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THE QUESTION

CONCERNING THE

SENSIBILITY, INTELLIGENCE,

AND

INSTINCTIVE ACTIONS OF INSECTS,

BY

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Licet irrideat, is qui velit; plus apud me tamen vera ratio valebit  
quam vulgi opinio.

Cic.

There are not many certain truths in this world. It is therefore in  
the anatomy of the mind as in that of the body; more good will  
accrue to mankind by attending to the large, open, and *perceptible*  
parts, than by studying too much such *finer nerves* and vessels as  
will for ever escape our observation. The *disputes* are all upon  
these last.—(Pope's preface to the Essay on Man.)

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PARIS,

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## DEDICATION.

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To Sir Benjamin Brodie, Bart., etc., etc., etc.

My dear Sir,

Allow me to dedicate to you a few loose thoughts on a subject which involves discussions far from alien to our common professions, and of which the intrinsic interest might well recommend it to abler hands.

I remain, my dear Sir,

very truly yours,

THE AUTHOR.

*Paris,*  
*46, Rue Basse du Rempart,*  
*September, 1837.*



## ON THE SUPPOSED

### SENSIBILITY AND INTELLIGENCE OF INSECTS.

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WE may not positively have impaled a worm; we are not perhaps initiated in the so accounted *cruel* mysteries of hook and line; but few of us would not rather have trodden elsewhere, when we have chanced to crush the worm that was crawling across our path, nor is it with entire indifference that we see him cut in twain by spade, or ploughshare, and writhing (as we call it) at *both ends* on the up-turned earth. Then, as to the beetle, with his horny covering, the crash of whose extinction unavoidably calls attention to it, the authority of Shakspeare, as to the kind, and amount of *his* suffering, has made it sacrilege to doubt its reality! We were, however, not ill-pleased when the thought lately occurred to us, that creatures whom in our inadvertence we so incessantly injure or destroy, might be, after all, in much probability, so constituted by benevolent Nature, as to be exempted, if not absolutely, in a great measure, from those *painful* consequences which wound or contusion inflict upon ourselves. I am sufficiently aware how serious a charge I incur of departure from received opinions, in the pages which are to follow. I know that the humane prejudice of ages is all against me; Lactantius has assured me that

beasts are equal to man in *all things but religion*: the author of the article on instinct in the Encyclopédie, avers, that to doubt whether beasts have *feeling*, were as unreasonable as to question whether our fellow-creatures feel: and another writer of the same nation, in a very pleasing treatise on animals, alleges, that *he* can neither have heart, nor ears, who does not comprehend, and is not affected by those demonstrations of pain to which the *voices* of hurt animals give utterance. But let all this be ever so true, (and I enter not on *that* subject at all,) butterflies and beetles, spiders and cock-chafers, *belong* not to those orders of intelligent creatures, which cheer our dwellings, and attach us by affection. Rather annoyances than otherwise in their familiarity, *insects* are neither like the parrot whose education we undertake, the dog who is *dreaming* at our feet, or the horse that is proud to carry us; and my concern, be it understood in all that is to follow, is with *insects only*—their supposed *modicum* of mind, their sensibility, their instincts, or what not—in short the influence of their psychology, if they have any, on the economy of their lives.

Sir Charles Bell has, if I recollect, somewhere written, that when a worm is cut in two, that portion of him which carries his *head*, makes a decided effort to escape, while the *caudal* part resigns itself without resistance to its fate,—that is, being interpreted, the half to which the head is attached, being in possession of the *brain*, contains all the energies of life, and all the capacity of suffering. But what if a worm *has no brain*, or modification of brain? without which, what is the use of nerves? for nerves indeed he has; but what sort of thing *is* the nervous system of insects, or what would *any* nervous system be *without a brain*? What right can such imperfect structures have, to be regarded as an *organ of sensation*? for as to the opinion that sensation is possible *without* nerves at all, it appears to have been set up, by way of explaining

the activity of certain animalculæ which exhibit no nervous fasciculi; and it is in reference to this supposed fact that an ingenious dentist of this city (M. Regnard) has advanced an opinion, that tooth-ache does not require a seat in the nerve, but that it is competent to the bony matter of the tooth itself to incur this penalty. As sensibility however, is incontestably united to a nervous structure through all the races of being in which sensibility is most conspicuous, or can *best* be traced and verified, we would make light of the exception, if indeed it be such, and hold it more useful to enquire rather into the *character* and extent of such a nervous arrangement as *insects* really exhibit.

