

*Some Grafting Experiments upon Lepidoptera.*

H. E. CRAMPTON, JR.

THE writer described a series of experiments carried on during the spring of 1897, preliminary to a full series now in progress. The operations were performed on pupæ of the commoner Saturniidae: *P. cynthia*, *S. cecropia*, *C. promethea* and *T. polyphemus*. They were designed to determine, if possible, besides the coalescence power of fragments or nearly complete pupæ, as well the color effect, if any, of each component upon the other. As shown by Mayer and others, the pigmental colors are produced by the chemical decomposition of the blood in the empty scale cells; and, therefore, if two specifically different forms were coalesced, reciprocal color-effects might be looked for.

Photographs and specimens illustrating the types of operations, as well as some coalesced imagines, were exhibited. The first group of operations included homoplastic and heteroplastic unions in natural proportions of anterior and posterior halves of pupæ. Four out of sixty-one furnished metamorphosed imagines, with the parts perfectly coalesced. A hinder part of the abdomen of a *promethea*, fused to a *cynthia*, showed a buffy color, with no trace of its specific red color.

'Tandem' unions formed the second group. In these, two pupæ, one deprived of its head and the other of the posterior part of its abdomen, were joined. Three out of twenty-seven operations proved successful, producing compounds with four pairs of wings, six pairs of legs, etc. In heteroplastic operations no definite abnormal color-effects were observed.

'Twin' unions afforded fourteen pairs of coalesced imagines from a total of sixty-nine operations. Head to head, back to back, tail to tail, and other unions were obtained. No pairs among the heteroplastic operations showed any reciprocal color-effect whatever.

*Regeneration in Planaria maculata.*

T. H. MORGAN.

THE remarkable power of regeneration of Planarians has been known for a long time. The more recent results of Van Duyne and Randolph have added many new facts to those already known. The following account gives a few additional observations and experiments to those previously published. If the planarian (*Planaria maculata*) is cut into cross-pieces all the pieces make new worms unless they be too small. The piece in front of the eyes does not seem to be able to regenerate. Other experiments show that this piece is near the linear limit of size below which a piece does not regenerate. In the more anterior cross-pieces the new pharynx appears near the posterior end of the piece; in the more posterior pieces the new pharynx appears in the middle of the piece, and in the last piece the new pharynx appears in the middle of the old tissue. Longitudinal pieces cut from the side of the worm, generally form new long worms with the pharynx along the line between the old and new tissue, sometimes, however, in the old tissue. The new median line is often along the middle, or a little to one side of the middle, of the old tissue. Not infrequently these long pieces from the side develop differently. They shorten and become crescentic in shape, with the cut edge in the concavity of the crescent. Along the new edge new tissue develops and completely fills up the crescent. This new tissue soon develops into a head, with eyes and brain. The median plane of the new animal is at right angles to that of the original worm. These pieces never elongate, since there is an unbroken ectoderm behind, that originally formed the side of the worm.

Other experiments showed that almost any part of the old tissue had the capacity to form a new pharynx, but the head with