldom recorded over several years of observation (Camargo 1976) and remaining uncommon there today (seen on six days with a maximum of eight in one day) (D. F. Stotz *in litt.* 1988). The population at Camará do Sul is small (C. Yamashita *in litt.* 1987) and in Rio Grande do Sul in general the bird is considered a “scarce resident” (Belton 1984-1985).

ECOLOGY The Blue-bellied Parrot inhabits wet (Sick 1985 says dry) lower montane and escarpment forests, chiefly at 300-700 m at least in Rio de Janeiro state (although perhaps 500-1,000 m elsewhere), ranging lower into adjacent lowland forests and at times even into coastal regions outside the breeding season (Sick 1968, Belton 1984-1985, Sick 1985, Forshaw 1989). The evidence under Distribution largely confirms this, though not entirely: thus in Espírito Santo the records from the rio Doce (both at sea level) in April and August are consistent, and in Santa Catarina the São Francisco do Sul record from July involved a sea-level locality (as described in Paynter and Traylor 1991), the Corupá record from July was at only 75 m (elevation on AMNH label), and the Garuva record from June (of a sexually inactive bird as given on AMNH label) refers to a locality at 50 m on the coastal plain (as described in Paynter and Traylor 1991); in Rio Grande do Sul, two birds taken in August and September were at 250 m or below although not in breeding condition, birds in both August and January at Monte Alverne were in plateau forest at 500 m, not venturing into lower (though forested) areas (G. A. Bencke *in litt.* 1992), but two taken in October and November at Lagoa do Forno were at sea level at the start of the breeding season (both had gonads slightly enlarged). Vertical displacements are seen on Ilha do Cardoso, where the species ranges from sea level to 700 m (P. Martuscelli *in litt.* 1991). Outside the breeding period it may enter farmed areas with orchards and plantations or even suburban woodlands and gardens, e.g. on the outskirts of São Paulo (Descourtilz 1854-1856, von Berlepsch and von Ihering 1885, Pinto 1946, Ridgely 1981a, Forshaw 1989). However, it does not occur in either savanna or xerophytic woodland (*contra* Smith 1975: 40). At Augusto Ruschi Biological Reserve the birds have been found from mid-storey to the lower canopy, and have never been seen to fly across even small clearings, let alone open countryside (TAP). Birds are usually found in the canopy of tall, bromeliad-rich forest along watercourses in valleys, and this may be a habitat preference that would explain their relative overall scarcity; they are very active in twilight, both in the early morning and at sunset (C. Yamashita *in litt.* 1987, verbally 1988). In captivity the species seeks shade and shows distress in temperatures above 18°C, and one holder knew of no other parrot that enjoyed cold so much (Low 1972).

Birds feed on fruits, seeds, nuts (araucaria: Belton 1984-1985), berries (myrtaceous: Descourtilz 1854-1856), nectar, buds, and perhaps insects (possibly caught on the wing) and their larvae, generally procured in the treetops (Bertagnolli 1981, Forshaw 1989). Murray (1969) noted that captive birds caught flies, and considered that their remarkable swift flight and beautifully precise landings indicated a possible adaptation to hawking for insects. Small groups are attracted to the small fruits of a forest palm (“palmito”, i.e. *Euterpe edulis*) in the period from January to May (Bertagnolli 1981, G. A. Bencke *in litt.* 1992; see also Threats). All records in the Augusto Ruschi Biological Reserve, 1980-1990, were from the same small areas near stands of *E. edulis* (TAP). In the Duas Bocas State Reserve birds come periodically to feed on oranges and fruits of jabuticaba trees in an orchard close to the forest (C. E. Carvalho verbally 1987). When the species takes the particularly juicy fruits of *Citrus medica* the pulp is discarded and only the seeds are eaten (Forshaw 1989, H. Sick verbally 1990). In a study near Capão Bonito the species's diet showed no overlap with other parrots there (a *Forpus*, *Brotogeris*, *Pyrrhura* and *Pionopsitta*) (I. Simão, M. A. Pizo and M. Galetti *in litt.* 1991). In captivity it has been seen to eat leaves, bark, algae growing on wood, and nectar (Murray 1969, Low 1972), bark also being recorded in Bertagnolli (1981).

Nesting occurs from September to January in a natural hollow in very old, large trees, often a palm trunk (Bertagnolli 1981); however, a nest with three chicks has been found as early as September (Camargo 1976, Forshaw 1989). A male collected on 17 August 1974 had inactive gonads (Belton 1984-1985), as did four birds of both sexes (in AMNH) taken in June, August and September; but as noted above, two others taken in October and November had slightly enlarged gonads. Of four birds collected in

late January and mid-February one was very young, two were young and one, a male, was in moult (von Berlepsch and von Ihering 1885). The birds are strongly territorial and respond to taped playback (C. Yamashita *in litt.* 1992; see Threats). Two nests were found in holes in trees situated approximately 2 km from each other in forest at the Boracéia Biological Station: the entrances were 4.5 m and 2.2 m above the foot of the trees; three young were taken in September from one of these nests (Camargo 1976). The same nest-site is reported to be used in consecutive years, which may be the result of a scarcity of hollow trees (Camargo 1976). In captivity the clutch is 2-4, incubation is 28 days, and while the fledgling period remains unknown the young become independent three weeks after fledging (Robiller 1990).

