

spur slender curved, longer than the ovary, slightly compressed laterally. *Column* very short: stigmas large, tapering towards the entrance to the spur. *Pollinia* cylindric, slightly clavate, rather longer than their caudicles and attached to them at half a right angle; gland small, subrotund.

Sikkim: at Gnatong; elevation 11,000 feet: flowering in July; collected by Mr. Pantling and also by Dr. Cummins; Surgeon to the detachment of troops stationed near the Thibet frontier, to whom we have dedicated the species.

This belongs to the section *Hologlossa* and is allied to *H. pachycaulon*, Hook. fil., but it is perfectly distinct from that species.

Contributions to the Theory of Warning Colours and Mimicry, No. I.

Experiments with a Babbler (Crateropus canorus).—By FRANK FINN, B.A., F.Z.S., Deputy Superintendent of the Indian Museum.

Not long after my arrival in Calcutta in October 1894, I commenced some researches on the common “warningly coloured” butterflies of the locality, in the hope of supplying some of that experimental proof of the unpalatability of such species, the insufficiency of which Professor Poulton (the Colours of Animals, p. 227) so justly deplores. My most complete experiments were made with the common Babbler *Crateropus canorus*, a representative and abundant insectivorous bird in India, whose habit of going about in small flocks is indicated by its native name of “sat-bhai” and the English ones of “Seven Brothers” and “Seven Sisters.” This bird, as it frequents trees and bushes, though often feeding on the ground in the open at a short distance from these, must constantly encounter butterflies in repose; that it often succeeds in capturing them on the wing I very much doubt, its weak clumsy flight being certainly most ill-adapted for such a performance. Though it can swallow whole butterflies of considerable size, it often transfers its prey to one foot, and thus holding it, easily picks off the wings. In confinement this species speedily becomes tame enough to feed from the hand, and will eat table scraps, boiled rice, &c., quite readily. So tame were some birds which I kept, that, when after being kept about a fortnight (some of them longer) they were released, they stayed about the compound for about three days, still willing to take insects from my hands. Thus I had an opportunity of checking the results of the experiments I had made on them during their incarceration—a piece of good fortune which has not so far, I believe, fallen to the lot of any previous experimenter.

As I intend to make this paper the first of a series, in which I shall record the results obtained by experiments with several more species of birds and with insectivorous animals of other groups, I refrain at present from drawing any general conclusions; such as can be drawn from the experiments given below will be perfectly obvious to any one who has studied this subject.

I have much pleasure, however, in here expressing my sincere thanks to Dr. Alcock, Superintendent of the Indian Museum, for the kind interest he has taken in my experiments. To him I owe the accommodation of a small aviary for some of my birds, and permission to use the services of the Museum collectors for obtaining insects—requisites indispensable for successful experiments.

I have also to record my obligations to Mr. L. de Nicéville, and to Mr. Barlow of the Museum staff, for assistance in naming the insects herein and after dealt with.

EXPERIMENTS WITH BABBLERS IN CONFINEMENT. SERIES A.

November 11th.—Offered various insects to four Babblers (*Crateropus canorus*) which I had just bought and placed in a large hutch, after I had given them some boiled rice, which they ate readily. They seized cockroaches (*Periplaneta americana*) and *Catopsilia* readily, squabbling over them, and one ate a *Terias* whole. They tackled two *Danaïs chrysippus* just as readily, and I thought I saw one swallowed; certainly there seemed no difference in their behaviour.

Later on in the day, giving the birds two more Danaids, they certainly seized and mauled them, but left them for a little while at any rate; and I found pieces of body and wing from the previous specimens. But these disappeared later. A *Delias eucharis* was torn to pieces, and some of the body at least eaten before my eyes.

November 12th.—The Babblers had still some rice left this morning; I took it away and gave them butterflies. I saw *Danaïs chrysippus* and *Delias eucharis* mauled and left, while of a specimen of a protectively-coloured species part at least was eaten. *Terias* to-day was pecked and left, and even the common Hesperid and a *Catopsilia* pecked about much; and though I believe they were eaten in part, I could not be quite sure.

