

FIRST STEPS FORWARD IN THE BREEDING OF THE PLUM-CROWNED PIONUS *Pionus tumultuosus* AT LORO PARQUE

by Roger G. Sweeney

The Plum-Crowned Pionus *Pionus tumultuosus* has a unique blend of qualities which make this species fascinating to aviculturists. Its beauty, quiet and interesting behaviour combined with considerable captive management and breeding challenges have ensured that for those who have been fortunate enough to work with this species in captivity on the few occasions when successful breeding has been achieved, the breeding of few other species could have given greater satisfaction.

The Plum-crowned Pionus measures about 29cm (approx. 11½in) in length. Weights recorded for the adult pair at Loro Parque at the end of the 1996 breeding season were: male 224g and female 265g. The general colour is green which is paler on the underside of the body. The feathers of the sides of the head are red, tipped purple, with white bases to the feathers showing through, particularly below the eyes. The crown of the head is darker red, which becomes purple-red on the neck and breast. The under tail-coverts are bright red with yellowish-green tips. The bill is olive-yellow; the legs and feet are grey. Immature birds vary from the adults in having the nape and hindneck green like the back, the cheeks and breast are also green. The under tail-coverts of immature birds are also yellowish-green with only slight red markings. Little recent field information is available to assess the size of the wild population although it is known that this species prefers high altitude mountain regions at 2,000m (approx. 6,500ft) and higher in eastern Peru and Bolivia, which is perhaps the main limiting factor to the size of the wild population. The Plum-crowned Pionus has always been extremely rare in aviculture and poor captive breeding results have now brought the Plum-crowned Pionus to the point where it has almost disappeared from aviculture.

A single male was present at Loro Parque for many years, until a young female was located in South Africa, bred there by Dr Deon Smith. The pair settled down well together but no signs of breeding were recorded prior to my arrival at Loro Parque in 1994. As with all of the other pairs of Pionus, the pair of Plum-crowned have two feeding periods each day. At 7.00am they are given a main dish of approximately 60g of diced salad which comprises items such as apple, pear, lettuce, tomato, orange, beetroot, alfalfa, red pepper, banana, palm fruit and carrot. A second food dish supplies the birds with approximately 30g of commercial pelleted food (Pretty Bird Hi-protein special) which is available to the birds throughout the day. At 3.00pm

the remains of the salad are removed and replaced by a new dish containing approximately 50g of mixed seed and grain such as sunflowers, safflower, corn, millets, oats, niger and hemp, and cooked pulses such as mung beans, black-eyed beans, lentils and chick peas, etc.



Copyright Loro Parque

Plum-crowned Pionus at Loro Parque

Drinking water is available to the birds at all times and is from a special filtered supply which passes through a series of chlorination, reverse osmosis filtration and finally ultra-violet light sterilisation. In addition the birds are provided with daily showers in the late morning or early afternoon from a fine mist spray sprinkler system which is included in the design of every exhibition cage in the parque.

During the early part of the 1994 breeding season, the pair were transferred to a newly constructed exhibition area for Pionus and had settled down well by the second part of 1994, but without showing any signs of nesting behaviour. No serious attempts were made at breeding by the pair during 1995 or 1996, most probably due to construction work taking place from mid-1995 to early 1996 on a new cinema in the parque very close to the Pionus cages. When this disturbance ceased in spring 1996 the behaviour of the birds improved and indications of breeding were observed. The female spent several weeks during which she frequently entered the nest-box and the nesting medium was chewed into a scrape, but no eggs were laid.

In spring 1997 the pair again began to show signs of breeding behaviour, and on February 19th laid their first egg. The clutch eventually consisted of three eggs but after they had been in the nest-box for several days it was evident from nest-box inspections that they were not being incubated properly. I removed the eggs and placed them in an incubator. When first candled they all had large air-cells, but no sign of fertility could be seen. After five days in the incubator all three eggs began to show embryo development but none of the embryos survived past 16 days of incubation, probably due to the early period of poor brooding by the parents.

