

the hypothesis that the colour is due to pigment or dye, but is not explainable if the colour were due to the superposition of white transparent scales on a background of black or dark-brown ones. Finally, further light may perhaps be thrown on the subject by actually analysing the colours as they are emitted from the wing, by means of the spectroscope. To do this I improvised a small spectroscope attachment to an old and low-power microscope in my possession. When I examined the wings of white butterflies or moths, the whole spectrum was clearly visible. When I examined the red portions of such butterflies as *Vanessa atalanta*, *Parnassius apollo*, the under wing of a *Catocala* or the red spots on a *Zygænid*, the red portion of the band remained brilliant, but the yellow and green was greatly weakened and the rest was practically invisible. Orange and reddish-brown butterflies, such as the *Argynnids* or *Chrysophanus hypophlæas*, gave strong red and orange bands, weaker yellow and the rest of the spectrum was very much weakened, but nevertheless contributed something to the total effect. When I examined the wings of *L. pseudargiolus*, I found the green, blue and violet strong, as I expected, but there was some red and yellow present also, but weak. The intensely blue wing of *L. bellargus*, however, gave brilliant green and blue bands, rather weaker violet and very weak red-yellow and orange. When it is considered that these experiments were made with the light of an incandescent gas burner, the results are not surprising. Such light is known to be deficient in the blue and violet rays, but are strong in the yellow and red rays, although, of course, the entire spectrum is clearly visible. Again, the presence of red in every case is, I think, partly due to total reflection from the metallic surfaces of the scales at angular points and from the glass itself which covers the wing in those cases where a slide was made for the purpose of examination. Also it is notoriously difficult to produce artificially a green or blue colour free from red, though it is easy to produce red free from blue and green, and this difficulty may also be felt by nature in preparing the natural tints of insects. In any case the strongly-marked blue end of the spectrum and the much-weakened red end show clearly that the scales themselves are inherently blue, in that the total colour emitted by the wing is actually blue and is not a mixture of rays from a brown or black surface seen through a white transparent layer, which