

Tapiragem and Feather Color Alteration on Live Parrots by the Peoples of Amazonia

by John McMichael

In the beginning, there was nothing. The gods hid the colors in the trees, animals and earth, and kept to themselves the spell of tapiragem of the birds. All was dark. Then, in a flash there was Kúat, the sun, and Iaê, the moon, and in those gods' wisdom, they gave the future of the world to man so that in living in it he would come to respect and protect it. Thus, the painting of the skin gives man life, color, joy and a reason to live; and when man learned to change the color of feathers, a little of the incomparable beauty of the birds left the sky. While the dream of man to fly would not be fulfilled, man flew in spirit to the home of the gods, and the gods put their faith in man."

From an Amazon legend

I became interested in how one can change the color of a parrot's feathers two decades ago after I purchased a female Black-headed Caique (*Pionites melanocephalus*²) as a mate for one of my breeders. In that era, before DNA sexing, her owner had mistakenly named her José and she was selling her because she had started to bite. I was happy to get her because she had also begun to lay eggs and I knew her sex with certainty. When I purchased her, she was different from any other caique I had ever seen because she had patches of yellow feathers scattered among her body coverts. At first, I thought this might be a pied mutation, but after six months in my possession, and the completion of her annual molt, all her feathers grew back in their normal green color. From this experience, it was clear to me that there were ways to alter parrot feather color other than by mutation. I became fascinated when I read in Helmut Sick's *Birds of Brazil* (30) that the indigenous peoples of that country use both diet and a process called tapiragem to alter the color of a parrot's feathers.

Tapiragem

Tapiragem, or alternatively tapirage, is a term derived from the Creoles of the Guianas (34, 35), and is a method used by the natives of South America to alter the color of individual feathers on living parrots, usually Amazons (5) and macaws (30).

There is controversy whether it actually works and if it does how (5). For the many Indians across South America who practice tapiragem there is no doubt that it does. The reason they practice tapiragem is to produce the colored feathers, particularly pleasing yellow ones that they highly value for use in their feather artwork. The feathers they usually chose to alter are the longer ones on the wings or tail (38). In general, the method involves plucking out the bird's feathers and vigorously rubbing a compound onto the skin and into the feather follicle. Some reports say they directly instill the compound into the feather follicle (21) and seal it in with wax (20, 21). After the treatment, the affected feathers grow back with a color anywhere from a brilliant yellow to orange to red; some say they grow in yellow with flecks or tinge of red. The main difference in the practice from tribe to tribe is the compound used to induce the color change (Table 1). The compound can be a plant dye; frog or toad derived blood, skin, or skin excretion; the fat of a fish; the fat of the Pink River Porpoise; or other concoction. Once induced, practitioners claim the feathers continue to grow in with the same color, and their owners harvest them whenever they grow back. In Brazil, they call these birds "contrafeitos" or counterfeits because early European visitors thought the natives were selling them in place of rarer species (5, 6, 20, 30). The exact method each Indian practitioner uses is a strongly held secret that he zealously guards (34).

History of tapiragem

Early on, explorers and naturalists noted that the Indians were practicing tapiragem³. Soares de Souza (32), one of the earliest explorers of Brazil, noted it as early as 1587. Pernetty (24) in 1771, Spix & Martius (33) in 1824, and Humboldt & Bonpland in 1862 (9) all made mention of the practice. Both La Condamine (10) in 1745 and Le Vaillant (11) in 1801 mentioned it, but they both doubted whether tapiragem could actually alter feather color. Alfred Wallace (38), the co-discoverer of the concept of evolution, on an expedition up the Rio Negro observed the practice and wrote in 1853 about its use in making the Indian coronets:

"The feathers are entirely from the shoulder of the great red macaw, but they are not those that the bird naturally possesses,

for these Indians have a curious art by which they change the colours of the feathers of many birds.

They pluck out those they wish to paint and in the fresh wound inoculate with the milky secretion from the skin of a small frog or toad. When the feathers grow again they are of brilliant yellow or orange colour, without any mixture of blue or green, as in the original state of the bird; on the new plumage being again plucked out, it is said always to come of the same colour without any fresh operation. The feathers are renewed but slowly, and it requires a great number of them to make a coronet, so we see the reason why the owner esteems it so highly, and only in the greatest necessity part with it."

With this long history, one cannot easily dismiss tapiragem, and its origins clearly antedate the arrival of Europeans.

Tribal Origins

The practice of tapiragem was once wide spread and is probably still practiced among the tribes in South America reaching from the Guianas at least as far south as the Gran Chaco region of Bolivia, Paraguay and Argentina (Table 2). One speculation is that the Indians discovered the process when they tried to cure wounds on their pet birds (21). Because the practice was more prevalent north of the Amazon River, Métraux (19, 21) thought tapiragem probably originated and spread from the northern Arawak tribes to the rest of Amazonia. However, its practice was so wide spread before Europeans arrived, there is little to support this. Thus, it is possible that it arose independently in several places in South America. Supporting this is the fact Wallace reported that it arose independently on the

other side of the world in Malaya (39) where diffusion of the practice from South America would have been highly unlikely.