November 13th.—This morning the Babblers had no food and were hungry when I came to them. They took and mauled three *Danaïs chrysippus*, but I saw none eaten; even one with the wings removed was left. One of them battered and partly at least ate a skipper. A larger skipper (*Tagiades*) was seized, mauled, and apparently eaten, A *Catopsilia* had its wings picked and knocked off and was eaten. A

Delias eucharis (minus abdomen) was mauled and left. A female *Hypolimnas misippus* was taken, and part at least was eaten. The birds take all butterflies one gives them and batter them a bit. Some of the *Danaids* may have eventually been eaten.

Next day I released these Babblers, not having got any very conclusive results from them. They did not seem very keen on butterflies, and were perhaps not healthy. Moreover it was difficult to observe them in a hutch.

EXPERIMENTS WITH BABBLERS IN CONFINEMENT. SERIES B.

December 11th.—A fresh Babbler confined alone pulled about an *Euproctis* moth for a time, but I found it left afterwards. I gave him separately an abdomen which he had knocked off, but did not see it eaten.

December 12th.—Babbler appeared to eat a bit of an *Euproctis* abdomen.

December 13th.—This Babbler, with another, and other birds being now in a small aviary, with $\frac{1}{2}$ inch-mesh netting, I saw one of them seize an *Euproctis*. A Babbler also pulled another of these insects to pieces, but did not eat it as far as I saw.

December 14th.—A Babbler ate a *Papilio demoleus** whole, but did not eat a *Danaïs chrysippus* and *Delias eucharis*, though descending from his perch to eat a *Catopsilia*.

December 15th.—The birds in the aviary being hungry, I put in some butterflies. I saw a Babbler eat a *Terias*. Later on, after the birds had had some food (meal moistened with water) I put in more butterflies, and saw a Babbler eat a *Danaïs genutia*, *D. chrysippus*, and *Delias eucharis*. Two *Euproctis* were eaten by Babblers. Two *Danaïs genutia* were seized and torn to pieces, and part of one was apparently eaten by the Babblers, which showed some signs of apparent dislike; of two *D. chrysippus* then given, one was torn up and eaten, and the other torn up and rejected, by a Babbler, which then took and left a *D. genutia* and *Delias eucharis*, and then went and ate some rice. After this I released the other birds in the aviary, as they had no chance with the Babblers. About this time I added a third specimen of the latter.

December 16th.—One of the Babblers took and ate nearly whole, after much rubbing and pecking, a caterpillar rather larger and much hairier than that of the Buff-tip (*Pygaera bucephala*). I think this is the larva of whose hairs I recently got my fingers full. The bird had

* *erithonius auctorum*.

food by it, and had had cockroaches in the morning. Another caterpillar, smaller, and covered with long whitish hair, with two pencils of hair near the head, was untouched.

December 17th.—A Babbler ate an *Euproctis* readily. The hairy caterpillar not eaten yesterday was still untouched, so I took it away.

December 18th.—The Babblers ate four specimens of *Euproctis*; they were hungry. They ate some *Catopsilia* and other non-warningly-coloured butterflies with relish, and ate also three *Danaïs genutia*; but only one of these was eaten directly by one and the same bird, and the others were evidently not relished much, for the birds ate *Papilios** of equal size much more readily. Specimens of a black beetle with yellow patches (*Mylabris* sp.) were taken, and the elytra got rid of, but the birds did not seem to like the body, and I saw one left.

December 19th.—The birds were hungry in the morning, and one ate a *Danaïs chrysippus* readily enough. Then a *D. limniace* was readily eaten. An *Euploea* was also eaten; the bird pecked it about on the ground much first, seeming especially to attack the yellow anal organ. A cockroach subsequently put in excited more competition than these butterflies, and caused a fight. Several *D. genutia* and *chrysippus* were then turned into the aviary, and two of the Babblers immediately attacked them. I gave them some *Euproctis*, and they ate some, I believe all, of them. By this time, too, they had torn all the *Danaïs* to pieces, and as I saw no bodies lying about, I presume eaten them, though they had now some plantain (a food they did not relish). In the evening an *Euploea* was eaten, though there was food in the cage.

Yesterday, I think, I put the hairy caterpillar which had previously escaped destruction, in again. It remained untouched for a day, and next morning I found it dead in the water. The birds seemed never even to look at it.

