WRIGHT'S NOTES ON BUTTERFLY BIOLOGY.

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Mr. W. G. Wright's excellent handbook¹ of the butterflies of the West Coast of the United States is going to help all of us out here who are already interested in insects, and is going to inspire some others with this interest. The writer of the book is a veteran collector and observer, his years of entomological work in California already numbering twenty-five. His records of observation seem quite exact, and undoubtedly all that he has to say in this book, as far as it is based on personal observation, can be relied on. Therefore we may welcome with particular pleasure an interesting introduction—the major part of the book being composed of an annotated catalogue of the butterfly species found in the Western States and of a complete series of excellent colored plates illustrating nearly all of these species—which introduction, called "General Features of Butterfly Life," is made up of some forty or more numbered sections, each with a special title, and all together including some merely curious, but many really valuable suggestive remarks, records of observations, odd conclusions, etc., about butterfly biology.

As many of these notes ought to find their way to all students of insect bionomics, whether they be especially interested in Western butterflies or not, I have extracted, for PSYCHE's readers, from these "general features" notes of Mr. Wright certain ones which seem to me particularly interesting or suggestive.

As the butterflies are, of all insects, those which we know best systematically and faunistically and also as regards their seasonal changes, their life history, in fact, their general biology, they are, like the North American birds, specially valuable for the student of species-forming, of the effects of isolation and environment, and, indeed, in general, of evolution.

I shall take up Mr. Wright's notes according to his own section numbers.

Section 2. Altitude is equivalent to latitude in its effect on ornamentation. A species which occupies both valleys and mountain heights will be found to be darker in color in those examples from the mountains than those living in the lower valleys. Example, *Meganostoma eurydice*, in valleys, becomes *M. e. bernardino* in its upper range.

¹ *The Butterflies of the West Coast of the United States*, by W. G. Wright. Whitaker and Ray Co., San Francisco, 1905. Most of the sheets of this book were destroyed in the disaster of April 18 and following days, but a few copies in the hands of the author are for sale.

Section 5. *Range of butterflies.* An interesting brief discussion of the range limits of species and of what determines these limits. Food plant sometimes is the determining factor, sometimes obviously not; something not obvious in many cases, but real.

Section 12. *Seasonal forms.* In some cases the early spring appearers are darker in markings than the later ones; in other cases, as *Colias eurhytheme*, the early or cold weather forms are paler than the later warm weather forms.

Section 13. *Hybrids.* Some interesting examples of butterfly hybridization are noted. Author has seen *Thecla dumetorum* and *Th. iroides* in copulo; also *Pieris rapae* plus *P. protodice*. Author noted both of these cases in seven years; in the same time he noted perhaps twenty other pairs of butterflies in regular mating; he concludes, therefore, that one pair of butterflies in every one hundred and forty is regularly mismated, that is seven out of one thousand. "Now if that per cent be normal and continues, we see at once that there can be no resulting fertile progeny from the mismating, for if there were intergraded varieties following every mismating the world would be full of hit-and-miss butterflies in a few years. It therefore appears conclusive that, as in other lines of the animal kingdom, the mismatings must be infertile immediately or in the next generation." [This is in opposition to Luther Burbank's belief that much of the variety in organisms, plants, at least, is due to fertile hybridizing. V. L. K.]

Section 14. *Dimorphism.* An interesting paragraph calling attention to white and black dichromatism of *Argynnis* and *Colias*. Author notes that the normal female of *Colias* is being replaced by the albino, and believes that the normal females of *Argynnis* *nokomis*, *A. nitocris*, and *A. leto* have all been supplanted by the black form. [This is in line with Emery's theory of the origin of secondary sexual forms — V. L. K.]

Section 16. An interesting paragraph on gynandromorphy. Author notes the capture of a specimen of *Lycena piasus* with male and female right and left wings (figured).

Section 17. *Sex-marks.* Notes an interesting secondary sexual character namely, in *Nymphalidae* the fore-legs or lappets of males "are fully clad with plenty of long hairs, while the lappets of the females are less fully clad in shorter and scanty hairs.

Section 20. *Non-feeding species.* Notes the non-feeding characteristic of the *Satyridae*; yet they have sucking proboscis.

