

THE ORIGIN OF ORNAMENTATION IN THE LEPIDOPTERA.

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Elsewhere I have ventured to call attention to the interesting chapter in Mr. Scudder's book on Butterflies, in which the theory as to the primitive pattern of ornamentation is given. By this we are told that the complex patterns, the seemingly chiselled lines and the eye-like spots, arose from simple transverse shade bands running parallel to the outer margins of the wings themselves. Such bands we yet find on the wings of many Owllet Moths. In the Moths we might expect to find, still existing, a nearer approach to the primitive style of marking than in the higher Butterflies. Mr. Scudder's theory of the primitive pattern is quite independent of the theory as to the origin of the primitive transverse shade lines themselves. Referring to what I have said in my "Essay on the Noctuidæ" and in other places, about the pattern of one wing being reproduced in some species exactly, and in some whole families in the style of a rougher copy, upon the under-lying wing, I have employed the word "photographed" to express the effect produced. The primitive band may then be conceived to have been produced by an *outside* process, the effect of light and shade upon the surface of the wing itself. Its production may have been aided by the movement of the wings (expanding and shutting). The edges of the wings in many ways may be conceived to be first affected. That the primitive Lepidopteron was plain and sombre, we have reason to suppose, judging from what is known of now extinct types from which the whole Order may have been evolved. Under the murky skies of the Carboniferous the colors of the insects remained dull. Upon this plain wing, the first shade or marking may have arisen by a process comparable with photography, the action being produced by the same chemically acting ray of light. The atmospheric conditions then existing are factors in the problem. The shadow originally cast on the wing left a trace in process of time, a deeper tinting which became a permanent shade line or band. The evolution of this primitive shade band is the subject of Mr. Scudder's theory. The manner in which it may have arisen from a shadow has been long the subject of my own thoughts. I am aware that there is a learned opinion that the colors and patterns of insects are developed from the insects' insides, by a process the links in which I am unable to follow, and which it has not pleased the authors of this