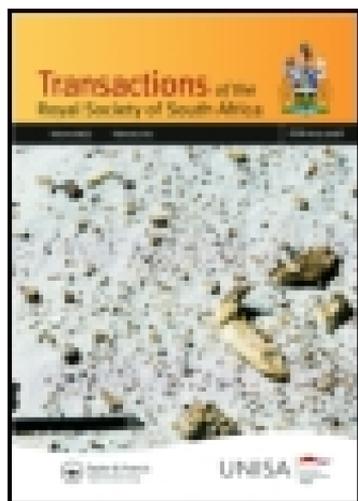


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IV. *On the peculiar Colours of Animals in relation to Habits of Life.*—By M. E. Barber, (Communicated by the General Secretary).

[Read, 26th June, 1878.]

On reading Mr. A. R. Wallace's interesting paper published in MacMillan's Magazine "On the Colours of Animals and Plants," several important facts recurred to my mind, which I have endeavoured to embody in the following pages. They are all of them more or less intimately connected with the subjects discussed by Mr. Wallace, and may perhaps be the means of throwing additional light on these matters, especially as there is so much that we have yet to learn, for it is only of late years that naturalists have given their attention to these interesting subjects. And to Mr. Darwin we are mainly indebted, to him we owe our thanks for putting us upon the right track; it is comparatively an easy task to follow in his footsteps, and to spell out the book of nature with Mr. Darwin's alphabet in our hands. We need not however be vain or presumptuous in our wisdom and learning, as we ourselves are but a link in that wondrous chain which connects all earthly things. There is not a bone or sinew in our frame which is not represented in that of all creatures, even in the serpent beneath our feet, which we despise and dread. If we have in the struggle for existence climbed to the top of the tree, and assumed dominion over the lumberer inhabitants of the earth let us not exult in the strength of our position, we may not always hold our own, other creatures have had their day, and have vanished from the face of the earth, and this may also be our doom; far be it from me therefore to imagine that all that is grand and beautiful in nature, together with the wonderful tints of birds, and flowers with their sweet perfumes, &c., were solely created for the gratification of human beings; or that it is possible for flowers "to waste their sweetness on the desert air."

In the beneficent economy of nature there is no absolute waste or squandering of materials, she is only lavish where it is strictly necessary ; every form and colour has its own intrinsic value, or use, its place in the appointed season ; although, as yet, many of them are altogether beyond our limited comprehension.

Colour throughout nature, as far as investigation extends, is not the result of accident at all, "accidental colour" is a vague and empty term applied by some naturalists to brilliant hues, the uses of which to them appear obscure or purposeless, colours in fact which they do not understand. In the economy of nature colour is employed for innumerable and widely different purposes, none of which are accidental (not even in cases of variegated foliage), on the contrary its uses are of the utmost importance in their various applications and expressions. No word-painting could be more effective, or could tell a tale of greater interest than do the different significations of colour as applied in the various services of nature to animals and plants.

Typical colour is, however, by no means to be depended upon. It is not so much the result of near relationship, as of similar habits. The species of widely different genera harmonize in colour where their habits are similar and *vice versa*. Mark the striking difference that exists between the common dove (*Turtur Semitorquatus*) clad in her modest coat, and the dove of the Transkeian country (*Treron Delalandii*) arrayed in glorious shades of light and dark green, with red beak and legs. In form both species are alike ; remove the feathers and you will not distinguish the one from the other, dissimilar habits have produced in these nearly allied birds, this remarkable difference in colour.

Mr. Wallace, I find does not agree with Mr. Darwin in his theory of female selection ; he does not consider it to be mainly the cause in male birds of the production of brilliant colour and ornamentation. Now although to a certain extent I admit that there may be something in what Mr. Wallace says, for doubtless strength and vigour in birds tend to the production of perfect feathers, as in quadrupeds a high state of condition will produce a superior coat of hair ; I have, nevertheless, so frequently seen and watched the display which male birds of various tribes are in the habit of performing during the early

spring or pairing season, when they collect in great numbers in certain localities and sing before the females, that I cannot bring myself to believe there is nothing in this theory, even were I inclined to do so.

