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ART. I. *On the Psychological Distinctions between Man and all other Animals; and the consequent Diversity of Human Influence over the inferior Ranks of Creation, from any mutual and reciprocal Influence exercised among the Latter.* By EDWARD BLYTH, Esq.

THERE is not, within the wide range of philosophical enquiry, a subject more intensely interesting to all who thirst for knowledge, than the precise nature of that important mental superiority which elevates the human being above the brute, and enables man alone to assume the sway where-soever he plants his dwelling; and to induce changes in the constitution and adaptations of other species, which have no parallel where his interference is unknown.

I am led to offer a few remarks on this subject, by observing continually that the instinctive actions and resource of animals are attributed, most inconsiderately, to the habitual exercise of their reflective faculties; often where it is utterly and manifestly impossible for them to have observed facts whereon to base those inferences, which alone could have led them, by an inductive process, to adopt the course we find them to pursue. I am perfectly aware that the word "instinct," by not a few, is denounced as a mere cloak for ignorance, as a sort of loophole through which to escape from a rational explanation of phenomena; but, with all deference to those who advocate this over and above refined notion, I venture to maintain that it has a very definite signification, to express which no other term could be substituted: it implies an innate knowledge, which is not, like human wisdom, derived exclusively from observation and reflection, and to assign a secondary cause for which is clearly impossible; wherefore it savours rather, I conclude, of sophistry,

to affect to be dissatisfied with any non-misleading expression, which is currently understood to denote it.

Place a juvenile chimpanzee in presence of one of its natural enemies; a python, or one of the larger *Fēles*; and it "instinctively" recoils with dread. But does a human infant evince the like recognition? Here, then, is a fundamental distinction at the outset.

Not only, too, do brute animals (as remarked by White of Selborne) attempt, in their own defence, to use their natural weapons before these are developed, but they intuitively understand the mode of warfare resorted to by their brute opponents. They know, also, where the latter are most vulnerable, and likewise where their concealed weapons lie. Observe the deportment of a rat that is turned into a room with a ferret: see how artfully he guards his neck against the wall, instinctively knowing that there only will his enemy fix.* Notice, on the other hand, the wondrous accuracy with which the *Mustéladæ* constantly wound the jugular vein of any bird or quadruped they attack. Witness a thrush that has captured a wasp, first squeezing out the venom from its abdomen, before it will swallow it. Or see a spider trying to shake off a wasp from its web, and, failing to do so, proceeding to cut it clean away. Can aught analogous be traced in the actions of inexperienced man? Whence, then, the acquired knowledge on which these animals could reason to act thus?

The distinction is, that, whereas the human race is compelled to derive the whole of its information through the medium of the senses, the brute is, on the contrary, supplied with an innate knowledge of whatever properties belong to all the natural objects around, which can in anywise affect its own interests or welfare†; a sort of intimation, by the way, that all the inferior races pertain to some general comprehensive system, all the components of which have a mutual reciprocal bearing, and to which man only does not intuitively conform nor constitute a part of, except in so far as his bodily frame is of necessity subject to the common laws of matter and of organisation.

In every other species, each individual comes into the world replete with "instincts," which require no education

* Even more: he will contrive so to place himself, if practicable, that the ferret's eyes shall be dazzled by the light.

† The indirect effects of human agency on this intuitive knowledge of brutes will be considered presently. In no way is the deterioration more evident, than in domesticated animals poisoning themselves by feeding on that which, in a wild state, they would instinctively reject.

for their developement. A kitten reared by hand, or a bird raised from the nest, have the same language *, the same leading habits, as the rest of their species, but little, if at all, modified by change of circumstances. A kitten watches at a mouse-hole, though it has never seen a mouse; the squirrel proceeds by the easiest possible method to get at the kernel of its first nut, by invariably scraping, with its lower incisors, at the softer end, which it instinctively turns in its fore paws to the proper position; and the wasp, crawling forth from its pupa envelope, immediately commences feeding the neighbouring larvæ. The human infant, too, applies instinctively to the breast, like the young of all other mammalians; but, unlike those, it has to attain all its after-knowledge through the medium of its external senses. It looks to its nurses, and those about it, for information; and these are capable of so communicating their attainments, as very materially to assist the infant learner in its acquisition of knowledge. It is preposterous to assert the contrary, as has been done; or to pretend that it rests on the choice of the infant whether or not it will learn.† Practically, it cannot help doing so; and it is equally monstrous to deny that human beings can so communicate the results of their experience, that, with what in addition is ever accumulating, each generation must necessarily rise in knowledge above the last. Unless the faculties were to be much deteriorated, it could not be otherwise. Who can pretend to deny the excessive influence of every generation upon that which immediately succeeds it; the influence both of precept and example? Imagine it possible for those of the present day to refuse to instruct; and what would then be the consequent condition of their offspring? Apply the same test to any other species of animal; and in what measure would the progeny be affected?

I wish not to defend the untenable doctrine, that the higher groups of animals do not individually profit by ex-

* The reader may probably be disposed to refer this to the structure of the vocal organs. But, admitting to the full extent the reasonableness of this view, it must be borne in mind that the smaller birds have great power of modulation; and it is a certain fact, that, although in most species the song is purely innate, there are many (as the song thrush and nightingale) in which it is, for the most part, acquired; as is proved by the fact of these never warbling their wild notes when reared in confinement, except they have had opportunities of listening to the proper song of their species; which latter, it may be remarked, they imitate much more readily than any other. I do not consider, however, the music of a bird to be so much the language of its species, as those various notes and calls by which different individuals commune together; and these I have never known to vary under any circumstances.

† See *Mag. Nat. Hist.* (old series), vol. ix. p. 612. l. 3., et seq.

perience; nor to deny to them the capability of observation and reflection, whereby to modify, to a considerable extent, their instinctive conduct: neither do I assert that the human race is totally devoid of intuition, when I see the infant take naturally to the breast; when I perceive the force of the maternal attachment, and the ardour of the several passions: which latter, however, are, of course, but incentives to conduct common to both man and animals. In only the human species are the actions resulting from them unguided by intuitive knowledge. All I contend for is, that the ruling principle of human actions is essentially distinct from that which mainly actuates the brute creation, whence the general influence of the two is diverse in kind; and I mistake if I cannot establish the position.

The brief period that elapses before most animals are compelled to perform the part allotted to their species, precludes the possibility of their attaining sufficient information from external sources, and renders, therefore, the possession of a substitute for knowledge so obtained absolutely requisite. We have already seen that such a substitute is not wanting; but that all the knowledge necessary to insure their general welfare is intuitively conferred on the brute creation. Their various actions, in wild nature, are consequently based on this innate knowledge; which, being the same in every individual of the same species, in a natural state (that is, as completely uncontrolled by those peculiar changes of condition which man only, the exception of all other animals, can bring about), superinduces a normal uniformity of habit throughout the members of a species, which is rarely modified to any considerable extent by individual experience. Now, this uniformity is at variance with what reasoning from observation could possibly lead to; and, as it extends even to the resource of creatures of the same species, when driven to emergency, we have herein sufficient intimation that their wiles and stratagems, however consonant with what reasoning from observation might suggest, may nevertheless be purely instinctive, perfectly unalloyed with any wisdom resulting from experience.

