

probably some more comprehensive law which would account for *all* those resemblances.

3rd. It must be shown that the cause of the rarity of the *Leptalis* was one acting on the insect entirely or chiefly while it was in the perfect state; this had not been done, and it was improbable that it could be; for the most critical periods in the life of *Lepidoptera*, as regarded their enemies, were the larval and pupal states.

4th. It must be shown that the enemy (whatever it might be) which attacked the *Leptalis* sought its prey principally by the sense of sight; but this suggested another improbability. If the *Heliconia*, which the *Leptalis* resembled, was protected by its nasty odour, surely the bird or other enemy of the *Leptalis* must be very foolish to let it escape when it smelt nice, because it *looked* like the *Heliconia*. The purpose of protection would have been better accomplished by the *Leptalis* mimicking the *Heliconia* in that point by which the *Heliconia* was protected.

5th. A forcible objection to the mimicry theory (as already pointed out by Prof. Westwood) was the rarity of the mimicking species. The theory involved the hypothesis that there was a time when the *Leptalis* differed in pattern from the *Heliconia*; was the *Heliconia* then commoner than now, or as rare? If commoner, it was curious that, when not protected, it flourished better than now, when protected. If as rare, how could it have survived at all before and during its transmutation? It would, perhaps, be suggested that the *Leptalis* was formerly commoner than now, and that some enemy arose, rendering it necessary that the *Leptalis* should find a new means of defence. This, however, was mere supposition, and it was almost impossible to adduce facts to prove it; but supposing it to be the case, why did not the enemy exterminate the *Leptalis* when it did not resemble the *Heliconia*, as (according to the theory) it would now, but for this resemblance. The further supposition must be made, that the enemy was not at first very dangerous to the *Leptalis*, and that in proportion as it grew dangerous, the *Leptalis* grew more and more to resemble the *Heliconia*: it was certainly very fortunate for the *Leptalis* that spontaneous variations, bringing it to resemble the *Heliconia*, should occur in the exact proportion required for its safety.

6th. Again, taking the time when the *Leptalis* differed in pattern from the *Heliconia*, it was said that specimens exhibiting small variations approximating to the *Heliconia* were selected for the preservation of the species. But a small variation in marking would be of no practical service to the *Leptalis*, especially as it was by its nasty odour that the *Heliconia* was protected; to which it might be added that on the theory of Natural Selection no reason or fact was brought forward to induce the belief that variations of the required sort should occur at all.

In conclusion, whilst admitting the impossibility that such a theory as that of mimetic resemblances could ever be shown by facts to be correct at all points, Dr. Sharp was of opinion that the evidence as yet adduced was insufficient to convince an unprejudiced observer. The most that could at present be said of the theory was, that it was very ingenious, and might or might not be true.

Mr. Wallace, in replying to Dr. Sharp, remarked that it was very easy to make objections to any theory, and many of those advanced were of such a general nature that it would require the whole subject to be again fully gone into to answer them in detail. The first objection was one of those vague and general statements which was really no objection at all; it was said that natural selection, being a power of *differentiation*, was therefore not likely to produce *similarity*! But natural selection was more

