

Growth and Feather Development of Alexandrine Parakeets, *Psittacula eupatria* (Linnaeus, 1766), In Captive Condition

Thin Thin Khaing
Associate professor
Department of Zoology
University of Magway
Magway, Myanmar

Sandar Win
Associate professor
Department of Zoology,
Yangon University
Yangon, Myanmar

Chaw Su Shwe
Lecturer
Department of Zoology
University of Magway
Magway, Myanmar

Abstract:- Growth and Feather development of Alexandrine Parakeets, *Psittacula eupatria* were observed in captive condition. Twelve specimens of hatchlings were obtained from five nests in the cavities of trees from the Shwesettaw Wildlife area lies on the northern edge of the central plains of Myanmar. Chicks were carried to the Laboratory of Zoology Department, Magway University and growth parameters such as weight, total length, culmen, gape and tarsus were measured weekly. Development of feather tracts was also observed. In one week old, their eyes were closed and naked. In second weeks old, eyes start to open and alar pins start to come out but feathers on the head, dorsal, ventral, femoral and caudal were not found. In 3rd weeks old, the babies down feathers come in more at dorsal, femoral and caudal tract. Wings feathers such as primary, secondary and tertiary were begin distinct. While the feathers not found on the head and ventral. In 4th weeks old, feathers distinct on the head and ventral. On six weeks old, green contour feathers covered almost the whole of the body.

Keywords:- Growth, Nestling, Feather Development, Weight, Alexandrine Parakeet.

I. INTRODUCTION

More than 360 species of brightly colored noisy birds belonging to the Order Psittaciformes and two families, Psittacidae and Cacatuidae, they are generally called parrot. Parakeets, love birds, amazons, macaws and parrotlets are in the Family Psittacidae. Parrots were associated with humans as pets since earlier times and they were transported to zoos and private collectives. Parrots were kept in the homes of rich citizens of early Rome and esteemed them as delicacies of the dinner table. The ability to imitate human sounds and their display of affection make them popular pets. They use toes for climbing and food handling as humans use hands, this manner also makes parrots appealing. People may feel for various kinds of parrots as pets for their longevity, bright colors, intent gaze, ability to learn tricks, and willingness to remain on a perch instead of fluttering about contribute to the fondness [1]. *Psittacula eupatria* which are commonly called Alexandrine parakeet, their population is rather rapid decline because of continuing habitat destruction and unsustainable level of exploitation. These parakeets are

threatened by widespread poaching by local peoples [2]. To manage and conserve the avifauna, studying nestling development is necessary to provide basic information but is still limited or absent for many species [3]. The knowledge of different nesting strategies on productivity and the impacts of parental care and environmental variables on fitness can be studied on nestling development. [4][5] Indeed, new hatchlings need to stay in the nest for development thus staying in the nest is important for survival and reproductive success [6].

Each body component of nestling grows at a different point in time relative to other components, resulting in a staggered growth pattern which is generally adaptations for nest survival. For instance, contour feathers of some species grow rapidly and provide important insulation cover early in life [7]. The young hatched with or without feathers may vary among related taxa or even within families, some hatched densely covered with down while others hatch naked [8]. Within the Order of Psittaciformes, young of the Loriidae hatch with a thick down cover whereas young of Psittacidae have only very little down or are naked [9]. Skutch [8] reports that the blue-throated motmot (*Aspatha gularis*), lives on the high Guatemalan mountains, hatches naked but soon develops a thick coat of down. The closely related turquoise-browed motmot (*Eumomota superciliosa*), which lives in tropical lowlands, does not develop feathers until it is almost fully grown. In some species, the tarsus or gape grow rapidly during the early nestling stage for food acquisition [10] Developmental events such as pin-feather eruption patterns, eye opening, and behavior can be age specific and are readily observed [11][7]. In consequence, several growth measurements can provide reliable aging throughout the nestling period [7][12]. This study was conducted with the following objectives:

- to investigate the specific patterns of nestling growth
- to observe the feather development in young Alexandrine Parakeet

II. MATERIAL AND METHODS

Twelve specimens of hatchlings were obtained from four nests in the cavities of trees from the Shwesettaw Wildlife area lies on the northern edge of the central plains of Myanmar (94° 31' 39" E - 20° 06' 14" N) during November to April of the breeding period of 2018 -2019 .Then , and kept in plastic baskets in which lined with paper towels, placed heating lamp on the baskets for worm. They were fed the feed including eggs, banana and mainly chickpea four times a day. All measurements were made once per week.

The following parameters were measured with calipers as follows:

- Body weight was obtained by placing the bird on the digital balance.
- Total length - from the tip of bill to the tip of the tail.
- Tarsus - the distance from the middle of the intertarsal joint to the distal edge of the last complete scale before the toes begin
- Culmen (Bill length) - from the anterior end of the nostrils to the tip of the bill.
- Gape (Bill width) –at the base (broadest part) of the bill.