To ascend from illustrations the least equivocal, let me here cite the nidification of the feathered tribes. Who, that considers the wonderful fact, that not only genera, but even species, of birds are for the most part distinctly indicated by their nests, can fail to recognise in this the operation of a principle essentially distinct from that which we understand by the word *reason*? which latter, in human beings, can, of course,

be only the result of observation and reflection.* We observe a similar marked uniformity in the fabrics and operations of all animals of identical species (man only exempted), endless examples of which will instantly recur to the reader in the insect tribes; and, if we consider the beaver, and others of the higher grades of animals which join their labours for mutual advantage, or are otherwise remarkable for what has thoughtlessly been deemed *their* ingenuity, the same truth will be found still to hold just as obviously apparent, and forbids us to attribute their proceedings to aught else than the dictates of intuition.

It is most commonly, however, in the resource of brute creatures, the wisdom they display in their expedients, that unreflecting persons fancy they discern the proofs of intellect identical with human; but, even here, this does not necessarily follow; for it is sufficient to refer to the cases which I commenced by detailing, to be assured that Providence has conferred instinctive wiles on animals as a resource against contingencies; the legitimate actions resulting from which according, perhaps, with what reason might dictate in like circumstances, we are therefore apt to conclude must necessarily have been induced by reasoning. To illustrate what I mean, let me adduce the simulation of death practised by so many species, with intent to weaken the instinctive vigilance of their foes or prey. (That another animal, it may be remarked, should suffer itself to be thus duped, is most probably a result of acquired experience.) A cat has been seen to feign death, stretched on a grass-plot, over which swallows were noticed sailing to and fro; and by this ruse to succeed in capturing one which heedlessly approached too near it. The fox has been known to personate a defunct carcass, when surprised in a hen-house; and it has even suffered itself to be carried out by the brush, and thrown on a dung-heap, whereupon it instantly rose and took to its heels, to the astounding dismay of its human dupe. In like manner, this animal has submitted to be carried for more than a mile, swung over the shoulder, with its head hanging; till at length, probably getting a little weary of so uncomfortable a position, or perhaps *reasoning* that its instinctive stratagem had failed in its object, it has very speedily effected its release, by suddenly biting. The same animal has been

* Brutes appear to reason from innate knowledge, and this in proportion to the development of the cerebrum; but the extreme promptitude of their expedients (as will be shown), in cases of emergency, often prohibits us from inferring that these can be the result of aught else than intuitive impulse.

known, when hunted, to crouch exposed upon a rock of nearly its own colour, in the midst of a river, and so to evade detection by its pursuers; and we perpetually hear such cases brought forward as decisive proofs of its extreme sagacity. However, as regards the latter instance, will not a brood of newly hatched partridges instantly cower and squat motionless at sight of a foe*? and, as concerns the former, do we not find that many beetles, though just emerged from the pupa state, will simulate death every bit as cleverly as a fox or corn-crake? Whence it surely follows that there can be no occasion to attribute the act to a reasoning process in the one animal, any more than in the other.

It would be unnecessary to enter here into any details on the obvious correlativeness of the dominant instincts of animals to the mode of life most congenial to their constitution, to remark on the mutual relations of habit and structure, and the exquisite adaptation of structure to locality. Hence, the natural habits of species of necessity bear reference to their indigenous haunts, as manifestly as their structural conformation. Thus, the elephant, which, like the other great *Pachydermata*, affects the vicinity of rivers and marshes, delights to relax its rigid hide in the stream; and afterwards covers it with a thick plastering of mud, probably to retard its too rapid desiccation: the which has been deemed an incontrovertible proof of its reasoning from observation. A young robin, however, the first time that it sees water, will, if it be not too deep, fearlessly plunge in and wash; and a young wren or lark will avail itself of the earliest opportunity to dust its feathers on the ground, the exact purport of which is not yet definitely understood. If, therefore, the latter be thus obviously instinctive, what reason have we to esteem the former otherwise? The uniformity of all these habits and propensities, in creatures of the same species, tends rather to intimate that in neither case are they the result of reasoning.

To infer reflection on the part of brutes, as many have not scrupled to do, as the motive for whatever in human actions could only be the result of reasoning, one would imagine to be too palpable a misapprehension to need serious consideration; yet some writers have gone so far as to attribute forethought to the dormouse, and other species which provide

* I have noticed a remarkable instance of this, on placing down a stuffed polecat before a young brood, tended by a bantam hen. A rail or gallinule will also run towards a bank approximating to their own colour; and, if no hiding-place be discoverable, will insert the head into a crevice, and, remaining motionless, suffer themselves to be taken. Of this I have known many instances.

instinctively against the winter season.* Perhaps it might be deemed a sufficient overthrow to this most shallow notion, to call in mind the migrative impulse; to enquire how the untaught cuckoo (raised by permanently resident foster-parents) could reason that in another clime it should escape the rigours of a season that it had never experienced? But herein we have an additional principle involved, which will require a separate consideration. Proceed we, then, to examine into the presumed sagacity of those provident creatures, as the ant and harvest mouse, that habitually lay up a store for future need, and even provide against all possible injury from germination, by carefully nibbling out the corcule from each grain. Can any thing be more truly wonderful as a matter of instinct? All instincts are, indeed, equally wonderful. But it would certainly be even more extraordinary, if every member of these species were to be alike induced to pursue the same course by a process of reasoning. The following anecdotes will suffice to probe the intellect of these animals:—I have a tame squirrel, which, though regularly fed all its life from day to day, nevertheless displays the intuitive habit of its race, in always hoarding the superfluities of its food. Now, in its mode of effecting this, a superficial observer might fancy that he discerned a fair share of intelligence. Carrying a nut, for instance, in its mouth, it scrapes a hole with its fore paws in the litter at the bottom of its cage; and then, after depositing its burthen, scratches together the hay, or whatever it may be, over it, and pats it down with its paws. Moreover, it never fails to remember the spot, and will occasionally, when not wishing for food, examine the place to ascertain whether it be safe. But mark the sequel. I have repeatedly seen the same animal act precisely thus on the bare carpet, and upon a smooth mahogany table; yes, upon a table I have frequently seen it deposit its nut, give it a few quick pats down, and finally thus leave it wholly unconcealed.† The tits (*Pàri*), also, evince a like propensity of hiding food, one of their many resemblances to the

* See *Mag. Nat. Hist.* (old series), vol. ix. p. 611. l. 15.

† It is no new remark, that rodents are much below the Carnívora in the scale of intelligence; a necessary consequence of their inferiorly developed brain. Yet few animals have more instinctive cunning and resource than the common rat: but this is not intellect, of which it displays scarcely any when brought up tame; a condition which, as will be shown, is sure to call forth the non-instinctive intelligence of animals. Judging from my own observation, I should say that the rat was mentally superior to the house mouse, but inferior to the squirrel; which, in its turn, must yield in intellect to the hare; and, I believe, the comparative structure of their brains will be found in accordance.

Córvidæ; and a tame marsh tit that I once possessed used habitually to drop the remainder of the almond, or piece of suet, that he had been picking, into the water-glass attached to the cage, although he never could thence reobtain it, and though his water was thus daily rendered turbid. I could narrate analogous instances without number.

