



Selection of Cuculidae to the Hosts Based on the External Characteristics of the Eggs

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Abstract

Most of Cuculidae were known as parasitic birds, and they breed depend on their hosts. The objective of the study was to know the external characteristics of the eggs of Cuculidae and their hosts which includes several components. e.i. shell color, shape, length, diameter and egg index. Those species of Cuculidae were *Cacomantis merulinus lanceolatus*, *Cacomantis variolus sepulcralis*, *Surniculus lugubris lugubris* and *Eudynamys scolopaceus malayanus*. There were 117 item of the bird egg reference's collections in the Ornithology Laboratory, Zoology Division, Research Center for Biology, LIPI, in Cibinong, used as a research materials. Color and form the egg from every sample noted by pursuant to direct eyesight with the eye if possible and assisted with the magnifier, especially at flimsy spots egg's color. The results shown that egg size of Cuculidae groups are bigger than their host eggs. Generally, the color variation of eggs of Cuculidae and their hosts are white or bluish white and their combination like as brown and greenish. The eggs shape of Cuculidae and host are similar, namely oval with IFO value about 73 - 75%. The Cuculidae family pays attention to the color, spot pattern and shape of the host's eggs in choosing the host for their own eggs. Though, there was also a tendency not to recognize the characteristic of the host's egg. The studies represent an early stage in an attempt to strive the conservation of Cuculidae the bird hosts.

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INTRODUCTION

Indonesia have 59 species of bird of Cuculidae family, disseminating at various habitat type from lowland forest till mountain forest (Sukmantoro *et al.*, 2007). Mostly species of bird of member Cuculidae categorized by as “birds parasitism”, that is at the time of breed is parasite by placing its eggs in their host. That’s mean, most of the Cuculidae families do not make the nest, but laying eggs at other birds as the host. And then, the bird Cuculidae eggs brooded on, incubated and after hatching remain to the young birds will be mothered and fed up is and also enlarged till can be flown self-supporting by their host. However, young bird from host is often discovered to by fail scrambling of foods by young is Cuculidae, so that do not seldom die at the time of still reside in the nest. Even, egg of the host is sometimes thrown by a nest exit as effect of movement of the young Cuculidae hatched in advance. Thereby, young by itself from host of a more regular fail to expand.

Knowledge of the breeding of parasite birds from Cuculidae family and their host still be felt less in Indonesia. Though, some species of parasite bird very depended by host species to be success multiply. This matter is caused by a parasite birds have to have the special strategy to chosen and get the host at the breeding time. There is anticipation of parasite bird accommodate the niche, also foods type for their young of when in upbringing host till can look for the foods by itself in nature. Others possible also there is looking like of pattern of egg color, size measure and also form the egg of between parasite birds by their host. Early study in ornithology laboratory, zoology division, Research Centre for Biology, at the LIPI Cibinong indicate that some bird species becoming host Cuculidae is birds which its body is relative small. Among other things is plaintive cuckoo *Cacomantis merulinus* breed in parasite by placing egg at the nest of Leafbird *Chloropsis cochinchinensis*, Talilorbid *Orthotomus sutorius* and Prinia *Prinia familiaris* (Mackinnon, 1990; Lowther, 2014). If from year to year species of birds of host of Cuculidae progressively decline the diversity and also its population, hence there is anticipation of manner Cuculidae will change its strategy in host election. That matter is enabled to have an effect on to accelerating propagation of parasite birds from Cuculidae. On the other side known by the Cuculidae have potency to also as controller of pest insect in various plantation area or agriculture farm. This matter is caused by most Cuculidae of is inclusive of birds insectivore.

Pursuant to fact of is above, this research is executed with analyzing some egg from Cuculidae at one blow egg their host. The research purpose was to know the external characteristics of the eggs of Cuculidae and their hosts which includes several components, e.i. shell color, shape, length, diameter and egg index. The species egg of Cuculidae are analyze, i.e. *Cacomantis merulinus lanceolatus*, *Cacomantis variolus sepulcralis*, *Surniculus lugubris lugubris* and *Eudynamis scolopaceus malayanus*.

The knowledge applicable to anticipate in management of parasite birds as predator of pest insect with host types. Its hope there would wisdom in management of parasite birds and hosts population and habitat in Indonesia to support the ecological balance. Some hosts were also known as song birds which must use to sustainable. Even so, Indonesia is not wanted the loss of species of parasite birds and their hosts.

