Pruritic polyfolliculosis and dermatitis in budgerigars (*Melopsittacus undulatus*) and African lovebirds (*Agapornis spp*.)

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INTRODUCTION

This paper draws together two disease syndromes affecting the skin and feathers of budgerigars and African lovebirds which in the chronic form are characterised by an apparent pruritus and the development of dystrophic feathers. Some follicles have the gross appearance of growing more than one deformed quill per follicle. A common aetiology is postulated and the name Pruritic Polyfolliculosis (PPF) is proposed. The patterns of disease are described from a clinical viewpoint and histopathological data are provided. It is suggested that the disease may be virus associated. Attempts to treat and manage affected birds are summarised.

ACUTE AND CHRONIC POLYFOLLICULOSIS (INCLUDING BUDGERIGAR SHORT TAIL DISEASE) IN BUDGERIGARS

Budgerigar Short Tail Disease (BSTD) has been reported for many years in Australia as a sporadic disease of aviary-bred budgerigars (Cooper, H. 1975 Pers. Com.). It is now apparent that this disease affects other psittacine species and that many affected birds may not necessarily have a short tail. Hence a new name for this disease (PPF) is proposed.

Acute Polyfolliculosis (Budgerigar Short Tail Disease)

BSTD is characterised by the development of twisted, deformed and short rectrices. Accumulations of keratin and/or dry blood adherent to the ventral side of the rachis and ramus of the feathers are frequently seen. Portions of the feather sheath will often remain attached. The disease was originally observed in young fledged

budgerigars and appeared to spread through some aviaries. Spread was reported to be facilitated by "rump biters" (aggressive [usually female] budgerigars which habitually lean forward and bite the tail or rump of any other budgerigar within reach). No effective treatment was known and control was attempted by culling affected birds and rump biters. Since then BSTD has occasionally been seen to affect the majority of young fledged budgerigars in some aviaries in the absence of rump biters. In some of these aviaries affected birds have not been closely related.

Chronic Polyfolliculosis in Budgerigars

A chronic form of the disease affects mature budgerigars (usually at least several years old). Affected birds grow an apparently normal tail in most instances and yet have approximately bilaterally symmetrical areas of skin with short deformed quills, similar to but distinguishable from those seen in chronic Psittacine Beak and Feather Disease (PBFD). Feather tracts over the rump, flanks or neck are commonly affected. Feathers over the pectoral area can also be affected. There is often intense, prolonged and frequent preening of affected areas. The preening is so intense, vigorous and prolonged that it is interpreted as being a response to severe pruritus. Some of the feathers fail to erupt through the skin and instead grow parallel to it in tight circles whereas other quills grow as short, fat, sheathed feathers which fail to mature and which are often curled and malaligned. Some feathers may be divided longitudinally by keratin clefts, giving the appearance that there is more than one quill per feather follicle. This sign is presently considered pathognomonic for "polyfolliculosis". A gradation of cases has been seen between typical acute BSTD and the chronic form with PPF follicles.

Polyfolliculosis in lovebirds (Agapornis spp.)

A pattern of disease similar to chronic PPF in budgerigars is now recognised as affecting peachfaced lovebirds (*Agapornis roseicollis*) and occasionally other lovebirds. Many of the affected peachfaced lovebirds grow dystrophic feathers around the base of the tail, rump and especially the mid to upper neck where follicles which are apparently producing multiple quills may be found. The word "apparently" is used because such quills are short and stout with retained sheaths divided longitudinally in part by up to 5 keratin clefts. It may require several minutes of careful searching to find these feathers. In more chronic cases they increase in number and it becomes more likely that tightly curled short subcutaneous feathers and small (approximately 3 mm diameter) feather cysts will also be found. Occasionally PPF and PBFD have been diagnosed histopathologically as occurring in the same bird.

The nature of the association between PPF and "stress dermatitis" remains uncertain. They may be separate diseases or different manifestations of the one

disease or the pruritus associated with PPF may provide the stress stimulus for the development of stress dermatitis. Many of lovebirds seen with "stress dermatitis" also have

dystrophic feathers similar to those seen in birds with PPF. Whereas stress dermatitis has been diagnosed in pet sulphur crested cockatoos (*Cacatua galerita*), typical PPF has yet to be recognised in this species.

"Stress dermatitis"

Stress dermatitis is a name given by Schultz (1981) to an ulcerative dermatitis occurring chiefly in love birds (mainly *A. roseicollis*), pet sulphur-crested cockatoos and budgerigars in Australia. Affected birds have large ulcerated areas of skin in the vicinity of the axillary region, patagial membrane, the base of the tail and rump. It is often seen in the bird lower or lowest in the pecking order. For many years this disease occurred sporadically in aviaries and had not been seen in an outbreak form. Recently two aviaries have had about 40% of 60 peachfaced lovebirds affected with the disease within a period of three months. The pattern of occurrence suggested an infectious aetiology but this must be confirmed. The term "stress dermatitis" no longer seems adequate although "stress" seems to be a contributing factor. A new name is needed but may need to await elucidation of the pathogenesis.

