

The glaucous macaw. Does it still exist? by Tony Pittman
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The Glaucous macaw (*Anodorhynchus glaucus*) and the question of its continued existence exerts considerable fascination for many people both within and outside aviculture. This is why the Mail on Sunday originally devoted a centre-fold article to the macaw and was prepared to publish follow-up articles. The possibility of the female Lear's macaw from Mulhouse Zoo on loan to Harry Sisson being a Glaucous macaw not only attracted the attention of HM Customs and Excise, but also TV and radio presenters as well as representatives of the national and regional press.

When looking at the literature on the Glaucous macaw, particularly that most recent, it is obvious that much of the mystery is due to the nature of the information published on the bird. Many latter-day writers appear to have borrowed indiscriminately from earlier authors and there is a disturbing and regrettable tendency for one or two to spice up the subject matter with rumour as well as unsubstantiated and highly speculative assertions. This has contributed to the spread of misconceptions and perhaps illusory ideas about the continued existence of the macaw.

Joe Cuddy had seen most of the skins of the Glaucous and Lear's macaws in museums in Europe and the United States, but had, however, no photographic records. We decided that following the furore about the Mulhouse Zoo macaw, we would spend our annual leave this year in Argentina and the surrounding areas. We set ourselves several main objectives. The first was to inspect and photograph the skin of the last known Glaucous macaw, which died in Buenos Aires Zoo (1) in 1938 after having been there allegedly for more than 20 years (2). Secondly to make contact with local ornithologists and conservation bodies to verify and supplement the information we had gleaned from the established body of literature. Thirdly we intended to visit as many of the reported localities for the Glaucous macaw as we could in the limited time at our disposal. The local information was absolutely essential for this purpose. Finally a fourth objective arose because we discovered that some of the earliest records had become corrupted with interpolations and mistranslations by later writers. We had to research the original texts thoroughly if we were to avoid wasting time and effort in our investigations.

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Before leaving we read again all the available literature and the as yet unpublished report by Nigel Collar of the ICBP, which gave a summary of reported sightings with map references. We plotted these out on a travel map of southern South America with a scale of 1:4,000,000 and discovered that they formed an almost perfect circle covering Corrientes and Misiones Provinces in northeast Argentina, Artigas Province in northwest Uruguay and Rio Grande do Sul as well as Santa Caterina Provinces in southwest Brazil (3).

We left London on 30th June 1992 courtesy of British Airways, arriving in Buenos Aires just after dawn on Wednesday, 1st July. After finding a hotel we started work immediately visiting the national tourist office and the important local ornithological society called the Asociacion Ornithologica del Plata. The latter had a good library as well as experts in local birdlife and we were very fortunate to locate a Spanish language version of D'Orbigny's *Voyage dans l'Amerique Meridionale* (1827-35).

D'Orbigny, a prolific writer and seasoned traveller, had visited the area between 1827 and 1835. He had written a detailed record of his travels, which included several references to a blue macaw, which could only be the Glaucous macaw. This account also contained numerous references to the yatay palm, which we believed could have been the main food source for the Glaucous macaw, the clearing of which probably contributed most to its extirpation.

The following day we visited the Botanical Gardens to see if we could view a yatay palm for identification purposes during our travels and then the Zoo. At neither location could we obtain any information about the tree or the macaw. In the afternoon we visited the Museo Argentino de Ciencias Naturales, where we were allowed to measure the specimen of *Anodorhynchus glaucus* there as well as inspect, photograph and video it in the basement room with artificial lighting and some indirect daylight as well as outside the building in somewhat overcast conditions.

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The skin had been mounted at some time and given eyes, which gave it a fairly lifelike appearance. Its overall length was 640 mm, the tail 360 mm and the primaries 395 mm. The bill had been varnished. The upper mandible measured 88 mm and the lower 44 mm (4). The plumage colour was quite distinctive, being greenish blue with a greyish-brown hindneck, throat and upper breast. The head was bluish-grey.

We videoed the skin from different angles in the basement room with indirect daylight and perceived an astonishing change in colouration from almost aquamarine to blue. I subsequently discovered that Azara, an early naturalist, had commented on this effect(5). The back plumage close-up almost seemed to have a brownish edging to the feathers.