METHODS

The research was conducted at Laboratory of Ornithology, Research Centre for Biology, Indonesian Institute of Sciences (LIPI) in Cibinong. The research was done at January - February 2015 and January - February 2016. As much 117 item of bird egg collect references in Ornithology Laboratory from four species of Cuculidae family and some host used as sample in research. Fourth election of species of member of Cuculidae and host used as by an item analyses on the basis of consideration is existence of limitation collect egg in ornithology laboratory and lack of references (Hoogerwerf, 1949). Egg specimens of Cuculidae for the analysis were *Cacomantis merulinus lanceolatus*, *Cacomantis variolus sepulcralis*, *Surniculus lugubris* and *Eudynamis scolopacea*.

Research method used by perceived directly and morphological of egg color, form and size measure of egg of some species of Cuculidae and host. Egg color from every sample studied to be noted by pursuant to observation or direct eyesight with the eye can possible and assisted with the magnifier of at flimsy spots color, especially in shares of tip of blunt egg (Yang *et al.*, 2012). The method was also combination with the egg color such as those which have been submitted in Mackinnon (1990). Length and wide of egg of Cuculidae and host measured by caliper digimatic (in set of “mm”), then used to calculate the value make an index to the egg form. The average value of an index the egg form furthermore for to categorize of form the egg. Determination make an index to the egg form by comparing wide and

length egg and expressed in set of “%” (Teuşan *et al.*, 2008). Measurement of length and wide of egg conducted several times, among other things for the sample of specimen which its amount a little, that is between 1-3 items repeated until five multiply. The modification formula to calculate the value index to the egg form of Teuşan *et al.* (2008) as follows:

$$I_{FO} = \frac{d}{D} \times 100$$

I_{FO} = make an index to the egg form (%)
 d = diameter transversal / wide of egg (mm)
 D = longitude diameter / long of egg (mm)

The statistical to analyses there is and do not it difference assess the index form of the egg Cuculidae by their host use the Comparability Analysis Two Independent Sample (Triyono, 2015).

RESULTS AND DISCUSSION

According to all studied egg specimens, there are variation of shape or egg form and color pattern between some Cuculidae eggs and their hosts. Egg's color comparison from four groups of Cuculidae species and each host are as follows.

The first group of Cuculidae, namely *Cacomantis merulinus lanceolatus* (CML/738) and its hosts are described in Figure 1. Primary, CML egg's color is white of a few ashes, such as color of duck egg. The color is also combines with the small spots of brown, especially more in shares on the tip of blunt egg. Egg shell is very brittle and fragile. At least, *Cacomantis merulinus lanceolatus* (CML/738) were known have six hosts. One of all, B1 is *Orthotomus sepium sepium* (OSS/883). The color of OSS egg is dirty white and small red spots and more in shares of tip of blunt egg. C1 is egg of *Orthotomus sutorius edula* (OSE/881); egg's color is similar to the egg of *Cacomantis merulinus lanceolatus* (CML), that is white dirty and there are brown spots in part egg surface, and more on the tip of blunt egg. D1 is egg of *Prinia familiaris familiaris* (PFF/907); egg's color is dirty white, and spotting brown of a few ashes and also more amounts at the blunt part of the egg. E1 is egg of *Prinia familiaris olivacea* (PFO/443). Primary, egg's color is bluish white like a duck's egg, and reddish brown at most egg surface. F1 is an egg of *Cisticola juncidis malayanus* (CJM/888); egg's color of CJM like the egg of *Cacomantis merulinus lanceolatus* (CML), i.e. ashes white. But, egg of *Cisticola juncidis malayanus* is cleaner and whiter; and a few brown spots at the end of blunt egg tip. Both egg shells are flimsy and fragile. G1 is egg of *Zosterops palpebrosus* (ZP/414); egg's color is white

and clean.



Figure 1. Eggs of Cuculidae I and their hosts. From left to right, A1= Egg of *Cacomantis merulinus lanceolatus* (CML/738), Host: B1=*Orthotomus sepium sepium* (883), C1=*Orthotomus sutorius edula* (881), D1=*Prinia familiaris familiaris* (907), E1=*Prinia familiaris olivacea* (443), F1=*Cisticola juncidis malayanus* (888), G1=*Zosterops palpebrosus* (414). [Doc.: W. Widodo].