The pair continued to show breeding behaviour and a second clutch of eggs was laid, beginning on April 27th. On this occasion we had the option of a pair of Maximilian's Parrots *Pionus maximiliani* which were incubating nearby and which could be considered as potential foster-parents. The Plum-crowned Pionus laid four eggs in their second clutch and so two eggs were removed and fostered under the Maximilian's Parrots. The other two eggs remained with the natural parents, together with one of the Maximilian's eggs so that the clutch-size of the Plum-crowned Pionus was not changed too dramatically and numbered three instead of four eggs. The remaining Maximilian's Parrot eggs were taken for artificial incubation and rearing. The pair of Plum-crowned Pionus failed to hatch their own eggs, but did hatch and rear the single Maximilian's Parrot chick thereby demonstrating good parental ability. Once the Maximilian's Parrot chick was a few days old, the two unsuccessful Plum-crowned Pionus eggs were removed, measured and necropsied. Both showed embryo death at mid-term of incubation. External measurements of the eggs were 38.3mm x 27.4mm and 34.6mm x 27.0mm.

Meanwhile the pair of Maximilian's Parrots had managed to hatch both of the Plum-crowned Pionus eggs that they had been given. On discovering that the chicks had hatched our thoughts turned immediately to considering what steps could be taken to reduce the possibility of fungal conditions such as aspergillosis, which have been the most significant problem in the successful breeding of this species in captivity. Prior to the breeding season

the nest-box was disinfected and provided with clean wood shavings as a nesting medium, and these were lightly dusted to prevent a parasitic infestation. By the time that the chicks hatch the nesting medium has become soiled, not to a degree which would normally cause me concern, but in the case of this species extra caution was deemed prudent. We waited until the fifth day and then the nesting medium was quickly replaced with clean shavings. The chicks when viewed closely are among the most attractive that can be encountered in the Parrot family. The primary natal-down is dense and soft white in colour, similar to that of newly hatched Keas *Nestor notabilis* and chicks of the black cockatoos of the genus *Calyptorhynchus*.

On June 12th the chicks were handled briefly to ascertain if they were ready for closed leg bands to be fitted, and at this time they were weighed and crop and cloacal swabs were taken as a precaution. The chicks appeared in very good body condition but the cultures from the cloacal swabs showed a significant growth of *E. coli* (more than is routinely seen from other similar parent reared chicks of this age), and so a three days course of antibiotics was administered without any significant interruption to the chicks' growth rate. Subsequently, the wood shavings were changed regularly until the time of fledging.

On July 15th we suffered a great disappointment when we discovered that one of the chicks had died in the nest-box. The necropsy was inconclusive, although a fungal infection was considered the most probable cause. The remaining chick was then removed from the nest-box and transferred to the clinic. Now close to being fully feathered the chick was initially given three feeds a day and was subject to close observation. The young bird seemed strong and showed no sign of either fungal or bacterial infection, but it remained very nervous. After two days it was introduced to a young Lilacine Amazon *Amazona a. lilacina* which, due to a leg fracture just before fledging, had also been brought into the clinic. The Lilacine Amazon was more confident in its behaviour and began feeding from the food dish almost immediately. The Pionus remained more nervous but certainly became more confident in the company of the Amazon and after a week was also starting to eat from the food dish. The chick was eventually eating on its own four weeks after being brought into the clinic. The young bird was now in beautiful condition with a richness in the coloration of the plumage which was even more striking than that of the male parent which I have long considered to be one of the most beautiful birds in the parrot collection at Loro Parque.

The above article was written when Roger G. Sweeney was Curator of Birds at Loro Parque. He can be contacted by writing to:- Dymocks Mill Cottage, Oldcastle, Nr. Malpas, Cheshire SY14 7NE, England.

*The following article was first published in the magazine in July 1934. Walter Goodfellow was born in 1866 and died in 1953. Alan Gibbard wrote about him in the Avicultural Magazine, 92, 4:220-221, and noted that an Obituary notice written by David Seth-Smith was published in the magazine in 1955. Goodfellow is credited with having brought to the notice of science the Mount Apo Lorikeet *Trichoglossus johnstoniae* and the Mikado Pheasant *Syrmaticus mikado*, and with introducing the first living specimens of them to aviculture. He also brought to Britain the first Duivenbode's Lories *Chalcopsitta duivenbodei* and Bulwer's Pheasants *Lophura bulweri* - in 1919. -Ed.*

THE ROYAL PARROT FINCH *Erythrura cyaneovirens regia*

by Walter Goodfellow

I think the introduction of this beautiful finch to this country is quite a landmark in aviculture. Why it has been so long delayed I don't know unless it is the difficulty and expense in getting to the far off islands where it lives.

It was first described by Dr Sclater in 1881 from a skin collected by Captain Kenneth Howard, R.N., on the island of Epi in the New Hebrides, and this skin and a spirit specimen are still the only ones in the British Museum. American collectors, however, were out there a few years ago, and got a good series of skins from the type locality and other small islands nearby, which together form what is known as the Shepherd Group. It was to these islands Mr Shaw Mayer and I went.

