Merganser comatus.

A specimen of a Goosander, in very bad condition, sent to me in March of the present year by the Editor of the *Asian*, with the information that it was shot at Myitkiyana, Burmah, appears to me to be referable to the Eastern form. It is a female or young male.

Merganser serrator.

There is in the Museum collection an excellent specimen of this bird, not sexed, but by plumage a female or young male, obtained in the Calcutta Provision Bazaar on December 17th, 1889.

Contributions to the Theory of Warning Colours and Mimicry. No. III. Experiments with a Tupaia and a Frog.—*By* F. Finn, B.A., F.Z.S., *Deputy Superintendent in the Indian Museum.*

[Received April 29th, Read May 5th, 1897.]

The only other animals, besides birds and *Calotes* lizards, with which I have systematically experimented, are a Tupaia or Tree-Shrew (*Tupaia ferruginea*), and a Bull-frog (*Rana tigrina*); in each case a single individual only being used.

This being the case I have thought it as well to give the experiments on this Mammal and Amphibian together in one short paper, before dealing with the rest of the birds, my notes upon which much exceed in bulk all those I have hitherto published taken together.

Experiments with a Tupaia.

The Tupaia used in these experiments was bought in the Bird Bazaar, in July, 1895, and kept for most of the time in the aviary which I had used for birds: it was fed on boiled rice, fruit (plantain) and cooked meat. It used its fore-paws to hold the insects it ate, after the manner of a squirrel, and from its tameness and keenness after insects was a very satisfactory subject to observe. With it I made the following experiments, in 1895, about the time at which some of my experiments with *Calotes* (*J. A. S. B.*, 1896, *Part II*, *p.* 42) were made.

July 15th. The animal being hungry, I offered it a *Danai. genutia*, which it took, but refused, apparently disliking the taste. I then gave it three non-warningly-coloured butterflies, which it was even less inclined to eat. All these insects were dead and rather dry however.

The animal had an hour or so before eaten cockroaches (*Periplaneta americana*) and plantain with relish.

Shortly after I could not find two of the non-warningly-coloured butterflies I had put in its cage, as above mentioned. In the evening, after having meanwhile given the Tupaia some meat and rice, the former of which it had some time ago eaten, (the latter it seemed not to like) I found the *D. genutia* still uneaten in the cage. The last non-warningly-coloured butterfly, a *Catopsilia*, I found outside the small cage in which the Tupaia at present was kept. I put it in the netting, but the animal would not take it.

I then offered it a *Danais limniace* and another *Catopsilia*, fresh specimens. These it smelt and would not eat.

Next I put in a live *Catopsilia*, which the Tupaia eagerly pursued, seized and ate. I then put in live specimens of *D. genutia* and *limniace*, one each, neither of which it would take. Then I gave successively a non-warningly-coloured butterfly much like those it had refused when dead, in the morning, and five *Catopsilias*, all these being alive; all were eaten, and the animal smelt about for more, while the two *Danais* recently given were still alive. It then readily ate a glossy green Muscid fly.

It then ate the *Catopsilia* which it had previously refused (see above), while within two inches of the living *D. limniace*.

Once or twice, in chasing butterflies, it grabbed at one or both *Danais*, but did not bite them.

July 16th. The two *Danais* put in the cage last night were still alive and unhurt, though the wings of the *D. genutia* were torn and rubbed. I had noticed the animal smelling this more attentively last night, and it was more inclined to seize it. The *D. limniace* was quite untouched. The Tupaia ate a piece of plantain, and later a cockroach, readily. I then took out these two butterflies, and offered them to Lizards (see *Experiments with a Lizard*, under this date, *J. A. S. B.*, 1896, *Part II, p.* 46.)

I offered the animal to-day two plain-coloured caterpillars of a species living in stick cases, which it ate, but rubbed them first on the ground, and did not gobble them up immediately like the winged insects. It seemed to have no idea of getting them out of the cases for itself, though I saw it afterwards nibbling at one of these.

In the evening, the animal being now in the aviary, where there was plenty of meat, rice, and plantain, I put in with it a disabled *Euploea*, which it smelt and refused; then a disabled *Junonia* and another non-warningly-coloured specimen; these it ate readily. Then I gave it a disabled *Danais genutia*, which was also examined and refused. Two non-warningly-coloured specimens like the preceding were then eaten, wings and all, as usual. I then took out the *Euploea*, and offered it to a Lizard (see *Experiments with a Lizard, loc. cit.*)

July 17*th*. I put in the Tupaia's aviary, where there was still meat and fruit left over from yesterday, disabled specimens of *Danais genutia* and *limniace*, and *Euploea*, the last-named being that which I had removed on the preceding night. The animal smelt at, but did not take them, and an hour or so after they were still alive. I took out the *Euploea* and *Danais*, using the former again for Lizards (see *Experiments with a Lizard*, under this date *loc. cit.*) and returning the two latter later, after the Tupaia had had a fresh allowance of meat. They were both now dead; the *D. limniace* had been wounded and the *D. genutia* had lost two legs, but my notes do not state what had done this. At all events I now took them away finally.

