II.—*On some West-African Squirrels, with a Description of a new Species, and proposed Alteration in the Arrangement of the Groups.* By W. E. de Winton.

A number of squirrels from the French Congo territory have lately been received at the British Museum. Of the so-called *Pyrrhopus* group, besides the typical form *Funisciurus pyrrhopus*, Cuv., from the Gaboon, there are examples of *F. auriculatus*, Matschie, and four specimens of a squirrel—a description of which is given below—from the Benito River, in outward appearance closely resembling *F. anerythrus*, Thos.

The fact that these two squirrels are found in the same district is sufficient to prove that they are perfectly distinct species, and not geographical races or subspecies; the same remark applies to *F. anerythrus* and *F. Emini*, which are found together in Monbuttu.

The new species and *F. anerythrus* agree in proportions and general markings, in the want of bright colouring, and in having longer tails than any of their allies; but, as will be shown, the pattern of their molars is so different from one another, that they must be regarded as distinct species.

F. auriculatus, on the other hand, has the shortest tail of the group, being very closely allied to *F. erythrogenys*, from Fernando Po, of which species it appears to be only a local form; and seeing that these two short-tailed forms with *grey* legs differ so much from *F. pyrrhopus*, which has *bright red legs*, besides different colouring throughout, and a longer tail, it is most misleading to lump them together; it will be found more convenient to keep them apart as distinct species.

The new squirrel may be described as follows:—

Funisciurus mystax, sp. n.

The general arrangement of colours as in *F. anerythrus*, but the prevailing tone more brown than green and the face-markings, especially the moustache, more distinct; the legs washed with reddish brown; the side-stripes are so faint in some specimens as hardly to be distinguishable, and on the whole may be said to be less developed than in its near ally; the underparts are strongly washed with rufous-cinnamon or apricot-colour, the throat paler, the scrotum of the male thickly clothed with grey fur.

The form of the skull as in other members of the group.

Measurements of the skull:—

Greatest length 51·5 millim., greatest breadth 27; length

of frontals 21·5; interorbital constriction 12·1; length of nasals 14·5; greatest breadth of nasals 6; basal length 42; gnathion to back of palate 21·5; back of palate to foramen magnum 17·5; length of incisive foramina 4; diastema 12; upper molar series 9; outside molars 11; length of auditory bulla 10·5.

Mandible: length (bone only) 28·5; back of incisors to coronoid 25·3, to condyle 28·5, to angle 25; greatest height 16; lower molar series 9.

Type (♂), British Museum no. 98. 5. 4. 9. Teeth worn.

Collector G. L. Bates, no. 315. Fang name "Kwē." Benito River, 15 miles from mouth, 6th Jan., 1898.

Specimens of different ages and sexes killed from September to January do not vary in colour.

The chief interest in this squirrel is due to the fact that the molars have a more complicated pattern than is found in any of its near allies. The accompanying figures will show the pattern of the molars of some of the group. Fig. 3 represents R. $\frac{m.1}{}$ of *F. mystax*; it will be seen that there is an extra infolding of the enamel on the outer side; the central

Fig. 1. Fig. 2. Fig. 3. Fig. 4.

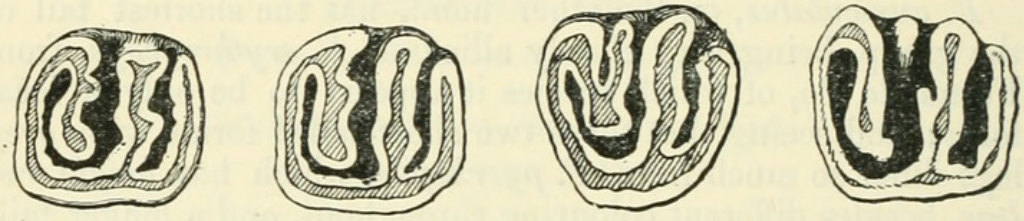

Fig. 1.—R. $\frac{m.1}{}$ of *Funisciurus anerythrus*.
Fig. 2.—Ditto of *F. pyrrhopus*.
Fig. 3.—Ditto of *F. mystax*.
Fig. 4.—Ditto of *F. Jacksoni*.

cusp is only rudimentary in the majority of the existing squirrels, but is found in *Anomalurus* and in some fossils which are not considered to belong to *Sciurus*, and it is not too much to say that had this tooth been found in a fossil state it would not have been referred to a true squirrel.