For a long time I had this bird in my mind hoping one day to be the first to get it alive, but the great drawback was, that these islands are very poor in bird life, and there was nothing else there to make it worthwhile in case of failure. Last year when Mr Mayer returned from New Guinea I found he had been considering the same thing, so we joined forces and set out. I must say though that when we left England it was perhaps more with the intention of going to New Guinea, but as we had first to go to Australia in either case, we decided to leave it open until we got to Sydney and saw how the boats fitted in. When we found there was one leaving for the New Hebrides in five days we made up our minds to risk it, as it was by no means certain if Royal Parrot Finches would be in sufficient numbers to pay expenses, and I am afraid they were not.

Vila, the only port in the islands, is some ten days from Sydney, and from there on it is difficult to get to some of the islands, and always with great delay, so if we made a wrong choice much time would be lost and great expense incurred. This is one of the drawbacks in going to the more

out of the way very small islands, some of which are so unhealthy, and the chance of getting any accommodation at all uncertain, as camping out during six months of the year is quite out of the question owing to the possibility of hurricanes which periodically devastate the islands. Two such occurred last year on the island where we collected, and one last January while we were there, of which more later.

I doubt if there is one New Hebrides island without any parrot finches. Close around the little settlement of Port Vila we saw small flocks of the Blue-faced *E. trichroa* every day feeding on the grass seeds in the coconut plantations; and on some of the islands further north (Ambrym for one) *E. c. serena* and the Blue-faced are both to be found. The former of these, also a beautiful bird, was first discovered as far back as 1860 when MacGillivray procured one on the island of Aneityem right down south. This distribution is rather curious as typical *regia* also inhabit an island in the Banks Group in the extreme north, while the intervening islands have other sub-species. We thought it best to go to the type locality and get true *regia*, which after all is the most beautiful of all the parrot finches either from the New Hebrides or elsewhere. When in full plumage I think there is no doubt that it is the most beautiful finch known. Gouldians *Chloebia gouldiae* look pale and washed out in comparison with the striking contrast of the scarlet, blue and green of the Royal Parrot Finch, and I may as well say here it seems to be as hardy as any finch known. Out of all ours we only lost three. One of these we had to destroy because of a deformed leg, and the other two escaped in Tahiti on our way home when the cages were being cleaned out under very difficult conditions. What our birds had to go through and survived only ourselves know. We changed to three boats before we got home, and sometimes this was late at night after the birds had gone to bed. Colon on the Panama Canal was one port where we changed from a French boat to an English one. The cages were lowered by ropes over the side into a launch at 10.00pm, and none too gently either, and then left in the Customs shed all night on shore. To hear the birds dashing about it seemed as if they would all be fatally injured.

After we arrived at Vila from Sydney our steamer was making a special trip to some of the principal islands, so we took advantage of this to become acquainted with them before deciding on a collecting ground. In this way we visited Malekula where there are still cannibals inland, Esperitu Santo, Tangoa and many others, finally returning to Vila. A week later we embarked on a still smaller boat, indescribably dirty, for our final destination, which we reached after three days. I shall always see the picture in my mind of this beautiful island as we approached it in the early morning through a sea like glass. It rose before us mountainous, and clothed in tropical verdure to its summits, and how we scanned it through our glasses to see if we could

detect any open grassy spaces where the finches would be likely to feed, but in vain. The boat only stopped long enough to put us and our baggage ashore and then was off again. Had she stayed longer I really believe after we had been on shore a day we should have re-embarked and chosen another island as this seemed so unpromising.

We neither saw any of the finches nor any ground where they would be likely to feed (from our point of view), nor even any suitable grasses, neither did the local people seem to know the birds we were after. It was several days before we could make them understand, and longer before we definitely got its true local name, although we had the assistance of two white traders who spoke the language. We had mentioned the redhead, so they jumped to the conclusion that it was the Cardinal Honeyeater *Myzomela cardinalis* we wanted and gave its name 'Susupaumiel'. At length after interviewing scores of local people we made them understand, and found the right name, which is 'Taputi'; the 'u' is pronounced like a double 'o' and means a grass-plucker. In some of the villages they called it 'Taput' without the final 'i'.