The feather development of young was observed once per week. Feather tract on

- The capital – on the head
- Dorsal – that extends along the mid-dorsal line and includes the cervical,interscapular ,dorsal and pelvic regions
- Humeral – from where the leading edge of the wing meets the body over the dorsal surface of the thigh
- Alar – including primary and secondary flight feathers plus coverts
- Femoral – on the dorsal surface of the thigh
- Cruel – on the lower leg,caudal – the rectrices and coverts
- Ventral - include cervical,sterna and abdominal regions

Pin lengths are measured with a ruler from the point of emergence from the skin to the end of the feather or pin.

III. RESULTS

➤ *Nestling Development*

Development and growth of Alexandrine Parakeet was illustrated in Table 1.The development of average body weight and total length were found linear increase with time within study period as well as culmen, gape and tarsus development.

| Age (Week) | Weight (g) | Total length (cm) | Culmen (mm) | Gape (mm) | Tarsus (mm) |
|------------|-----------------|-------------------|----------------|----------------|----------------|
| 1 | 48.75 ±3.28 | 80.21 ±3.37 | 13.22 ±0.74 | 13.69 ±0.92 | 29.34 ±3.09 |
| 2 | 70.91 ±6.29 | 100.49 ±3.96 | 16.96 ±0.85 | 16.66 ±0.93 | 36.42 ±2.76 |
| 3 | 106.13 ±7.92 | 130.3 ±5.02 | 18.45 ±0.79 | 18.06 ±0.82 | 44.87 ±2.18 |
| 4 | 143.67 ±9.89 | 148.35 ±3.79 | 20.02 ±0.80 | 19.78 ±0.81 | 49.09 ±2.15 |
| 5 | 180.78 ±9.31 | 185.75 ±3.793 | 24.72 ±0.82 | 24.12 ±0.88 | 55.9 ±2.67 |
| 6 | 201.78 ±9.02 | 203.06 ±3.58 | 29.05 ±0.61 | 29.05 ±0.61 | 60.76 ±2.60 |

Table 1:- Weight Gain and Morphometric Development of Total Length, Culmen, Gape and Tarsus of Young Alexandrine Parakeet from One to Six Weeks Old.

➤ *Feather Development*

Feather-tract development were observed week by week, in one week old,eyes closed. The whole body of young was uniformly fleshy yellowish pink except around eyes. Head and body were naked. Down was sparsely present on the capital, humeral, dorsal, alar and crural tracts. Bill is orange-yellow.

In two weeks old,eyes began opened. Alar pins were becoming visible on the dorsal surface of the wing. Capital, ventral , crural and femoral pins were not visible. Posterior dorsal tract was appearing as whitish papillae. Caudal tract was becoming developed.

In three weeks old, eyes moderately opened. Pins emerged on alar and humeral tracts. On the wings, alar pins such as primary, secondary and tertiary were ready to unsheathe, their length were 0.5cm,0.2cm and 0.1cm respectively. Capital tract pins were developed as dark spots, dorsal and femoral and crual tract with whitish papillae. Caudal pins becoming as thin light papillae and emerged pin tips.

IV. DISCUSSION

In four weeks old, eyes open. On the capital tract, feather pins start breaking through the skin. Contour feathers were developed. Some wing covert pins were unsheathed. Femoral and crural pins start breaking through the skin and a few tiny feathers emerge from sheaths. Caudal tract with feathers. Ventral tract start to emerge on the throat and sides of chest.

In five weeks old, most feather pins clearly emerge through the skin, wings were well developed with feathers. Upper wing covert pins clearly unsheathed. Outer primary pins measure about 3cm in length. Tail was clearly seen with feathers although some dorsal, femoral and crural tracts were buffy. Ventral tract form two broad strips of unsheathed feathers.

On six week old, green contour feathers cover most of the capital, humeral and dorsal and caudal tracts. Green breast feathers are well developed on both sides of the ventral tract, but leave an uncovered gap in the middle.

In various species of bird, their chicks differ markedly in maturation of many aspects of their behavior, physiology, and anatomy. Parental care and many aspects of its environment are important role in the functional maturity of the chick in its postnatal development. The chicks of songbirds and parrots hatch in almost embryo like state, while the chicks of megapodes resemble adult birds and can fly from the first day after hatching [13]. Oken [14] said that naked and blind hatchlings cannot feed themselves in the nest ,they depend on their parents and the young hatch with open eyes and feathered soon runs about and search for their food by themselves.

In the present study, measurements of growth such as body weight, total length, culmen length, bill length, gape and tarsus were recorded (Table 1).Body mass shows regular increase with time during the study period as well as total length, culmen, bill, gape and tarsus length.

Lack [15] paying attention on weight and predicted that body weight accompanies with the size of the fat reserve and a heavier juveniles can achieve higher survival than lighter ones, expecting fat reserves to buffer the food limitation during foraging inexperience. Growth rate reflects the juvenile survival it seems to be fast growth indicates low stress during the developmental period. Young that do not obtain adequate nutrient during development may be likely to have slower growth than consistently well-fed offspring of the same population [16]. Although nestlings have fast weight gain which may be more sensitive than other parameters to food availability or environmental stress and may not always reflect the maturity level of a nestling [17].