Thus it plainly appears, that the instinct of each animal is adapted to its proper sphere; for the mode of life it was destined to pursue, and for that only. With this restriction (if such it can be called), it is in each case perfect. The actions of every creature uncontrolled and uninfluenced by man are invariably such as tend to the general welfare of its species; sometimes collectively, however, rather than individually * (whence we hear of what have been termed "mistakes of instinct"). They evince superhuman wisdom, because it is innate, and, therefore, instilled by an all-wise Creator. Indeed, the unpremeditated resource of animals, in cases of emergency, is oftentimes decidedly superior to that of man; and why? Because they need not experience for their guide, but are prompted to act aright by intuition.

In wild nature, this inborn knowledge of brutes thus abundantly sufficing for the attainment of all they require, there is, in consequence, but little to stimulate the exercise of their reflective faculties; and, accordingly, their general agency may be considered as passive, in effect analogous to the operation of the laws of matter. Even the "half-reasoning elephant," in the wild woods, is but a creature of unreflecting impulse, to an extent which wholly dissevers it from all community of mental attribute with the lowest grade of mankind. Witness the subdued tamed animal, which, travelling along its accustomed route, suddenly broke loose from its attendants, affrighted at the near yell of a tiger. At once its former submissiveness was forgotten: it rejoined the wild troops, and was again a free tenant of the jungle. Years rolled on, and it was retaken by the ordinary method. The sight of the stakes never sufficed to awaken its recollection; nor did the mode employed to secure it when entrapped. It was sullen and savage, and acted in nowise differently from its companions. By chance, however, its former keeper was present, who, after a while, recognised the animal. He gave the word of command, and it was instantly submissive; all traces of its wild nature suddenly dissipated; its previous habits were forgotten; it was once more a reclaimed animal,

* As in the contests of animals for the other sex; whence it follows that the breed is chiefly transmitted by the most stout and healthy.

and suffered itself to be led tractably to its place of confinement.* Would a rational being have acted like this elephant?

(To be continued.)

ART. II. *An Estimate of the probable Degrees of Temperature in Europe during the Tertiary Periods; founded upon the Study of Fossil Shells.* By M. G. P. DESHAYES. Read to the French Academy, May 23. 1836.

(From the *Annales des Sciences Naturelles.*)

CONCHOLOGY, studied in a logical manner in its various relations both to zoology and geology, may become a powerful means of bringing this latter science to perfection. It is even allowable, in the present day, to anticipate the time when conchology shall arrive at questions which relate to the general physics of the terrestrial globe, and furnish us with the necessary materials for their solution.

Very numerous observations, repeated upon more than eight thousand species of recent and fossil shells, and these, again, multiplied upon more than sixty thousand individuals of all regions, have enabled me to perceive important consequences with regard to an approximate estimate of the temperatures of the geological periods, concerning which man cannot cite his historical annals, since he then had no existence upon the surface of the earth.

If vegetables, as M. Arago has learnedly established in the *Annuaire du Bureau des Longitudes* for 1834, can give the mean temperatures of the historic period; if the existence in certain places of the vine, the palm, &c., are, to the skilful naturalist, equivalent to thermometrical observations; I think that animals also, and especially those which people the waters of the ocean, may by their presence determine very nearly the mean temperature of the place they inhabit.

All marine animals are not adapted to indicate temperature with the same precision: we must choose those which, possessed of but small powers of motion, cannot withdraw themselves periodically from the changes of the seasons, and are obliged to sustain all their influence in the places which have given them birth. The greatest number of the Mollúsca and Zoophytes answer to this description.

To arrive at a knowledge of the temperatures of periods antecedent to human existence, there is a chain of reasoning to follow. We must first seek a starting point in existing na-

* I shall have occasion to revert to this presently.

bably, may see them again and again. But there is one purpose for which the British oak stands alone, unrivalled in the world, the purpose of ship-building. As adapted to this, it has been the boast of our country, and the terror of our foes; lauded in lyric strains, from the ingle side of the humble mud cabin to the princely halls of the noble; and well indeed is it merited.

“Britannia needs no bulwarks,
No castles on the steep;
Her march is o’er the mountain waves,
Her home is on the deep.”

The bark of the oak is of very great value as an article of commerce, from the astringent principle called *tannin*, which it contains in much larger proportion than the bark of any other tree. This ingredient, as is well known, it is, with which the raw hide is saturated in the process of tanning, preserved, and fitted for sale and use. The value of the bark, for the purposes of trade, depends very much on the age; as that which is peeled from the full-grown and healthy tree contains much more of the requisite principle, than either the sapling, or that which is old, gnarled, or decaying. The bark on the healthy growing tree, although rough, rugous, and seamed, is by no means unsightly to look upon; but has a fitness and adaptation, as the external covering of the majestic bulk which it envelopes. And, oh, what a grapple it affords for the ivy, with its smooth, bright, and glinting leaves (for ever green), to creep up the trunk, and enring itself round the barky fingers, and, grateful for the protection it receives, deck it in garlands of beauty in the last stage of decay!

ART. IV. *On the Psychological Distinctions between Man and all other Animals; and the consequent Diversity of Human Influence over the inferior Ranks of Creation, from any mutual and reciprocal Influence exercised among the Latter.* By EDWARD BLYTH, Esq.

(Continued from p. 9.)

MAN only, by the habitual exercise of his reasoning powers, appears to be competent to trace effects to their remote causes; and is thereby enabled to recognise the existence of abstract laws, by assuming the guidance of which he can intentionally modify their operation, or, from observation, convert them to a means of accomplishing his various ends. It is thus he wields the principle of gravitation; and it is thus, from studying the inherent propensities

and consequent habits of other animals, that, by judicious management, he contrives to subdue their instincts (as in the case of the elephant just mentioned), or to direct their force towards effecting other purposes than those for which they were more legitimately designed. But a more remarkable sequence of human interference is, that, by removing animals from their proper place in nature, and training them to novel modes of life, wherein the field for the exercise of their original instincts becomes much limited, their faculties of observation and reflection are, in consequence, brought more into play, in proportion as the former are rendered inefficient; till, at length, experience not unfrequently supersedes innate impulse as the main spring of their actions; more especially where they have become attached to a human master, and pass much of their time in his society. Yet even here the difference between man and brute is still manifest, in the transmission of acquired knowledge by generation, in the offspring inheriting as innate instincts the experience of their parents*; so that the tendency of brutes is ever to become slaves to a certain amount of intuition, rather than beings dependent on their own intelligence.

And here we recognise a fundamental principle of domestication, which is only gradually induced to any extent through a series of generations. Thus the elephant, though tamed, is not domesticated, for every individual is separately captured in a wild state; and we have seen that, when one of these returns to its proper haunts, its natural instincts having been only for a time subdued and rendered subservient (not eradicated), these have again become the incentives to its conduct, to the exclusion of those reasoning faculties which had only been excited into action under circumstances adverse to the efficient operation of the former. Far otherwise is what we observe in animals truly domesticated: witness the opposite conduct of even the newly hatched progeny of a wild and domestic duck, though

* Propensities are similarly transmitted in the human race, but certainly not the knowledge of how these are to be gratified. It is true, however, that our observation in these matters is too much confined to cultivated, domesticated man, who is, consequently, farthest removed from the brute creation. The Australian savages are known to have a great *penchant* for snails and caterpillars; and I have somewhere read of one of these who had been brought up in a town, and carefully kept away from all communion with others of his race, who, nevertheless, exhibited the same fondness for these dainties, despite the abhorrence with which all his companions regarded them. His *gout* for them must thus unquestionably have been hereditary; though it is probable he may have learned the fact of their being eaten by his race, which, likely enough, induced him to taste and try them.

incubated by the same bird. But here a question arises, that, as numerous instincts in domestic animals, which are now hereditary, are known to have been originally habits superinduced by man's agency, to what extent may not all the innate propensities and consequent habits of animals have originated in the acquired experience of their predecessors?