In any event the skin could not possibly be confused with the Lear's macaw (*Anodorhynchus leari*). Like the Lear's, however, it had a short tail and the bare facial skin did not extend to below the lower mandible as it does in the Hyacinthine macaw (*Anodorhynchus hyacinthinus*).

After our return from South America we had the opportunity to study the Glaucous skin at the Museum der Naturkunde in Berlin and make direct comparison with the skin of the Lear's macaw there. Again under normal light conditions there could be no possibility of confusing the two species. The skins in Berlin, which have only been generally accessible since the reunification of Germany, are kept in drawers with glass lids and are in excellent condition. The greyness of the neck in the Glaucous specimen there, which was reported to be in Berlin Zoo in 1892, was even more noticeable than in the skin in Buenos Aires. Initially we believed the Glaucous skin to be larger than the Lear's Macaw, but on measuring the skins we discovered the Lear's to be marginally larger, thus underlining the fallibility of visual assessment.

On Friday, 3rd July I went to negotiate the rental of a car and visit the Argentinian AA to buy road-maps for Entre Rios, Corrientes and Misiones Provinces. In the afternoon I spent several fruitful hours with the forest conservation organisation, the Fundacion Vida Silvestre Argentina.

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They informed me that the yatay palm had been mostly cleared as it indicated good farming land and had become so endangered that the Argentine government had set up the Parque Nacional El Palmar near Colon in Entre Rios Province 1965 to save it. The staff at the Fundacion also had a small sample of fruit, which I examined.

The yatay palm belongs to the *Butia* family of palms, which is closely allied to the *Arecastrum* and *Syagrus* palms. The family is hardy and grows under a wide range of conditions from high rainfall tropical to fairly dry subtropical. It will even survive moderate frost. The mean daytime temperature during our trip - July could be described as mid-winter in Argentina - was 10-15 C as far north as Eldorado (27.5 S) in Misiones Province. There was however a dramatic temperature change in the 100 km between Eldorado and Iguazu, where the daytime temperature rose to 25 C.

The fruit of the yatay palm is egg-shaped, 5 cm long with persistent petals attached to the base giving it an appearance like an acorn. The fruit has a hard shell with a very fleshy, finely fibrous outer mesocarp layer and a thick stone endocarp. The flesh is very juicy and edible. It is used for food by human beings and the juice can apparently be fermented to make a wine.

At the Parque Nacional El Palmar we discovered the palm to be tall with bluish-grey fronds and recalled a passage in D'Orbigny's *Voyage dans l'Amerique Meridionale*, where he refers to the vast forests of yatay palms stretching along the Rio Parana creating a bluish expanse (6). It occurred to us that this may have provided the Glaucous macaw with some measure of protective camouflage from its most likely natural predator, the Harpy Eagle (*Harpia harpyja*), which still occurs in the most northerly provinces of Misiones and Formosa.

These palm forests no longer exist in Entre Rios and Corrientes. One can glean some small impression of how they must have looked to D'Orbigny for small distances along the Rio Paraguay between the cities of Resistencia and Formosa. Interestingly D'Orbigny in his entry for 29.6.1827 had foreseen that the palm forests would disappear as soon as the local people realised how fertile the soil was.(7)

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Corrientes Province has been progressively settled since the 16th Century - the city of Corrientes was founded in 1588 - and the river systems bordering the northern, eastern and western boundaries of the province have been used to transport people and livestock in and natural resources out. This development was dramatically accelerated with the application of the steam engine in shipping.

Soon after D'Orbigny's departure for Europe in 1835 the first steam ships started to ply the rivers. A sailing boat took nearly eight months to sail the 2,000 miles from Montevideo in Uruguay to the city of Corrientes and back again. HMS Alecto, an 800 ton British ironclad, took under 6 weeks for the same journey in 1851.

I recently found a detailed entry on Corrientes Province in a Geography Cyclopaedia published in 1866, which made clear the extent of settlement, although it did mention there was 1,000 sq. miles of palm forest still existing. The population was estimated at 41,000 in 1847 by Parish and 32,000 in 1848 by McCann, the difference being due to difficulties caused by depopulation in the civil war then raging. The 1914 edition of Baedeker gives a population according to the 1913 census of nearly 350,000, a density of over 4 inhabitants per sq. km(8). Thus between 1848 and 1913 the population had increased at least tenfold.