The Procedure

As noted before, the main difference among the Indian practitioners is the composition of the compound rubbed into the skin and feather follicles. The compounds, that Brazilian authors call unguents, can be divided into two basic groups—those of plant origin and those of animal origin. However, because of the secretiveness of the Indian practitioners, whether there is a strict divide is difficult to know. The plant origin compounds are usually dyes. The most frequently mentioned is a preparation from *Bixa orellana*, which contains a red carotenoid. You can buy the seeds of this plant as a spice in North America under the name annatto, achiote, or urucú. Urucú has a pleasant scent and is an effective insect repellent (31). The natives of South America frequently use it as body paint and in their folk remedies. Later practitioners of tapiragem sometimes used preparations made from a non-native variety of the safflower. One suspects they use these dyes in the belief that their color guided the new growth of the feather toward the desired hue. The exclusive use of vegetable dyes in tapiragem, however, appears to be restricted to the southwest of Brazil and the Gran Chaco.

The Indians in other areas of Amazonia typically use a variety of animal-based preparations. North of the Amazon River, the indigenous peoples usually make their preparations from frogs or toads. Villela (37) and Sick (30) suggest, but Humboldt (9), Walls (40) and Wassen (41) clearly state, that one of



**Arizona's Largest
Certified
Avian Specialist**
(480) 833-4001
2110 W. Southern Ave. Mesa, Az. 85202
www.cageworldaz.com
We are ALL about the wing thing!



RED BIRD PRODUCTS, INC.
Leg Bands & Breeding Supplies
P.O. Box 376
Mt. Aukum, CA 95656-0376
530-620-7440
www.redbirdproducts.com



San Diego Bird Breeders
A Club for Breeders & Keepers of Birds
Learn how to Care for, Feed, &
Breed your Bird & meet new friends.
Professionally raised Birds available from breeders.
Guest speakers at monthly meeting. Bring a friend.
Extinction is Forever—Endangered means there is still time!
Call 760 789-3815 or 619 469-1570 for more information!
<http://clubs.yahoo.com/clubs/sandiegobirdbreeders>



PARROTDISE PERCH
EVERYTHING FOR YOUR PARROT
BUDGIES TO MACAWS...
WE'VE GOT IT ALL!
(888) 243-2194
www.PARROTDISEPERCH.com

these is the colorful Poison Dart Frog (*Dendrobates tinctorius*) (9, 30, 37, 40, 41). The range of this frog is north of the Amazon particularly in the Guianas. There are many morphs of this frog and they occupy small non-overlapping ranges within their overall range. The difference in the patterns of the colors on the backs of each morph is striking. The Indians also practice rubbing this material into small cuts in their own skin as a part of their folk rituals (28). According to witnesses, this is strongly psychoactive, and they probably use the same active form on their parrots. What is not always clear is just what part of the frog or toad they used to make the preparation. Métraux (20, 21) describes in gory detail a process used by one tribe to secure toad fluids. He wrote that they repeatedly prick the live animal with thorns allowing the blood to ooze out, then place it in a pot and sprinkle it with ground red pepper. The stressed toad then exudes its active component mixed with its own blood. Walls noted that sometimes the Indians simply rub a live frog on the parrot's skin, while other tribal practitioners mix the skin excretion with the previously mentioned red plant dye from *B. orellana* (6, 20, 21). In addition to frogs, they also use the Cane Toad (*Bufo marinus*) (41), which exudes bufotoxins, including bufotenine, from its skin. The indigenous peoples sometimes ingest this toxin to induce an hallucinogenic state (29), but if not prepared properly and from the correct toad species this can be lethal.

The practitioners in other parts of Amazonia use animal fats to induce tapiragem. The fat most frequently mentioned is from the Pirarara or Pirara Fish (*Phractocphalus hemipipterus*) (30), but there are also reports that some Indians use

the fat of the Carajó Fish (possibly *Albula vulpes*) (6, 20). The fat of pirarara is nearly red in color (30) and most natives do not eat it because it supposedly eats human corpses, but more likely because it is reputed to cause intense itching in susceptible individuals. (20, 21). They also use animal fats of other origin, including that of the Pink River Porpoise (*Inia geoffroyensis*) (30) and turtle egg fat from the *Podocnemis* species. They also use "fluids" from domestic chickens and caimans, but it is unclear if they use the fat from the egg yolk. As noted for the vegetable origin inducers, the natives appear to link the color of the inducer to the desired response.

The basis of parrot feather coloration

Before going further, it is important to understand the origin of feather coloration. Feather coloration is the result of two very different properties. One is pigmentation and the other structure. The final color of a feather is usually an amalgam of the two. Feathers, like our fingernails, are not composed of living tissue, so the feather follicle must incorporate pigment and structure at the time of the feather's formation. There may be others, but scientists recognize two main sets of pigments in parrot feathers. These are the psittacofulvins (16, 17) and the melanins (27). I refer to these pigments as sets because neither of these pigments represents a single shade of color, but rather they represent a range of shades dependent on molecular differentiation of basic molecular structures. The psittacofulvins represent a range of colors from yellow to red, while the melanins represent a range from red-brown to black. In this regard, parrots differ from other orders of birds in that they do not



**Safe and affordable
handmade parrot toys
for parrots of all sizes!**

Also available are parrot
pinatas, treats, cages
and much much more!

Esther Graham
Phone: 717-424-2318
Fax: 877-808-9676



www.grahamsparrottoycreations.com

www.FlockStockandBarrel.com
TRJ Enterprises

David & Terri Jones
Supplies for Your Pet Bird

Freehold, NJ 07728
Ph: (732) 462-0625
Fax: (732) 462-0377
Dave@FlockStockandBarrel.com



BIRDTOYOUTLET
As breeders you care about your birds!