The peacock with his wonderful train is never weary in the pairing season of exhibiting and displaying his grand colours and markings before the females, strutting backwards and forwards at the same time in the most stately manner, and calling attention to his movements, being at this season exceedingly proud of his fine feathers, and moreover, taking the greatest care of them during rainy weather to prevent them from becoming soiled. I was once told by the late Sir Walter Currie (who was a man of great observation) that his peacocks would rather starve than quit their perches when the earth was wet and muddy, and that he frequently went round and fed them from his hand out of sheer pity for their starving condition. No sooner, however, was the pairing season over, than no further care was taken of the fine train, it was dragged in the mud or ruffled against wet bushes, and but seldom exhibited or displayed. However it is not improbable that in the wild state of the peacock, this extraordinary appendage may also have been used to scare away predaceous creatures from the vicinity of their nests or young. Its sudden expansion, together with the defiant note uttered by the bird, and the wonderful display of colour and imitation "eyes," with their waving lashes or apex of each feather, would in itself be sufficient to startle any creature unaccustomed to such a sight; in the same manner as a lady in India is said to have baffled a tiger by the sudden expansion of her parasol.

The numerous species of sunbirds (*Nectarinia*) will spend hours together in the early spring season, singing, and displaying their brilliant plumage before the females. I have frequently watched the males doing so, one morning in particular, when I was observing this habit in the common redbreasted sunbird (*Nectarinia Afru*), a male was perched upon a low flowering shrub, where he was singing and displaying his beauties in the most excited manner, with many a bow and gesticulation before a couple of admiring females, while they, ever and anon were answering him in so many pretty little chirpings, (the females do not sing). At length one of them (his favourite I presume) uttered a shrill note, as much as to

say, "I have had enough of this sort of thing," and away she darted through the air, evidently much to the disappointment of her suitor, for his song was abruptly concluded, and she was immediately followed, whilst the other female uncared for was left behind. All the display of fine feathers and singing takes place in the beginning of the season, before the toils of nest building, and rearing of young commences; for in these arduous duties the male takes his full share, assisting his mate in various ways. When the young (which are usually male and female) are fully fledged and in a fit condition to abandon the nest, the male sunbird takes the young female under his entire care, and the female the young male. In colour the young closely resemble each other, both possessing the hues pertaining to the female sunbird, the male, however, being somewhat larger and longer in body. After the parent birds have finally separated with their young charges, they become exceedingly jealous of each other, and angry disputes take place between them, when they may be seen driving each other away from favourite haunts, and flowers; how long this animosity is kept up between the old birds I cannot tell. Sunbirds, however, return again and again to the same localities to build their nests, not caring whether they have been successful at these places in rearing their young.

Cape canaries (*Crithagra canicollis*) have their favourite haunts, usually where the morning sunbeams find their way to sheltered nooks and trees; at such places they will collect in great numbers, where the males will employ their time in singing and displaying their pretty yellow coats, for hours together before the females. These "love meetings" invariably take place in the pairing season. After each has chosen a mate, the early morning gatherings cease, the singing considerably diminishes and the more earnest work of nest building commences. Like the canaries the yellow finch (*Hyphantornis olivaceus*) or "reed sparrow" as it is commonly called in this country, has the same habit. These birds are, however, more numerous and noisy in their gatherings than the canaries. Their favourite haunts being reed beds, or trees overhanging precipitous cliffs or water courses.

Many species of birds, however, choose their mates once for all, and they live together (provided no accident occur

to either sex) throughout the natural term of their lives, in such cases there is but little display on the part of the males of fine feathers, or singing to enchant the females; such birds pursue the even tenor of their way as do married people of the human race, displaying, however, great affection for each other, which is not always the case on the part of human beings. The domestic fowl cares not a straw for the beauty of plumage, the females swear allegiance to the strongest and most victorious fighting bird of the "clan," no matter what his colours may be, and to him they look for protection from the importunities of younger males, and from the attacks of dogs, cats, etc., etc.

Indicative or banner colour.—There is an important use to which brilliant or conspicuous colours are adapted in male birds, on which Mr. Wallace, in his paper on "Colour," does not in my opinion, place sufficient importance. I refer to *indicative colours*, where the plumage of the male is more brilliant and conspicuous than that of the females, and where the male is polygamous; in all such cases the male takes the lead by proceeding in whatever direction he thinks proper, followed by the females; the bright colours of the male, like the banner of a Regiment, forming the guiding star to the band. With regard to these polygamous birds, there are frequently as many as seven or eight females to one male, and great confusion would take place if the male did not take precedence and upon all occasions become the leader of this little band of females.