We spent much time on the possible food sources of the Glaucous macaw. Although T.Silva (1989) curiously claims the feeding habits of the Glaucous are undescribed and suggests without evidence that it probably fed off the fruit of the *Atalea phalerata* (sic), earlier writers have speculated about the subject. Azara was the first naturalist (1802) to refer to the Glaucous Macaw and its feeding habits when he suggested its diet may be limited to fruits, seeds and dates because he thought the bill and the roof of the mouth too weak.(9) Goeldi (1894) suggested, again without evidence, it fed off the fruits of the tucum and mucuja palms.(10) Sick alludes to this in his habitat description in his great work *Ornitologia Brasileira* published in 1984.(11)

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I have not yet found any reference to the feeding habits of the Glaucous in D'Orbigny's work although Collar mentions that D'Orbigny wrote a note to Bourjot Saint-Hilaire in which he says the macaw ate the kernels of various palms.(12) However we were convinced the yatay palm was the most likely main food source. After our return from South America we were pleased to discover that Martin de Moussy had in 1860 reported the presence in the province of Corrientes of a small violet macaw, which lived in the yatay palm trees feeding off its fruits.(13) We have also heard that Carlos Yamashita is investigating the relationship between the Glaucous macaw and the yatay palm and await his findings with great interest.

The Glaucous macaw does not seem to have been very numerous. The Jesuit priest Sanchez Labrador had reported in 1767 that it was rare in the forests of the Rio Paraguay, although it was apparently abundant (muchisimas) on the left bank of the Rio Uruguay.(14) It is difficult to assess from this report how relative the comment was. Azara (1802) merely says he saw several pairs.(15) D'Orbigny only refers to the macaw in a few passing remarks. He did try the meat and found it unpalatable (16), although he certainly did not eat it exclusively during his travels on the Rio Parana as claimed by Goeldi (1894). (17)

Joe Cuddy and I then spent the next 10 days driving through the provinces of Entre Rios, Corrientes and Misiones. We also spent a day driving north from the city of Corrientes to Clorinda, the border town with Paraguay, some 40 km from Asuncion, which we visited by taxi. In Asuncion Zoo we discovered 10 hyacinthine macaws, which have been confiscated recently by the Paraguayan authorities. We are hoping that with the assistance of Traffic South America, the ICBP, the World Parrot Trust and diplomatic channels that these birds and any others confiscated can be considered for re-release.

We were able to study the topography and assess the condition of the habitat. Nowhere did we find sufficient habitat for a bird like the Glaucous macaw. Much of Entre Rios and Corrientes is naturally treeless savannah. Any forest was concentrated along the rivers and water courses.

(7)

The northeast of Corrientes was a huge swamp and although large tracts have been drained for farming, there is still much left. This does not however offer suitable habitat for a macaw. The Batel swamps in western Corrientes, where D'Orbigny reported shooting a blue macaw in 1827 (18), also no longer offers suitable habitat.

The disturbance for wildlife in the region has been considerable and as mentioned already above is not just recent. Apart from forestry, farming and ranching, there is also the gigantic hydroelectric complex at Salto Grande on the River Uruguay, which has resulted in the flooding of lowland areas and the construction of a bypass canal for river traffic. There are other similar projects on the Rio Parana. We spoke to the local people and questioned them about the possibility of a blue macaw still existing or having existed in living memory. All were amazed at the idea.

We had hoped that in Misiones, which still has large tracts of forest in the northern part, we would be more fortunate. However the forest is largely dry sub-tropical vegetation dominated by the parana pine (*Araucaria angustifolia*) and with few palms. We saw no yatay palms at all. Interestingly western Misiones was settled in the twenties by German immigrants. Eldorado was very clean with neat little houses. Our hotel had framed photographs of the German Alps and Rhine castles on the walls. I spoke more German in Misiones than English or Spanish. I also discovered I speak Spanish with a German accent.

I spoke to several old settlers, including a bus company operator, who owned a zoo near Eldorado and had been there since 1923. He told me that the original German settlers had been " lazy " and had spent their lives fishing and hunting instead of logging and farming. None of these people, who knew the province, which measures roughly 300 km by 100 km, exceedingly well, had seen or heard of a bird like the Glaucous macaw. In the eastern part of the province we spoke to squatters and settlers from Brazil. Again we encountered genuine astonishment that such a bird could possibly still exist.