December 21st.—Two of the Babblers had been placed in the cage of a Bhimraj (*Dissemurus paradiseus*), and this bird put in the aviary with a Laughing Jackass (*Dacelo gigas*,) (not used in these experiments) and one Babbler. Another of the hairy caterpillars noted previously (*Dec. 16th*) as eaten by a Babbler remained untouched for some time, but afterwards I found it dead and deprived of its hair, but uneaten. I don't know which bird did this. I put a mixed lot of butterflies in the aviary, and saw the Babbler, which was hungry, three times take and eat a non-warningly-coloured butterfly in preference to *Danaïs chrysippus* and *D. genutia*, which it could easily have caught. Indeed, I saw it take and drop a *D. genutia*, and seize and eat a *Papilio** instead. It ate a grasshopper before any butterflies. At the end of the day two *Papilios* (one torn)

* Not *P. aristolochiæ*.

and most if not all of the warningly-coloured species were left, though the Babbler readily ate grasshoppers. Yet, when I gave an *Euploea* to the other two Babblers in the cage, one took and ate it whole, though they had had some grasshoppers, and did not eat some *Danaïs chrysippus* and *genutia* which I put in, so far as I saw.

Between this last date and January 3rd, I took, with one exception, no notes on the behaviour of the Babblers. I added during this time other specimens and had as many as twelve at once. However, I turned out three of these, and started the next series of experiments with nine birds, including the three used in the above series of experiments. I have a note for December 28th, on which date I gave the Babblers a small black and yellow zygaenid moth, which none touched, though some evidently saw it. The other birds had been removed.

Before beginning to take the systematic notes which follow, I had more than once given the birds butterflies, and had seen *Danaïs*, &c., devoured. I cannot give the exact dates of the experiments following, but they took place on and after January 3rd of 1895, on consecutive days for the most part. I have endeavoured to record each day's experiments separately. One and possibly two, of the present birds were young, but my notes are not quite clear on this point.

EXPERIMENTS WITH BABBLERS IN CONFINEMENT. SERIES C.

I. Put in, in the evening, first some grasshoppers, which were immediately devoured, then some butterflies (*Danaïs chrysippus*, *genutia* and *limniace*, *Euploea*, *Papilio aristolochiae* and some non-warningly coloured kinds). The *Danainae* were most numerous, and all were attacked, but the non-warningly-coloured species disappeared first. However, all the others but one *Danaïs genutia* and the *Papilio aristolochiae* were killed and more or less mauled, and some eaten. I saw one bird take and reject an *Euploea*, and another eat one. The *Papilio aristolochiae* was refused four times at least, and sometimes looked at and not touched. I then took it out. A very worn female specimen of *Elymnias undularis* was one of the first insects seized by the Babblers, as also were the *D. limniace*. There was food in the cage at the time.

II. The butterflies offered and partly left yesterday had disappeared this morning, with the exception of a few bits of wing, though there was still some food. In the evening I put some butterflies (one each of *Danaïs chrysippus*, *genutia*, and *limniace* and some other kinds), into an insect cage, and placing this in the aviary watched the result. One bird went in and took out a *Catopsilia*, which seems to be a favourite. Another (young) went in and took a female *Elymnias undularis*, though he could see its mimetic upperside; but he lost it. The three *Danaïs* were the last

left. Even two of these were ultimately taken, and I suppose eaten; I did not watch the whole process. The other, a *D. chrysippus*, was at the top of the cage, and possibly hard to get; I took it out. The young Babbler took, instead of a *Danaïs genutia*, a specimen of *Nichitonia xiphia*, which he seemed not to like. However, later on I could only find a few bits of wing left of all the butterflies I had put in, so I suppose it was eaten after all. The birds had had some grasshoppers first.