The black and yellow finch (*Ploceus capensis*) commonly called in this country the "Artillery bird" on account of its black and yellow colours, is one of these polygamists; there are seldom less than from six to eight females in his establishment. The female is a dun coloured little bird of no account, as far as beauty is concerned, whilst the male on the contrary is arrayed in the deepest velvet black, contrasted with bright yellow. Of these gay colours he is exceedingly proud, displaying them in various ways before the females, by throwing out his wings in a rapid manner while flying or while perched upon some lofty reed or water bush, etc., etc. The "Artillery bird" frequents river sides, or marshy places, where reeds or long grass abound. Their nests are neatly constructed, and covered in with the stems of long

grasses, rendering the female invisible while on the nest ; these birds build in small colonies, the nests being near to each other, enabling the male to superintend them all. In autumn the male changes his bright coat of conspicuous colours, assuming one which closely resembles that of the females, at which time the family becomes dispersed in search of food, or they unite with other families of the same species, and visit corn-fields in large flights.

The long tailed black finch (*Chera Progne*) has similar habits to the " Artillery bird," he is also a polygamist, and possesses a harem of inconspicuously coloured females. His long tail feathers form the leading banner of the family party. The tail of the male is indeed of such inconvenient length, that in stormy weather, if alarmed he does not seek safety by flight, like other birds, but is compelled to secrete himself beneath the long weeds and grasses, leaving the ladies of the harem to shift for themselves in the best way they can. In the winter season, however, the long tailed finch is happy in being enabled to cast off his long tailed black coat, for a brown one, like that worn by the females, his only distinction then being the red patches on the wing coverts, and a somewhat greater length of body. However when the breeding season is past, and the days of his pride are over, many families then unite and dwell together, roosting among the reeds.

It may be that among mammals also conspicuous colours are of great value. For instance, there is a tendency in all the creatures that are allied to the *Equus* or horse tribe, to be striped. The zebra and quagga of this country are both striped, especially the former ; why they are marked in this conspicuous manner, is difficult to say, but doubtless these stripes have their peculiar signification and value.

The different species of large game of South Africa are frequently found feeding together in numerous droves, scattered over the wide plains, and they drink habitually at the same watering places, moreover, it is the custom of these creatures to drink, not during the day so much as in the night season, or the early dawn of the morning. Zebras frequent mountain ranges or hilly localities, consequently they are not so frequently found upon the plains in company with other kindred

species, but nevertheless they are compelled to drink at the same watering places, where they intermix with other creatures, and it is not improbable that the conspicuous stripes of the zebra may be indicative or banner colours, which would enable them, after having quenched their thirst, with the general troop, to follow each other and keep together, or to separate from them even in the darkness, or in the dim indistinct light of early dawn.

Protective colour.—There is no other purpose in nature to which colour is so widely and universally adapted as that of protecting its possessor from observation, and thus rendering it comparatively safe from dangers of innumerable kinds. Who has not looked in vain for the little mottled partridge, so like in colour to the locality in which it occurs, when suddenly startled by the whirring sound of its wings, as the bird rises from almost beneath their feet! However, the advantages of protective colour have been described by many able naturalists, and I shall confine myself entirely to cases that have come under my own observation, and hitherto undescribed. It is not only sombre and inconspicuous colours that are absolutely necessary for the protection of their owners, but likewise the most brilliant and superb. A casual observer would scarcely imagine that the highly varnished, and magnificent coloured plumage of the various species of sunbirds (*Nectarinia*) could be of service to them for this purpose (as well as in that of "female selection") yet this undoubtedly is the case. The most unguarded moments of the lives of these birds, are those that are spent amongst the flowers, it is then that they are less wary than at any other time. It will be remembered that sunbirds subsist almost entirely upon the nectar of flowers. The different species of *Aloes* which blossom in succession, form the principal sources of their winter supplies; and a legion of other gay flowering plants in spring and summer, the Aloe blossoms especially, are all brilliantly coloured, and they harmonize admirably with the gay plumage of the different species of sunbirds. Even the keen eye of a hawk will fail to detect them, so closely do they resemble the flowers they frequent. The sunbirds are fully aware of this fact, for no sooner have they relinquished the flowers than they become exceedingly wary and rapid in flight, darting arrow-like through the air and seldom remaining

in exposed positions. The black sunbird (*Nectarinia Amethystina*) is never absent from that magnificent forest tree the "Kafir Boom" (*Erythrina Caffra*); all day long the cheerful notes of these birds may be heard amongst its spreading branches; yet the general aspect of the tree, which consists of a huge mass of scarlet and purplish black blossoms, without a single green leaf, blends and harmonizes with the colours of the black sunbird to such an extent, that a dozen of them may be feeding amongst its blossoms without being conspicuous, or even visible. This fine tree, which blossoms early in the spring, forms the favourite haunt of this species, and amidst its branches they collect in considerable numbers, holding their "love meetings" and singing and chirping for hours together in bright sunny mornings.