As with all other subjects, we must trace the series upward from its more simple phases. In the insect world, we discern the most complicated instincts; modes of procedure of which the consummate wisdom excites our admiration and amazement, and bearing reference to a future generation, in beings which are but creatures of an hour. Can it be supposed possible that the progenitors of these derived their habits from acquired experience, and transmitted them as innate instincts to their posterity? Here we must ascend to a higher source, which, being admitted, the marked uniformity, also, of the instinctive habits of all wild animals, before commented on, warrant us in concluding that these were from the first imprinted in their constitution, and may, therefore, be legitimately esteemed as forming part of the specific character.*

The tendency of human influence is every where to destroy whatever conduces not to man's enjoyment, as superfluous, and only cumbering the ground; but to secure, by every means the reasoning faculties can suggest, a due continuance and never-failing supply of all that tends to the gratification of our species. Brutes, on the contrary, evince indifference to whatever does not immediately concern them; and although, practically, their influence upon their prey is for the most part decidedly conservative, yet they individually continue to destroy without reflection, and endeavour not, by any forbearance, or plan resulting from reasoning, to insure the perpetuity of their provision. That the squirrel or jay should instinctively plant acorns is, of course, nothing whatever to the purpose: we have already tested the sagacity of the former animal; and we know that the latter, removed from its proper office in wild nature, will bury a bit of glass or clipping of tin as carefully as it does a seed.

It may be worth while to devote a few remarks to the consideration of the unintentional agency of brutes, towards not only preventing the over-increase of their prey, which would only lead to too much consumption of the food of the latter, and so bring about famine and consequent degeneration from

* The reader will observe that the doctrine here controverted is but an application of the exploded hypothesis of M. Lamarck.

insufficiency of nutriment, but likewise towards preserving the typical character of their prey in a more direct manner, by removing all that deviate from their normal or healthy condition, or which occur away from their proper and suitable locality, rather than those engaged in performing the office for which Providence designed them. In illustration, it will be sufficient to call attention to the principle on which many birds of prey are enabled to discern their quarry. When the tyrant of the air appears on wing, his dreaded form is instantly recognised by all whose ranks are thinned for his subsistence; and instinct prompts them to crouch motionless, like a portion of the surface, the tint of which all animals that inhabit open places ever resemble; so that he passes over, and fails to discriminate them, and seeks perchance in vain for a meal in the very midst of abundance; but, should there happen to be an individual incapacitated by debility or sickness to maintain its wonted vigilance, or should its colours not accord sufficiently with that of the surface, as in the case of a variety, or of an animal pertaining to other and diverse haunts, that creature becomes, in consequence, a marked victim, and is sacrificed to appease the appetite of the destroyer: so profoundly wise are even the minor workings of the grand system; and thus do we perceive one of an endless multiplicity of causes which alike tend to limit the geographical range of species, and to maintain their pristine characters without blemish or decay to their remotest posterity.

Thus it is that, however great may be the tendency of varieties to perpetuate themselves by generation, we do not find that they can maintain themselves in wild nature; nor do the causes which induce variation, beyond the occasional and very rare occurrence of an albino, prevail in those natural haunts of species to which their structural adaptations bind them. We have already noticed the anomalous influence of human interference in altering the innate instincts of the lower animals, thereby unfitting them to pursue the mode of life followed by their wild progenitors. It would be needless to amplify on the concomitant effects produced by domestication on the changes in the physical constitution and adaptations of the corporeal frame of animals, which oftentimes render them dependent on human assistance for continuous support, in the degree of their domesticity. Such changes are equally imposed on the vegetable world by cultivation; and they every where mark the progress of man, and exhibit in indisputable characters the diversity of his influence over the inferior ranks of creation, from any mutual and reciprocal influence observable among these latter.

I may cursorily allude to hybridism also, as a phenomenon,

so far as can yet be shown, at least in animals, where fecundation cannot happen fortuitously, in every instance referable to human interference. As yet, I have failed to meet with a single satisfactory instance, wherein commixture of species could not be directly traced to man's agency, in superimposing a change on the constitution of the female parent. This is a subject of exceeding interest; and I am glad to avail myself of every occasion to endeavour to incite some to undertake its further investigation. There can be little doubt that certain of our domestic races, as the common fowl, are derived from a plurality of species, which, however, do not blend in wild nature; so that their union (assuming the hypothesis to be correct) may here, at least, be fairly ascribed to domestication. Still, when we consider that separate species (i. e. races not descended from a common stock) exhibit, as is well known, every grade of approximation, from obviously distinct to doubtfully identical, there appears, I think, sufficient reason at least to suspect that circumstances may sometimes combine to induce those nearest allied to commingle. That the mixed progeny, too, would in some instances be mutually fertile, I know in the case of the hybrid offspring of the *A'user cygnoides*, and the common goose; but, in birds generally, the converse nevertheless obtains, as is particularly instanced, I have learned, by the hybrid *Fringillidæ* reared in confinement; and also the mule betwixt the common fowl and pheasant; the males of all which appear (from a variety of instances I have been fortunate in collecting) to have been incompetent to fecundate the eggs produced.* Perhaps the superior size, too, of these hybrids generally to that of either of their parent species may be explicable on the principle which occasions the large growth of capons. However, none of the species here alluded to are by any means so closely allied as many that are known to exist; and, therefore, as in the vegetable world the degree of fertility in hybrids is in the ratio of that of affinity between the parents, those derived from very approximate species being, apparently, quite as prolific as the pure race, analogy would lead us to infer that the same law holds in the animal creation. At present, we have no proof of it: and I may conclude the subject by observing that the cases of supposed union (apart from human influence) betwixt the carrion and hooded crows, so often insisted on, are inconclusive, inasmuch as it does not appear that the individuals were ever examined and compared, although black varieties of *Córvus Córnix* have been several times known to occur. Indeed, I have myself examined a female specimen,

* Since writing this, I have been informed of a solitary instance of a male goldfinch mule producing offspring with a hen canary.

on which were several black feathers intermingled with the ordinary ash colour on the back.*

The agency of the human race has been likened to that of brutes, in the particular that, as man effects the destruction of one species, he necessarily advances the interests of another.† How far he may permanently benefit the latter, might be discussed on principles that have been already expounded. More able writers, however, have put the enquiry whether man, by taking certain plants, for instance, under his protection, and greatly extending their natural range by cultivation, does not thereby unintentionally promote the welfare of the various species which subsist upon them. But, will it be argued that man, by vastly increasing the breed of sheep, is unconsciously labouring for the advantage of the wolves? As little can it be concluded, regarding the human race as progressive (in which it differs from all other species), that any race hostile to man's interests can be permanently benefited by his agency. The question, in short, resolves itself into one of time.