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We returned from Iguazu through southern Brazil to Sao Paulo and were shocked by the deforestation. Virtually all the dry sub-tropical forest, which once stretched from Paraguay to the Atlantic coast has disappeared. Most of the trees we saw were stands of foreign trees such as the Caribbean pine or eucalyptus. Some years ago I was told by a Brazilian diplomat in London that his government had attempted to encourage reforestation projects by offering an inducement grant. The result was that landowners cleared the little natural primary forest left and planted foreign trees to qualify for the grant.

A similar situation is developing in Misiones, where more and more primary forest is being replaced by plantations of foreign trees. Apart from this replacement with alien trees, the saplings are apparently planted 2,000 to the hectare to obtain grant, when 1,100 according to the Forestry Research Station in Surrey should be the maximum per hectare for the climate and soil conditions.

We had thus travelled several thousands miles through the reported habitat of the Glaucous macaw and realised there was no chance of it still existing. I believe that the Glaucous macaw has been extinct since the early years of this century, the main cause being the clearance of its main food source, the yatay palm. I do not believe there were large populations in recent historical times. The Glaucous macaws reported in the last century probably belonged to a relict population supplanted by the more successful hyacinthine macaw to the north, which was or became a specialist feeder.

There has been some speculation that there could be a small population still existing somewhere and the existence of a small population of Lear's macaws in a remote part of Brazil, which was unknown until discovered by Sick in 1978, has been cited as an example. However I would argue that the accepted distribution area of the Glaucous macaw is not remote and has not been so for at least 150 years. Apart from the settlement of the area and all the disturbance this has brought, the entire region has been subject to military incursions and actions since the days of the Jesuit settlements in the 18th century.

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Throughout the 19th century there were devastating wars including the civil war, which involved Paraguay, Brazil and Uruguay as well as British and French naval intervention, from 1835 to 1851. The war of the Triple Alliance from 1865-70 between Paraguay on the one hand and Argentina, Brazil and Uruguay on the other resulted in Paraguay losing most of its adult male population.(19) Paraguay also had a serious border dispute for decades with Bolivia, which erupted into war from 1932 to 1935. Even today access to the River Parana on both the Argentinian and Paraguayan sides is very restricted and often impossible because of the military presence.

I discovered this when I went to view the nesting sites in the river banks near Ita Ibate in northern Corrientes reported by D'Orbigny in 1827 (20) and was arrested by the Argentine navy. Fortunately I was able to convince an initially incredulous naval officer that this tall Englishman in green fatigues, binoculars, camera and note book really was looking for the reported nesting site of an extinct blue macaw and he eventually escorted me to take photographs of what turned out to be sheer cliffs some 7-8 metres high with a small shingle beach on the Rio Parana.

We returned to London on 17th July. The trip was very demanding physically and was disappointing in that we realised that the Glaucous macaw was long gone. We decided the reported sighting by Vaz-Ferreira in 1951 of a single bird on a fence post near Bella Union in Uruguay was on the basis of our findings erroneous and heard from Nelson Kawall that Rossi dalla Riva's claim to Bertagnolio to have had a Glaucous macaw in his collection in 1975, which he said died in January 1976 of food poisoning, was total invention.(21) It seems most likely that his claim to have located nesting sites in Sao Paulo state is also fantasy. However we learnt much and got to know some really friendly and co-operative people whilst we were there, whose help and advice was indispensable and contributed greatly to our expedition.

Much of the research into original reports was completed after our return and continues. This has been a real labour of love. I have discovered that when many early writers and naturalists refer to a blue macaw, they are

often referring to the blue and gold macaw (*Ara ararauna*). This started with the great French naturalist Buffon.

Azara, however, refers to the blue and gold macaw as caninde and this is still its local name in Brazil today. The local Indian name for the hyacinthine macaw is araruna, meaning black macaw, which must not be confused with the Latin for the blue and gold macaw.(22) Apart from the library at the Natural History Museum at South Kensington, I have been fortunate to have access to the library at the Latin American Institute in London.

Finally I should like to express thanks to Diego Gallieno, Claudio Bertonatti, Dr. Navas and his assistant Juanna in Buenos Aires as well as Daphne Colombet in Misiones Province, Nelson and Marianne Kawall in Sao Paulo, Dr. Mauersberger in Berlin as well as Nigel Collar of the ICBP for their enthusiastic help and support. I should not forget Senor Abal at Pinalito Reserve in Misiones nor the couple in the forest hamlet of Deseado, who supplied me with water, soap, towels and beer when I arrived exhausted and covered from head to foot with red mud after having dug the car out with my bare hands when it got stuck in the Urugua-i Provincial Park.