The colours of the green wood-pigeon of the Transkeian country (*Treron Delalandii*) so closely resemble those of the fruit and foliage of the wild fig (*Ficus* species) their favourite fruit tree, that a flight of them may be concealed amongst its branches without being seen; on any one's approaching the tree, the birds, being fully aware of the protection which their colours afford them, remain perfectly motionless. A shot, however, fired into the tree will send them flying in all directions. The plumage of this pigeon consists of beautiful shades of green, with red beak and legs; these colours blend admirably with those of the wild fig. The tree is an ever-green, and bears fruit all the year round, thus continually affording the green wood-pigeon not only food but also protection; hence it is the home of these birds.

The favourite food of that superbly arrayed bird, the lory (*Turacus albo-cristatus*) are the berries of the wild vine. Like the plumage of the lory, the foliage of this climber varies considerably in its shades of green, and the berries alter in colour as they ripen from light red to crimson, and ultimately to almost a black colour, while the twining stems of the plant are of a pale grey or white. These colours being the same as those of the lory, blend and harmonize with them admirably, rendering the bird protection from her foes. This climber, with its long twining branches, covers large patches of the forest, it is seldom without fruit, and forms the favourite haunt of the lory; it is there they may be found if you seek diligently, but they are by no means conspicuous, hidden amongst its sheltering leaves.

In the ostrich (*Struthio Camelus*) protective colour is of the greatest importance ; the indistinct grey colours of the female are wonderfully adapted for purposes of concealment, which in so large a bird (especially during the season of incubation) are of infinite service to her. These birds, while upon their nests, do not erect their long necks at all, but place them at full length in front of them upon the ground ; neither are their large white feathers conspicuous, for they rest upon the earth also, and are partly hidden by the dark ones ; at all times the grey inconspicuous colour of the female ostrich might easily be overlooked, or mistaken for some other object, such for instance as an ant-hill, so common on the plains of this country. It will not, however, be imagined that the male ostrich in his splendid white feathers and jet black coat, is equally well adapted for purposes of concealment, and that together with the female he shares the duties of incubation ; such, however is really the case. No sooner has the day ended and the darkness fairly set in than you will find the male upon the nest, while the female is away in search of food, from whence she will not return until daylight has rendered the male a conspicuous object. Her approach to the nest will be conducted in a most cunning and careful manner, for well she knows that the keen and watchful eye of the wild Bushman (her deadliest foe) may be upon her, and that every precaution is absolutely necessary. In wide circles therefore and apparently in the most careless and unconcerned manner, the female ostrich will feed round her nest, never once looking towards it, but gradually approaching nearer and nearer to it, by diminishing each circle as she walks round, until at length, her perambulations have brought her to within a yard or so of the nest, when the two birds will suddenly and rapidly change places, the male walking swiftly away, and not remaining in the vicinity of the nest during the day. The wonderful rapidity with which the change is effected is perfectly astonishing, and it is impossible to see the exact manner in which it is done, so swiftly do they change places.

The young of the ostrich have similar habits to those of the pheasant and partridge ; on the approach of an enemy they scatter and hide in the long grasses, where they are left by the parent birds until such time as the

danger has passed over. The rounded form and mottled coat of the young ostrich, as it lies hidden and motionless in the grass, is a capital imitation of the small black ant-heaps, which are by no means uncommon in the grassy localities, or on the plains where these birds have their nests; this remark, however, has reference to the very young birds only, for they quickly become swift-footed, and soon learn to follow the parent birds.

Land birds are for the most part coloured to match the country they inhabit, some of them however possess conspicuous markings (*indicative colours*) which are of great service to them in their flight, enabling them if disturbed (especially during the night) to keep together. If, however, they are not in possession of indicative colours (such as white beneath the wings, &c.), they will probably utter some peculiar note or frequent cry which will answer the same purpose, like that of the fern owl, for instance.