Fast Shipping!

Great Prices!

We provide all types of
bird care resources
to help keep
birds healthy and happy!

Remind new bird owners to

Visit www.BirdToyOutlet.com



EXOTIC BIRD SPECIALTY SHOP & ONLINE RETAILER

 **Bird Supply**
of New Hampshire

SHOP ONLINE at www.birdsupplynh.com
* Great Prices and Personal Service *
* Breeder & Wholesale Pricing Available *
Mastercard - Visa - Discover - Amex - Paypal

Abba Seed ~ Avico ~ Cede ~ Harrisons ~ Higgins ~ Goldenfeast
Kaytee ~ Lafeber ~ L'Avian Plus ~ Nemeth Farms ~ Orlux
Pretty Bird ~ Roudybush ~ Versele-Laga ~ Vetafarm Au ~ Zupreem

522 Amherst St. Nashua, NH • 888-319-0136 • 603-882-4737

incorporate the dietary derived yellow-red carotenoids (27). Instead, scientists currently believe parrots synthesize psittacofulvins pigments in chromophore cells in the feather follicle.

The blue color of parrots is due to feather structure (3, 22, 26). The blue is the result of an optical phenomenon called “coherent scattering” (25). The form of coherent scattering seen in feathers is similar to that seen reflected from an oil film on a puddle of water on a black asphalt surface or the constructive interference filters used in optical instruments. When light enters the film, only those wavelengths of light with an integral number of wavelengths corresponding to thickness of the film reflect back to your eye. In feathers though, the “film” is a set of small nanometer sized vacuole-like structures of relatively uniform size often organized into arrays. In the presence of melanin that absorbs all other colors, the feather is dark blue. If there is no melanin or other pigment, the feather is a light blue to white. In combination with a yellow pigment and the background of melanin, structure gives rise to the green feathers seen on most parrots.

Color Feeding

The least disputed way by which the Indians alter a parrot’s feather colors is diet (6, 19, 21). Two early mentions of the inhabitants of Amazonia using diet to modify the color of a parrot’s feathers are those of Wallace (38) and Mrs. Agassiz (1). Wallace reported in 1853 that the Indians fed parrots the fat of a “large catfish” as a way to alter feather color. Mrs. Agassiz, who kept a journal of her husband’s expedition up the Amazon in 1865, noted: “The yellow fat of this fish has a curious property; the

Indians tell us that when parrots are fed upon it they become tinged with yellow, and they often use it to render their ‘papagaios’ more variegated.” She identified the fish as the Pirarara (*Phratocephalus hemiliopterus*). In this case, we can be sure of the fish species because her husband was an ichthyologist who came to the Amazon to study its fish. Other Indians, such as the Puinav Indians fed the fat of the Cajaró Fish, and this is reported to render a parrot entirely yellow (21). Similarly, Sick (30) noted that natives of Brazil sometimes feed birds Dendé Palm oil⁴, and this also results in an “intense yellow color.” In other cases, they not only feed the fat, but also work it into the skin and follicles as they would for tapiragem. For example, Teixeira (34) noted that the Karajá and Tapirapá tribes would both rub in turtle egg fat and feed it to the parrot.

Aviculturists have long used color feeding to enhance the feather hues of other bird species such as canaries, goldfinches, flamingos, etc. In those species, the feather follicle transfers carotenoids circulating in the blood into the feather and those carotenoids were originally absorbed from their food. Parrots, however, seem to be unique in that while carotenoids may circulate in their blood, they are not deposited in their feathers (16, 37). Further, “color feeding” of parrots is unrelated to the deposition of the yellow to red psittacofulvin pigments. Instead, it is the result of a failure of the follicle to deposit melanin. This means that the mechanism behind “color-feeding” of parrots is quite different from the color feeding of non-parrot species. I believe my experience with my female Black-headed Caique gave me some insight to this. The hen was on a diet high in sunflower seed typical of parrot diets at the time when

QUAKERS & LINEOLATED!!

LARGEST SELECTION of mutation colors ANYWHERE!!!

Breeding stock only NO PET SALES

Bob Nelson David Palmer
(541) 396-2360



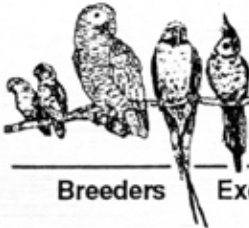
K&K Parrots

We sell hand-fed babies, Cockatiels to Macaws!

- Toys • Food
- Cages • Grooming
- Boarding and more!