July 18*th*. I gave the Tupaia in the morning a *Neptis kamarupa* (uninjured) which it readily seized and ate. Some of the meat given the animal yesterday was still at hand.

July 20*th*. Being unwell to-day, I was indebted to Mr. R. D. Oldham, of the Geological Survey, for making some observations. He gave the Tupaia (which was eager for insects, at any rate) a *Papilio aristolochiæ*, which the animal attacked and killed, eating its head. However, it was not eager for it, and left it to greedily devour a non-warningly-coloured specimen.

In the evening, though there was still some meat, Mr. Oldham found the Tupaia had apparently eaten the body of the *P. aristolochiæ*; it then greedily ate a non-mimetic specimen of *P. polites*, and another non-warningly-coloured specimen.

Two *Danais genutia* were then hunted by the animal; one was killed, but not eaten, and the other not even killed.

On the 22*nd* I found a *D. genutia* dead and uneaten, but being attacked by ants, in the Tupaia's cage, where there was also some meat and rice.

July 24*th*. I gave the Tupaia a disabled *Danais genutia*, which it smelt at and pawed, but left unhurt.

I then put in a disabled *Papilio demoleus*, which it ate, leaving most of the wings.

A large *Catopsilia* was then eaten more eagerly and entire. The animal had some meat left from yesterday.

The Tupaia then ate two or three other non-warningly-coloured butterflies (one of which had been offered to *Calotes* (see *Experiments with a Lizard*, under this date, *loc. cit.* line 30).

In the evening I gave the Tupaia (which had now only rice available) a larva of *Polytela gloriosæ*. This it did not seem to relish, as I saw it once flung aside and once dropped; but all, or nearly all, of it was eaten. These larvae are conspicuously coloured red, black and white, feed exposed, and do not appear to be touched by wild birds.

Another specimen was taken and dropped two or three times, and then left, still alive.

The Tupaia shortly vomited freely, and then ate a *Papilio eurypylus* I had just put in. I saw it vomit when being brought from the Bazaar in a "gharry" however, probably from fear.

Soon after I gave it a *Papilio demoleus*, which it ate greedily. I gave disabled specimens of *Danais genutia* and a non-warningly-coloured species, previously offered to Lizards (*Experiments with a Lizard*, under this date, *loc. cit.*, line 32) to the Tupaia, which ate the latter and smelt and left the *D. genutia*, which I used again for a Lizard (*loc. cit.* line 36). The *Polytela* larva which it had tried, and which had been crawling about the cage, was now not to be seen.

July 25*th*. In the evening I gave the Tupaia another *Polytela gloriosæ* larva, which it ate with less signs of dislike. It was seemingly hungry, and it did not vomit afterwards, but then I did not watch for this.

July 26*th*. I enticed the Tupaia, which was hungry, into its small cage with a living *Catopsilia*, which it ate.

I then put in two dead *Catopsilias*, and a *Danais genutia* and *D. limniace* alive. One *Catopsilia* was soon eaten, and the animal then smelt attentively at the *D. limniace*, but did not touch it. It then found and seized the other *Catopsilia*, but only ate the head, if anything.

I then put in a living *Euploea*, which the Tupaia smelt at and left.

Shortly afterwards, I found this and the two *Danais* still unhurt, while the *Catopsilia* left before had apparently been eaten, and another, put in alive, was also devoured.

About an hour afterwards the two *Danais* and the *Euploea* were still unhurt, though the Tupaia had had no food, and readily ate a cockroach.

After this I sent the animal to the Zoological Gardens at Alipore, where it was placed in a netted cage with another. Here I made a few more experiments with it a few days later.

August 3*rd*. I offered to the Tupaia (there was food, hard-boiled egg, in the cage) a *Papilio demoleus*, which it took and partly ate.

Then I put in a non-mimetic *Papilio polites*, which it ate all but the fore-wings and a piece of the hind-wings; it then ate all the rest of the *P. demoleus* except the fore-wings.

P. aristolochiæ was then taken, killed, and left. Then the head was eaten, and the body again left.

Three specimens of *P. demoleus* were then readily eaten in succession.

The body and hind-wings of the *P. aristolochiæ* soon disappeared, but I think I saw it under the sleeping-box in the cage, where no doubt

it had been taken by the other Tupaia. This was in fear of my animal, and had had none of the butterflies.