The stanley crane (*Tetraptyx paradisea*) is beautifully indistinct, as it stands with its long neck gracefully folded beneath its wing, roosting upon one leg in the broad shallow waters of the rivers and "pans" of this country. The different leaden shades of colour pertaining to this bird, are precisely those of fresh water, a pale slaty-blue; there could not be a closer resemblance. These shades of blue are not so deep as those of the ocean, which at all times, on account of its great depth, and cleanness reflects the sky more distinctly than do rivers and "pans" of fresh water, and the stanley crane being a fresh water bird is admirably adapted to escape notice in the station which it has to fill.

The brilliant colours of butterflies are in all cases I believe of a protective nature, for like the *Nectarinia*, or various species of sunbirds, their most unguarded moments are those employed amongst the flowers in search of food. It is then that most species of butterflies may be taken by the finger and thumb, so utterly devoid are they of all else, save the pleasures of imbibing nectar from their favourite flowers. It might be said of these little creatures, that they are determined epicures, but at the same time it must be remembered that butterflies are aware of the protective nature of their colours, and on them they rely in a great measure for safety whilst feeding amongst the flowers.

Deceptive colour.—There is a peculiar purpose to which colours are applied by certain creatures, which might appropriately be termed *deceptive*; it is nearly allied to mimicry in its nature, but different in its purposes, as mimicry in all cases is permanent, and likewise of a protective nature, whereas deceptive colour is ever changeable and uncertain, and assumed not for protection nor yet for ornamentation, but purely for purposes of misleading and deceiving.

The small grey mottled chameleon, apparently so quiet and harmless during the day sitting for hours together without moving upon some leafless, or scrubby shrub, following suit to its colour, is a very different creature in the gloaming or twilight, when the moths and other night-flying insects are abroad. It is then that the chameleon climbs to the summit of a branch, where he changes his sombre coat by turning *white* and by this means becoming a remarkably conspicuous object, in fact passing himself off as a flower, which of all others, is the easiest to be distinguished in the dimness of the evening twilight, thus becoming a "delusion and snare" to night-flying insects. Moreover I fully believe (although I am not prepared to state it as a fact) that in this position the chameleon opens its mouth, exhibiting its bright yellow colours as a decoy to insects that are passing by, for the purpose of tempting them into its mouth, and thus securing its prey by a cunning stratagem. It is well known that the centres or tubes of many white flowers are usually of a yellow hue, or otherwise the stamens are of this colour, consequently the yellow mouth of the chameleon would more than any other colour be calculated to mislead and deceive the insect tribes. It is well known that the chameleon is a dull and sluggish reptile, creeping along at a snail's pace, and unable to travel with any degree of rapidity from one locality to another in search of flowering plants, where naturally insects would abound; neither do I imagine, from what I have observed of the creature's common habits, that it ever does so; on the contrary, it may usually be found near the same spot, not frequenting the places where flowers most abound, but (as I have already stated) perched upon some tall shrub or tree following suit to its surroundings, with here and there a few patches of mottled green upon its otherwise grey, and inconspicuous body,

and in such stations the chameleon may be seen for months together. Now if my conjecture be correct this would exactly suit its natural habits, there would be no necessity for its going in search of flowers, for the purpose of capturing insects; the creature in its white disguise would be in itself a sufficient attraction to all night-flying moths or beetles. The strongest argument in my favour however, is that it is entirely contrary to the usual economy of nature, that the bright yellow mouth and throat of the chameleon, which must have been acquired through long ages of natural selection, is merely a purpose less object, a "*lusus naturæ*." It must not however be imagined that I am endeavouring to make out a wondrous tale; I have already stated that I am unable to *prove* that the chameleon actually does practice the habit. I am merely in search of the truth; these remarks may lead others who have time and opportunity to investigate the matter thoroughly. There is one thing that I am bound to state which is somewhat against my arguments, and this is, that the eye of the chameleon is not adapted for night-work. It is an exceedingly small squinting eye, there is no end of "speculation" in the bright twinkle of this little rolling telescope, as it is directed by its owner to various quarters, but it is not a night-seeing eye. This however, would not prevent the creature from receiving insects that came unbidden to its trap." That the chameleon is in the habit of capturing flies and other insects during the day (especially in confinement) I am fully aware, but this is not I imagine the manner in which they obtain their principal supplies of food, otherwise they would be in the habit of frequenting flowering plants, where insects would at all times be more numerous. I must not omit mentioning another peculiar habit pertaining to the chameleon, which is not perhaps generally known. When the creature is seized by an enemy, it utters a low hissing sound like that of an adder. This peculiar snake-like sound is somewhat startling and in itself sufficiently alarming to induce its enemies to drop it at once. A chameleon will, however, if alarmed detach itself from a branch and dropping to the earth will thus baffle its foe, not fearing the consequence of its fall, for in its passage downwards, it has the power of suddenly inflating its body, more or less, according to the height from which