I am also appreciative of the forbearance of the librarians at the Natural History Museum and Canning House, who have had to deal with an often harassed businessman rushing in between appointments to search for entries and have them photocopied for later collection and study.

Finally I should like to make a plea to one or two of today's writers on rare species. Aviculture like any other little sphere of human interest is rife with gossip, rumour and other tantalising information. It also wants to be taken seriously by the world at large and in particular rightly be recognised for its positive contributions to human endeavour. To present the Chinese whispers and tenuous tales in circulation as serious subject matter in my view goes beyond muddying the waters of scientific truth. It actually poisons the well of knowledge. I would plead with these people to consider very carefully the information they receive, checking and verifying it thoroughly before submitting it for the world's attention.

Notes

1. Porter visited Buenos Aires Zoo in 1938 and according to Rosemary Low saw an old bird, which he estimated to be some 45 years old and which he alleged had been at the zoo for over twenty years.

2. Orfila visited the zoo in 1936, took photographs and included a brief description in an article the same year for *Hornero*, the bulletin of the *Asociacion Ornitologia del Plata*, entitled "*Los Psittaciformes argentinos*". On receiving a copy of this from the *Asociacion* we immediately noticed that the two black and white photographs with the article were printed with the wrong caption - the picture of the Glaucous Macaw with a caption describing it as "Arara azul, *A. hyacinthinus*" and the Hyacinthine with a caption describing it as "Arara celeste, *A. glaucus*". Orfila described the bird as "Color general azul verdoso, tenido de grisaceo sobre la cabeza y el cuello y de parduzco sobre los lados de la cabeza, garganta y parte superior del pecho; abdomen verdoso, pagina interior de las plumas como asi mismo las grandes cobijas internas del ala negro sepia; piel de la region prioftalmica y base de la mandibula, desnudas, color amarillo cromo palido; pico, iris, tarso y parpados negros." He also claims there were two skins in the Museo Argentino de Ciencias Naturales Buenos Aires as well as the live specimen in the zoo.

We found, however, only one mounted skin during our visit and could not obtain any information about other skins. We assume in the absence of any information to the contrary that the skin we saw and examined was of the bird from the zoo.

3. We believe the reports of blue-green macaws on the Rio Iguazu in the early sixties to be that of Illiger's Macaws (*Ara maracana*), which occurs in localities in southern Brazil, and not *Anodorhynchus glaucus*. It is also possible that the Rossi dalla Riva report of nest sites in southern São Paulo state, which has otherwise been dismissed as fantasy, refers also to *Ara maracana*.

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4. The measurements of the skins in the Museum der Naturkunde, Berlin were as follows:

	<u>Length</u>	<u>Primary</u>	<u>Tail</u>	<u>Upper mandible</u>
<i>A. glaucus</i>	675 mm	370 mm	360 mm	80 mm
<i>A. leari</i>	690 mm	370 mm	400 mm	80 mm

Ruschi in Aves do Brazil gives the following measurements

<i>A. glaucus</i>	720 mm	370 mm	375 mm	65 mm
<i>A. leari</i>	750 mm	390 mm	370 mm	72 mm

5. Azara in his *Voyages dans l'Amerique meridionale* (1781-1801) published in 1809 writes " Couleurs. Un bleu faible colore la tete, et un bleu de ciel est repandu sur toutes les autres parties; mais, en opposition a la lumiere, ce bleu se change en vert de mer "

The only other early reference to this effect is in Vieillot's entry on macaws in the second edition of the *Nouveau Dictionnaire d'histoire naturelle* (Vol. 2 AN-ASE P.259) published in 1816 in which he writes " Un bleu foible colore la tete, et un bleu de ciel, changeant en vert de mer, regne sur toutes les autres parties superieures..." There is no reference to the Glaucous macaw in the first edition of 1803, as Azara had not yet published his account of his journeys in South America.

D'Orbigny in *Voyages dans l'Amerique meridionale* (1835) in his entry for 28.6.1827 (P.148) writes " Un lointain bleuatre, d'un aspect tout a fait nouveau pour moi, se deroulait devant nous, et nous offrait des bois immenses de palmiers yatais."