Call today!
302-354-4843

Visit our Website
kandkparrots.com



MYERS MENAGERIE of BIRDS

Breeders Exotic Birds • Hand Fed Babies

SEEDS & SUPPLIES REASONABLY PRICED

Bob, Joyce & Rob Ramona, CA 92065
M • W • F 10 am - 4 pm B: (760) 788-5848
OR call for appointment H: (760) 789-3815



NPRPF
THE PARROT FESTIVAL FOLKS

Festival 2009
January 23, 24, 25
www.parrotfestival.org

713-557-BIRD (2473)
FestivalInfo@parrotfestival.com

I purchased her. I have also seen this same aberrant coloration in caiques fed too many nut treats. The owner had those birds tested and found they had high serum lipid levels. Not all the feathers turn yellow, but they have yellow feathers intermixed with their normal green giving them what might be considered a “pied” appearance. Based on the terminology of Buckley (2), these caiques have a “localized melanic leucism.” A number of dietary stresses affect melanin deposition in the feathers of nonpsittacine birds (7, 14, 15), but no one has shown that these same ones cause the loss of melanin in Psittacine birds. Grau et al. (7) showed that diets deficient in choline or riboflavin result in the loss of feather melanin in cockatiels, with the omission of choline having the more striking effect. Nutritionists consider sunflower seeds to be a rich source of both choline and riboflavin, so this does not appear to explain the cause of the leucism. It may be that it is the fat rich diet itself. A number of reports support this. Parrots fed the fish fat apparently develop a melanic leucism similar to what I observed for the feeding of the high fat sunflower seeds to caiques. Unfortunately, feeding fatty foods comes with a cost. Sick (30) noted that the birds that developed yellow feathers when fed a diet rich in Dendé Palm oil suffered liver damage. Thus, it is possible that the development of aberrant yellow feathers is associated with abnormal liver metabolism. This remains speculative and we cannot rule out the existence of a specific component of the diet inducing the yellow coloration. The common feature

of both tapiragem and “color-feeding” is that they both result in the loss of the melanin background of the feathers revealing the yellow to red psittacofulvins pigments. One thing is clear, the mechanism that synthesizes and deposits melanin in the follicle stop functioning, while the mechanism that synthesizes and deposits psittacofulvins continue to function properly.

We do not know if tapiragem or color feeding works on all parrot species. It does seem to work on some non-parrot species (20). When the Portuguese first introduced domestic chickens, the first thing the Tupi tribe did was subject them to tapiragem. The results were too dull for their taste (21). As a guide to whether tapiragem would work on the different species of parrots, Teixeira (34) noted that aberrantly colored feathers of any kind have been recorded in just ten of the 25 Neotropical parrot genera. Further, he noted that only 14 species within eight genera of the South American parrots expressed a loss of melanin from their feathers. This suggests that the process may not work well for all parrots. Teixeira supported this within a small experiment on two macaws of different species and I consider this experimental evidence next.

Teixeira’s experiment was one of only two attempts to reproduce tapiragem by non-Indians found in the literature. The second report is by Villella who reported on an experiment that lasted only 30 days and tested the application of Pirarara fish fat (37). He achieved inconsistent results. On the other hand, Teixeira (34) was able to achieve some success by repeatedly

CRITTER-CAGES.COM

Your one stop Internet Shop

- Bird Nest Boxes
- Cage Screens
- Coops & Aviarys
- Starter Kits
- Supplements
- Wire Mesh
- Hardware Parts
- Hutches Parts

We stock a wide selection of supplies and equipment for your feathered friends. You will love our selection of quality products and you will love our low prices!

AND MUCH MORE!!

Online Store
www.critter-cages.com

for questions call: 310.832.9981

Table 1. Compound rubbed into plucked area by the different tribes

Compound	Tribes	References
Urucú (Bixa orellana) or other plant pigments. Urucú is a red dye and flavoring we know as annatto or achiote.	Guaná, Mbayá, and Mocoví, Bororo, Macuchí	(5, 6, 18)
Extracts of roots of “logoguigo” and fruit of the “nibadenigo” (B. orellana) tree.	Guaykurú, Mbayá	(21)
Milky excretion of frog or toad	Uaupés River Indians, Mundurucú	(21, 38)
Blood of the toad or frog, usually <i>Dendrobates tinctorius</i>	Tupi (Tupinamba)	(4, 30, 32)
Frog or toad skin secretion plus orange or red plant dye from B. orellana	Tupinamba, Achagua, Carib, Mojo, Bororo	(5, 6, 21)
Fat of Pirarára Fish (<i>Phractocphalus hemipiopterus</i>) rubbed on or fed.	Cocoma, Cambena	(5, 6, 30)
Fat of carajó fish	Puinave	(5, 6)
Fat of the Pink River Porpoise <i>Inia geoffroyensis</i>		(30, 35)
Blood or fluids from domestic chicken		(35)
Blood, fluids or egg fat from Turtle of the <i>Podocnemis</i> species.	Karajá, Tapirapé	(34, 35)
Blood or fluids from the spectacled caiman, <i>Caiman crocodylus</i> .		(35)

pulling feathers over a period of months. He used the fat from the turtle *Podocnemis expansa* as an inducer, and was able to demonstrate its efficacy on a Blue and Gold Macaw (*Ara ararauna*) but not a Green-winged Macaw (*Ara chloroptera*). Thus, Teixeira’s result lends credence to the practice of tapiragem. The Blue and Gold Macaw’s feathers returned to their original color after he stopped plucking. Both experiments involved very small sample sizes and did not adequately control all variables. You have to consider that they were laboring under very restrictive circumstances. Performing any scientific experiment on parrots other than budgerigars and cockatiels is a challenge because it is difficult to secure adequate number of birds. Then there are ethical problems of doing an experiment that inflicts pain. Plucking is painful to most birds and rubbing in the irritants into the plucked area would further exacerbate the wounds. Villella and Teixeira resorted to experiments on pet birds, but I do not think you will find too many pet bird owners willing to subject their pets to the painful and harsh treatment the natives apply. Indeed, I would be reluctant to allow this to be done to my pets. Thus, it is unlikely that we will soon see any experiments done with the scientific rigor required to prove just what aspect of tapiragem is important for eliciting the aberrantly colored feathers.