The reality do not entirely its egg's color of the first Cuculidae, i.e. *Cacomantis merulinus lanceolatus* similar to 6 species hosts. Color of CML egg is ashes attenuate such as duck egg. Apparently, eggs of two host which more similar of the CML eggs, those are eggs of *Cisticola juncidis malayanus* and *Prinia familiaris familiaris* (Figure 1). More that, there is ashes color of combination still meagerly pock and flimsy fleck cacao.

The second group of Cuculidae, namely D2 is *Cacomantis variolosus sepulcralis* (CVS/740). CVS has 3 hosts, i.e. A2 is *Lanius schach bentet* (LSB/?), B2 is *Megalurus palustris palustris* (MPP/895) and C2 is *Rhipidura javanica javanica* (RJJ/789) (Figure 2). CVS eggs is white and a few greenness, by spotting to minimize the dirty brown chromatic in 2/3 shares of tip of blunt egg. Their host is *Lanius schach bentet* (LSB/?); LSB egg is white with the small cacao spot and refine, and more amount in 2/3 shares of tip of blunt egg. *Megalurus palustris palustris* (MPP/895); egg's color is pink, spotted of purple and red refinement. Then, *Rhipidura javanica javanica* (RJJ/789); egg's color is buff, and ash spotting.



Figure 2. Eggs of Cuculidae II and their hosts. From left to right, Host: A2=Egg of *Lanius schach bentet* (LSB/?), B2=*Megalurus palustris palustris* (895), C2=*Rhipidura javanica javanica* (789), D2=*Cacomantis variolosus sepulcralis* (740). [Doc. W.Widodo].

Egg's color of CVS is turning white greenness by brown spotted in shares of tip of blunt egg. Those egg's colors are rather similar with the egg of their host that is white meagerly smooth cacao from host *Lanius schach bentet*. But, less similar with the other host egg's color, which is pink spot the purple of at *Megalurus palustris palustris*, and buff a few with the dusty fleck at *Rhipidura javanica javanica*.

The third group of Cuculidae, i.e. B3 is *Surniculus lugubris lugubris* (SLL/736) and two hosts are A3 is *Malacocincla sepiaria sepiaria* (MSS/831) and C3 is *Stachyris melanothorax melanothorax* (SMM/836) (Figure 3). Egg's color of SLL is purple such as Java plum fruit (*Syzygium cumini*) and red lines of blood. Their host, i.e. *Malacocincla sepiaria sepiaria* (MSS); egg's color like as SLL egg's, that is dirty white and shadowy brown of embryo growth flatten. Brown color are more on egg of MSS compared to by a brown color of egg SLL. But, *Stachyris melanothorax melanothorax* (SMM); egg's color is white and clean.



Figure 3. Eggs of Cuculidae III and their hosts. From left to right: A3=*Malacocincla sepiarium sepiarium* (831, host), B3=*Surniculus lugubris lugubris* (736, Cuculidae III), C3=*Stachyris melanothorax melanothorax* (836, host). [Doc. W.Widodo].

Hosts of the third Cuculidae group are mostly from Timaliidae family, those are *Malacocincla sepiaria sepiaria* and *Stachyris melanothorax melanothorax*. Egg's color of *Malacocincla sepiaria sepiaria* host, however, is similar with SLL, that is white dirty with the pock or shadowy brown outline of embryo growth flatten. The brown's color of egg of *Malacocincla sepiaria sepiaria* are in a more amount compared to by a brown color of egg SLL. While, color of egg SLL compare to host is *Stachyris Melanothorax melanothorax* of a few difference. The egg's color of *Stachyris melanothorax melanothorax* is clean white, and bold. The size of hosts egg, i.e. SLL and SMM are smaller than egg of MSS or *Malacocincla sepiarium sepiarium*.

The fourth group of Cuculidae, i.e. D4 is *Eudynamys scolopacea malayanus* (ESM/491).

