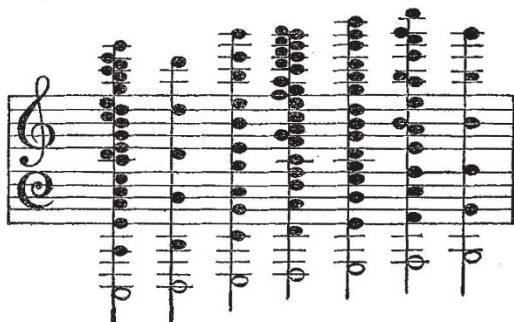


harmonics and the scale are treated of, and I am not surprised that its author cannot understand the numerical basis of Colin Brown's Just Intonation Harmonium.

The strict harmonic chords of the seven notes of the scale, including only sounds in the scale of C, and excluding all approximations, are these :—



Here it will be observed that all the tones of the scale are harmonics of F and of that note only (a circumstance first pointed out by Colin Brown). I do not admit that F and A are notes interspersed in the scale of C.

A. R. CLARKE

Ordnance Survey Office, Southampton, February 8

### Protective Mimicry among Bats

I HAVE read with much interest the remarks of Dr. S. Archer in NATURE, vol. xv. p. 313, on the habits of *Rynchonycteris naso*, Wied. (= *Proboscidea saxatilis et rivalis*, Spix.), as they quite agree with notes on the same species made by me when travelling some years ago in British Guiana.

This is not, however, the first published notice of protective mimicry among bats. In my "Monograph of the Asiatic Chiroptera" (1876), I have referred to the peculiar markings of the wing and intermembral membranes in *Kerivoula picta*, *Vesperilio formosus*, and *V. Welwitschii*, which are coloured on the same plan although these species are related in no other respects, and have stated that I believe these markings to be the result of "protective mimicry." Of one of the two first-named species, Mr. Swinhoe remarks :—"A species of *Kerivoula* allied to *K. picta* and *K. formosa*, was brought to me by a native. The body of this bat was of an orange brown; but the wings were painted with orange-yellow and black. It was caught, suspended head downwards, on a cluster of the round fruit of the Longan-tree (*Nephelium longanum*). Now this tree is an evergreen; and all the year through some portion of its foliage is undergoing decay, the particular leaves being, in such a stage, partially orange and black. This bat can, therefore, at all seasons, suspend from its branches, and elude its enemies by its resemblance to the leaf of the tree. It was in August when this specimen was brought to me. It had at that season found the fruit ripe and reddish-yellow, and had tried to escape observation in the semblance of its own tints to those of the fruit."<sup>1</sup>

A familiar instance of what appears to be "protective mimicry" occurs in the species of the genus *Pteropus* (Flying-foxes of European residents in India). These, the largest of all bats, measuring, on an average, nearly one foot in length with an expanse of wing of from four to five feet, are, from their large size, very conspicuous objects even when the wings are closed, and easily seen from the ground when hanging from lofty trees. With very few exceptions these bats have the fur of the back of the head and of the nape of the neck and shoulders of a more or less bright reddish or bright buff colour, contrasting strongly with the dark brown or black fur of the back. At first sight it might appear that this remarkable contrast of colours would render the animal more conspicuous to passing enemies, and consequently more subject to their attacks when hanging in a semitorpid condition. But any one who has seen a colony of these bats suspended from the branches of a banyan tree, or from a silk cotton tree (*Eriodendron orientale*), must have been struck with their resemblance to large ripe fruits, and this is especially noticeable when they hang in clusters from the leaf-stalks of the cocoa-nut palm, where they may be easily mistaken for a bunch of ripe cocoa-nuts. Hanging close together, each with his head bent forwards on the chest, his body wrapped up in the ample folds of the large wings, and the back turned outwards, the

brightly coloured head and neck is presented to view, and resembles the extremity of a ripe cocoa-nut, with which this animal also closely corresponds in size.<sup>1</sup>

The much smaller species of *Cynopterus* and *Macroglossus*, which feed on the fruit of guavas, plantains, and mangoes, resemble these fruits closely in the yellow colour of their fur and in their size, so that it is very difficult to detect one of these bats when suspended among the leaves of any of these trees.