When asked where they were to be found, they pointed to the great banyan trees. My experience of other species of the family was that they went in flocks, fed on the ground, and were easy to catch, so we were inclined to think that we might still be on the wrong track, but when they told us the Americans on the yacht *La France* had been after the same bird a few years before, we thought they must be right, as we knew they had collected skins of the Royal Parrot Finch on this island. We found one might live there for months or even years and never see one, because after all it is true they live in the tops of trees and feed on fruit. In a way it is practically a fruit-eating finch.

Two traders who had lived there for years had never seen the bird or heard of it, neither had the only white woman, the daughter of the pioneer missionary, who was born and brought up on the island and spoke the local language fluently. I mention this to show how concealed the birds must be in their treetops, and this on an island where the number of species is very small.

There are several kinds of ficus or banyan trees growing on the islands, so one or other is never without fruit, and it is on these the *regias* feed. Some of these trees are simply stupendous, but the one they liked best is called 'Nambulifer' with the accent on the second syllable, and after that 'Naïda'. The others were not of much consequence so far as their fruits were concerned, and I imagine they only eat them when times were hard. The 'Nambulifer' was the size of a large cherry, dark maroon on the outside. The birds bite through the rather hard outer flesh to get at the tiny fig-like seeds embedded in a sweet pulp in the centre, which they crack and eat; so it is easy to understand why they have such strong bills for their size. When

feeding they pluck a ripe fruit and carry it to a stout branch, where holding it under their strong claws, peck through the outer part until they reach the seeds, and each bird always returned to the same branch it had chosen. By watching this and placing lime there, was the way they were caught. This was tedious work as they were only obtained one by one and sometimes for days together none at all.

Of course we had to have local help, and like all such people, although they were well paid, quickly tired of the work as the novelty wore off, and left us; in fact most of them seemed to think it derogatory to catch birds at all except for food, and laughed at those who did. We never found one man who carried on right through to the end. It was rather surprising how few full-plumaged birds were caught. We must have had quite 20 before we got one with a red head, although at the last they were rather more numerous.

We arrived on the island in early December, and some of those caught then still showed the iridescent lumps at the gape, and had more or less yellow bills of the very young birds, so I think they commence to breed in October or even earlier. A nest containing three very young birds was brought in after the first week. This is placed in a fork, or between two branches 30 feet (approx. 9.1m) or more above the ground. It is a large domed structure more oblong than round, rather loosely constructed 18 inches (460mm) deep, with the opening at one end. The materials used in every case were dried grass, dead leaves, fibre and the curly tendrils of some vine. The whole thing had a very bleached appearance and many of the dead leaves were skeletonised.

All over the island grow great thickets of a tall reed-like grass 12 feet (approx. 3.6m) or more high which are used by the inhabitants to thatch their houses, and it is the long narrow leaves of these, torn up, which the birds use. The fine fibre had also been stripped out and very freely used. This seemed rather a dangerous material, as a young bird from the first nest had got some of it tightly twisted round a leg bringing the foot up to the thigh, and so completely crippled I had to destroy it. In another nest was one entangled by the wing, which was so badly swollen I thought it would have to go too, but it eventually got all right and now I can't pick the bird out, but it was bad for a long time. The nests have no lining but at the bottom is a loose litter of broken grass and leaves probably caused by the birds shuffling about.

It was always difficult to get the young ones without breaking up the nest, for as I have mentioned before, their feet and claws are very strong, even more pronounced when young, and with these they hold on to anything they can grip, so much so that whenever one was picked up it always brought another with it, either by the head, wing or leg, and tightly they held them too. The claws were also used freely for climbing about. The opening to

the nest was usually fouled by droppings which consisted entirely of fig seeds, dry and trodden quite hard. No nest contained more than three young ones, and on two occasions only two, but in both these under the litter was a clear egg pure white, so evidently three is the complete clutch. When first hatched the bill is flesh-coloured. This quickly turns to yellow and before they leave the nest it has become orange.

This looked strikingly beautiful against the dark blue heads of the first plumage, but would probably not look so well against the scarlet of the adult stage. The upper mandible quickly changes to a dingy black, beginning at the tip and spreading upwards, but the sides of the lower mandible remain more or less yellow for a long time. The legs and feet at first flesh-coloured, gradually get darker, and finally blackish. In all I reared 17 young ones, but one caught a chill after it could feed itself, through bathing late in the evening during the hurricane when the temperature fell very low, and died the next morning; and another from the last nest of all jumped from my hand onto the verandah at Vila just as the sudden darkness of the tropical night came on, and was lost under the house. The remaining 15 arrived here safely. They were among the most delightful youngsters I have ever reared. They all had enormous appetites, and it was really delightful to see a row of them all with their orange bills wide open asking for food.