III. Put a *Danaïs genutia* into the aviary, where a Babbler took it and ate it whole. A *D. chrysippus* was taken by a Babbler, which was pulling off the wings with no great eagerness, when another took it away and ate the body. An *Euploea* (rather crushed) was eaten readily enough, with part of the wings, by a Babbler. I then put in several *D. chrysippus* and *genutia*, and the birds ate them all and fought over them. I saw one throw up a body two or three times before swallowing it. A *D. chrysippus* was first taken when I put in two of each kind (*D. chrysippus* and *D. genutia*) dead. The birds had had some grasshoppers some hours before. Some time afterwards I killed and put in—

- (a.) One each of *Danaïs chrysippus*, *genutia*, and *limniace*, *Euploea*, and *Catopsilia*. A bird snatched the *D. limniace* before I took my hand away, and the *Catopsilia* was not, I think, the next taken. The *Euploea* was swallowed whole.
- (b.) Two *D. chrysippus* and a large brown species put in; a bird first took the latter.
- (c.) The same two *D. chrysippus* were put in together with a *Junonia*. Two birds advanced at once and one took the *Junonia*, the other a *D. chrysippus*. The *Junonia* was eaten before my eyes, and I saw the other begun upon.
- (d.) I repeated this experiment with two *D. chrysippus* and another protectively-coloured specimen. This latter was taken by the first bird which came. About this time I saw a bird eat the body of a *Danaïs*, and soon found two lying about. The birds pecked but did not seem to care for them.
- (e.) I put in a *Catopsilia* and two *D. chrysippus*; two or three of the birds came at once. One took the *Catopsilia* and another a *D. chrysippus*.
- (f.) Put in a *Catopsilia* and one *D. chrysippus*. The first comer took the former, and immediately afterwards the latter was taken. The *Catopsilia* was eaten at once with some of its wings. The body of the other was eaten after some rubbing; I do not know whether the eater was the individual which took it.

(g.) Put in another *D. chrysippus* and a small fritillary, *Atella phalanta*. A bird took and ate the latter; the former was unregarded for a little time at least, then a bird took and ate at least some of it.

(h.) A Babbler took and pulled about a *Delias eucharis*, but then left it. I offered it again, and it was refused by a bird or two, though another appeared to eat part of it.

I then put in one *Danaïs genutia*, two *D. limniace*, and several *D. chrysippus*, which were immediately attacked as they fluttered about. All of these last mentioned were soon killed and torn to pieces, and I saw at least three eaten, though the birds had rice, &c., in the aviary.

IV. The birds had had no insects but a fly or two when I gave them (dead).

(a.) Two *Danaïs chrysippus* and one *Papilio demoleus*. The latter was taken first. I took the former away and

(b.) Presented them again with another *P. demoleus*. Two birds, one young, went for the *Papilio*; the older got it, and then the other bird took a *D. chrysippus*.

(c.) Put in two more *D. chrysippus* and a *P. demoleus*. A bird advanced and deliberately chose the latter.

(d.) Two more *D. chrysippus* and a *P. demoleus* were put in. The latter was taken first.

(e.) Same experiment repeated with same result.

(f.) One *D. chrysippus* and one *P. demoleus* put in; first comer chose the latter.

The birds did not seem to me very eager for the *Papilios*, though they so obviously preferred them. All the butterflies were eaten, or at least torn to pieces, and I saw no bodies lying about. There was rice in the food-bowl notwithstanding.

V. Offered the Babblers a *Papilio aristolochiae*; a bird took it and tore off the greater part of the wings, but left the body. Another took this and tore off the thorax, and left the abdomen. A *Danaïs limniace* was then eaten, at least most of the body, I think by one of the individuals which had refused the other.

(a.) Put in the aviary two *Danaïs chrysippus* and a *Papilio demoleus*. One of the former was first taken, then the *Papilio*.

(b.) The experiment was then tried with two *D. chrysippus* and a *Papilio polites*.* A *D. chrysippus* was first taken, then *P. polites* by a young bird.

(c.) Two *D. chrysippus* and a male *Elymnias undularis* were then put in. *E. undularis* was taken first and swallowed whole. These sets of butterflies were put in dead.

* *P. pammon auctorum*.

The Babblers then took and left two *Papilio aristolochiae*, though by this time all the Danaids and the *Papilio polites* were more or less torn up and eaten, the latter all but the wings, I think. One of the *P. aristolochiae* was not even killed at first. There was other food in the cage.

(d.) Offered the birds a *Danaïs chrysippus* and a *Catopsilia*. Two of them came at once, so I was not quite certain; but I think the latter was preferred.