There is a post-breeding movement from the Serra do Mar down into the coastal flats, where the species appears at certain localities, and is caught in great numbers (Sick 1968). Birds move in singles, pairs or small family groups with little fear of man (Descourtilz 1854-1856, Bertagnolio 1981, C. Yamashita *in litt.* 1987).

THREATS The decline of this species has been attributed to hunting, land clearance for farming, urbanization, and the intensive collecting of one of its main foodplants, the “palmito” (see Ecology), which is targeted for its use in salads, soups and puddings, the whole tree being cut to obtain the fruit (Bertagnolio 1981, J. Goerck *in litt.* 1992); this also seems to have been a factor affecting the largely sympatric Black-fronted Piping-guan *Pipile jacutinga* (see Threats in relevant account). Although substantial amounts of forest, mostly too wet and too steep for agricultural purposes, might suggest that the Serra do Mar may still provide a secure refuge for the species (Ridgely 1981a, Forshaw 1989, D. F. Stotz *in litt.* 1988), the moister valleys preferred by the bird are threatened by banana plantations on the lower slopes (C. Yamashita verbally 1988, LPG) and in Rio Grande do Sul also by cutting of wood for curing tobacco, whose production is the major industry around Santa Cruz do Sul (G. A. Bencke *in litt.* 1992). Forest exploitation on Ilha do Cardoso is causing a decline there (P. Martuscelli *in litt.* 1991). The 1983 record from Argentina was assumed to be of a bird displaced by the deforestation of 85% of its habitat in adjacent Brazil (Rumboll 1989).

Trade Although described as very rare in captivity (Ridgely 1981a), Wied (1831-1833) quite often found the species in the houses of local people, and Sick (1968) reported it to be caught “in numbers” during its annual visits to the coastal lowlands. The species is sufficiently tame that it can be caught with a noose on a long pole (Bertagnolio 1981). It is also easily enticed into traps by calling decoys (A. Ruschi verbally 1980), presumably regarding such birds aggressively (see Ecology). Some internal trade persists, as birds have been seen in the notorious Caxias market in Rio de Janeiro (C. E. Carvalho *in litt.* 1987). Moreover, in the mid-1980s a number of birds came into international trade, and were judged an ideal cagebird (Robiller 1990), a point already made by Wied (1831-1833), although the testimony of G. Rossi dalla Riva is that it is a very difficult bird to keep (see Bertagnolio 1981).

MEASURES TAKEN The Blue-bellied Parrot is protected under Brazilian law (Bernardes *et al.* 1990). It occurs in at least eight protected areas, the small (40 km²) Augusto Ruschi (Nova Lombardia) Biological Reserve and the Duas Bocas State Reserve in Espírito Santo, the Desengano State Park and Tinguá Biological Reserve in Rio de Janeiro, Bocaina National Park (probably also on the Rio side), the privately run albeit extensive Boracéia “Watershed Reserve” (as given in Ridgely 1981a), Carlos Botelho State Park and Ilha do Cardoso State Park in São Paulo. Records from forest now protected as Sooretama Biological Reserve indicate, however, that several such lowland sites may be needed to cater for the species and that the seven reserves named above may not be sufficient in themselves. The two records from Argentina have both been from protected areas, and Urugua-í Provincial Park is notably rich in palmito palms (J. C. Chebez *in litt.* 1992).

MEASURES PROPOSED This bird requires patient and painstaking study to determine the fundamentals of its ecological requirements; work could be undertaken at any of the seven protected areas listed under Measures Taken. Surveys and perhaps more detailed studies might also be undertaken in the Serra do Mar between Angra dos Reis and Ubatuba, to confirm whether this area is particularly important for the species (see Population). Birds should be looked for in Aparados da Serra National Park. The nature of the birds'

seasonal movements requires elucidation. Any new perceptions and key areas to emerge from such fieldwork need to be brought into considerations for the long-term management of the species. Trade, including internal commerce, should be clamped down on. In Rio Grande do Sul, where the existing protected areas fail to include the species, efforts should be made to conserve the last major continuous tracts of forest within its range, but also to establish a network of small reserves at the municipal level in such areas as Santa Cruz do Sul, Poço das Antas, Sapiranga and northwards into Santa Catarina (G. A. Bencke *in litt.* 1992). Research on the species in the northern part of its range might be extended to cover similar research on the Cinnamon-vented Piha *Lipaugus lanioides*, which appears to utilize the same key food-plant, as does the Black-fronted Piping-guan (see relevant accounts and Ecology above).

REMARKS (1) This species is the only one in its genus and in form, behaviour and voice is like no other Neotropical parrot (Murray 1969, Low 1972, TAP). (2) There is a danger of confusion with the superficially similar female Pileated (Red-capped) Parrot *Pionopsitta pileata*, so that sight records in some cases may conceivably be mistaken (TAP). (3) A note that the bird has been recorded from Mato Grosso do Sul (Sick and Teixeira 1979) has been widely ignored, but Sick (1985) reinforced it with the locality Campo Grande (the state capital). Without further information this record appears wholly improbable; it is possible that there was a confusion with Campo Grande in São Paulo state (C. Yamashita *in litt.* 1990). (4) Belton (1984-1985) gave the elevation of Sinimbu as 80 m, but the specimen is labelled as taken at 800 feet.