6. The following day D'Orbigny wrote " Nous cheminames encore quelque temps au milieu des bois de palmiers yatais qui caracterisent les terrains sabloneux compris entre le Rio de Santa Lucia et le marais du Rio Batel.... tandis que la foret que je viens de decrire est tout-a-fait naturelle, et disparaitra, probablement, quand la population du pays augmentera et depouillera ce sol si riche de palmiers, qui le couvrent aujourd'hui. "

His concern about the disappearance of the yatay palm forests is a recurrent melancholy theme. For example on 4.1.1828 he writes " Je quittai le Tacuaral, pour aller au Yataity-Guacu (he explains in a footnote that this is Guarani for great yatay forest)... La Yataity - Guacu est, sans ontredit, le terrain le plus productif de toute la province de Corrientes.... Tous les habitans des autres parties de la province viennent s'etablir au milieu des ces bois, abattent les palmiers et ensemencent les terres.... Il est a craindre aussi que peu a peu l'on ne destruisse les palmiers, qui ne repoussent plus dans les terrains habites, et qui finirant par disparaitre entierement, comme il est arrive au Yataity."

8. The Baedeker of the Argentine Republic for 1914 provides the following statistics on the north-eastern provinces.

	Sq. km	Population	Inhabitants per sq. km
Entre Rios	74,571	388,100	5.2
Corrientes	84,402	341,600	4.0
Misiones	29,229	45,500	1.6

Net immigration to the Argentine between 1857 and 1912 was 2,958,147.

9. In his 1802 *Apuntamientos para la historia natural de los Paxaros* (Vol. 2) Azara writes in the entry on *Del Azul* " pero su alimento *parece que se limita a frutas, semillas y datiles*; porque no tiene la fuerza que el primero en el pico, ni en el cielo de la boca." The italics are mine. This speculation of Azara has been upgraded to fact by some more modern writers.

10. Goeldi in his *As Aves do Brasil* (1894) writes the following in his comments on the *Sittace glauca*: " Ao que *parece*, a alimentacao consta principalmente de cocos de tucum, tao rijos que mesmo a martello custa abril-os, et tambem da palmera mucuja." Again the italics are mine. This is yet another comment that has been taken as proven fact by some modern writers. Goeldi did not obtain this information from Azara. It would appear to be taken from Bates " *The Naturalist on the River Amazon*."

In his entry for 7.9.1848 Bates wrote " We saw here, for the first time, the splendid Hyacinthine macaw (*Macrocerus hyacinthinus* Lath., the Araruna of the natives), one of the finest and rarest species of the Parrot family. It only occurs in the interior of Brazil, from 16 S lat. to the southern border of the Amazon valley. It flies in pairs and feeds on the hard nuts of several palms, but especially of the Mucuja (*Acrocomia lasiospatha*). These nuts, which are so hard as to be difficult to break with a heavy hammer are crushed to a pulp by the powerful beak of this macaw.

In August 1852 on the Tapajos River some 70 miles from its confluence with the Amazon near Santarem he wrote " I obtained six good specimens of the Hyacinthine macaw The macaws were found feeding in small flocks on the fruit of the Tucuma palm (*Astryocaryum tucuma*), the excessively hard nut of which is crushed into pulp by the powerful beak of the bird. I found the craws of all the specimens filled with the sour paste to which the stone-like fruit had been reduced."

This evidence is completely at variance with Azara's speculation about the strength of the Glaucous macaw bill and its likely feeding habits. It is puzzling why Goeldi should repeat Azara's report on the nesting habits of the Glaucous macaw, but ignore his comment on its feeding habits.

11. Sick writes in Vol. 1 (P.302) of his *Ornitologia Brasileira* (1984) " Vivia nas baixaidas com palmeiras (tucum, mucuja) margem del rio, escavava seus ninhos nos barrancas altos do rio Paraguaui, nidificando tamben em ocos de arvores." This information appears to be taken uncritically straight from Goeldi.