The nervous system then in insects, to confer so large a title on a medullary cord which runs through the animal, and gives off a few branches to the organs which it visits, is of the simplest character; it is composed of two substances, an external of darker colour, and an internal of whiter matter, called, from some resemblance to that of the human brain, cortical and cineritious. In examining the nervous rope more closely, it is found to consist of two easily discernible elementary threads, more intimately united at particular points than at others, and that union effected by roundish knobs or *ganglions*, which appear as so many small inequalities or excrescences, occurring at unequal intervals, in uncertain number, and of irregular size. As to *external* manifestations of an *internal nervous centre*, in the existence of *organs of the particular senses*; it is observable that *eyes*, which constitute the most remarkable of such organs, are in insects not universal; but as insect eyes have optic nerves, and as the optic nerves in *man* proceed from the *brain*, the *first* ganglion, from which they proceed in *insects*, passes with some physiologists for an unequivocal *brain*; others being disposed to look on *all* the ganglia as so many equal brains; while a third school, consider the supposi-



tion of these bodies being of the nature of brain at all, to be altogether repugnant to analogy, and equally unsupported by experiment or observation. As to the first, and most popular perhaps, of these three views, I confess for my own part, that I am unable to find any support for it—be the ganglia what they may, I see no reason for believing the *extreme* one of the series to have any privilege or prerogative whatever, over the others. As to the second, which holds *all* the ganglia to be *so many* brains, an argument would, I think, be well entitled to a hearing, which, without attempting any thing more precise, should simply trace the legitimate and necessary *consequence* of supposing a conclave or council of brains in one being, and signalize the prodigious inconvenience of many brains to a single possessor. *Position* then goes for nothing, and *structure* being interrogated, the ganglia, in this respect, are all so much alike, that no reason appears to remain for believing the head ganglion, in insects, to be endowed with superior functions to the rest, and to be the brain *par excellence*; nor, so far as I know, is there any *experiment* or *observation* tending to such a conclusion, except Sir Charles Bell's, which, I am satisfied is incorrect. On observing a divided worm, I found that instead of the decollated head and shoulders moving away, and leaving the tail to the fate of dependents in general, *both* halves began to move in the *same progressive manner*, and each soon found its way to the borders of the plate. Perhaps, for a few seconds, the headless portion might, of the two, seem least lively, but as soon as it had made up *it's mind*, it moved off, much in the fashion that the entire worm is wont to do, or the piece to which the head belonged, did. Moreover, if worms be cut into *several pieces*, the motion is the very same sort of motion *in all*, with that of the obtruncated head and its piece of body, and the death, or cessation of motion in the different pieces, appears to depend generally upon their *masses*.

When the worm was divided not exactly at the middle, it would be the head piece, or the tail, according to their *size*, that first ceased to exhibit signs of vitality; and in poisoning the *entire* worm by touching it, for instance, with solid citric acid, (which first excites violent action, but quickly destroys mobility altogether,) no difference was noticed in the time in which that result arrived, by applying the poisonous agent to various *parts* of the animal;—all showing that there can be no essential difference in the different ganglia, as *reservoirs of life*, and that one confers no more vitality on the *whole*, or sensibility on the *parts*, than another. On making similar experiments on *insects*, dividing them at the juncture of the corslet with the abdomen, the life of the disconnected pieces, as of those of the worm, remained inherent in them for hours, sometimes for days; different insects however differing in the period of final extinction. In some instances perhaps, the portion to which the head was attached might have appeared to be endowed with a somewhat more enduring vitality, and might have exhibited some feeble indication of life, *after* the other extremity had already *ceased to move*; but, the difference was trifling, (and one should take in the fact that the upper ganglion is generally the *largest* in size, as perhaps sufficient to account for it), nor was the result invariable. Of a *Blaps mucronata*, for instance, which I had divided in the manner specified, the *head and corslet*, with their appendages, *ceased* to give signs of vitality *long before* the rest of the beetle had ceased to move. Again, the *head* cut off from a fly, or any other insect, soon dies, the *body* still surviving for some time; so that *the head would seem more dependent on the body, than the body on the head*. At any rate, the *considerable* period during which *either* part of a divided insect continues to manifest signs of life, leads to the inevitable conclusion of their *not* drawing supplies from the head, and of, in fact, their entire indepen-