These diseases, with the exception of the "stress dermatitis" appear to be one and the same, varying to some extent as to whether they are acute or chronic and with the species affected. Experimental transmission or infection has not been reported. The diseases need to be distinguished from PBFD, papovavirus infection and fungal and bacterial infections of the feather follicles. Fungal cultures have not revealed any pathogenic fungi. In the absence of "poly-follicles", histopathology of biopsied feather quills and of adjacent skin is required to determine the diagnosis.

Differential diagnosis of PPF and PBFD

The following chart may help differentiate birds affected with PPF from those affected with PBFD and/or Papovavirus.

	Polyfolliculosis	**PBFD**
"Pruritus"	++++	+
Twisted tail feathers	+++	+
Short and stout dystrophic quills	+++	-
Curled subcutaneous feathers	++	-
Self-mutilation/excoriation of skin	+++	-
Clinical immunosuppression	-	++
Prevalence	+	++++
PBFD inclusions	-	++++
Tightly curled very short feathers	+++	-
Malalignment of feathers	+++	-

CASE HISTORIES

Typical clinical descriptions of BSTD form of PPF:

1. Gross appearance, posture and behaviour normal. Plumage of head, neck, wings and breast normal. Central two rectrices short. Approximately 3 square cm of the rump feathers affected. Coverts proximal, lateral and distal to preen gland dystrophic - some characterised by single, but most have multiple quills per feather follicle. These quills are incompletely formed, partially ensheathed, bent, wider than normal at and just above skin level. Most affected coverts extend less than 8 mm beyond skin level. The two central rectrices are 3.5 cm long from skin level of which 2 cm is ensheathed. Throughout the body feathers and on the head are a few apparently normal growing single quills. The proximal end of a plucked rectrix blood quill is grossly normal.

2. Gross appearance behaviour and condition normal except for obvious short tail and scruffy rump. Head neck breast wing feathers grossly normal. Longest rectrices 5.5 cm with sheath extending about 1.5 cm from skin level on all primary tail feathers. Some upper and lower coverts also affected. Rump covert feathers deformed but majority are single quills per follicle with retained proximal sheath, bent, some expanded proximally and some narrow terminally. Abnormal feathers seen diffusely infiltrating into apparently normal body feathers. Small ensheathed distally narrow tending to be proximally expanded curved single quills scattered through plumage. Some rump quills curled almost 90° within skin.

3. Gross appearance : head neck body wings normal with single ensheathed covert feather quills throughout plumage, sparingly. Many coverts missing, especially proximally for about 1.5 cm., leaving mainly down feathers. Some very short single quills evident; these are very thin and sparse. No multiple quills per follicle seen. Central two rectrices abnormal. One feather straight about 6.5 cm long with proximal 2 cm of feather with thin sparse barbs which do not lock together and an expanded blood quill. Adjacent central rectrix shaped like a question mark, 2 cm long bent vs 3 cm long straightened, growing out of centre of a short expanded sheath. A prominent transverse fault line present 2 cm distally on one adjacent rectrix and about 1 cm distally on 3 lateral rectrices. Three rectrices have sheaths extending 0.5 to 1 cm above skin level but appear normal distal to this. Some tail feathers have unusually narrow shafts within the skin; these are mature non-vascular feathers.

4. Gross appearance obvious short tail. Largest tail feathers do not reach tip of wing feathers in folded position. Virtually all rectrices and upper and lower coverts are blood quills proximally. Rectrices have at least one transverse fault line distally and retained sheaths proximally, with total feather length less than 4 cm. Some upper coverts show two or three adhered quills per follicle; these quills are slightly bent. Feathers under tail extending proximally to vent have blood proximally and proximal sheaths but are single feathers per follicle. Feathers dorsally around preen gland for about 1 cm are all affected to varying degrees. Some feathers open at distal end but many are quills with pink (blood) in shaft occupying most of the feathers. Several clusters of multiple quills per follicle seen. One short

expanded feather quill with blood clot at distal end. Many long thin single ensheathed quills dispersed through apparently normal feathers on head and to lesser extent over body.

Histopathologically the appearance is generally that of a non-inflammatory process. On relatively few occasions scattered necrosis of cells of the dermal papilla has been recognised. There is a developmental abnormality resulting in multiple quills in some follicles. The separation of such quills is often sparse. Although some fifty tissue samples have been submitted to histopathology no consistent association with inclusion bodies, fungal elements, bacteria or other infectious agents has been demonstrated.

Histopathological reports on the BSTD form of PPF:

84/851 Budgerigar. There are multiple feather shafts within a follicle but there is a very thin layer of follicular epidermis between the feather shafts. There is a chronic inflammatory lesion beneath the pulp cap. The feather sheath appears thickened.

84/854 Budgerigar. There are two feathers growing in a follicle and a thin band of epithelium is present between each shaft. The shafts are irregular in cross-sectional shape.