It has already been intimated, that man is the only species that habitually destroys for other purposes than those of food. This leads me to a few remarks on the extinction of species. Without alluding, however, to the more direct agency of the human race, towards accomplishing the destruction of every terrene species which conduces not in some way to our enjoyment, we will merely consider the natural causes which suffice to extirpate all other races, but are inadequate to effect the extinction of the human species. We have already seen that brute animals, in a state of nature, are merely beings of locality, whose agency tends to perpetuate the surrounding system of which they are members. It tends to do so, but is insufficient to effect this permanently; because, in the immensity of time important changes are brought about in every locality, by causes ever in operation, to which the faculties of the inferior animals are blind. They must, therefore, perish with their locality, unless distributed beyond the influence of the change; for their adaptations unfit them to contend for existence with the more legitimate habitants of diverse haunts, in proportion as they were suited to their former abode: and it

* A friend informs me that he has repeatedly noticed, in Aberdeenshire, the pairing of a black crow with an ordinary individual of *C. Cornix*; and he further assures me that, to judge from its most commonly sitting, the former was in every instance the female bird. (Are not the black individuals noticed in Ireland, and assumed to be *C. Corone*, in reality varieties of *C. Cornix*?) It may be added, that the circumstances occasioning the alleged union, stated by Temminck, betwixt the *Motacilla lugubris* and *M. alba* require much additional investigation.

† Vide IX. p. 613.

must be necessary for creatures of instinct to be thus expressly organised in relation to their specific haunts, even to all the minutiae we perceive, in order to enable them to perform efficiently their destined office; which exquisite adaptation, however, cannot but of course disqualify them for maintaining their existence elsewhere. In man only we discover none of these partial adaptations, further than that he is intended to exist upon the ground; and the human race alone, in opposition to all other animals, takes cognisance of the progressive changes adverted to, and, from reflection, intentionally opposes obstacles to their course, or systematically endeavours to divert their energy. Man's agency, indeed, tends everywhere to alter, rather than to preserve, the indigenous features of a country; those features which natural causes combine to produce: in short, he strives against the united efforts of all other agents, insomuch that, wherever he appears, with his faculties at all developed, the aspect of the surface becomes changed: forests yield to his persevering labours; the marshes are drained, and converted into fertile lands; the very climate, accordingly, changes under his influence, which every way inclines to extirpate the indigenous products of the soil, or to reduce them, by domestication, to a condition subservient to the promotion of human interests. Does not, then, all this intimate that, even as a mundane being, man is no component of that reciprocal system to which all other species appertain? a system which for countless epochs prevailed ere the human race was summoned into being. His anomalous interference, therefore (for this word most aptly expresses the bearings of human influence upon that system), essentially differing from the uniform agency of all the rest, in not conducing to the *general* welfare, is thus shown to be in no way requisite to fill a gap in the vast system alluded to. All rather tends alike to indicate him a being of diverse, of higher destiny; designed, in the course of time, with the aid of physical causes ever in operation, and the presumed cessation of the creative energy, to revolutionise the entire surface of our planet. I will presently recur to this subject as regards marine productions. It is sufficiently evident, that, as the human species is bound to no description of locality, but alike inhabits the mountain and the plain, and is, by self-contrivance, enabled to endure the fervid heats of tropical climes, equally with the withering blasts of a polar winter, it is consequently proof against the undermining effects of those surface changes which suffice to effect the extermination of every other.* Its future removal, then, from this

* There is no occasion, here, to follow out all the causes which combine to bring about the extirpation of species; but I will mention one which

scene of existence, whenever that shall happen, will probably be brought about on another principle: how, it would be most

appears not to have been duly considered by those who have written on the subject. We have every reason to believe that the original germ of an animal may be developed into either male or female; and it is certain, that external circumstances exercise a very considerable influence in determining the sex of the future being. Now, the results of experiments instituted on sheep by the Agricultural Society of Séverac fully warrant the conclusion, that, where species exist under circumstances favourable for their increase, a greater number of that sex is produced, which, in polygamous animals is most effectual for their multiplication; whereas the contrary obtains, probably, in proportion to the difficulty of obtaining a livelihood. The relative age and constitutional vigour of the parents is likewise an important element in this problem; and, combined with the former, will enable us to calculate an average with tolerable precision. I have collected some very curious facts bearing upon this subject, some of which are extremely difficult of explanation. Mr. Knapp, in his *Journal of a Naturalist*, has the following, which is worthy of close attention:—"The most remarkable instance," he observes, of variation in the relative proportion of the sexes, "that I remember of late, happened in 1825. How far it extended I do not know; but, for many miles round us, we had in that year scarcely any female calves born. Dairies of forty or fifty cows produced not more than five or six; those of inferior numbers in the same proportion; and the price of female calves for rearing was greatly augmented. In a wild state," he justly observes, "an event like this would have considerable influence upon the usual product of some future herd." (Note to p. 138.) This occurred in Gloucestershire. The character of the preceding season is not stated; but, most probably, it was one of scarcity to the parent animals. The following list exhibits the proportion of the sexes in the annual produce of generally six cows, of the Ayrshire breed (four being the same individuals throughout, the remainder their produce) kept in a park in this neighbourhood. It commences with the year in which the present superintendent took charge of the stock; and there is no question but that, if the stock-books of other persons who have the care of cattle were to be duly looked over for a series of years, many similar and equally interesting facts would be brought to light:—

In 1826, from 6 cows, were born	6	male calves,	0	females.
1827	- 6	- - -	6	- - - 0
1828	- 6	- - -	6	- - - 0
1829	- 5	- - -	4	- - - 1
1830	- 6	- - -	3	- - - 3
1831	- 5	- - -	0	- - - 5
1832	- 5	- - -	0	- - - 5
1833	- 6	- - -	0	- - - 6
1834	- 6	- - -	0	- - - 6
1835	- 6	- - -	3	- - - 3
1836	- 6	- - -	2	- - - 4

Thus it appears that, for the first four years, but one female calf was produced out of twenty-three births; that in the succeeding year the proportions were equal; that in the next four years, out of twenty-two births, there was not a single male; and that in the following year, again, the sexes were in like proportions. The present season, alone, has formed an exception to this remarkable regularity, which I have in vain endeavoured to solve by making every enquiry concerning the male parents. There is some reason, also, to suspect that the same phenomenon will be found to obtain

useless to enquire. There is no reason, however, hence to anticipate that supernatural means must *necessarily* be resorted to, as a malignant disease might suffice to level all ranks in the dust. It is enough for my present purpose, to indicate in this the diversity of the human from all other species.

Some have argued the connexion of man with the reciprocal system to which the inferior animals pertain, because, forsooth, he sometimes is annoyed by parasites. Without dwelling upon this topic, I may be allowed to say that it remains to be shown that any are peculiar to the human species. The certain fact, that different races of mankind are infested by distinct species, rather points to the conclusion, that, as the bed cimex can subsist and thrive away from human habitations, so also may even those species which abide on the person.*

(To be continued.)

ART. V. *On the Longevity of the Yew, as ascertained from actual Sections of its Trunk; and on the Origin of its frequent Occurrence in Churchyards.* By J. E. BOWMAN, Esq., F.L.S.

(Continued from p. 35.)

MANY reasons have been assigned for the frequent occurrence of the yew in our churchyards: to me, it always seemed most natural and simple to believe that, being indisputably indigenous, and, from its perennial verdure †, its longevity, and

among wild birds. The Hon. and Rev. W. Herbert remarks, incidentally, that he has found in the nests of whitethroats (*Curruca cinerea*) a great predominance of males, and the contrary in those of whinchats and stonechats; which latter I have also noticed myself; but cannot say that I have remarked it in a sufficient number of instances, nor over a sufficient extent of ground, nor for a sufficiently protracted period, to be enabled to deduce any general or satisfactory conclusion: the fact can, in most instances, be only ascertained (without slaughtering a great number) by raising them to maturity in confinement. But the young stonechat may be readily distinguished even in the nest: the immature males having a large pure white spot above their wings, which in the females is pale brown. The subject is extremely worthy of further investigation, and it is needless to point out its important bearings in wild nature.