it has precipitated itself. By this ingenious contrivance, the body of the chameleon is rendered light and boyant and the force of its fall is broken, and like an india-rubber ball coming in contact with any hard substance, it would rebound and the creature would receive no injury.

The green chameleon of Griqualand West has its habitat in the large "thorn trees," (*Acacia giraffæ* and *heteracantha*) which abound in that country. As far as my observation goes, with the exception of a few small rotate markings of pale grey, I have never found this species to be of any other colour but green. This chameleon being an inhabitant of the ever-green *acacia* tree, other colours would be of no advantage to it, it has however the power of assuming innumerable shades of green, changing from the deepest hues, to the palest shades, but at the same time never departing from this colour. Like its congener, the mottled grey chameleon of the coast (above mentioned) it has a similar coloured yellow mouth and throat, but in addition to these, the exterior of its throat or neck is also coloured in striated lines of orange and yellow, with a slight admixture of green, adding to it another charm and rendering the neck of this species not unlike the tube of a flower in its colour. It will be remembered that the blossoms of the above-mentioned *acacia* tree are yellow, they are of precisely the same shades as the mouth of the chameleon. These *acacia* trees blossom once a year only, and continue in flower but for a brief space, they are very sweetly scented, and on this account clouds of insects of various kinds frequent them during the season of their blossom, this period however, as I have before stated, is so brief in its continuation that to mimic the colour of the *acacia* blossom would be of infinite service to the chameleon, as it would in all probability be the means of attracting the different species of insects which frequent these trees, and of leading them to the yellow mouth of their enemy, or in other words, to the open sepulchre prepared for their reception. The green chameleon is much larger than the grey mottled species of the coast, but on account of its colours resembling at all times those of the *acacia* trees, and changing like the trees at different seasons of the year to different shades of green, the creature is but rarely seen, and is comparatively safe

from the ravages of its enemies, which consist of hawks, owls, snakes & c.

There is another South African creature with habits very similar to those of the chameleon, ; I refer to a species of tree frog, or more properly speaking "a flower frog" (*Hyperolius*). This small frog is invariably found to be of precisely the same shades of colour as the flowers it inhabits, and it possesses the gift of acquiring different hues, even more rapidly than the chameleon. I have changed this frog from flower to flower and found it follow suit to them all. Its favourite haunt is always beneath the sheltering petals of some large blossom, when it lies in wait for its prey. The mouth of this species is beautifully variegated in soft shades of rose colour, and I am inclined to believe that like the chameleon, this frog makes use of its pretty mouth as a decoy for insects. It would not be difficult while hiding in a flower for this little creature, on the approach of an insect to open its rosy mouth, thereby rendering the blossom more attractive to the unsuspecting moth or butterfly.

The "Flower Spider" also assumes deceptive colours, as it hides beneath the petals of a flower, ready to spring forth upon its prey. This spider will always be found to be of the same colour as the flowers in which it occurs, and in all probability possesses the power of changing its hues, like the above-mentioned creatures. A lizard (*Zonurus* species) not uncommon on the plains of Griqualand West has also the power of altering its colours to suit the locality in which it is found. This lizard which subsists chiefly upon butterflies and locusts, lies in wait for its prey, amongst the low-flowering shrubs that are scattered upon the plains of Griqualand. Its prevailing colour is a pale reddish-brown or grey, according to the colour of the soil in the locality in which it occurs ; it has however large irregular spots or markings, which cover a great portion of its body, gradually diminishing as they approach the extremity of the tail, and these patches vary in colour according to the nature of the flowers and foliage in which the lizard is found. At times they will be of a brilliant red or magenta colour, when the creature will be extremely handsome, or of a fine yellow or green beautifully blending with lighter or darker shades of whatever the predominant colour may