dence, as to the possession or conservation of the vital principle. If different parts of the insect be held over sulphur, it makes no difference as to the time when contractility ultimately ceases, nor does the *partial* application of *heat*, or *prussic acid*, affect that result in any conspicuous degree; whereas when the same insects are exposed to a very slight *general* heat, no part of the body being protected, they die almost instantly. To revert to the mere *position* of this ganglion being the same which brain occupies elsewhere, I suppose nobody would ever have thought of instituting a serious argument from that fact, nor have dreamt, on that account, of advancing for ganglion No 1, a claim to more *cerebral* attributes than No. 2, had it not happened to send off, where an organ of vision really exists, the optic nerves. But these nerves must be inserted somewhere into the general nervous matter of the body, and that point would naturally be as near as possible to the eyes; and when it is added that worms and caterpillars have no eyes, and so are destitute of even *this* narrow pretension to a brain, or cerebroëid ganglion, it would appear that nothing could well be more gratuitous than the speculation that the *first* ganglion is to be regarded as the *brain of insects*.

Or take the other view, and make the extreme ganglion but one of *several* brains; the inevitable consequence of having more than one brain, *more than one seat of sensation and intelligence*, must surely have been overlooked in such an extravagance! for do not sensation, and consciousness that we have it, make up our individuality? and would not a plurality of seats for these faculties in the same creature *disintegrate* that creature, and make many individualities, out of, or within one organisation! \* Are the *pieces* of a worm then, just so many

\* The mighty serpent love,  
Cut by this chance in *pieces small*,  
In *all* still lived; *each little broken part*  
Felt the whole pang of all the heart.—COWLEY.

worms, in virtue of the ganglionic *life of each*, and yet capable of consolidation *into one existence*? To support this theory it will not be enough that each ganglionic centre, whatever cerebral attributes we shall invest it with, be supposed in possession of its own independence; for as the worm *entire* can move his *whole* body thus composed, we must further suppose an exact harmony and understanding between these different individualities, else his actions would have no unity, no rhythm, no steadiness of purpose, or uniformity of character. In short, has a worm a *will*, or a *chorus of wills*? To *will* is one of the first attributes of *mind*, (and mind is *unity*, —is indivisible,) as opposed to matter, or to mechanical necessity. When I walk, I will to walk—I have but *one* brain—when a worm crawls, with his *twenty brains*, is it *his will* or *their wills* that govern him? Were every ganglion a separate brain, there might come to be, there is no denying it, an insurrection or mutiny of the wills, the balance of power in the *ganglionic Republic* might be perpetually disturbed, and not only every motion be very difficult to be executed, but even the vital principle be often in exceeding doubt how to distribute itself.\* Neither then

\* If any one shall say that I am perplexing what is extremely *simple*, and that no one pretends that these *ganglionic* brains are like our brains, seats of *intelligence*, but simply *depôts of sensibility*, (and there is no *third* office that can be suggested), I reply, that a plurality, even of *such* brains, cannot be supposed in the same individual—bird, beast, reptile, or insect. To enter fully upon the subject would be to *anticipate* in a great measure what follows in the text; I would merely state here, that as there can be no *feeling* without *consciousness* (for I ask whether any one can conceive of feeling separately from consciousness; and whether the words “I am *conscious* of a pain or uneasiness” are not synonymous with “I *feel* pain or uneasiness?”) and consciousness is essentially single like all the other phenomena having reference to mind, which is one and single—so there can be but *one seat* for consciousness, or for feeling, i. e., *one brain*.

That there can be but *one brain* may be also proved by a comparison of the phrase, *I feel*, with that of, *I digest*, *I breathe*; or with any *other* function of *organic* life. We are conscious that our mind, our inner man, our “*I*,” is involved in the first expression; and that

can the *collective ganglia* be so many brains,\* nor has the *head ganglion* made out any case to be pre-eminently such. †

And if the supposition of a multiplicity of brains be thus absurd, and the assertion of any one ganglion to be *chief* amongst its fellows, and *brain proper*, be thus unsupported, it would seem to follow, as of course, that insects have, indeed, no *centrum commune* of sensation and intelligence; and if it be admitted that they are destitute of *this*, to prove them in the largest possession of *nerves*, would be of no avail.