* It is amusing to observe how gravely the loss of these parasites is commented on in Vol. IX. p. 612. as a necessary consequence of the extermination of human beings. Let us suppose they were to perish; what then? Have not myriads upon myriads of every class of beings become extinct, as species, without affecting at all the workings of the mighty system? Why, then, should the *dreaded* loss of a few parasites, the sphere of whose influence cannot be supposed to extend beyond that of the species to which their adaptations link them?

† Its very name seems to be derived from the Celtic, *iw*, signifying *verdure*.

are beneath the notice of men of science, whom I would gladly see discarding the superfluous English names altogether. Some concession must, however, be made to the vulgar cry; for, if science be not put in a "popular" form, the labours of its real cultivators will not be repaid. If, then, English terms must be superadded to the Latin, I would suggest that the old terms, such as warbler, finch, &c., be as much as possible retained, and that, where a genus has no peculiar English name already, the Latin one should be used in preference to coining a new term. Thus, I would rather say, "hedge accentor, fire-crested regulus, bearded calamophilus, yellow budytes, &c., than burden science with such clumsy appellations as dunnoek, kinglet, longtail, and willet (*alias* oatear); to say nothing of abern, surn, popin, sprigtail, and the like.

But I would strongly protest against extending the system of English nomenclature beyond the English fauna. What possible benefit can accrue from coining new substantives, of Saxon derivation, for the countless genera of exotic zoology? I trust we may never see the forms of New Holland or of South America burdened with such uncouth appellations as have been invented for the birds of England.

ART. VI. *On the Psychological Distinctions between Man and all other Animals; and the consequent Diversity of Human Influence over the inferior Ranks of Creation, from any mutual and reciprocal Influence exercised among the Latter.* By EDWARD BLYTH, Esq.

(Concluded from p. 85.)

I WILL now proceed to notice, and follow to its bearings, that mysterious impulse (if possible, even more incomprehensible than ordinary instinct) which guides a migrant animal to its destined haven; which also propels a bee towards its hive, and a pigeon homeward from one extremity of Europe to another; a principle, as will be shown, not wholly absent from the human constitution. The migrative restlessness displayed so forcibly by birds of passage, even when raised in confinement, and plentifully supplied with the nourishment they have been accustomed to (thus showing that insufficiency of food is not the predisposing cause, as is also intimated by the early departure of certain species from their summer haunts, after performing the duties of the season), is merely on a par with all other instinctive manifestations: and I may cursorily remark that, from much careful and attentive observation, I have determined, at least

to my own satisfaction, that, as a general rule, it is in autumn mainly influenced by decline of temperature, and in spring by the breeding stimulus: the period of the incidence of which latter (though, undoubtedly, somewhat affected by temperature) is primarily dependent on specific peculiarity, and, secondarily, on constitutional vigour.* It is not the erratic impulse, however, so much as the guiding principle, that we have here to do with; that wonderful, most inexplicable principle, on which a diurnal migratory bird is not only, and by

* The direct influence of decline of temperature in prompting the equatorial movements of the feathered race, may be observed in the fluctuations in intensity of the erratic impulse, throughout the greater part of winter, exhibited by migrant birds in a state of confinement; such variations being constantly found to accord with thermometrical changes. It may be added, that the degree of temperature which incites them to migrate varies considerably in different species; and in some instances, also, it must not be concealed, that the impulse to quit the breeding station is entirely independent of decrease of temperature; as is exemplified by the swift and adult cuckoo retiring southward at the hottest period of the year: so powerful, too, is this impetus in the first-named species, and others of the *Hirundinidæ*, that these have been many times known to leave a brood of half-fledged nestlings to perish. As regards the polar movement, the proximate cause will appear on consideration of the following facts:—It is known that, in the feathered race, the enlargement of particular organs in spring superinduces, in most groups, some considerable change in the external aspect; frequently altering, for instance, the colour of the bill, and occasioning (in single-mouling species) the rapid disappearance of those deciduous edgings to the feathers, which oftentimes conceal, for a while, the brighter tints of summer; which latter, also, are, in addition, commonly more or less heightened at this period. Now, all these changes are observable in two nearly allied species, the chaffinch and bramble finch, both of which pass the winter in the same localities; but it uniformly happens that the vernal change takes place in the former species several weeks earlier than in the latter. In the beginning of March, every chaffinch is found to exhibit its complete summer aspect; whereas, late in April, I have watched, with a glass, a flock of bramble finches feeding on elm blossoms, in none of which had the bill acquired its blue colour; coincident with which change this species always leaves the country. The fact is equally noticeable when they are kept in confinement. Fieldfares and redwings, also, linger in our fields till long after their resident congeners have been engaged in breeding; and it is found, on dissecting these, at this period, that they are comparatively very backward in their seasonal developements, the attainment of which immediately prompts the migrative impulse. Of course, the breeding station is the proper home of a species, and thereto do all its adaptations directly refer; and thus we find that even the genial influence of a more equatorial abode fails to excite the breeding energies of migrant birds, until such time as their distant summer haunts become fitted for their reception. To conclude this subject, it may be added, that the migratory restlessness in caged birds does not dissipate in spring, at the time of the reappearance of their wild brethren, but is occasionally evinced throughout the summer, till its cessation follows the decrease of those organs which had all along stimulated its manifestation; a constitutional change which likewise puts a stop to song, and brings about the autumnal renovation of plumage.

night, enabled to soar for even thousands of miles, over seas and continents, surmounting every obstacle, even lofty mountain ridges, in its course, impelled always in one unvarying direction, till it arrives at the proper winter quarters of its species; but, at the ensuing season, is also led back to its former abode, to the precise locality that it had previously set out from, having been known even to return to confinement. I conceive it unnecessary to detail observed instances of this astonishing fact, because, in the feathered race, it is well known to every student of natural history. It will be enough to mention, that I have an instance, on indisputable authority, of a lame redstart returning regularly for sixteen summers to the same garden.

Among mammalians, numerous instances have been recorded, resting on unexceptionable testimony, of animals returning straight to their accustomed haunts, over pastures and across streams they could not possibly have ever traversed before, and by a nearer and very different route from that by which they had been driven or carried. To these I will add the following, which occurred to the personal knowledge of my informant. A cat, from the centre of an intricate and populous seaport town*, was shipped on board of a vessel bound for the Brazils; and, after performing the voyage to and fro, contrived to escape, on returning to its native port, and found its way, through several streets, to its former domicile.

Mr. Jesse, in the third series of his *Gleanings*, has related a like anecdote of a reptile. Of a number of turtles, captured on Ascension Island, chanced to be an individual which, to use the technical phrase, had lost one of its *fins*. It was marked in the ordinary manner on the under shell, which marks are well known to be indelible. The vessel, on arriving in the Channel, was long detained by contrary winds, during which time a great mortality took place among the turtles; these dying one after another so fast, that it was at length resolved to cast what few remained of them, including the lame one, into the sea, to give them, as was said, a chance for their lives. Three years afterwards, this same turtle, with its three fins, and the marks of the hot iron beneath, was found again upon Ascension Island.