At first the iridescent nodules at the gape were bright blue, but quickly lost their brilliance as the birds grew. On the palate were two crescent-shaped patches, black, and very conspicuous when the mouths were open. Long after they could feed themselves they still liked to be hand-fed, and whenever I opened the cage door they jumped out of my hand and arm with beaks wide open. I reared them on a mixture of fig seeds (crushed at first) with the yolk of hard-boiled egg and biscuit meal which seemed to suit them perfectly, and they were as easy to rear as any birds I have ever had. At first the food was well moistened with water, but later given fairly dry. When canary seed was supplied they took to it at once.

In their first plumage they had the head and upper breast very dark blue shaded into a much lighter greenish-blue on the underparts, the rump dark red and the tail brownish-red, the back and wings dirty green. At the time of writing (May) they are now five and four months old, and all have red heads, but not quite the bright cherry red of adult birds. Some, probably the older ones, are quite bright blue on the back and fore-breast. It is not a fact as an American ornithologist states (he was judging only from skins) that they moult straight from the nest plumage to the adult, for the first change is nothing like so bright, nor is the body entirely blue. This can be seen by the pair in the Bird House at London Zoo. Individual birds seem to vary in some particulars as we caught birds still showing the blue nodules at the gape, while some of our hand-reared ones lost them even before they were

able to feed alone, and others again still showed them much later. Also the bills turned black in some cases much sooner than in others from the same nest. The females, according to the same ornithologist, are supposed to have the wings entirely green, while the male has the wing-coverts the same blue as the body, but we are still uncertain if this is quite correct.

On January 24th two young ones were brought to me which could not have been more than a few hours old. They were so feeble and tiny, barely an inch (25mm) long, it seemed impossible to do anything with them. They were entirely flesh-coloured, body, bill and legs, and opened a minute oblong mouth with the tips of the bill so slightly developed as to be all but invisible, but the dark crescent marks on the palate and the blue spots at the gape were highly conspicuous. I did my best with them and failed, but they lived for four days.

The island we were on was entirely waterless so far as springs or wells were concerned. The local people depend upon rain water and the birds likewise. Fortunately the rainfall is heavy, but at times they suffer from a shortage.

We found the Royal Parrot Finches extremely difficult to get on to seed. At one time we thought we might have to bring them home as fruit-eating finches. It was no good trying to starve them on to it, we did this for several hours first thing every morning, neither would they take soaked seed. For weeks we looked in vain for husks, then after a time a few grains of canary seed were eaten by a few, but not enough to keep them alive. At first we gave them their natural figs cut in half, and these they ate in quantities, but made a dreadful mess of the cages and themselves by throwing the outer red part about which stained everything crimson. Then we started to take the seedy centres out on the point of a spoon, and mixed it with biscuit and the yolk of hard-boiled egg. Hours and hours were spent every day over this until we loathed the very sight of the fruits; moreover, the outer part of the *naïda* variety contained an acid which after a time burnt away the skin on the fingertips until they bled and became extremely painful. We put a local man on the job, and at first he rather laughed at the effect of the fruit on us, but after a few days he suffered just the same. We had thought that his fingers would be harder. The birds were very fond of egg and I think this kept them from falling off in condition. We kept up this egg and biscuit even after they had taken well to seed, so we landed here without one weak or thin bird. After we had left the islands and could get apples, we gave them some every day, and greatly they enjoyed it, and lettuce also.

Unless one has great patience, and is prepared to stay on the islands until the birds are well on to seed, it would be useless to go there for them. We were quite afraid to move out of reach of the figs, not knowing how the birds would fare when these were suddenly and entirely stopped.

The Blue-faced Parrot Finch *E. trichroa* and Red-headed Parrot Finch *E. psittacea* certainly feed on grass seeds in the wild, but I imagine those with entirely red heads, must have similar feeding habits to those of the Royal Parrot Finch. Perhaps this is why so few Peale's *E. c. pealei* ever come over, because so few survive until they are eating seeds. *E. c. cyaneovirens* and *E. c. serena* have not yet been imported, but as neither of them is as beautiful as *E. c. regia*, it is hardly worth while bringing them when you can get the other. *E. c. cyanovirens* comes from Samoa and *pealei* from Fiji.

There is still one more beautiful species to come, this is the Tri-coloured Parrot Finch *E. tricolor* from Timor, discovered by Alfred Russel Wallace in 1868. It is a green bird with the face and the whole of the breast blue. It seems very desirable, and I have no doubt it is a grass feeder as Timor has much open grass country. I have landed in the island, but never collected there.