(e.) Repeated the experiment with two *D. chrysippus* and one *Catopsilia*. The latter was distinctly chosen by the first comer.

(f.) Repeated the experiment with two *D. chrysippus* and a *Junonia*. The first comer (young bird) took a *D. chrysippus*, the second the non-warningly-coloured species.

(g.) Put in a *Junonia* and one *D. chrysippus*. One bird took one and another the other.

A Babbler took a *Papilio polites* readily. I saw no traces of the *P. aristolochiae* about by this time.

(h.) Offered the Babblers a *Papilio polites* and two *Danaïs chrysippus*. The two first comers took the latter; but the former was soon taken.

(i.) A *Papilio demoleus* and a *Danaïs chrysippus* offered. One bird came, and chose the former; but the *Danaïs* was soon taken.

(j.) One *Catopsilia* and one *D. chrysippus* were offered. The former was chosen by the first comer.

There was some rice still left in the vessel at this time.

VI. (a.) Offered to birds, in my hand, one specimen each of *Danaïs chrysippus*, *Papilio demoleus*, and *P. polites*. The last named was taken first, and then the *Danaïs*.

(b.) A protectively-coloured butterfly was offered in my hand to the birds, together with a *D. chrysippus*. The *Danaïs* was taken first.

(c.) A *Danaïs limniace* and a *Papilio demoleus* were offered; the latter was taken first.

(d.) A protectively-coloured butterfly (same species as above); again offered with a *D. chrysippus*. The *Danaïs* was taken first; it was nearest to the bird.

(e.) Same experiment repeated with another *D. chrysippus*; the *Danaïs* again taken first.

(f.) Same experiment repeated; this *Danaïs* was also taken first, though the other species was eaten readily by the next bird.

(g.) A small satyrid butterfly offered with *Danaïs limniace* in my hand. The former was taken first.

- (h.) *D. limniace* and *Huphina phryne* offered. Former taken first, but latter eaten readily.
- (i.) Same experiment repeated. This time *Huphina* was taken first.
- (j.) Living specimens of *Danaïs chrysippus*, *D. genutia*, and *D. limniace*, *Euploea*, and *Delias eucharis*, together with two dead specimens of the last, put in. Many of these were attacked at once. The birds had no food by them this time.

VII. (a.) Offered to the birds *Papilio demoleus* and *Danaïs limniace*, one of each. Former taken first.

- (b.) Same experiment repeated with same result.
- (c.) Experiment again repeated; same result.
- (d.) Same species of *Papilio* offered with a female *Nepheronia hippia*; the *Papilio* was taken first. The upperside was of course exposed and the insects killed, as usual in these comparative experiments of mine.

The birds had food by them. They ate to-day one specimen of *Nichitonia xiphia*.

- (e.) An *Euploea* and a *Papilio demoleus* offered; the former was taken first, but the latter swallowed nearly whole.
- (f.) Experiment repeated; *Papilio demoleus* taken first.
- (g.) Experiment again repeated; same result.

The *Papilios* were eaten more readily, usually whole, and apparently more relished.

- (h.) Experiment again repeated; *P. demoleus* taken first, but the bird which took it did not seem very eager, and did not mind another robbing it of its prey. But it had had others.
- (i.) Experiment repeated; *Euploea* taken first.
- (j.) Protectively-coloured species offered with a *Danaïs limniace*; former chosen and eagerly eaten.

Two or three *Terias* were eaten to-day. A lot of *Danaïs* (*chrysippus*, *genutia*, *limniace*) and *Euploea*, and a few non-warningly-coloured specimens turned in. All were attacked, but the latter were eaten first, and with more relish, though some *Danainae* were swallowed whole.

VIII. (a.) Offered the birds one each of *Papilio demoleus* and *Danaïs chrysippus*. Both were taken almost simultaneously; the latter first if anything.

- (b.) Offered, in my hand, one each of a *Catopsilia* and *D. chrysippus*. Former chosen.
- (c.) Offered one each of a *Catopsilia* and *D. genutia*. The former was chosen, though another bird made a dash at the *Danaïs*.
- (d.) Same experiment repeated; *Catopsilia* again chosen.

- (e.) Small brown Satyrid butterfly offered with *D. genutia*; former was deliberately chosen.