12. Bourjot Saint-Hilaire in his entry on the Glaucous macaw in his splendid work *Histoire Naturelle de Perroquets* (1837-8) says, " M. D'Orbigny ... a bien voulu nous donner quelques notes sur les habitudes de ces especes. Ces individus ne sont pas tres-nombreux; ils se tiennent dans l'interieur des bois du littoral, sont sedentaires, vivent par couples, timides, peu querelleurs, on le volleut, droit, prolonge; ne se posent jamais a terre, mais passent de branches en branches, vivant de l'amande du noyaux des different palmiers; nichent dans les falaises des rivieres, et ont un cri desagreable, qui peut se noter ainsi araraca."

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This entry is accompanied by one of the best illustrations I have ever seen. It would appear to have been of the live specimen Bourjot Saint-Hilaire saw in London Zoo in 1836 and on which he comments as follows: " Nous avons nous-meme vu a Londres ce Guacamayo, ou notre Perruche-Ara glauque ici decrite, en opposition avec le Perruche-Ara bleu cobalt; la dissemblance est frappante, ce dernier oiseau est d'un bleu fonce de cobalt et beaucoup plus grand, a la membrane basi-rostrale d'un jaune bien plus intense."

In the entry on the Hyacinthine Macaw Bourjot Saint-Hilaire refers to this aspect again " Nous avons vu la Perruche-Ara bleu-cobalt et la Perruche-Ara glauque en presence l'une de l'autre au Zoological Garden; la confusion n'est pas possible entre ces deux especes, si on les voit ensemble; il faut tout l'art de faiseurs de synonymes pour embrouiller des choses si distinctes."

13. Martin de Moussy writes in his *Description géographique et statistique de la Confederation Argentine* (1860) " La province de Corrientes possede un autre Ara plus petit, mais a longue queue comme les precedents (other macaws already mentioned), qui vit principalement dans les bois de palmiers, ou il se nourrit du fruit du Yatai; sa couleur est violette."

14. The Jesuit father Jose Sanchez Labrador made the earliest known reference to the Glaucous macaw. Born in Spain in 1717, he joined the Jesuits in 1731 and was sent to South America in 1734. From 1746 to 1758 he worked with the Guarani reductions. Then he spent a year in Asuncion teaching theology, after which he went to Belen, 130 miles north of Asuncion, where he founded new reductions particularly among the Mbaya Indians. He was one of the last Jesuits to be expelled from South America in 1768 by the Spanish and Portuguese authorities and spent the remainder of his long life in Italy at Ravenna, where he died in 1798.

He was a distinguished naturalist as well as ornithologist, travelling widely in the area. In 1767 he wrote about the Glaucous macaw " Hay muchisimas de estas aves en los bosques de la orilla oriental del rio Uruguay; en las selvas del rio Paraguay se ven raras."

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Sanchez Labrador produced a massive work on his experiences and research in South America, six volumes of which are entitled " *El Paraguay Natural Illustrada* ". This apparently still lies unedited and unpublished in the Jesuit archives in Rome. Photographs are also in the archives of the Provincia Argentino- Chilena in Buenos Aires and an extract entitled " Peces y aves del Paraguay " was published in 1968.

15. Azara's opening sentence for his entry Del Azul in the *Apuntamientos para la historia natural de las Pajaros* starts " He visto algunas parejas identicas entre los 27 y 29 grados de latitud"

16. In mid-December 1827 D'Orbigny and his companions had to hunt to eat and besides ducks and other birds sampled Glaucous macaw. He wrote however " mais la chair de ces oiseaux est si coriace, que je ne pouvais en manger."

17. Goeldi wrote incorrectly " Informa D'Orbigny que navegando o rio Parana por algum tempo, sustentou-se exclusivamente da carne intragavel d'esta Arara."

18. D'Orbigny travelled in the Batel swamps in the summer of 1827 and describes (P.168) how " J'y tuai, pour la premiere fois, cette belle espece d'ara bleu que les Guaranis nomment araraca."

19. The population of Paraguay in 1865 immediately before the War of the Triple Alliance has been estimated at between 525,000 and 1.3 million. The population census in 1871 indicated a total population of 221,079 made up of 28,746 adult males, 106,254 adult females and 86,079 children. Assuming the lowest population figure in 1865 to be correct, Paraguay would have lost some 90% of her adult male population in this terrible conflict. Some writers have accepted the higher figure leading to the claim that Paraguay lost over 1 million men.