The gape can grow quickly early in the nestling period. Tarsus and culmen length may grow normally even with food restrictions [17]. Nestlings will open their eyes at a predictable age. As a consequence, opening the eyes can indicate the age of birds. The date of the eyes opening is especially useful, while the degree of eye opening can vary considerably.

Total length is an important standard measurement that is relatively simple and quick to take. Nevertheless, the length can increase quickly, and should be used with caution [18].

Alexandrine Parakeet chicks hatched with closed eyes, naked and only a few down are present on the body. In two weeks old, Feather pins did not yet emerged from the skin, small papillae of feather pins are noticeable on the alar, dorsal and caudal tract but not on the capital, femoral and ventral tract. In three weeks old, sheaths of humeral and alar pins feathers start breaking through the skin, while feather pins of capital, femoral and ventral did not break through the skin yet. In four weeks old, Feathers on the humeral, alar and caudal became unsheathing and capital, femoral, crural and ventral tract pins have begun to emerge. In five weeks old, most feather pins clearly emerge through



Fig 1:- Feather Development of *P. eupatria*

the skin on the dorsal, humeral, alar and caudal tracts and they also emerge on the belly. In six weeks old, green contour feathers have already covered most of the body and part of the face.

V. CONCLUSIONS

The chick of Alexandrine Parakeet hatch with naked and closed eyes. The body weight increase week by week at rapid levels as well as total length while the culmen, bill and tarsus grow normally. The gape can grow quickly early in the nestling period. The flight feathers started to emerge and develop in pin before the contour feathers, while primary pins usually grow rapidly, capital, humeral and ventral tracts usually do not begin to develop until the age of three weeks old.

In conclusion, the hatchling of Alexandrine Parakeet are relatively survival in their nestling period because they can survive in experimental conditions without parental care.

ACKNOWLEDGEMENTS

I would like to thank Dr Min Thu Aung, Professor, Department of zoology, University of Pathin, for his guide lines.

I extend warm thanks to my field assistants, Phyto Wai Lwin and Su Myat Cho, for their positive attitudes and energy in the field. Finally, I would like to thank my friend, Khaing Khaing Mon for her suggestions to carry out this work.

REFERENCES

- [1]. F. Gill, E. Glen woolfenden, Psittaciform, Bird. <https://www.britannica.com/animal/2019>
- [2]. IUCN Red List of Threatened Species 2017: <http://dx.doi.org/10.2305/IUCN.UK.2017-1.RLTS.T22685434A110985466.en>.
- [3]. Starck, J.M., and R.E. Ricklefs, editors. 1998a. Avian growth and development: evolution within the altricial-precocial spectrum. Oxford University Press, New York, New York.
- [4]. R.J. O'Connor, Growth strategies in nestling passerines. *Living Bird* 16:209-238. 1978.
- [5]. H.A. Ross. Growth of nestling Ipswich Sparrows in relation to season, habitat, brood size, and parental age. *Auk* 97:721-732. 1980.
- [6]. R.D. Magrath, Nestling weight and juvenile survival in the blackbird *Turdus merula*. *Journal of Animal Ecology* 60:335-351.1991.
- [7]. Jongsomjit et al, A Guide to Nestling Development and Aging in Altricial Passerines, U.S Fish & Wildlife Biological Technical Publication BTP-R6008-2007.
- [8]. M.T.Murphy, Growth and aging of nestling Eastern Kingbirds and Eastern Phoebes. *Journal of Field Ornithology* 52:309-316,1981.
- [9]. A.F. Skutch, Parent Birds and their Young. University of Texas Press, Austin, 1976.

- [10]. J. M. Forshaw, Parrots of the World. Lansdowne Press, Melbourne, Australia, 1973.
- [11]. R.J. O'Connor, The growth and development of birds. Wiley-Interscience, Chichester, England, 1984.
- [12]. R.E. Ricklefs, Behavior of young Cactus Wrens and Curve-billed Thrashers. *Wilson Bulletin* 78:47-56, 1966.
- [13]. J.R.King, and J.K. Hubbard. Comparative patterns of nestling growth in White-crowned Sparrows. *Condor* 83:362-369, 1981.
- [14]. S.Gebhardt-Henrich and H. Richner. Causes of growth variation and its consequences for fitness. Oxford University Press, Oxford, United Kingdom, 1998.
- [15]. L. Oken, Allgemeine Naturgeschichte für alle Stände. Bd, 1837.
- [16]. D.Lack, Population Studies of Birds. Oxford University Press, Oxford, United Kingdom, 1966.
- [17]. P.T.Boag, Effects of nestling diet on growth and adult size of Zebra Finches. *Auk* 104:155-166, 1987.
- [18]. C.A. Lepczyk and W.H. Karasov, Effect of ephemeral food restriction on growth of House Sparrows. *Auk* 117:164-174, 2000.
- [19]. C.W. Boal, A photographic and behavioural guide to aging nestling Northern Goshawks. *Stud. Avian Biol.* 6: 32-40.1994.