Among the main aspects of tapiragem that remain inadequately examined is the claim by practitioners that once induced, the feathers always grow back in their new color. The permanence of the new feather coloration elicited by tapiragem is widely questioned (5). Most reports indicate that if allowed to molt normally, the parrot’s feathers revert to their

original color. Teixeira and Mayaud are of the opinion that it is the repeated trauma to the follicle from the repeated harvest of feathers that perpetuates the deviant color (13, 34-36) and argue that the unguents have no role in tapiragem except to add to the trauma. Teixeira believed this to be the case for the Blue and Gold Macaw that he had to pluck repeatedly to achieve a change in feather color. However, his experiment lacked a control without an initial use of an “unguent,” so one cannot state this with certainty. Further, it is difficult to discount the form of tapiragem that relies on the frog and toad excretions. These preparations clearly contain a bioactive ingredient that might selectively interfere with the melanin producing chromophores. Also untested is that some sources state that the tapiragem must be performed on young birds prior to their first molt in order for the alteration to be permanent (21, 24). There is even the possibility that practitioners may inadvertently introduce microorganism into the follicle by their rough treatment. Clearly, we would have to test many variables before we can state exactly what factors are critical for the success of tapiragem.

Nonetheless, I feel that feather follicle trauma has a major role in altering feather color. I base this on the fact that one occasionally sees an anomalously colored feather or two on a parrot (13) that is not the result of tapiragem. A breeder in Germany once contacted me regarding the presence of several white feathers among the outer primaries on a caique. She speculated that it might be a mutation. I have seen this myself on a Green-thighed Caique (*P. leucogaster*) in the São Paulo Zoo. I personally doubt that these feathers are due to mutation. In the

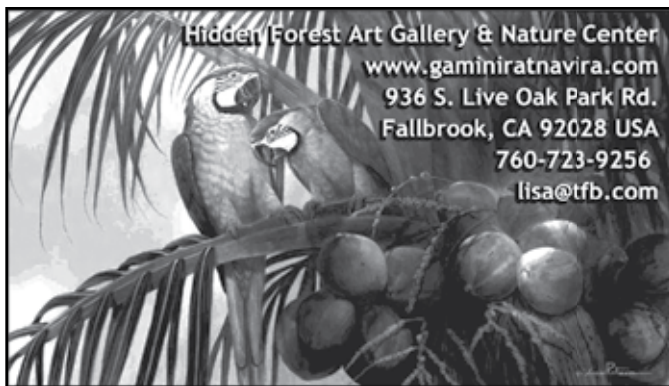
case of caiques, the normal color of the outer primaries is black with some structural blue and only a hint of green. Thus, if the follicle fails to deposit melanin in the feather, it could be so pale a yellow as to appear white. Unfortunately, I was not able to inspect the feathers of the caique in the zoo at close enough range to determine if they possessed any residual yellow. If they were pure white, these feathers would have also lost their psittacofulvin pigment as well (25). (See the accompanying figure.) Many parrot species develop yellow or white feathers including the Hyacinth Macaw (42). Owners seldom report them as long as their birds remain healthy. In 1801, Le Vaillant (12) made a comparison of the appearance of aberrant white and yellow feathers on parrots to that of people developing grey hairs as they age. I think he got it about right. The darkness of both human hair and parrot feathers is due to melanin. If trauma of individual feather follicles were the cause, one would expect older birds to accumulate more yellow and white feathers than younger birds.

Many of the indigenous peoples probably continue to practice methods that alter the color of the feathers on live parrots. There seems little question that feeding fats is effective. The practice of tapiragem also appears to be effective, but there remain many questions about its practice. Is it simply due to repeated follicle trauma? Do the unguents play any role in the efficacy of the practice? Do the aberrant colored feathers continue to grow back if they allow the bird to molt normally for all forms of the process? Does the permanence in the color change depend on the age of the parrot? These questions point to the fact that we know very little about the avicultural practices of indigenous

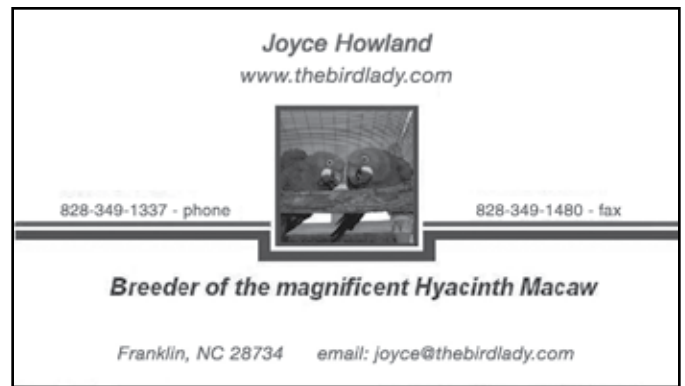
peoples. Anthropologists have written many ethnographies on the native peoples of Amazonia, but none devoted to their keeping of birds. Ornithologists and other naturalists visiting Amazonia, are usually more concerned about native peoples removing birds and animals from the wild and have little interest in their “domesticated” pet birds and only mention them in passing. This is unfortunate. As Teixeira (34) points out, the aboriginal cultures of Amazonia are being inexorably lost. In the Amazonian legend, the gods put their faith in man, but I fear we may be failing them. With the loss of native cultures, we are also losing their unique knowledge of the birds of the Amazon.