Section 24. *Taming butterflies.* "Butterflies are easily tamed . . . ; a day or two will suffice to tame a butterfly so that when it sees you coming it will walk toward

you, waving its wings in pleasure at your appearance, and gently unrolling its tongue as it walks along in anticipation of a sip of sweetened water; then it will climb upon your finger. . . . You must always approach the butterfly with gentle motions, with an absence of anything new or strange, or unexpected or unpleasant, when it is hungry and with food on your finger tips; and when you call it you must each time do so with the same motions and the same tone of voice. The females are more tractable and teachable than the males."

Section 25. *Length of a butterfly's life.* Notes on the duration of the imaginal stage in various butterfly groups; Graptas, Vanessas, Pyrameis (long-lived) Argynnis and Melitaea (a few weeks to two months), Satyridae (short-lived a week or so), and Chionobas iduna (ten days).

Section 27. *Rubbing the wings.* Author notes the curious habit of the Theclas and Lycaenas of rubbing the wings together while at rest. Author sees no explanation. [They are not improbably producing sound by rubbing special series of stiff upright scales together; I have referred to this phenomenon in an early paper on the scales of the Lepidoptera. V. L. K.]

Section 30. *Mimicry or simulation.* An interesting but rather peculiar section under this subject, including some excellent observations, but showing a curious lack of understanding, of the theory of protective resemblance and mimicry on the author's part. The author assumes that mimicry, where existent, is a *voluntarily* acquired condition of the mimicking or simulating species! Among the author's observations are the following: Most Satyridae alight "upon places concolorous with themselves." Chionobas gigas alights only on bare gray rock upon which gray moss and lichens grow. "When it alights on such a place you cannot distinguish it although you saw it alight only three yards away." . . . "During 25 years' butterfly work I have seen but one attempt of a bird to catch a butterfly; then it was a fly-catcher bird chasing a Colias, dashing after it many times until, tired out, it stopped and the Colias escaped."

Section 31. *Movement of butterflies.* By this title author means "the substitution of the abnormal female for the normal; the temporary or permanent disappearance of an entire species, and the unaccountable appearance of lost or unknown species; in fine, the change from one state of things to another state." Author notes the conditions of occurrence of pale females of Colias, the disappearance of the species Lycaena tequa in Southern California, the disappearance and reappearance of Lycaena xerxes near San Francisco, the becoming common of the former very rare Pampila melane, and the disappearance of Chionobas nevadensis, Satyrus wheeleri and Mechanitis californica.

Section 25. *Getting butterfly eggs for rearing.* Under this practical title author has some interesting biological notes on the egg-laying of butterflies. *Parnassius*, *Argynnis*, *Euptoieta* *Neonympha*, and all genera of *Satyridae* "will lay their eggs upon anything, even on the net itself if other matters, as proper shade, warmth, air and quiet, are agreeable." All other butterflies demand their own peculiar larval food plant, "and it is necessary that the plant should be fresh and bright, as the butterfly will not oviposit on a plant that is at all wilted."

Section 37. *Breeding in darkness and in cold.* "When caterpillars are bred or raised in darkness from egg to imago, the resulting imago will be darker in color than the normal; the dark spots or lines will be broader and more dense or dusky and the lighter ones will be sordid or dusky. But no excessive variation or deviation from the plan of the normal form has ever been noticed, for the effort has many and many times been made to create new forms by this method." So also by cold. Caterpillars raised in an ice house or in cold storage where the temperature is kept down as low as possible will never develop any radical variation, but the butterflies will be darker than they would have been if raised in a normal temperature.

Section 38. *Migration of butterflies.* Describes large swarms or flights of *Pyrameis cardui*, not always in the same direction, but generally to the northward. Some came from Baja California and reached British Columbia!

LARGE BUTTERFLY CAPTURED BY CRAB-SPIDER.—On the 13th of August, 1905, a swallow tail butterfly (*Papilio troilus* L.) was found lying dead by the side of the Amboy Road at Tottenville, Staten Island. Clinging to the body of the butterfly under one of its wings, was a small whitish crab-spider 7 mm. long, such as is often found on flowers awaiting its insect prey. Evidently the large butterfly had been attacked by the small spider, and had flown away with it, only to die later by the side of the road. There were no flowers near and the butterfly must necessarily have flown some distance before being overcome.

The spider has been shown to Mr. J. H. Emerton, who says it is *Misumena aleatoria*; a species commonly found on the blossoms of wild carrot and thoroughwort where it sits between the flowers and catches butterflies and other insects that alight on them. He adds:—"A butterfly a little too large might easily carry a spider away as yours appears to have done."—WM. T. DAVIS.