Their hosts, i.e. A4 and B4 are *Dicrurus macrocercus javanus* (DMJ/1019 & 1021), E4 is *Corvus enca enca* (CEE/1031) and C4 is *Oriolus chinensis maculatus* (OCM/1015) (see Figure 4). Egg's color of *Eudynamys scolopacea malayanus* is white rather blue with the black fleck. Egg's color of their host, namely E4, *Corvus enca enca* egg is most similar with egg of ESM. There are black spot on the blue surface of egg and more on amount of the blunt egg. *Dicrurus macrocercus javanus* (DMJ), egg's color is dirty white with the pale spots rather flatten at surface of egg shell. Then, *Oriolus chinensis maculatus* (OCM) host, egg's color is white and smoot black spot in shares of egg surface. According to egg's color in the reality, the egg of *Eudynamys scolopacea malayanus* is similar with the color and shape or form of *Corvus enca enca* egg. The color of egg *Corvus enca enca* is white rather blue with the black fleck.



Figure 4. Eggs of Cuculidae IV and their hosts. From left to right, Cuculidae IV: D4=*Eudynamys scolopaceus malayanus* (491), Host: A4 & B4 = *Dicrurus macrocercus javanus* (1019 & 1021), C4=*Oriolus chinensis maculatus* (1015), E4=*Corvus enca enca* (1031). [Doc. W.Widodo].

Overall, the results shown that egg size of Cuculidae groups are bigger than their host eggs, relatively. The body size of hosts its also are smaller than the Cuculidae body size groups. However, the color and shape of eggs is similar. It is stated that parasitic cuckoos increased their egg laying opportunities by choosing host species smaller than themselves, because these tend to be more abundant than are larger hosts (Krüger *et al.*, 2004). It has been suggested that the cuckoo's parasitic habit of depositing eggs in the nests of smaller species, or of carrying them there in her bill, has caused an adaptation of egg size (Romanoff & Romanoff., 1963). Generally, when a cuckoo egg is well matched to its host eggs, it has a greater chance to survive than those with poor matching (Davies & Brooke, 1988; Moksnes *et al.*, 1991; Hauber *et al.*, 2006; Cherry *et al.*, 2007). Avian eggs, nevertheless, vary not only in color and spotlessness but in shape too, which is

possibly related to sufficient heat transfer during incubation in different sized clutches (Barta & Székely, 1997).

Size and an index value of the egg from four species of Cuculidae and host in detail are presented at Table 1.

Modification of Tyn & Berger (1976) that form of egg were groups into 12 categories, i.e. [1].Spherical (circular / domed), that is if the comparison of width and length is equal (1:1) and form and egg index of 100% ($I_{FO}=100\%$); [2]. Elliptical (ellipse), the I_{FO} value is 80%; [3].Long elliptical ($I_{FO} = 66.67\%$); [4].Oval ($I_{FO} = 75.18\%$); [5].Short Oval ($I_{FO} = 88.49\%$); [6].Long Oval ($I_{FO} = 62.5\%$); [7].Pyriform ($I_{FO} = 68,49\%$); [8].Short Pyriform ($I_{FO} = 90,91\%$); [9].Long Pyriform ($I_{FO} = 59,88\%$); [10].Sub elliptical ($I_{FO} = 70,92\%$); [11] Short Sub elliptical ($I_{FO} = 83\%$); [12].Long Sub elliptical ($I_{FO} = 60,60\%$).

According to those above categories, hence form the egg of Cuculidae I or *Cacomantis merulinus lanceolatus* have near oval with the I_{FO}

average is 73.68%. Group of Cuculidae II, that is CVS or *Cacomantis variolosus sepulcralis* of is in form of oval or near oval with the I_{FO} value range from 73-75%. This matter also happened in group of Cuculidae III, i.e SLL/ *Surniculus lugubris lugubris* by host are *Lanius schach bentet*, *Megalurus palustris palustris* and *Rhipidura javanica javanica* with I_{FO} are between 73-74%. At group of Cuculidae IV, that is ESM / *Eudynamys scolopaceus malayanus* form its egg also near oval with the value of $I_{FO}=74.55\%$. Then, the egg form of hosts (i.e. *Corvus enca enca* and *Dicrurus macrocercus javanus*) is sub elliptical to oval with the value of I_{FO} ranged from 72.85-73.03%.

Statistical analysis of the form index of egg from each Cuculidae and host is submitted in Table 2.