Four specimens examined have teeth of precisely the same pattern; and I think it will be interesting to palæontologists to have an accurate figure recording the occurrence in an existing species.

Although the teeth of *F. pyrrhopus* and *F. anerythrus* have been figured before in Dr. Forsyth Major's most valuable paper in the P. Z. S. 1893, pl. viii., I have thought it advisable to reproduce them in a similar manner to that of *F. mystax*

for the sake of comparison; it will be noticed that the tooth of *F. anerythrus* agrees with that of *F. pyrrhopus*, and not with that of *F. mystax*, which is the reverse of what might have been expected, seeing that these two forms agree so closely in external characters.

It may be that this middle cusp is not so rare in existing species as is generally supposed; at any rate, it is a curious fact that two squirrels which I have introduced to science—the present one and *F. Jacksoni* from British East Africa—have this character developed to a remarkable degree. The latter species having far more cuspidate teeth the central cusp is only strongly developed on the outer border, but the extra fold of the enamel is well marked even in much-worn teeth, giving the teeth a much more complicated appearance than that found in any of its allies. A figure of the tooth of this squirrel is also given of approximately the same age (fig. 4), but owing to the strongly cuspidate nature of the tooth it is difficult to do it justice in this manner of drawing. The nature of the tooth will, however, be readily understood by comparing this figure, which is only intended to show the *pattern*, with the teeth of any of its allies or with the figure of *F. cepapi* given by Dr. Major. The teeth of *F. mystax*, on the contrary, with their evenly worn surface and clearly laminated pattern, are exactly suited to this form of illustration.

Both *F. mystax* and *F. Jacksoni* have undoubtedly very near allies in their respective groups, whose teeth show no sign of the middle cusp; thus it would seem that no great value can be attached to its presence or absence as a classifying character.

Alteration in the Arrangement of the Groups.

Additions to the squirrels of the *Paraxerus* group of Dr. Forsyth Major have caused me to look into the characters of the species forming that subgenus. First I would mention *S. Nordhoffi*, Duchaillu (?=*S. calliurus*, Peters). The skull of this squirrel has never been described; in general form and in the pattern of the molars it closely resembles *S. Stangeri* from Fernando Po, but the size of the infraorbital foramina is altogether unique among the Sciuridæ, the openings being 4·5 millimetres high by 3 broad, and so approaching in size within measurable distance those of *Anomalurus*.

In connexion with the form of the infraorbital foramen, another squirrel in the same collection must be mentioned: this is *S. Wilsoni*, Duchaillu. Dr. Jentink, in his Mono-

graph of the African Squirrels, places this name as a synonym of *S. Ebii*, Temm.; certainly the two forms resemble one another very closely in outward appearance, but on comparing the skulls there are found so many slight differences, that I prefer to regard them as distinct species; but chiefly I wish to draw attention to the infraorbital foramina.

In *S. Ebii* the foramen is formed on the same pattern and is of nearly the same size as that of *S. Stangeri*, while in *S. Wilsoni* it is much smaller, having a prolonged outer wall, and therefore typically Sciurine. The differences in size of the opening of this foramen must not therefore be considered of too great importance, seeing that it only results from a cutting away of the outer wall and is found to be so variable in closely allied forms.