References

1. Agassiz, L., and M. Agassiz. 1893. *A Journey in Brazil*. Houghton, Mifflin and Co., New York.
2. Buckley, P. A. 1969. Genetics, p. 23–43. In M. L. Petrak (ed.), *Diseases of Cage and Aviary Birds*. Lea & Febiger, Philadelphia.
3. Dyck, J. 1971. Structure and spectral reflectance of green and blue feathers of the rose-faced lovebird (*Agapornis roseicollis*). *Biologiske Skrifter* 18:5–65.
4. Gandavo, P. d. M. 1924. I. Tratado da Terra do Brasil. II. *Historio da Provincia Santa Cruz, Rio de Janeiro*.
5. Gilmore, R. M. 1950. Fauna and ethnozoology of South America, p. 345–464. In J. H. Seward (ed.), *Handbook of South American Indians*, vol. 6. United States Government Printing Office, Washington, D.C.
6. Gilmore, R. M. 1986. *Fauna e etnozoologia da América do*



Hidden Forest Art Gallery & Nature Center
www.gaminiratnavira.com
936 S. Live Oak Park Rd.
Fallbrook, CA 92028 USA
760-723-9256
lisa@tfb.com



Joyce Howland
www.thebirdlady.com

828-349-1337 - phone 828-349-1480 - fax

Breeder of the magnificent Hyacinth Macaw

Franklin, NC 28734 email: joyce@thebirdlady.com



Member of
AFA
NFSS
ADA

100% GUARANTEED

Twin Beaks Aviary's
Herb Salad[®]

'Enable your bird's ability to self-medicate'

PO BOX 385
GRATIOT, WI 53541
608-768-1311 or 573-573-2959 www.twinbeaksaviary.com sales@twinbeaksaviary.com



QPS
Quaker Parakeet Society

To promote the survival
and humane treatment of
Quaker Parakeets
in all environments and habitats.

Join us: <http://www.qp-society.com>

Table 2. Distribution of some of tribes practicing tapiragem.

Location	Tribe(s)	References
Gran Chaco	Guaná, Mbayá, Mocoví, Huanyam, Guaykurú	(6, 18, 20, 21)
Orinoco River	Atsagua, Puinave	(9, 21)
Uaupés River		(5, 6, 38)
Coastal Brazil	Tupi (Tupinambá)	(4, 20, 21, 32)
Southern Pará	Arauetê	(34)
Ucayali, Marañon, Solimoes Rivers	Cocama, Cambewa, Omagua, Cocama	(20, 21)
Guiana-Brazil border	Wapisana, Makusi	(21)
The Guianas	Creoles, Arawak	(19, 21)
Araguaia River		(30)
Eastern Columbia. Upper Meta River	Achagua	(5, 6, 20, 21)
French Guiana	Carib, particularly the Galibi	(5, 6, 20, 21)
Eastern Bolivia	Mojo, Huanyam	(5, 6, 21, 23)
Southwest Brazil, Matto Grosso	Bororo, Paresi	(5, 6, 20)
Rio Negro		(5, 6, 21)
Rio Solimões	Cocoma, Cambena	(5, 6)
Southeastern Columbia	Puinave	(5, 6)
Lower Amazon, Tapajoz River	Mundurucú	(1, 8, 20, 21)

- sol tropical. In D. Ribeiro (ed.), *Suma Etnológica Brasileira*. Vozes, Petrópolis, Brazil.
- Grau, C. R., T. E. Roudybush, P. Vohra, F. H. Kratzer, M. Yang, and D. Nearenberg. 1989. Obscure relations of feather melanization and avian nutrition. *World's Poultry Science Journal* 45:241–246.
 - Horton, D. 1948. The Mundurucu, p. 275. In J. H. Steward (ed.), *The Handbook of South American Indians*, vol. 3. United States Government Printing Office, Washington, D.C.
 - Humboldt, A. v., and A. Bonpland. 1862. *Reise in de Aequinoctial-Gegenden des neuen Continents in den Jahren 1799-1804*, vol. 5, Stuttgart.
 - La Ctondamine, C.-M. d. 1986 *Relation abrégée d'un voyage fait dans l'intérieur de l'Amérique méridionale*. "Mundo Científico", Barcelona.
 - Le Vaillant, F. ca. 1801. *Histoire Naturelle des Perroquets*, vol. 2. Levrault, Schoell & Company, Paris.
 - Le Vaillant, F. 1989. *Natural History of Parrots*. The Pot Still Press Proprietary Ltd, Sydney, Australia.
 - Mayaud, N. 1950. Téguments et phanères. *Traité de Zoologie* 15:4–77.
 - McGraw, K. J. 2006. Mechanics of melanin-based coloration, p. 243-294. In G. E. Hill and K. J. McGraw (ed.), *Bird Coloration*, vol. 1. Harvard University Press, Cambridge, MA.
 - McGraw, K. J., E. A. Mackillop, J. Dale, and M. E. Hauber. 2002. Different colors reveal different information: how nutritional stress affects the expression of melanin- and structurally based ornamental plumage. *Journal of Experimental Biology* 205:3747–3755.
 - McGraw, K. J., and M. C. Nogare. 2004. Carotenoid pigments and the selectivity of psittacofulvin-based coloration in parrots. *Comparative Biochemistry and Physiology B* 138:229-233.
 - McGraw, K. J., and M. C. Nogare. 2004. Distribution of unique red feather pigments in parrots. *Biology Letters* (online).
 - Métraux, A. 1946. Ethnography of the chaco, p. 197–370. In J. H. Steward (ed.), *Handbook of South Indians*, vol. 1. United States Government Printing Office, Washington, D.C.
 - Métraux, A. 1928. *La civilisation materielle des tribus Tupi-Guarani*. P. Geuthener, Paris.