Some specimens of *Euploea*, *Danaïs chrysippus*, and *D. genutia*, were given alive, and immediately attacked by some of the birds.

Two *Papilio aristolochiae* were tried and left, while some of the *Danainae* above-mentioned were being torn and eaten, though some were still alive or uneaten. The birds had food by them at the time. Later on offered them—

- (a.) A *Danaïs genutia* and a brown Satyrid species. The first comer having a fair field, first took the former, and then dropped it and took the other.
- (b.) Last experiment repeated; two birds came at once, and the *Danaïs* was first taken.
- (c.) Offered a *Junonia* and a *D. genutia*; the former was taken first.
- (d.) Put in one *Catopsilia*, one *Danaïs chrysippus*, and two *Papilio polites* (one mimetic of *P. aristolochiae*, and the other not). The first comer deliberately chose the *Catopsilia*; the next looked at the remaining three and turned away; then a *P. polites* was taken, and I saw it swallowed nearly whole—I could not say whether by the same individual. The birds had food by them. None of the butterflies previously put in were to be seen. They did not seem very eager even for *Catopsilia*.

IX. Offered to the Babblers killed or disabled specimens as follows:—

- (a.) One *Danaïs chrysippus*, one *Catopsilia*. Former taken first.
- (b.) One *D. chrysippus*, one *Catopsilia*. Latter taken first, by young bird.
- (c.) Same experiment repeated; *Catopsilia* taken first.
- (d.) Same experiment repeated with same result.
- (e.) One *Danaïs genutia* offered with one *Catopsilia*. Latter deliberately taken first.
- (f.) One female of *Elymnias undularis*, one *Catopsilia*. Latter taken first. The mimic also taken and swallowed whole.
- (g.) *Papilio demoleus* and *Danaïs limniace*. Former taken first.
- (h.) Same species of *Papilio* and an *Euploea*. *Papilio* taken first.
- (i.) *D. chrysippus* and *Papilio polites*. Both of these were taken at once.
- (j.) Same experiment repeated. The first comer took neither, the second *Papilio polites*.
- (k.) Protectively-coloured Satyrid and *D. chrysippus*. Former taken first, and swallowed whole.

- (l.) Same experiment repeated. Protective species taken first, and eaten, by the same bird.

This bird again ate one of this Satyrid; though there were *Danaïs limniace* and *chrysippus* uneaten in the cage. A *Catopsilia* was then put in, and the same bird took and began upon it, when it was taken and soon swallowed by another.

Some *Danaïs genutia* and *limniace*, *Euploea*, and *Delias eucharis* were then thrown in, but though one or two birds pulled them about, I saw none eaten. The birds were now going to roost. They had had no insect food before on this day, but a number of cockroaches the day before.

X. Offered the birds—

- (a.) One *Danaïs chrysippus*, one *Catopsilia*. Latter chosen.
- (b.) One *D. genutia* one *Catopsilia*. Former chosen, by young bird.
- (c.) Same experiment repeated. This time the butterflies were on my hand, held on the floor; a bird swooped from the perch on the *Catopsilia*, and took it.
- (d.) Same two species offered. Both were taken at once.
- (e.) One protectively-coloured specimen, one *D. chrysippus*. Former deliberately taken.
- (f.) One *Huphina phryne*, one *D. chrysippus*. Former taken first.
- (g.) One *Papilio demoleus*, one *D. chrysippus*. Former chosen, but birds not eager.
- (h.) Same experiment repeated. As the first comer was hesitating, and seeming to prefer the *D. chrysippus*, another snatched the *P. demoleus*.
- (i.) One small protective Satyrid, one *D. chrysippus* offered. The first comer in the last experiment deliberately chose the former, though the *Danaïs* was nearer.
- (j.) *Papilio demoleus* offered with *Euploea*. Latter taken first.

Put in three *Euploeas*, one *Danaïs genutia*, one *D. limniace*. Last chosen deliberately by young bird. I threw in two more *Euploeas* and two *D. limniace*. The former were this time seized, but one bird soon left its prey, and I did not see the other specimen eaten, though I saw one *Euploea* swallowed whole.

In the afternoon of the following day I released these birds, which, as observed in the beginning of this paper, still continued about the place. Thus I was enabled to make the following experiments with them.