The resemblances, however, between these frugivorous bats and the fruits of the trees on which they roost, may be accidental, and, in the present state of our knowledge, we would scarcely be justified in setting them down as the result of "protective mimicry," though there can be little doubt that, to whatever cause due, they aid in concealing these animals from the attacks of enemies.

I could adduce other instances of what appear to me to be cases of "protective mimicry" among bats, but my letter has already much exceeded the limits intended by me when I commenced it, and I must reserve my remarks on the peculiar position of *Rynchonycteris naso* when resting on a perpendicular plane surface for another communication.

G. E. DOBSON

### Sense of Hearing in Birds and Insects

IN respect to "The Sense of Hearing in Birds," the habit of pattering with the feet while seeking food, which is common to many worm-eating birds, seems to preclude the idea that such birds at least depend to any great extent upon their powers of hearing. Gulls frequently tread or patter with their feet while seeking food. The object being clearly to discover, from some slight movement, the whereabouts of their hidden prey. Plovers, doubtless with the same object, vibrate one foot rapidly with tremulous motion on the ground. Now the plover is essentially a worm-catching bird, more so even, probably, than the thrush. Light-footed, active yet stealthy in its movements, quick-sighted, and certainly quick of hearing, the plover, when feeding, runs a little way, like the thrush, then stops, with head erect, looking intently; listening it might well be thought but for the tremulous motion of its foot. The plover, at such time, trusts without doubt to sight and not to its sense of hearing.

It is true that the thrush has not this trick of pattering with the foot. It is true also that it has, while seeking food, very much the look of listening attentively. The largeness of its eye and comparatively small development of its ear incline me, however, to believe with Mr. McLachlan (NATURE, vol. xv. p. 254), that the thrush also depends when feeding more on its power of sight than on its sense of hearing.

C. J. A. MEYER

### THE ATMOSPHERE OF THE ROCKY MOUNTAINS<sup>2</sup>

ANYONE who observes with a large telescope soon becomes aware of the great obstacle atmospheric undulation offers to the pursuit of astronomy, particularly in the application of photography and the spectroscope. During two years when I photographed the moon on every moonlight night at my observatory,<sup>3</sup> there were only three occasions on which the air was still enough to give good results, and even then there was unsteadiness. Out of 1,500 lunar negatives, only one or two were really fine pictures. A letter which the late Mr. Bond wrote to me states that in seventeen years he had never met with a perfectly faultless night at the Cambridge Observatory.

Such facts naturally cause astronomers to consider whether it is not possible to diminish atmospheric disturbances, and have led to the celebrated expeditions of Prof. Piazzi Smyth to the Peak of Teneriffe, and Mr. Lassell to Malta. Theoretically it would seem that the only complete solution is to ascend high mountain ranges or isolated peaks, and leave as much as possible of the air below the telescope.

Having had occasion during the months of August and September, 1876, to go on a hunting trip with two distinguished officers of the United States Army into the Rocky Mountains

<sup>1</sup> In a note to Sir James Emerson Tennent's "Ceylon." Mr. Thwaites remarks :—"These bats (*Pteropus medius*) take possession during the day of particular trees, upon which they hang like so much ripe fruit."

<sup>2</sup> "Astronomical Observations on the Atmosphere of the Rocky Mountains, made at Elevations of from 4,500 to 11,000 feet, in Utah, Wyoming Territory and Colorado." By Henry Draper, M.D., Professor of Analytical Chemistry and Physiology in the University of New York. Communicated by the author.

<sup>3</sup> Prof. Henry Draper's observatory is at Hastings-on-Hudson, near New York; latitude 40° 57' 25", longitude 73° 52' 25"; elevation above the sea, 22 feet.

<sup>1</sup> Proc. Zool. Soc., 1862, p. 357.