20. Métraux, A. 1944. "Tapirage," a biological discovery of South American Indians. *Journal of the Washington Academy of Sciences* 34:252–254.
21. Métraux, A. 1928. Une découverte biologique des indiens de l'Amérique du sud: la décoloration artificielle des plumes sur les oiseaux vivants. *Journal de la Société des Americanistes de Paris* 20:181–192.
22. Nemesio, A. 2001. Colour production and evolution in parrots. *International Journal of Ornithology* 4:75–102.
23. Nordenskiöld, E. 1924. *The Ethnography of South-America Seen from the Mojos in Bolivia*, vol. 3, Göteborg.
24. Pernetty, A.-J. 1771. The history of a voyage to the Malouine (or Falkland) Islands made in 1763 and 1764 under the command of M. de Bougainville in order to form a settlement there : and of two voyages to the Streights of Magellan with an account of the Patagonians. T. Jefferys, London.
25. Prum, R. O. 2006. Anatomy, physics, and evolution of structural colors, p. 295–353. In G. E. Hill and K. J. McGraw (ed.), *Bird Coloration*, vol. 1. Harvard University Press, Cambridge, MA.
26. Prum, R. O., R. H. Torres, S. Williamson, and J. Dyck. 1998. Coherent light scattering by blue feather barbs. *Nature* 396:28–29.
27. Ralph, C. L. 1969. The control of color in birds. *American Zoologist* 9:521–530.
28. Roth, W. E. 1915. An Inquiry into the Animism and Folklore of the Guiana Indians, p. 103–386, 30th Annual Report of the Bureau of American Ethnology, 1908-1909. U.S. Government Printing Office, Washington, D.C.
29. Schultes, R. E. 1972. An overview of hallucinogens in the Western Hemisphere, p. 3–54. In P. T. Furst (ed.), *Flesh of the Gods. The Ritual use of Hallucinogens*. Praeger, New York.
30. Sick, H. 1993. *Birds in Brazil. A Natural History*. Princeton University Press, Princeton.
31. Smith, A. 1971. *Mato Grosso. Last Virgin Land*. E.P. Dutton and Co., New York.
32. Soares de Souza, G. 1851. *Tratado descritivo do Brasil em 1587*. Instituto historico e geogrpheco brazeleiro, Rio de Janeiro.
33. Spix, J. B. v. 1824–1825. *Avium species novae, quas in itinere per Brasiliam annis MDCCCXVII-MDCCCXX*. Franc. Seraph. Hubschmanni, Monachii (Munich).
34. Teixeira, D. L. M. 1983. Tapiragem. *Ciência hoje; revista de divulgação da Sociendade Brasileira para o Progresso da Ciência* 2:42–46.
35. Teixeira, D. M. 1992. Perspectivas da etno-ornitologia no Brasil: O exemplo de um estudo sobre a "tapiragem." *Boletim do Museu Paraense Emílio Goeldi. Serie Zoologia* 8:113–121.
36. Teixeira, D. M. 1985. Plumagens aberrantes em psittacidae neotropicais. *Revista Brasileira de Biologia* 45:143–148.
37. Vilella, G. G. 1968. Carotenóides de penas de algumas aves Amazônicas. *Anais da Academia Brasileira de Ciências* 40:391–399.
38. Wallace, A. R. 1853. *A Narrative of Travels on the Amazon and Rio Negro*. Reeve and Co, London.
39. Wallace, A. R. 1864. On the parrots of Malayan region. *Proceedings of the Zoological Society of London* 288.
40. Walls, J. G. 1994. *Jewels of the Rainforest. Poison frogs of the Family Dendrobatidae*. T.H.F. Publications, Neptune City, NJ.
41. Wassen, S. H. 1934. The frog in Indian mythology and imaginative world. *Anthropos* 29:613–658.
42. Worrell, A. B. 1993. Veterinary viewpoints. *The A.F.A Watchbird* 22:54.

Footnotes

- 1 A loose translation from the Portuguese by the author. This legend is prominent in the ads of Brazilian tattoo artists.
- 2 Many people refer to this species as *P. melanocephala*; however, this is incorrect. To follow proper taxonomic rules, you must modify Pionites, a masculine noun in Latin, with a masculine adjective. Thus, the correct scientific name is *P. melanocephalus*.
- 3 Because accounts by the early references were either difficult to locate or too expensive to purchase, I had to rely of the veracity of secondary sources. I have seen and read the one from Le Vaillant, and seen transcription fragments of the Spix & Martius and the Humboldt & Bonpland references.
- 4 Dendé oil is the same as "red palm oil." Owners often feed this oil to parrots, particularly those of African origin, as a rich source of vitamin A. The dendé palm is a native of Africa, and may have been part of some parrots' original diet. In the case of South American parrots, perhaps one should be more circumspect about feeding it. Some believe that too high a level of vitamin A itself may be damaging to some parrots. Even some African species may be susceptible to diet and one occasionally hears of people buying "pied" Senegal parrots that later molt out normal after they place them on a new diet.