EXPERIMENTS WITH BABBLERS AT LIBERTY.

January 16th.—As the birds were hopping about the garden eating termites, &c., I gave them a number of butterflies, mostly dead or

disabled, comprising specimens of *Danaïs chrysippus*, *D. genutia*, *D. limniace*, and *Euploea*, with *Papilio demoleus*, *Huphina phryne*, *Catopsilia*, *Junonia*, &c. There was no doubt that these latter non-warningly-coloured species were preferred to *Danaïs* and *Euploea*. All as far as I saw were eaten, while though the *Danainae* were picked at, and I think one or two of them eaten, I often saw them looked at and then passed over in favour of a *Catopsilia* or other palatable species.

I offered two specimens of the female of *Nepheronia hippia*. The first one, which was displayed, was passed over by a bird in favour of a *Catopsilia*, though the same individual then tried and ate it. The second specimen, whose wings were half closed, did not seem to be noticed at first, but on being thrown to a bird it was picked up and eaten. I saw one bird, eating a *Catopsilia*, leave it and try a *Danaïs genutia*, and then return to its former prey. I saw one bird try unsuccessfully to catch an uninjured butterfly on the wing; decapitated specimens were caught with some trouble as they fluttered.

This day they four times refused a red, black and white bug (*Dysdercus* sp?). I thought *Euploeas* were least disliked of the unpalatable butterflies given.

January 17th.—This morning I found lying about wings of the butterflies rejected overnight; but these birds may not have eaten the bodies.

I put out several *Danaïs genutia*, which were not regarded with favour, though one or two were taken. A bird which had left one took and ate a skipper.

Another protective butterfly was eaten in preference to *Danaïs genutia* and *D. chrysippus*. A *Junonia* was eaten readily.

A male *Elymnias undularis* was eaten readily.

Two *D. genutia* were rejected, but a protectively-coloured species taken.

Some specimens of *Huphina phryne* were taken readily and eaten.

Two birds tried to catch a *D. genutia* on the wing.

A bird took a *Junonia* from my fingers and apparently ate it.

Another protectively-coloured species then taken.

Another attempt made to catch a flying *D. genutia*.

Two male specimens of *Elymnias undularis* taken in succession from my hand.

D. genutia was taken from my hand, but it escaped, and three birds tried to catch it.

Another protective species was taken.

A specimen of a protective species was taken, squabbled for, and eaten.

A protective species was again eaten; then a male *Elymnias undularis*, swallowed whole.

A *D. genutia* was allowed to remain perched on a shrub.

I did not see one *Danaïs* at this time eaten, though one *D. genutia* was torn up; but I found the body left. Afterwards, however, I saw one *Danaïs* (I do not know which species) eaten, and then a *D. genutia*; this latter was thrown up several times. Another was eaten; and then I had to leave the birds.

January 18th.—The birds were still about, though one seemed to be missing. I saw some *D. chrysippus* lying about, left from yesterday. In the morning I offered the Babblers a large brown moth and a cockroach, which were taken. The birds, however, did not seem to wish for some rice, &c., which I threw out, though such had formed their ordinary food in confinement, and they had eaten some the day before.

In the late afternoon I offered them some butterflies, mostly decapitated, chiefly *Danaïs genutia*, but also *D. chrysippus*, *D. limniace*, *Euploea*, and *Delias eucharis*. None of these were eaten, as far as I saw, as long as other species could be had, and only one, a *D. genutia*, afterwards. On the other hand, male *Elymnias undularis*, *Catopsilia*, and other non-warningly-coloured specimens were readily devoured, and even taken from my hand, while specimens of *D. genutia* fluttered about. A male *Nepheronia hippia* was taken and eaten. These experiments left not the slightest doubt in my mind as to the unpalatability of *Danaïs* and the other "warningly-coloured" forms. Birds would often only look at them, and soon left them when picked up.

Next day the birds had disappeared, and so ended my experiments with this species.



Finn, Frank. 1896. "Contributions to the theory of Warning Colours and Mimicry, No. I. Experiments with a Babbler (*Crateropus Canorus*).*" The journal of the Asiatic Society of Bengal* 64(III), 344–356.

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