The result supported with the statistical analysis showed that the egg index of Cuculidae I/*Cacomantis merulinus lanceolatus* (CML) is not significantly different compared with the egg of *Cisticola juncidis malaya* (CJM), *Orthotomus sepium*

Table 1. Average of size and an index to the egg from some species of Cuculidae and host

| Species Name | Length (mm) | | Width (mm) | | Form index of egg (%) | |
|--|--------------|-------------|--------------|-------------|-----------------------|-------------|
| | Average ± SD | Range | Average ± SD | Range | Average ± SD | Range |
| <i>Cacomantis merulinus lanceolatus</i> (CML) | 17.09±0.37 | 16.85-17.76 | 12.45±0.04 | 12.42-12.51 | 73.68±0.56 | 73.24-74.64 |
| <i>Cisticola juncidis malaya</i> (CJM) | 15.27±0.27 | 14.79-15.71 | 11.39±0.39 | 10.92-12.26 | 74.60±2.54 | 69.50-79.15 |
| <i>Orthotomus sepium sepium</i> (OSS) | 15.42±0.35 | 14.42-16.44 | 11.22±0.28 | 10.77-11.65 | 72.78±2.59 | 67.09-77.25 |
| <i>Orthotomus sutorius edela</i> (OSE) | 15.60±0.58 | 14.67-16.39 | 10.82±0.10 | 10.69-10.96 | 69.42±2.25 | 66.63-73.42 |
| <i>Prinia familiaris familiaris</i> (PFF) | ** | | | | | |
| <i>Prinia familiaris olivacea</i> (PFO) | 17.20±0.18 | 15.85-18.19 | 12.32±0.38 | 11.79-13.16 | 71.68±2.39 | 68.77-75.63 |
| <i>Prinia inornata blythi</i> (PIB) | 16.31±0.56 | 15.17-17.20 | 11.87±0.25 | 11.41-12.23 | 72.85±1.63 | 70.13-76.33 |
| <i>Cacomantis variolosus sepulcralis</i> (CVS) | 19.37±0.65 | 17.64-20.58 | 14.63±0.51 | 13.34-15.28 | 75.51±2.44 | 68.99-79.16 |
| <i>Lanius schach bentet</i> (LSB) | 23.45±1.09 | 21.17-24.78 | 17.22±0.69 | 16.22-18.58 | 73.48±1.85 | 70.30-77.14 |
| <i>Megalurus palustris palustris</i> (MPP) | 22.83±0.92 | 21.37-24.07 | 17.11±0.38 | 16.55-17.97 | 75.07±3.22 | 71.35-79.50 |
| <i>Rhipidura javanica javanica</i> (RJJ) | 17.66±0.54 | 16.62-18.43 | 12.92±0.31 | 12.25-13.29 | 73.13±1.54 | 70.65-76.11 |
| <i>Surniculus lugubris lugubris</i> (SLL) | 20.44±0.89 | 18.98-21.09 | 15.22±0.55 | 14.42-15.95 | 74.82±2.09 | 72.27-79.54 |
| <i>Malacocinca sepiaria sepiaria</i> (MSS) | 22.34±0.77 | 21.24-23.99 | 16.25±0.60 | 15.48-17.58 | 73.26±3.30 | 67.28-79.08 |

Table 1. (Continued).

| Species Name | Length (mm) | | Width (mm) | | Form index of egg (%) | |
|--|----------------|-----------------|----------------|-----------------|-----------------------|-----------------|
| | Average ± SD | Range | Average ± SD | Range | Average ± SD | Range |
| <i>Stachyris melanothorax melanothorax (SMM)</i> | 17.75± 0.21 | 17.43- 17.97 | 13.28± 0.24 | 12.97- 13.60 | 74.84± 0.87 | 73.79- 75.85 |
| <i>Eudynamys scolopacea malayanus (ESM)</i> | 33.92± 1.31 | 31.88- 35.99 | 25.25± 0.43 | 24.65- 26.05 | 74.55± 3.55 | 70.32- 79.74 |
| <i>Corvus enca enca (CEE)</i> | 16.31± 0.56 | 15.17- 17.20 | 11.87± 0.25 | 11.41- 12.23 | 72.85± 1.63 | 70.13- 76.33 |
| <i>Dicrurus leucophaeus leucophaeus (DLL)</i> | 41.62± 1.43 | 39.40- 43.70 | 28.75± 0.88 | 27.24- 30.05 | 69.15± 2.53 | 65.40- 72.87 |
| <i>Dicrurus macrocercus javanus (DMJ)</i> | 24.37± 0.95 | 22.99- 25.63 | 17.78± 0.48 | 17.08- 18.83 | 73.03± 2.41 | 68.94- 77.15 |
| <i>Oriolus chinensis maculatus (OCM)</i> | 29.60± 0.61 | 28.94- 30.85 | 20.19± 0.73 | 19.32- 21.54 | 68.25± 2.94 | 64.55- 72.85 |