than a power of differentiation; it was the preservation and accumulation of *useful variations*; and the moment it became useful to one creature to resemble another, all variations which tended to make it so would be preserved, and would accumulate till an outward similarity was produced. In answer to the second objection, Mr. Wallace admitted that it must be shown that pairs of mimetic insects occurred together more frequently than apart, and maintained that this had been shown: he denied that a single case of mimicry by insects of different countries would discredit the general explanation; since in *one case* the resemblance might easily be accidental, or recent changes of distribution might have parted creatures that once lived together. But, however this might be, even one case of mimicry among insects from distinct countries (as complete and striking as many of those adduced by Mr. Bates and the speaker) had not yet been produced by the opponents of the theory. Dr. Sharp, as a third objection, required proof that the scarcity of *Leptalis* was owing to persecution in the perfect state, not in the larval or pupal conditions; probably Dr. Sharp could not give such proof in the case of a scarce British insect which he had studied for years, and it was quite immaterial to the question. The *Leptalides* alone of all *Pieridæ* were universally scarce in individuals, and almost all the *Leptalides*, and they alone, mimic *Heliconia*. As to requiring proof that birds seek their prey by the sense of sight, it was so generally admitted that insectivorous birds captured their prey by sight, that if Dr. Sharp denied it he should rather prove that they do not. In the next place, it was asked, "Was the *Leptalis*, before it resembled the *Heliconia*, abundant or rare? If abundant, then it was better off without protection than with it. If rare, how did it survive at all before and during transformation?" The reply was, that before the *Leptalides* began to mimic the *Heliconiæ* they were more abundant than now, and like nations and individuals, they were better off when they did not require protection, than now when they cannot exist without it. The *Leptalides* were not now the same insects they were then, and their conditions of existence had also materially changed since that remote epoch. Lastly, it was said that as the *Heliconiæ* were protected by their disagreeable odour, a superficial resemblance to the *Heliconiæ* could not be at first a sufficient motive power to change the species of the *Leptalides*. Mr. Wallace thought, on the contrary, that it would, because it was self-evident that under all circumstances "the fittest must survive," and any variation which caused but a small percentage of individuals to escape destruction would to that extent benefit that variety, and might, when the species was struggling for existence, cause that variety alone to survive. To deny this would be to deny that insectivorous birds could ever be deceived by slight resemblances, although it was well known that very rude resemblances sometimes deceived animals and even men. Mr. Wallace thought, therefore, that the theory of the "survival of the fittest" (or natural selection) did offer an explanation of almost every fact connected with mimicking insects, and that the objections that had been made to it were of a vague nature, and such as could be made against any theory whatever that attempted to explain the phenomena of organic life. Our knowledge of the present life-history of insects was exceedingly imperfect, and how many questions might be asked concerning them that no one could answer. In the long life-history of species how much more must ever remain unknown; yet because our knowledge was thus incomplete we should be the more thankful for such a theory as that of Mr. Darwin, which supplies a real cause of modification of species, and enables us to correlate so many of the most curious phenomena of organic

existences, and to comprehend the series of actions and reactions by which they have most probably been brought about.

Prof. Westwood reiterated, with further illustrations, some of the objections to the theory stated by him at the previous Meeting, and the discussion was brought to a close by a few remarks from the President.

*Paper read.*

Mr. M'Lachlan read a paper entitled "A new Genus of Hemerobidæ, and a new Genus of Perlidæ." The former was described under the name of *Rapisma*, and the type was the *Hemerobius viridipennis* of Walker; the latter under the name of *Stenoperla*, and the type was the *Chloroperla prasina* of Newman.

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January 7, 1867.

Sir JOHN LUBBOCK, Bart., President, in the chair.

*Additions to the Library.*

The following donations were announced, and thanks voted to the donors:—  
 'Mémoires de la Société de Physique et d'Histoire Naturelle de Genève,' Vol. xviii. pt. 2; presented by the Society. 'Exotic Butterflies,' Part 61; by W. W. Saunders, Esq.  
 'Notes on the Zygænidæ of Cuba,' by Augustus Radcliffe Grote; by the Author.  
 'Lepidopterological Contributions,' by Aug. R. Grote and Coleman T. Robinson; by the Authors.  
 'Note on the Japan Silkworm,' by Captain Thomas Hutton; by the Author.  
 'De Tunnelgravende Biller Bledius, Heterocerus, Dyschirius og deres Danske Arter,'  
 'Danmarks Cerambyces,' 'Danmarks Buprestes og Elateres,' 'Krebsdyrenes Suge-  
 mund, I. Cymothoæ,' 'Phthiriasis og Mundens Bygning hos Pediculus,' by J. C. Schiödte; by the Author.  
 'Danmarks Geophiler,' by Bergsøe and Meinert; by the Authors.  
 'Om Slaegten Stalita,' by the Editor of 'Naturhistorisk Tidsskrift.' 'The Entomologist's Annual;' by H. T. Stainton, Esq. 'The Zoologist' for January; by the Editor. 'The Entomologist's Monthly Magazine' for January; by the Editors.

The following addition by purchase was also announced:—Bericht über die Wissenschaftlichen Leistungen im Gebiete der Entomologie während der Jahre 1863 und 1864, von Dr. A. Gerstaecker; Erste Hälfte.

*Election of Subscriber.*

Samuel Alfred Davis, Esq., of 4, Durham-place West, Holloway, was balloted for, and elected an Annual Subscriber.

*Exhibitions, &c.*

Prof. Westwood exhibited a number of butterflies, chiefly Heliconiidæ, collected by Dr. Burchell in Central South America, and observed that the Burchell collection was peculiarly interesting, from the fact that each specimen bore a ticket giving the date