The skulls of *S. Ebii* and *S. Wilsoni* differ greatly from those of *S. Stangeri* and *S. Nordhoffi*, as also do the patterns of the molars; both in the length of the facial portion, the generally elongated skull, and in the more hypsodont molars the two former are much more *Xerus*-like. Though the lower molars certainly are more Sciurine than those of the other members of the group in which I propose to place them, I see no reason to keep them separate, and I think they should be transferred to the subgenus *Funisciurus* = *Paraxerus* of Forsyth Major; while in the shortness of the facial portion, the generally broadened skull, and in the brachydont molars the two latter might very well be placed with the *Rufobrachiatus* or true Sciurine group of African squirrels.

It is proposed therefore that the subgenus *Protoxerus* be done away with and that its members be divided between the other two groups, *S. Stangeri* and *S. Nordhoffi* being transferred to the Sciurine group *Sciurus*, sec. *a*, Major, = *Heliosciurus*, Trouessart, and *S. Ebii*, *S. Wilsoni*, and *S. Aubinnii* to the more *Xerus*-like group *Funisciurus*, Trouessart, = *Paraxerus*, Major, lately raised to the rank of a genus by O. Thomas (P. Z. S. 1897, p. 933).

This seems to me the only place where a line can be drawn, and I believe in this manner the squirrels of Africa will be divided into two more workable groups than according to the former arrangement, for there appears to be quite as much relationship between *Funisciurus Ebii*, *F. Aubinnii*, and *F. cepapi* with its allies, as exists between the latter and *F. pyrrhopus* groups.

Since Dr. Forsyth Major wrote his paper the collection of African squirrels in the British Museum has been very greatly increased, there being then no skulls of *F. Wilsoni* or *S. Nordhoffii* available, and the only skull of *F. Ebii* having

abnormally worn teeth. The squirrels of the *cepapi* group were also in an unsatisfactory state, the East-African forms being confused with *cepapi* proper, a slightly larger animal with even less hypsodont teeth; the tooth figured as belonging to *F. cepapi* in Dr. Major's paper belongs really to a squirrel from Kilimanjaro, probably *F. ganana*, which is closely allied to *F. Jacksoni*.

It is a curious and it might be said inconvenient fact, that in the pattern of their teeth and in the shape of the skull the harsher-furred squirrels approach *Sciurus*, while the softer-furred approach *Xerus*; with the exception of *S. rufobrachiatus*, the rule would almost hold good that the harsher the fur the nearer to *Sciurus*, the softer the fur the nearer to *Xerus*.

III.—*On the Butterflies of the Genera* Leptophobia *and* Pieris.

By Arthur G. Butler, Ph.D., F.L.S., F.Z.S., &c.

In spite of adverse criticism, I have seen no reason to change my decision either as to the distinctness of *Leptophobia* or as to what should be regarded as typical *Pieris*. Strictly speaking, perhaps, *Parnassius apollo* should be regarded as the type of *Pieris*, Schrank; Scudder, however, considers *Ganoris rapæ* to be the type, regarding the closely related *G. brassicæ* as generically distinct. I have clearly proved that the trivial characters upon which these two nearly allied "cabbage-butterflies" were separated are utterly unreliable, being inconstant in the extreme. If we were, on the other hand, to make *Parnassius apollo* the type of *Pieris*, it would not only create hopeless confusion, but would necessitate giving a fresh name to the subfamily Pierinæ, a course not to be desired by any who keep in view the sole object of nomenclature.

As before, therefore, I accept Boisduval's definition of *Pieris*, taking *P. amathonte* (=*P. demophile* ♀) as its type.

In the 'Biologia Centrali-Americana' the genus *Pieris* is expanded to include *Synchloe*, *Mylothris*, *Leptophobia*, and *Glutophrissa*; but personally I prefer to keep all groups having constant structural differences, whether of neuration or other details, as separate genera. As regards the statement that *P. protodice* (*Synchloe*) is sexually inconstant in neuration, I can only suggest that this state of things is individual and abnormal, inasmuch as nine out of our ten male examples show the apical furca in the primaries quite as