**No measured (sample less)

Table 2. Result of “T” test between egg index of Cuculidae and hosts eggs

| No. | Species Names [Cuculidae vs Host] | Average of form index of the egg (I _{FO'} %) | | t-test | t-table | df |
|-----|-----------------------------------|---|-------------------------|--------------|---------|----|
| | | I _{FOA} (Cuculidae) | I _{FOB} (Host) | | | |
| I | CML vs AAA | 73.679 | 69.650 | 9.97 (*) | 2.201 | 11 |
| | CML vs ATS | 73.679 | 76.989 | 8.033 (*) | 2.179 | 12 |
| | CML vs CJM | 73.679 | 74.609 | 0.7956 (ns) | 2,052 | 27 |
| | CML vs OSE | 73.679 | 69.703 | 3.215 (*) | 2.179 | 12 |
| | CML vs OSS | 73.679 | 72.779 | 0.777 (ns) | 2,052 | 27 |
| | CML vs PFF | 73.679 | 74.829 | 3.07 (*) | 2.447 | 6 |
| | CML vs PFO | 73.679 | 71.678 | 0.0018 (ns) | 2.052 | 27 |
| | CML vs PIB | 73.679 | 72.851 | 1.11023 (ns) | 2.042 | 30 |
| II | CVS vs LSB | 72.745 | 72.745 | 0.3229 (ns) | 1.99 | 61 |
| | CVS vs MPP | 72.745 | 75.075 | 0.7382 (ns) | 2.018 | 43 |
| | CVS vs RJJ | 72.745 | 73.133 | 0.1250 (ns) | 2.01 | 43 |
| III | SLL vs MSS | 74.818 | 73.263 | 1.47 (ns) | 2.033 | 34 |
| | SLL vs SMM | 74.818 | 74.845 | 0.08601 (ns) | 2.093 | 19 |
| IV | ESM vs CEE | 73.208 | 71.286 | 3.39741 (*) | 2.074 | 22 |
| | ESM vs DLL | 73.208 | 74.494 | 2.20144 (*) | 2.086 | 20 |
| | ESM vs DMJ | 73.208 | 73.023 | 0.21832 (ns) | 2.042 | 30 |
| | | 73.208 | 70.072 | 3.86037 (*) | 2.086 | 20 |

Remarks: CML=Cacomantis merulinus lanceolatus, AAA=Arachnothera affinis affinis, ATS=Aegithina tiphia scapularis, CJM=Cisticola juncidis malaya, OSE=Orthotomus sepium edela, OSS=Orthotomus sepium sepium, PFF=Prinia familiaris familiaris, PFO=Prinia familiaris olivacea, PIB=Prinia inornata blythi, CVS=Cacomantis variolosus sepulcralis, Lanius schach bentet, MPP= Megalurus palustris palustris, RJJ= Rhipidura javanica javanica, SLL=Surniculus lugubris lugubris, MSS=Malacocincla sepiaria sepiaria, SMM=Stachyris melanothorax melanothorax, ESM=Eudynamys scolopacea malayanus, CEE= Corvus enca enca, DLL= Dicrurus leucophaeus leucophaeus, DMJ=Dicrurus macrocercus javanus, OCM=Oriolus chinensis maculatus. ns = non significant, (*) = P<0.05