I put in another *P. aristolochiæ*, which was smelt at by both the Tupaias, but not killed, though my animal then ate a *Catopsilia* given it.

Some time later I found this *P. aristolochiæ* dead, and slightly bitten, but quite whole, having evidently been rejected.

It is obvious that this animal has a very strong objection to the "protected" *Danainæ* and *Papilio aristolochiæ*, as it so constantly refused them, and that in the case of the former absolutely, unlike the Babblers dealt with in my first paper (*J. A. S. B.* 1895, Pt. II, p. 344), which birds, caged under much the same conditions, generally showed their dislike of the *Danainæ* merely by preferring other species.

Experiments on a Bull-Frog.

My experiments on this amphibian, which Dr. Alcock had been keeping for a little time for use in the Museum, and which he kindly allowed me to test upon this subject, were few and not long continued. But such as they are, I have thought well to insert them, if only for completeness. The experiments were made soon after I came to India, in 1894.

November 2nd. Offered a *Danais chrysippus* to the frog, which was being regularly fed on cockroaches; the butterfly was not touched.

November 10th. I put into the cage of the frog, instead of its usual meal of about a dozen and a half of cockroaches (*Periplaneta americana*), one cockroach only, and a *Delias eucharis*. Before long both insects had disappeared.

I then put in another *D. eucharis*, a *Danais chrysippus*, and a smaller non-warningly-coloured butterfly. Later on I found the *Danais* was gone. The others apparently remained.

November 11th. No butterflies left in the frog's cage.

November 12th. I put in the frog's cage a *Terias*, three *Delias eucharis*, and three cockroaches.

November 13th. To-day there were no insects in the cage, and about five cockroaches were put in by Dr. Alcock, and a *Danais chrysippus* by myself.

November 14th. The *Danais chrysippus* given to the frog yesterday was still there, alive; I saw none of the cockroaches, but did not specially look for them. I took out the *Danais*.

November 15th. To-day I put a female *Hypolimnas misippus* and a cockroach in the frog's cage; there were also two or three more cockroaches. I did not note what happened next day.

November 17th. No insects left in the frog's cage. I now put in

two cockroaches, but did not note when they were eaten, nor did I make any more experiments with this frog.

These experiments are hardly sufficient to form any conclusion as to the tastes of this Amphibian; but it would appear, if anything, to object to *Danais chrysippus* more than to *Delias eucharis*, and not very seriously to either. But sufficient opportunity for choice was not given.

A toad (*Bufo melanostictus*) which was also being fed on cockroaches, and had one in its cage at the time, did not touch a *D. chrysippus* put in on November 4th. But one such experiment is practically useless.*

A tree-frog did not eat some Skippers put in, but then as far as I saw it did not feed at all while I observed it.

* I note on August 24th, 1895, offering a large "glow-worm" to a small toad at Dehra Dun. The insect was followed about but left; and another small toad behaved in the same way. In this case the insect was probably too big: but subsequently a smaller one offered to a toad was not noticed. The toads were at liberty.

Description of Neptis praslini, *Boisduval, and some species allied to it.*—*By* Lionel de Nicéville, F.E.S., C.M.Z.S., &c.

[Received May 11th;—Read June 2nd, 1897.]

Neptis praslini, Boisduval, and its allies form a very interesting little group of the large genus *Neptis*. They appear to be confined to the Moluccas, the Papuan group of islands, the Bismarck Archipelago, and Northern Australia. So long ago as 1832, Dr. Boisduval noted the very strong superficial resemblance of *Neptis* (*Limenitis*) *brebissonii*, Boisduval, from New Guinea, which is one of the species referred to in this note, to the butterflies of the genus *Tellervo*,† Kirby (*Hamadryas*, Boisduval, nec *Hamadryas*, Hübner, the type of the latter being *Papilio* (*Vanessa*) *io*, Linnæus). The mimicry in this case by the brittle-winged edible *Neptis* of the leathery-winged unpalatable *Tellervo* is one of the most remarkable and complete in the entire range of the *Rhopalocera*. The sexes probably in all the species of the group here dealt with are well marked, the male having the inner margin of the forewing on the underside and the costal margin of the hindwing on the upperside broadly furnished with closely-packed shining grey scales which are wanting in the female. Both wings of the female also are somewhat broader and more rounded than in the male. Several authors have placed "*Limenitis*" *praslini* and its allies in the genus *Athyma*, which is certainly incorrect; they are all true *Neptes*.

† *Tellervo*, Kirby, Allen's Naturalist's Library, New Edition, Lepidoptera, part i, Butterflies, vol. i, p. 28 (1894).