

The theory now proposed is a considerable modification of this view, for it supposes that the rupture of the central body did not take place until it was partially consolidated, and had attained nearly its present dimensions.

I do not pretend, in these remarks, to have thoroughly discussed the cases of the other planets, and have only drawn attention to a few salient features; in the paper itself the subject is considered at greater length. It will, however, I think, be admitted that the theory agrees with some remarkable facts in the solar system.

G. H. DARWIN

THE SEXUAL COLOURS OF CERTAIN BUTTERFLIES

DR. SCHULTE, of Fürstenwalde, has called my attention to the beautiful colours which appear on all four wings of a butterfly, the *Diadema bolina*, when looked at from one point of view. The two sexes of this butterfly differ widely in colour. The wings of the male, when viewed from behind, are black with six marks of pure white, and they present an elegant appearance; but when viewed in front, in which position, as Dr. Schulte remarks, the male would be seen by the female when approaching her, the white marks are surrounded by a halo of beautiful blue. Mr. Butler, also showed me in the British Museum an analogous and more striking case in the genus *Apatura*, in which the sexes likewise differ in colour, and in the males the most magnificent green and blue tints are visible only to a person standing in front. Again with *Ornithoptera* the hind wings of the male are in several species of a fine golden yellow, but only when viewed in front; this holds good with *O. magellanus* but here we have a partial exception, as was pointed out to me by Mr. Butler, for the hind wings when viewed from behind change from a golden tint into a pale iridescent blue. Whether this latter colour has any special meaning could be discovered only by some one observing the behaviour of the male in its native home. Butterflies when at rest close their wings, and their lower surfaces, which are often obscurely tinted, can then alone be seen; and this it is generally admitted, serves as a protection. But the males, when courting the females, alternately depress and raise their wings, thus displaying the brilliantly coloured upper surface; and it seems the natural inference that they act in this manner in order to charm or excite the females. In the cases above described this inference is rendered much more probable, as the full beauty of the male can be seen by the female only when he advances towards her. We are thus reminded of the elaborate and diversified manner in which the males of many birds, for instance the peacock, argus pheasant, &c., display their wonderful plumage to the greatest advantage before their unadorned friends.

The consideration of these cases leads me to add a few remarks on how far consciousness necessarily comes into play in the first acquirement of certain instincts, including sexual display; for as all the males of the same species behave in the same manner whilst courting the female, we may infer that the display is at least now instinctive. Most naturalists appear to believe that every instinct was at first consciously performed; but this seems to me an erroneous conclusion in many cases, though true in others. Birds, when variously excited, assume strange attitudes and ruffle their feathers; and if the erection of the feathers in some particular manner were advantageous to a male whilst courting the female, there does not seem to be any improbability in the offspring which inherited this action being favoured; and we know that odd tricks and new gestures performed unconsciously are often inherited by man. We may take a different case (which I believe has been already advanced by some one), that of young ground birds which squat and hide themselves when in danger immediately after emerging from the egg;

and here it seems hardly possible that the habit could have been consciously acquired just after birth without any experience. But if those young birds which remained motionless when frightened, were oftener preserved from beasts of prey than those which tried to escape, the habit of squatting might have been acquired without any consciousness on the part of the young birds. This reasoning applies with special force to some young wading and water birds, the old of which do not conceal themselves when in danger. Again a hen partridge when there is danger flies a short distance from her young ones and leaves them closely squatted; she then flutters along the ground as if crippled, in the wonderful manner which is familiar to almost every one; but differently from a really wounded bird, she makes herself conspicuous. Now it is more than doubtful whether any bird ever existed with sufficient intellect to think that if she imitated the actions of an injured bird she would draw away a dog or other enemy from her young ones; for this presupposes that she had observed such actions in an injured comrade and knew that they would tempt an enemy to pursuit. Many naturalists now admit that, for instance, the hinge of a shell has been formed by the preservation and inheritance of successive useful variations, the individuals with a somewhat better constructed shell being preserved in greater numbers than those with a less well constructed one; and why should not beneficial variations in the inherited actions of a partridge be preserved in like manner, without any thought or conscious intention on her part any more than on the part of the mussel, the hinge of whose shell has been modified and improved independently of consciousness. CHARLES DARWIN

Down, December 16, 1879

NOTES

WE are much pleased to be able to announce that the Committee of the British Association for the Exploration of Socotra have secured the services of Dr. I. B. Balfour, Professor of Botany at Glasgow, as naturalist. Besides many other qualifications for the post Dr. Balfour has recently taken part in the execution of a similar piece of work as one of the naturalists attached to the station for the observation of the Transit of Venus at Rodriguez. Dr. Balfour will leave for Aden on the 9th inst., and proceed thence to Socotra.

M. PERRIER, the head of the French Survey, has been appointed a Member of the Academy of Sciences. It may be remembered that M. Perrier is a commander on the staff, and has just accomplished one of the greatest geodetic feats on record, the connection of the South of Spain with the Algerian province of Oran. M. Perrier is a supporter of M. Roudaire's scheme, and his appointment is considered likely to accelerate the work of the survey for the great Saharan Railway.

WE are pleased to see that a movement is on foot to erect an educational natural history museum in Perth, as a memorial to the late Sir Thomas Moncrieffe, president of the Perthshire Natural History Society. From a statement sent us by Dr. Buchanan White, we notice that the organisers have a rational idea of what such an institution should be, and their scheme is a comprehensive one, having in view the education of the citizens of the ancient burgh, as well as the collection of objects of natural history connected with the county. A generous citizen of Perth, Mr. Robert Pullar, offers 500*l.* of the 2,000*l.* which it is estimated the building will cost.

M. E. LEVASSEUR, a well-known French geographer, has invented an amusing and instructive geographical game, to which he gives the name of "Tour du Monde." It is played on a large terrestrial globe divided into 232 spherical rectangles, each of which has a number, corresponding to a number on a list,