sepium (OSS), and *Prinia familiaris olivacea* (PFO) ($P > 0.05$). The size of egg of Cuculidae II/ *Cacomantis variolosus sepulcralis* (CVS) by host show the higher similarity. Statistically, index form the egg of *Cacomantis variolosus sepulcralis* is not significantly different with the egg from *Lanius schach bentet* (LSB), *Megalurus palustris palustris* (MPP) and *Rhipidura javanica javanica* (RJJ) ($P > 0.05$). That's not significantly different its also occurred between index form of Cuculidae III/ *Surniculus lugubris lugubris* (SLL) with *Malacocincla sepiaria sepiaria* (MSS) and *Stachyris melanothorax melanothorax* (SMM) ($P > 0.05$). Visual of measured size of Cuculidae IV/ *Eudynamys scolopacea malayanus* (ESM) and the form of egg host (*Corvus enca enca* / CEE) is higher similarity ($P > 0.05$). The form its egg is both ellipse and one of its back part is in a very fine-form. Though, statistically assess the index egg of between *Eudynamys scolopacea malayanus* (ESM) by *Corvus enca enca* (CEE) of a few difference ($P < 0.05$). There are also not different, the index egg form of *ESM* vs *Dicrurus macrocercus javanus* (DMJ) and *ESM* vs *Dicrurus leucophaeus leucophaeus* (DLL) ($P < 0.05$).

Result of this study indicated that most of Cuculidae eggs are similar to their hosts, namely *Cacomantis merulinus lanceolatus* (CML) to the *Cisticola juncidis* and *Prinia familiaris*; *Cacomantis variolosus sepulcralis* (CVS) to *Lanius schach bentet* (LSB) and *Surniculus lugubris lugubris* (SLL) to *Malacocincla sepiaria sepiaria* (MSS). Then, *Eudynamys scolopacea malayanus* (ESM) have almost the similar color with the egg of *Corvus enca enca* (CEE). The fourth Cuculidae choose to their groups hosts specifically, i.e. *Cacomantis merulinus lanceolatus* (CML) prefer to the Sylviidae, and *Cacomantis variolosus sepulcralis* (CVS) to Laniidae. The SLL choose to the Timaliidae and ESM to the Corvidae family. This was indicated that Cuculidae families have many strategies to get its eggs to appropriate nest host. One of the strategy is by considering the high similarity between the form and color of the host's eggs. Therefore, Cuculidae there is having strategy by accommodating egg color, form the egg and also color and form the egg host alike is high relative. Female of Cuculidae secret prefer to and have the behavior quickly lay eggs, but in a lot of male matter of Cuculidae assist with the strategy lure the adult host from its nest till go out the nest, and female of Cuculidae can lay eggs in the nest host (Davies, 2011).

A lot of species host which possible try to prevent the female Cuculidae laying eggs in nest by besieging it reside in the area of nest host. However, female Cuculidae will lay eggs and place

them in nest host having visible egg similar with its eggs (Aviles *et al.*, 2006). Usually, shell Cuculidae egg is thick with two different coats. In the outside, it contains the chalk that is trusted to give the strength of attack cart when the eggs are placed in nest host (Antonov *et al.*, 2008). Whereas, stated that the egg of Cuculidae will hatch earlier than hosts and their young will grow bigger and faster so they have possibility to force off the egg or young host.

Generally, in Indonesia and especially in Java, most of the hosts of Cuculidae the birds with potency to own the good song birds, like Tailorbird (*Orthotomus sepium*), *Prinia familiaris*, Long-tailed Shrike (*Lanius schach*), Black Drongo (*Dicrurus macrocercus*), and Oriole (*Oriolus chinensis*).

For becoming Cuculidae look for the adaptation of at other; dissimilar group is which possible that matter will pass by of with do not easy to. Besides, getting host newly need an evolution process which do not during as soon as that. Thereby, loss of hosts of parasite birds cause the retreating their regeneration. Survive is to ability to be non stopped live on or able to maintain its existence in the environment (Arundina *et al.*, 2014).

Parasite birds will be able to survive, grow and expand in an environment providing compatible condition. Here the availability of host and creation of new habitat is needed, in order to maintain, or even to increase the current diversity of habitat (Young, 1994). It is expected that Cuculidae and their hosts still could be developed in their habitat. The Management of Authority required to take action forwards while watching the exploitation of song birds population as the hosts. Furthermore, the breeding strategy of parasite birds in purpose of adaptation look for and or chosen their hosts. It is very important, because considering that the successful breeding of avian birds (Cuculidae) depend on their hosts.

CONCLUSION

It is concluded that Cuculidae pay attention to the color, spot pattern and shape of the host's eggs in choosing the host for their own eggs. Though, there was also a tendency not to recognize the characteristic of the host's egg. This study represent an early stage in an attempt to strive the conservation of Cuculidae the bird hosts.

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