I mentioned how the New Hebrides are subjected to hurricanes and that in January it was our ill luck to experience one. For more than two weeks before we had constant high winds often reaching gale force and gloomy skies. Later, as the wind grew still stronger, came torrential rains without ceasing day or night. It seemed impossible to imagine so much rain, just as if a sea was overhead, so solidly it came down, and one began to wonder if the sun would ever shine again. The wind still increased until it reached the peak which lasted more than a day. The palms bent nearly double, and many snapped in two, while large branches were falling from other trees all around. Nearly all leaves were stripped off, and the noise and chaos bewildering. I was alone at the time, living in a ramshackle iron shanty anything but watertight at the best of times, and two miles (3.2km) from the nearest village. Mr Mayer was away weather-bound on a small island off the coast unable to return. During the two worst nights I got a local man to come and stay with me as I was afraid if the place went I should be unable to cope with things single-handed. The local people were anxious for me to move to the village, but for many reasons it was impracticable, as in the first place I doubt if we could have got even the cages through the storm. Some of the men spent the daylight hours with me, and with tree trunks and heavy chains strengthened the place as much as possible, but most of them were occupied in looking after their own places. Everything inside was a foot (30cm) deep in mud and water, with bed and everything else wet through.

Cooking was mostly out of the question as fires were hard to keep alight. How I looked after the birds I don't know, for they were not yet eating seed, and fruits were impossible to get. Egg and biscuit was about all they had, and even this under very difficult conditions. I used to wonder how the birds were faring outside, for it seemed impossible that any could live through

it. A young zosterops was picked up near the house, blown from the nest, which I managed to save and rear. The parrot finches must have suffered, as all the ripe figs were stripped from the trees and lay rotten on the ground. After the hurricane had died down I saw many boys pass by with bunches of dead birds they had picked up. Yet after all this, just a week later, I had the two youngest *E. c. regias* I have mentioned brought to me, so their nest had escaped, and the parent birds must have sat through it all and hatched out the eggs.

These hurricanes must do considerable damage to bird life throughout the islands. It was days later before we began to hear again the beautiful notes of the honeyeaters and the screeching of the lorikeets, but I thought not so freely as before.

At the same time I was hand-rearing the young parrot finches I also brought up successfully 16 zosterops of two species, the Yellow-fronted *Z. flavifrons perplexa* and Grey-backed *Z. lateralis vatensis*. Some of these were very newly hatched when brought in, but all lived, and also four Massena's Lorikeets *Trichoglossus haematodus massena*. The zosterops were reared on that invaluable fruit papaya (called in some parts pawpaw) and the yolk of hard-boiled egg, while the lorikeets, of course, were brought up on the sweet milk mixture.

Now we have introduced the Royal Parrot Finch over here, it remains to be seen who will be the first to breed it.

The answer came the following year, when it was bred by C.H. Macklin, whose account of the breeding was published in the magazine in 1935.

BREEDING OF THE ROYAL PARROT FINCH

by C. H. Macklin

In April 1934, I obtained from Messrs. Goodfellow & Mayer a pair of Royal Parrot Finches from the first importation. They were young birds and one still in juvenile plumage with the blue head, but they turned out to be a true pair, although the sexual difference did not show clearly until their first full moult nearly a year after I obtained them. Then it was easy to see that the male had considerably more blue than green in the body plumage in comparison with the female and his red head was distinctly brighter; the red also extended a little further back on the nape of the male.

When I first got them their wings were badly frayed, but they were so wild in a cage that I decided to risk it and put them in an outdoor aviary; here they spent most of their time climbing and hopping about in the shrubs and soon the male was flying well, but the female was rather weak on the



Sweeney, Roger G. 1998. "First Steps Forward In The Breeding Of The Plum-crowned Pionus Pionus Tumultuosus At Loro Parque." *The Avicultural magazine* 104(3), 102–113.

View This Item Online: <https://www.biodiversitylibrary.org/item/253397>

Permalink: <https://www.biodiversitylibrary.org/partpdf/314911>

Holding Institution

Smithsonian Libraries and Archives

Sponsored by

Biodiversity Heritage Library

Copyright & Reuse

Copyright Status: In Copyright. Digitized with the permission of the rights holder

Rights Holder: Avicultural Society

License: <https://creativecommons.org/licenses/by-nc-sa/4.0/>

Rights: <http://www.biodiversitylibrary.org/permissions/>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.