11th Annual

South Texas Avian Symposium


Promoting Aviculture through Education

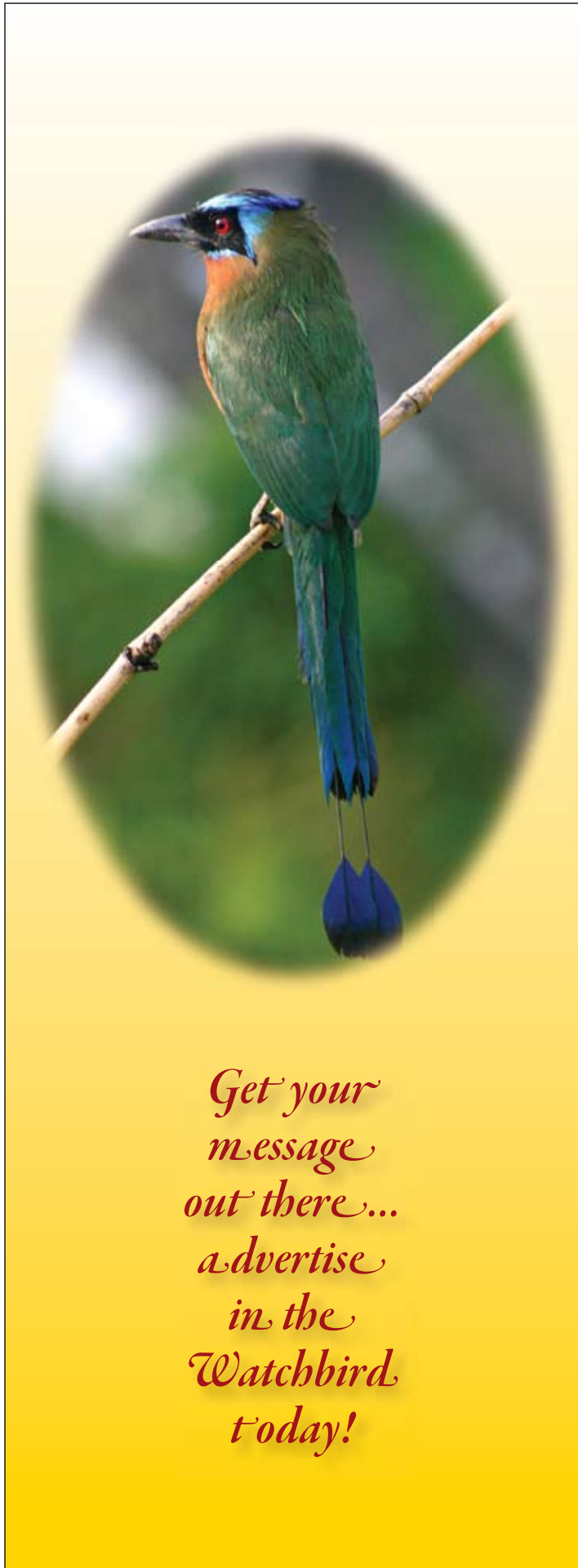
November 8-9

Doubletree Hotel, JFK Blvd, Houston, Texas

Presented in cooperation with the Schubot Exotic Bird Health Center at Texas A & M University

Early bird registration ends October 15, 2009
 Registration@SouthTexasAvianSymposium.com
 www.southtexasaviansymposium.com 281-217-0614





Mattie Sue Athan

Parrot Behavior Training
In-Home Grooming, Adoption,
& Rehabilitation since 1978

Award Winning Books

Guide to a Well-Behaved Parrot
Guide to Companion Parrot Behavior
Guide to the Quaker Parrot
Guide to the Senegal Parrot & Its Family
The African Grey Parrot Handbook
Parrots, A Complete Pet Owner's Manual
The Secondhand Parrot
Parrots in the City

918-812-1099



Voted **BEST PET SHOP** of the East Bay 1998 & 2006
Featured on
Evening Magazine
& Pet's Port of the Family

- Hand-fed, Healthy Birds
- Raised by us in our nursery
- Quality toys & supplies
Including: Harrisons, Hagen,
Goldenfeast, Birdie Bread



925*299*9466

Visit us at: www.feathered-follies.com

LAURIE E. BAKER

3471 Mt Diablo Blvd., Lafayette, CA 94549

AFA Members:
Receive **10% OFF** of
our regular website
price on **ALL** items by
entering the following
Promotion Code:

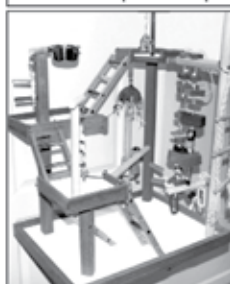
A0712A



**Parrot
Bonanza**

www.parrotbonanza.com

For your Chewers...
The solution: Acrylic Steps!
and cleanup is a snap!



BirdiePlayStands.com

PARROT PLAY GYMS AND STANDS
TABLETOP OR PORTABLE W/PEDESTAL & WHEELS

Mahogany frame & Posts
w/Melamine base for easy cleaning

WEBSITE: <http://www.BirdiePlayStands.com>
TEL: 631 754-4963 - Cell # 917 332-8857