It is sufficient to refer to the results of numerous experiments which have been instituted on the fry of the *Salmonidæ*, to be convinced of the prevalence of the same surprising impulse also among fishes.

* St. Helier's, Jersey.

In the invertebrate animals, we have, apparently, proof of the existence of this principle, in the fact of the great distances to which many hymenopterous insects are known to range for food. A decisive experiment, however, is still needed to render the inference conclusive; and I venture to suggest, to whoever may have the opportunity and inclination, that of marking a number of bees from the same hive, and suffering them to fly from, say, a hundred miles' distance. There is hardly a doubt that they would be found to regain their abode; and it would be interesting to ascertain the time they would require to do so.

Some migratory birds are observed to resort annually to the exact same winter quarters; for illustrative proof of which, refer to Bewick's description of the woodcock. Other species would seem to wander through the winter, of which the waxwing may be cited as an example. They all, however, appear to return to their former breeding haunts, where dispersion is effected, in those species which do not nidificate in society, by the older individuals (which are always the first to return) driving away their young of a former year; which latter, however, do not commonly retire farther than they can help, as I have had occasion to notice in some instances.

The bearings of this law on the geographical distribution of species do not appear to have been sufficiently taken into consideration. For instance, Mr. Selby remarks, as an extraordinary circumstance, tending to show within what abrupt boundaries the natural range of particular species is confined, the abundance of the white stork in Holland, and its excessive rarity on the opposite English coast. In Holland, be it remembered, it meets with encouragement; whereas, in this country, no sooner does an individual make its appearance, than it is immediately shot down. Once allowed to settle, it would doubtless soon colonise our fenny counties.

Some years ago, a considerable flock of spoonbills settled in a part of Aberdeenshire; whereupon the whole neighbourhood uprose in arms, till every bird of them was killed. Here, probably, we have an instance of another phenomenon in the animal world, which should not be overlooked in this treatise. When a species increases numerically in any habitat beyond what the latter is adequate to sustain (a circumstance which, in the higher groups, can hardly happen, except in those of social habits), either their ranks are mysteriously thinned by what is termed *epizooty*, or an erratic impulse (unrestrained by the localising principle we have been considering) instinctively prompts a portion of them to seek fresh quarters. This is observed more in mammalians than in

birds, but is particularly noticeable in the insect tribes; various species of which, though solitary in their usual habit, have been known to assemble at times in prodigious multitudes, prompted by a general impulse, which, however, appears to be less conferred with intent to extend the previous range of their distribution, than to preserve the species within due bounds in its native locality; for the numerous dangers with which these wanderers are necessarily every where beset absolutely appear to suffice, in most instances, to prevent their permanently establishing themselves in other places; a remarkable fact, notorious to all who have attended to the subject. So many causes are there in operation which combine to circumscribe the geographic range of species.

A variety of important considerations here crowd upon the mind; foremost of which is the enquiry, that, as man, by removing species from their appropriate haunts, superinduces changes on their physical constitution and adaptations, to what extent may not the same take place in wild nature, so that, in a few generations, distinctive characters may be acquired, such as are recognised as indicative of specific diversity? It is a positive fact, for example, that the nestling plumage of larks, hatched in a red gravelly locality, is of a paler and more rufous tint than in those bred upon a dark soil.* May not, then, a large proportion of what are considered species have descended from a common parentage?

I would briefly despatch this interrogatory, as abler writers have often taken the subject in hand. It is, moreover, foreign to the professed object of this paper. There are many phenomena which tend, in no small degree, to favour the supposition, and none more so than what I have termed the localising principle, which must occasion, to a great extent, what is called "breeding in and in," and, therefore, the transmission of individual peculiarities. We have seen, however, the extreme difficulties which most species have

* Such is, at least, the uniform result of my experience; though I could never discern a corresponding difference in the adults. This curious fact was first intimated to me by a person who had a number of young larks for sale, among which were two nests of very rufous birds, and three of a much darker colour: the former, he assured me, were found in a gravelly situation; the others on a dark soil. Some cases I have since noticed have verified the observation. On another occasion, I may probably bring together a number of analogous facts, in the form of a paper; but it would occupy too much space to do so here. It may, however, be added, that the agency of many species confers a reciprocity of adaptation; thus, the mode in which sheep graze has a decided tendency to reduce a country to that bare and bleak state which suits best with their healthy condition. Hence would accrue a necessary return of varieties to their normal characters.

to encounter when occurring beyond the sphere of their adaptations; difficulties which must require human aid, in general, to render surmountable. But, without re-entering into the details of this subject, it will be sufficiently clear to all who consider the matter, that, were this self-adapting system to prevail to any extent, we should in vain seek for those constant and invariable distinctions which are found to obtain. Instead of a species becoming gradually less numerous where its haunts grade imperceptibly away, we should discover a corresponding gradation in its adaptations; and, as the most dissimilar varieties of one species (those of the dog, for instance) propagate as readily together as individuals of the same variety, producing offspring of blended characters*, so much so, that human interference is requisite to preserve a breed unadulterated, the unbending permanency of the distinguishing characteristics of all wild animals becomes of double import. Moreover, the characters in which these differ are of a diverse kind from those observable in any but the most distant of mere varieties; for they rarely agree in the relative proportions of parts, which are the most fixed of all specific distinctions. It is, therefore, advisedly that we are enabled to state that the raven of the Cape is distinct from the raven of South America; that both are again different from that of the South Sea Islands and from that of Europe. The common jay is diffused over a wide range of latitude, but is the same in Italy as in Sweden: this would not be were it affected by locality or climate; the very trivial distinctions, therefore, which characterise it apart from that of Japan, and from that of Asia Minor, we are warranted in esteeming of specific value. Until the jays of intervening localities present inosculant characters†, or until precisely analogous diversities are, in wild nature, observed to be produced by locality or climate, the above conclusion is as irresistible as it is incontrovertible.

When, too, we perceive that species so very general in their adaptations as the typical *Córvidæ* are limited in their range, it behoves us to be most cautious in assuming the specific identity of the most similar animals from widely separated localities. Let it be remembered that no reason can be assigned why those originally distinct should not

* Individuals of very diverse breeds mostly do so: where the parents more nearly approximate, the young often entirely resemble one or the other.

† Here the very remarkable fact, however, is not to be overlooked, that the solitary African species of trogon presents a combination of those colours and markings which uniformly distinguish apart its numerous congeners in the Oriental isles from those of South America.

exactly resemble. Human agency apart, I do not think there is a single species which even approximates to universal distribution. Of course, we can only judge from probability and analogy. Great locomotive power, even the maximum, by no means necessarily implies an extensive distribution: witness the common swift, and its American analogue*, neither of which have been known to straggle across the Atlantic, like many birds of far less power of wing, but are bound by the localising principle. It is true, this principle can apply only to such species as are locomotive; but it is equally true, that other causes analogously restrain the undue diffusion of those which are individually fixed. Thus we hear of the agency of sea currents in transporting seeds, which must abundantly be carried out into the ocean by the action of rivers; but it appears not to have been remembered that steeping in sea water destroys the vital principle; that moisture induces germination, which, once excited, can only be checked by the final cessation of the vital functions.† Analogy would lead us to infer that such antagonist principles obtain throughout creation, whether or not human observation may have yet detected their existence. It would be easy to point out additional hindrances to the more extensive spread of species of fixed habit, by treating on the fraction which are allowed to attain maturity, even in their normal habitat, of the multitude of germs which are annually produced; and in what ratio the causes which prevent the numerical increase of a species in its indigenous locality would act where its adaptations are not in strict accordance will sufficiently appear, on considering the exquisite perfection of those of the races with which it would have to contend. If there is a probability that any species has become naturally of general distribution, it is in the case of two lepidopterous insects, *Acherontia Atropos* and *Cynthia cardui*, both of which are of peculiarly erratic habits; and it is said that these are found throughout the world: yet the differences which exist in specimens from diverse localities are hard to reconcile with specific variation, at least to judge from what tropical specimens I have seen of the former; and an eminent entomological friend has remarked to me, in conversation, that he is equally sceptical, judging from his

* *Chætura pelásgica*.