(17)

20. D'Orbigny's entry about the nesting sites on the Parana at Ita-Ibate ("stony heights" in Guarani) in December 1827 says " nous demarrames et fimes force de rames contre le courant ... Une falaise elevee, couverte de bois, etait a notre gauche, a droite s'etendait la Parana, qui, lorsque sa rive opposee n'etait pas masquee par des cotes, nous offrait presque une lieue de largeur; et au-dela, la territoire du Paraguay. Tout le long de la falaise, on voyait dissemine des couples d'aras d'un bleu glauque, dont les echos des bois repetaient incessamment les cris aigus. Chaque couple se montrait soit sur le bord des enormes trous, qu'ils se creusent dans les falaises, afin d'y déposer leur nichee, soit perche sur les branches pendantes des arbres qui coronent la cote. A ces cris aigus venait se meler le cri non moins desagreable des pavas del monte (dindon des bois), qui ne cessait que lorsque nous nous eloignons de leurs nids."

21. Bertagnolio published an article in the Avicultural Magazine in 1981 based on letters he received from Prof. Rossi dalla Riva, who went to Brazil in 1960, became a collector and frequently went on expeditions into the interior. In a letter dated 20th April, 1970 he wrote (Bertagnolio's translation)" Regarding the information you requested on the.... Glaucous Macaw ... it seems certain that the latter nests in a locality not very far from here, a locality that ... I prefer not to reveal otherwise local collectionists (sic) would immediately send their hunters and trappers."

On 14th November, 1975 he wrote " Among the parrots I possess there are two pairs of Spix's Macaw and one Glaucous Macaw." Then on 12th January, 1976 he wrote, " I have suffered heavy losses because of an alimentary intoxication. Among the others the following birds died:....the A.glaucus...." I had heard from several sources that Rossi dalla Riva was very imaginative and contacted Nelson Kawall, the well-known Brazilian aviculturist for confirmation. He replied that Rossi dalla Riva never had Spix's macaws nor a Glaucous macaw.

22. Vieillot has also contributed to some of the confusion. His entry in *La Galerie des Oiseaux* - Vol. 1 (1825) on the Hyacinthine Macaw entitled *Macrocerus Hyacinthinus* (Plate XXIV) has an illustration of the Hyacinthine macaw, but the description is that of the Glaucous Macaw taken from Azara. He also adds " Un individu, que nous avons vu vivant a Paris, imitoit parfaitement la voix de l'homme, le cri des perroquets, et les divers bruits qu'il entendoit; il etoit tres jovial, tres caressant, et d'une tres grande docilite." It seems much more likely that the specimen he saw in the Paris zoo was a Hyacinthine macaw. It is also curious that the entry attributed to him in the earlier *Nouveau Dictionnaire d'histoire naturelle* (1816) is more accurate.

At the Latin American Institute library I found Captain Page's account published in 1859 of his explorations in the area in USS *Water Witch* from 1853-56. Although he explored the river systems extensively, including the Rio Paraguay as far as Corumba, Brazil, there is no reference to the Glaucous macaw except perhaps in Appendix J, where in the list of birds caught there is mentioned " *Anodorhynchus cinereus* " immediately before " *Macrocerus brasiliensis* ", the latter being presumably the Hyacinthine Macaw.

Some of the Glaucous skins in the Washington collection were provided by Capt. Page from his explorations. In the same library I read a footnote in Laubmann's " *Die Voegel von Paraguay* (1939)", an account of the scientific results of the German Gran Chaco expeditions of 1925-5 and 1931-2, which refers to Page's 1857-60 expedition. " .. eine einheitliche Bearbeitung dieser Ausbeute ist aber nie erfolgt. Einige wenige auf diesen Material beruhenden Neuschreibungen befinden sich zerstreut im amerikanischen ornithologischen Schrifttum." I have not been able to discover whether the situation has changed in the 53 years since Laubmann wrote this footnote, but as it appears the collection of skins was purely incidental to Page's mission, there may be too little information for proper scientific analysis.

(19)

There are frequently intriguing, tantalising references to very interesting birds in traveller's tales of the last century. One such is Paul Fountain's *Great Mountains and Forests of South America* (1902). In this account of a journey he is supposed to have taken in 1884 in South America, he reports seeing on the upper Purus macaws described as follows: " Another species was ultramarine, blue on the back and breast, with black wings and tail, and a noticeable bright yellow ring round the eye. This bird was only seen in small flocks." This description almost belongs to the " green with yellow and red bits " category, but serves to illustrate the care that must be taken with reference sources.

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