85/630 Both birds (budgerigars) had BSTD. Bird 1 had acute necrosis of epidermal cells in barb ridges but not in the epidermal collar. Bird 2 had bacterial dermatitis. This is the first time that I have seen a lesion in the epidermis of these cases. I don't believe that the necrosis here is part of the pathogenesis because all the necrotic cells are in the same stage. They are all acutely necrotic.

Histopathological reports on the chronic form of PPF:

85/139 Peachfaced lovebird. Most of the feathers are normal and there is no evidence of PBFD in the abnormal sheaths. The latter have a thick sheath and retention of degenerate feather in the pulp cap area. There is also dystrophic growth of the barbs in one, such that they appear to have curled within the sheath.

85/188 4 year old budgerigar. Sections of budgie short-tail feathers show relatively normal papillary bud. however proliferation of cells way from bud, up the shaft, while orderly, is not accompanied by differentiation into secondary structures. The cells merely grow and eventually die when they lose contact with blood supply. The feather end is merely a hollow shaft, with a thin keratin wall. The skin is normal. No evidence of infection is recognised. This appears to be a differentiation defect.

85/942 Peachfaced lovebird. Two feathers are very closely associated (there is only a slim sheath between the rachis of each). There is no inflammatory reaction. The feathers curl up within the sheath distal to the opening of the follicle. This is a dystrophic process but it is not associated with degenerative changes in the epidermis of the feather.

85/943 Peachfaced lovebird. There are areas of scarring in the dermis and some feathers are multiple as in BSTD. One feather has a thick sheath with retention of degenerate and haemorrhagic pulp.

Budgie. Large keratin filled cysts emanating from feather follicle epithelium or dystrophic multiple feathers with follicles. The wall of the large cyst is attenuated in areas and there is surrounding inflammation and metaplasia of CT.

86/319 Budgie. A feather follicle was dilated by keratinized disorganised feather components. Two shafts were present in another follicle. One was mature. It was separated from a growing shaft by a thin layer of epidermis. this feather is somewhat similar to those seen in BSTD although I have never seen a mature and an immature feather in one follicle before. There are no histological findings to explain the gross deficits.

Histopathological reports on "stress dermatitis":

83/1347 Budgerigar. There is no folliculitis but many follicles are inactive and plugged by keratin. The hyperkeratosis of remaining feather must produce the grossly visible swelling of the follicles.

Stress dermatitis in lovebird. Areas of ulcerative dermatitis and of PBFD. The lesions are very suggestive of bacterial (Eg Staphylococcal) dermatitis. May be they are initially bacterial.

84/1407 Peachfaced lovebird. the ulcerated skin has been invaded by fungi. Fungal hyphae are present in the subcutaneous and dermal vessels. These vessels are thrombosed resulting in necrosis.

87/361 Peachfaced lovebird. Severe fungal necrotising dermatitis. The fungi have the appearance of *Aspergillus sp.*

87/373 Budgie. The epidermis is very hyperplastic and ulcerated. it is not possible to say whether the hyperplasia was an initial change or a response to chronic irritation.

87/380 Budgie Severe staphylococcal ulcerative dermatitis.

Burrowing mites associated with stress dermatitis skin lesions were reported by one investigator (Filippich L 1983 pers. com.) but have not been found by other investigators.

INEFFECTIVE TREATMENTS

Treatments with systemic and/or topical antibiotics including ampicillin, amoxicillin/clavulanic acid, chloramphenicol, lincomycin, various tetracyclines, trimethoprim potentiated sulphonamides and ketoconazole may help control secondary bacterial infection but do not resolve the underlying

disease. Corticosteroids such as methyl prednisolone acetate (Depomedrol, Upjohn) infiltrated around or into areas of skin mutilation help temporarily and need to be repeated and used in conjunction with other treatments, but do not resolve the underlying disease process.

Injections of medroxyprogesterone acetate at 3 to 6 week intervals seem to reduce self-mutilation but this recurs when treatment is stopped. Titrating the dose of megestrol acetate in the drinking water daily (doubling or halving the dose at 4 day intervals, starting with 5 mg per 120 ml of drinking water) sometimes produces a similar response. Both these treatments are associated with side effects such as weight gain, polyphagia, polydipsia, polyuria, predisposition to a diabetes mellitis - like disease and lethargy, as well as suppression of ovulation in females. Various multivitamin and mineral supplements have not been of benefit when given alone.

Topical applications of a "paint" of 17 ml dimethyl sulfoxide, 4 ml injectable trimethoprim potentiated sulfonamide solution and 4 ml of injectable dexamethasone 2 mg per ml solution applied with an artist's paintbrush twice a day to the raw lesions appears to promote their healing. Vitamin E and Vitamin A creams have also been used.

A cure has yet to be found, but individual birds can often be kept comfortable provided there is not too much scar tissue formation by the combined use of Depo-Provera and/or DepoMedrol injections s.c. or i.m. with topical applications of the DMSO mixture applied as a paint to raw areas twice a day until healed. Elizabethan collars have been used on a temporary basis. Another approach that has yet to be tried is producing an autogenous vaccine from affected feathers and follicles and injecting this into affected birds.

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