"Lesson supposes that the brilliant hues of the plumage of the Humming-Birds are derived from some elements contained in the blood, and elaborated by the circulation—a theory we do not quite understand, inasmuch as colour is the result of the reflection of some rays and the absorption of others, caused by the arrangement of the molecules of any given body. He adds, however, that the texture of the plumes plays the principal part, in consequence of the manner in which the rays of light traverse them, or are reflected by the innumerable facets which a prodigious quantity of barbules or fibres present. All the scaly feathers, he observes, which simulate velvet, the emerald, or the ruby, and which we see on the head and throat of the *Epimachi* (as the Grand Promerops of New Guinea), the Paradise-Birds, and the Humming-Birds, resemble each other in the uniformity of their formation; all are composed of cylindrical barbules, bordered with other analogous regular barbules, which, in their turn, support other small ones; and all of them are hollowed in the centre with a deep furrow, so that when the light, as Audebert first remarked, glides in a vertical direction over the scaly feathers, the result is that all the luminous rays are absorbed in traversing them, and the perception of black is produced. But it is no longer the same when the light is reflected from these feathers, each of which performs the office of a reflector; then it is that the aspect of the emerald, the ruby, &c. varying with the utmost diversity under the incidences of the rays which strike them, is given out by the molecular arrangement of the barbules. It is thus that the gorget of many species takes all the hues of green, and then the brightest and most uniformly golden tints, down to intense velvet-black, or, on the contrary, that of ruby, which darts forth pencils of light, or passes from reddish orange to a crimsoned red-black.

"It is thus, we think, that the everchanging hues of the gorgets of the Humming-Birds from black to emerald, ruby, crimson, or flame-colour are to be explained."

In a note just received from Dr. Davy, dated Ambleside, June 10, 1861, that gentlemen says:—"I have examined with the microscope the feathers of the Humming-Bird, *Aglæactis cupripennis*, you entrusted to me, which is so remarkable for its rich colours as seen in one direction, and only one. The result is merely the following—viz., that those feathers in which this peculiarity is most strongly marked are membranous, terminating in pointed filaments, set on obliquely, so that looking from the head each feather is only partially seen. This result, I apprehend, will help very little to account for the peculiarity in question. Its explanation must be sought (must it not?) in the higher optics."

"As to the question you ask me about the beautiful play of colours in the Humming-Birds," says Dr. Stevelly, "I have never studied the subject, and I should greatly fear to say anything about it, particularly if what I said were to be looked on as of any authority.

"There are two optical principles only which I can see to be any way concerned in such an effect. One is the cause of the play of colours in mother-of-pearl, and which Brewster proved to arise from very fine striated rulings, the distance between the parallel lines not being greater than from the 10,000th to the 100,000th of an inch. Barton, of Birmingham, imitated this by ruling very fine parallel lines on steel dies, and then impressing these on buttons, which showed very beautiful colours when exposed to strong light. The other optical principle, which I think, however, to be the most likely to produce the effect in the case of feathers, is the influence of thin plates. If you know Mr. Gassiot (one of your leading Royal Institution savants), get him to show you some of his copper-plates, on which by an electrotype process he has had very thin films of lead deposited; and I think you will see colours fully as beautiful, though not as varied or as variable in different aspects as those of the Humming-Bird."