be of the plants they are hiding amongst, or lying in wait for their prey. On my first acquaintance with this lizard I was ignorant of the power it possessed of changing its colour like the chameleon, believing that each individual (like many of our South-African grasshoppers) was coloured to suit the locality it inhabited. Being charmed one day, however, with the fine magenta colours of one of these lizards, I captured it for the purpose of taking its portrait, and not wishing to injure the little fellow I tied it to a flower vase and left it on a table which was covered with a brown cloth. Great was my surprise on returning after a short absence, to find all its beauties flown, all its brilliant colours departed, and a dingy brown usurping their place ; in fact the colour of the old brown table cloth, which the creature had imitated.

The various species of *Mesembryanthemum* which are dispersed over the plains of Griqualand West, form the favourite hunting ground of these lizards, and the wonderful manner in which the colours of the lizards blend and harmonize with the blossoms and foliage of the different species of these plants, is both striking and remarkable. They hunt in pairs, and are fond of flowering plants on account of the butterflies which frequent them. The "painted lady" (*Pyrameis Cardui*) is one of their choice morsels. The lizards are well aware of the peculiar habit of this butterfly, which, if disturbed, will, after flying away, return again and again to the same spot, and they will patiently lie in wait amongst the shrubs and grasses, abiding their time, until the return of the butterfly. In hunting they assist each other.

The gaily painted "China spider" (?) as it is commonly called in South Africa, is another example of deceptive colour. This spider has not, however, the power of changing its hues, as in the above-mentioned cases, and its colours differ from mimicry in not imitating any one particular object, also in not being assumed for purposes of self-preservation. This creature is altogether a fraud, and its gay colours are put on purely with the intention of deceiving and misleading unwary insects.

By the edge of a forest, or among low flowering shrubs in sheltered nooks and corners, the China spider

takes up its abode, carefully building its nest, and spreading its golden meshes over a considerable portion of the low shrubs which it inhabits. The webs of this "Gay deceiver" are sufficiently strong to detain the largest butterfly. In the centre of this net the spider takes up its position; unlike most species of its tribe, there is on its part no hiding or mimicking obscure knots of wood thorns, &c., for the sake of protection; on the contrary the China spider is conspicuous in being gaily painted in a bright yellow ground colour, ornamented by undulating lines and shades, as well as other makings of various brilliant hues. The long spreading limbs of this spider are also ornamentally marked, and coloured, they are not unlike the narrow petals or stamens of certain flowers, and thus arrayed, it is evidently the intention of this creature to be mistaken for a flower in full blossom, thus forming a trap for butterflies, and other nectar-loving insects, a clear case of—

"Will you walk into my parlour?"

"Said the spider to the fly."

On the approach of an insect the China spider will cunningly jerk its net, causing it to vibrate rapidly up and down, rendering its form indistinct, and imitating a flower quivering in the breeze or quietly shaking in the wind, and in this manner completing the delusion and snare, which is prepared for unsuspecting insects. The bright golden appearance of this spider web may be discerned from a considerable distance, but woe betide the misguided creatures led thither by the glare and the stratagem of the China spider.

Mimicry.—I am of opinion that the ocelli or eye-like markings on the wings of certain butterflies and moths, are also somewhat deceptive in their nature, although properly speaking they come under the head of mimicry as they are assumed for the purpose of self-preservation, and are in reality intended to represent *bonâ fide* "eyes" of various kinds imitated for the express purpose of scaring away predaceous creatures. The influence which an eye possesses, when steadily fixed upon any creature is well known; even the lion may be defied by the stern gaze of a brave hunter. Which of us for instance will not quail before the nest of a wasp? when these small creatures turn and face us with their slender antennæ

waving in defiance, and their small fierce wicked eyes fixed upon us as much as to say "come nearer if you dare" and we retire quietly deeming discretion to be the best part of valour. Even on a crab the eye has great power, as you will see by the following anecdote. A friend of mine, Mr. A. Murray, while fishing one day in a small stream perceived a large crab on the opposite bank; it was steadily gazing across the stream on some small fish the angler had taken. After a short interval the crab disappeared, and crossing the river, was seen to be making its way stealthily towards the fish, the moment however that the crab perceived Mr. Murray's eyes fixed upon it, a retreat was at once commenced towards the river, but when his eye was withdrawn, the creature again came forward and this occurred several times; until at length deeming that the crab had earned a fish by its cunning and perseverance, Mr. Murray allowed it to steal one, which it did in all haste, hurrying off to the river with its prize; it was a clever case of theft on the part of the crab, at the same time illustrating the great power which an eye possesses, even over a crustaceous creature.