† This observation is, however, intended to apply merely to those of inland plants; for some maritime species, as the *Pandaneæ* and cocoa palms, have their seeds encased in sea-proof coverings, especially adapted for floating uninjured on the waves: the restricted distribution of such vegetables is provided for on another principle.

own experience, of many *Cynthiae* assumed to be *cárdui*. It will be borne in mind, however, that man has unintentionally carried with him the seeds of the very prolific plants on which the painted-lady butterfly feeds, wherever he has introduced the *Cereàlia*.

But to return to that mysterious guiding principle, so important, as we have seen, in regulating the distribution of species; and which I have asserted to be not wholly absent from the human constitution. It has been stated of many savages, and more particularly of the aborigines of Australia, that they are enabled to return for even hundreds of miles to their homes, though totally unacquainted with the route, being led by an intuitive impulse that they cannot explain. This seems incredible: but we know that diurnal birds will return by night from the heart of Africa to their former abode, marked individuals having done so; and we also know that a pigeon, carried from Paris to Constantinople, has flown back to the former city: these facts will tend to diminish our scepticism. I have two instances, however, of the manifestation of this principle by Europeans, when in a state of insensibility; for both of which I am indebted to the parties themselves, gentlemen of unimpeachable veracity: both of them returned, in this condition, to their temporary homes (one in the dark, and for upwards of a mile, having been thrown from his horse, which remained on the spot till found next morning), by routes with which they were quite unacquainted. I am not disposed to enlarge at present on this subject, by enquiring to what extent numerous phenomena recorded of somnambulists may be explicable on this obscure principle. We hear continually of surprising instances of blind men finding their way, with a degree of accuracy very difficult to comprehend; and, also, of drunkards stumbling home, when apparently unobservant of external objects. It will be sufficient if these hints serve to awaken the reader's attention, and so, peradventure, elicit some additional facts.

We have now traced to their ultimate results certain of the bearings of the intuitive information conferred on brutes, which, in wild nature, mainly influences their actions. We have seen that man is denied innate knowledge of the properties of objects, and is, therefore, necessitated to observe and reflect; in a word, to learn. Hence the necessity of a long infancy and superior intelligence; hence that progressiveness which so eminently distinguishes him from all other races. I have nowhere denied that other animals are capable of reflection; but I assert that, unrestrained by human influence, their inherent instincts sufficing to insure

their weal and maintenance, these, in consequence, supersede the necessity of habitual observation; whence their reasoning even may be independent of experience. Indeed, it is hard to instance a case wherein the conduct of truly wild animals may not be satisfactorily referred to instinctive motives; but that such cases do occur is shown by eaves swallows (*Hirundo úrbica*) having been known to immure a sitting sparrow that had usurped their nest*; which fact is proved sufficiently to be in nowise referable to instinct, inasmuch as it is contrary to the ordinary habit of the species upon such occasions. It will be readily admitted, however, that such instances are extremely rare exceptions to the general rule; and I imagine there are few who will be disposed to refer the ordinary habits of any species of the lower animals to aught else than original intuition.

I have yet another phenomenon, which is now, I believe, for the first time introduced to notice. It is the occurrence, in domesticated animals, of what is analogous to idiocy in the human race. Of this I have several instances in poultry, and one in a sheep. It consists in the privation of more or less of that intuitive knowledge which is needed to enable an animal to maintain its existence amid the numerous dangers with which it is naturally surrounded; dangers against which no experience could suffice to fortify it. The creatures I allude to evince a listlessness in their deportment strikingly similar to what is commonly observed in human idiots: they sought not the society of their companions; and one of them, a hen (of which only I can speak from personal observation), would heedlessly wander close before the kennel of a fierce dog, which the other fowls constantly avoided. Whether the dog would have attacked another fowl, I cannot say; very likely not: but it is a well known fact, that the most savage of the canine race will never attack a human idiot, nor a child, nor a person stupified by intoxication: of the truth of which latter, a most remarkable exemplification lately happened in this neighbourhood; a drunken stranger having been absolutely permitted to share the straw of a very fierce watch-dog, which those it knows can hardly approach with safety.

In the foregoing pages, I have all along been considering the diversity of human influence from that of all other organised races, rather in its effects towards these latter, than by

* Even here it might be objected that man's influence could alone have brought these species into contact; so hard is it to disentangle ourselves entirely from the meshes of human interference. Such an objection would, however, in this instance, be frivolous.

taking the higher ground of natural theology in reference to human kind, and recognising, in the grand aggregate of all that has been effected in past ages by the joint influence of every cause that has been in operation, not only a gradual prospective adaptation to the welfare of each succeeding race, but an ulterior object in capacitating the globe for the residence of human beings. A new era commenced with the introduction of man upon this world: a secondary intelligence was permitted to assume the dominion over matter, in so far as, by experimenting upon its properties, it can elucidate the unvarying laws which regulate these, a knowledge of which is indispensable to empower intellect to direct their operation.* To man it was given to “conquer the whole earth and subdue it;” and who can venture to aver the ultimate limits of those changes which he every where superinduces; changes which, in conjunction with the physical laws which wear away the land and uplift the bed of the ocean, may, in time, be gradually fatal to the normal condition of every other race, and to the existence even of by far the greater number? that is, assuming, what there is every reason to infer, that the human species was the last act of creation upon this world, and that it will continue to be so until its removal. It is needless to add, that a prodigious lapse of time is here required; and, to judge from data which the past history of the globe abundantly furnishes, in legible records, wherever we turn our eyes; to judge from the progressiveness of human intellect, and the long, long while that must yet transpire ere man can hope to assume that rank, as a consistent being, for which his faculties clearly show that he was intended, the duration of his existence upon this planet would appear likely to bear proportion to that immense period that the globe will continue fitted for his reception; a period, it may be presumed, that will abundantly suffice to alternate the land and sea, as we know has repeatedly happened heretofore, and which may sweep from existence the inhabitants of the present ocean, as those of which the exuvixæ occur in the chalk have become extinct before them.† The past affording the only record from which we are competent to judge rationally of the future, this inverse analogy would argue a continuance of the refrigeration of our planet, till it shall be again unfitted for the existence of or-

* “Homo, naturæ minister et interpres, tantum facit et intelligit quantum de naturæ ordine re vel mente observaverit; nec amplius scit aut potest.”—*Lord Bacon.*

† Except man shall have domesticated some of these, and artificially transferred them to new localities.