Now after this long digression, I must return to my subject, my only apology being that I have not wandered beyond the limits of natural history.

In the *Satyridae*, a family of dun or combre coloured butterflies, usually found to inhabit low woodland, or grassy localities, the *ocelli* or ring-like markings, are extremely common, many of them are capital representations of eyes, even the pupil with the light thrown upon it, being well defined by a minute white spot or transparent tissue. Many of these eyes are very keen and wasp-like in their expressions, others are indistinct like the eyes of hawk-flies or spiders. I have, however, never studied them with a view to discovering what eyes they chiefly resemble. The different species of *Satyridae* are not rapid in flight, but weak and uncertain, seldom flying to any great height or distance, but dancing about low shrubs, settling upon the earth, and roosting among old leaves, or half-dried stems and foliage, which resemble their own sombre colours, where consequently they would become very inconspicuous excepting always the peculiar *ocelli* upon their wings, which at all times, if exposed, have a remarkable appearance, and I am inclined

to think that any creature carelessly approaching them without the knowledge of their pertaining to the wings of a butterfly, and mistaking them for the eyes of an enemy lying in wait for its prey, would probably take its departure at once, being scared away from the locality altogether.

Moths with *ocelli* upon their wings are by no means uncommon. It is well known that the ordinary habit of a moth during the day is to retire or hide itself in dark shady places, where often it is scarcely possible to trace the general outline of its form, so closely will it resemble the fallen or dried leaves and branches by which it is usually surrounded. The large staring eye-like rings or *ocelli*, however on the hind wings of many species of large moths, if not concealed by the fore wing, are at all times remarkably conspicuous objects, as they are considerably larger than the *ocelli* on the wings of butterflies, and consequently more calculated to alarm predatory creatures prowling about in search of food, such as birds, toads, spiders, &c., especially if the moth by a sudden movement of the fore wing left the *ocelli* exposed, and apparently fixed upon them, from the indistinct mass of shadowy foliage in which it had concealed itself. A fit abode, not only for moths, but predatory creatures as well; for it will be remembered that such creatures do not only prey upon the insect tribes, but likewise upon each other. The small bird or spider might imagine the *ocelli* on the wings of a moth or butterfly, to be the yellow-ringed eyes of a toad, which in fact some of them greatly resemble, especially the eyes of the large mottled green forest toad, which is commonly found along the coast; the toad would be the enemy of the small bird or spider; and on the other hand, the toad might itself imagine the *ocelli* to be the eyes of a snake, its deadliest foe; in this manner the moth or butterfly would find immunity and the *ocelli* be of the greatest service to it.

A large brown moth (*Cyligramma Latona*) which is widely dispersed in South Africa, has on the centre of its fore wings, very handsome *ocelli* or eye-like markings; there is even much expression in these peculiar eyes, and the light upon them, is well defined by a wedge-shaped stripe passing just above the pupil. If this moth is placed with its head downwards, and examined critically,

with a view to discovering what it resembles, it will readily be admitted to be exceedingly owl-like in its appearance, especially in the expression of its eyes; the small projecting head of the moth would resemble the beak of the bird, and the cream-coloured wavy stripe which passes round the *ocelli*, would form the division between the short feathers which cover the face of an owl, and the longer ones which stand erect, forming the frill, beyond the cream coloured stripe above mentioned. The markings on the wings of the moth are exceedingly feather-like and curious, and the upright bars across the apex of the wing are somewhat ear-like in form, moreover this moth has a peculiar habit of causing its wings to tremble, or vibrate, which at once gives an exceedingly weird and fierce expression to this fanciful resemblance of the face of an owl or bat, which the general form of this handsome moth presents.

I might prolong this paper to a greater length, but perhaps for the time being, it is sufficient for the purposes for which it was written; first, that of proving from ocular demonstration to a certain extent the truth of Mr. Darwin's Theory of "Female Selection," and secondly that of further illustrating the peculiarities to which colour in its manifold services is applied in nature, and the all-important influence which it has on the lives and habits of various creatures.