But, as the possession of a brain, or some equivalent to a brain, by insects, may be still, by some, held not to have been entirely *disproved*, let us now enquire into the second condition required for the *sentient life*; and direct our attention to certain peculiarities of the Nervous system, as it has been latterly elucidated in man and the higher animals, in order to compare *that* nervous system with *the nerves of insects*, and see if it be a probable doctrine that they have *nerves fitted for sensation*.

It is now generally admitted that in man and the higher animals, there are two distinct orders of nerves, which not only differ in their place of origin, but are subservient to different uses. All physiologists now talk of nerves for sensation and nerves for voluntary motion, in addition to which two orders of nerves, some have thought that there is a necessity for the admission of a third, to administer to the growth of the body, regulate the transition of food into nourishment, and preside over the intestinal secretions, and the defæcation of the system. Take all three

the *other* functions are so independent of that mind, that they *can be* and *are* carried on without its cognizance. *Mind*, therefore, or one of the attributes of mind—*consciousness*—is necessary to *feeling*, which being in its very nature *single*, the corporeal seat (so to speak) of feeling must be *also single*, that is, again, there can be but *one brain*.

\* See Appendix (A).

† See Appendix (B).

supposed orders of nerves together, adding to them a brain, and it is certain that we obtain a pretty extensive view of a nervous system—how different from any thing that can be traced in insect anatomy, the least laborious entomologist is aware. Again, that in proportion as a complicated and efficient system of nerves, is susceptible of anatomical demonstration, do the phenomena of *mind* begin to be manifested; and that *sensation*, or that perception of external objects which supplies the mind with all practical knowledge, eminently belongs to a certain anatomical development—these are *also* conclusions in conformity to actual experience; for as we descend the scale of animal and find the general organizations less perfect and complete, but particularly the distribution of a nervous system less ample, we also find the *evidence* of mental operations, imperfect and unsatisfactory. It follows, therefore, that when we come to insects, whose nervous system is of the lowest order, we ought really to be prepared, at any rate for a great *diminution* of the general sensibility, and for an intelligence, so to speak, proportionately defective, in place of insisting on the fineness of their instincts, and their huge capacity for pain. Moreover, if we go into details, and speculate on those *parts* of *our* nervous system, which, in insects, where the whole is of such small dimensions, might seem the least indispensable, the *nerves of sensation* will probably present themselves, as the *least* necessary, and the least likely to be found. Nerves required for motion of organs should belong indifferently to high and low grades of animal existence; an equal necessity for nerves of the visceral life, is obvious; and, the nutrition of every animal requiring them, of *such* nerves, even *insects* ought not to be, nor are they *found* to be, destitute. For we may, from analogy, almost venture to name, or strongly to presume, the *offices* of certain even of *their* nerves; and knowing that the function of *nutrition* is executed by, or is under the control of, nerves in our-

selves, and in the higher animals, we may reasonably conclude, when we see tissues of similar appearance profusely distributed about the reservoirs of aliment, in lower forms of being, that these are the instruments of a similar operation—just as when we see that from different points along the nervous trunk, there proceed branches going to parts subservient to the *motions* of the creature, we cannot make much mistake in calling these latter expansions of the nervous tissue *nerves of motion*.

So far, some analogy in insects with man's structure really obtains; but when we come to enquire into their *probable* possession of nerves of *sensation* also, let us see how the case lies. First, we have no right to say that it is *necessary* they should *feel* at all. Granting sensation however, that is *conceding the point to be proved*, we should be exceedingly embarrassed to assign particular nerves as *their* nerves of *sensation*. The other functions above alluded to *must*, as we have seen, be executed in insects equally as in man. As to *sensibility*, however, or its *amount*, it could not, in the first place, have been assumed from any *abundance* of nerves; but the nerves in insects are *few*, and the duties which those nerves seem to discharge having been inferred from functions *actually performed*, and from the visible distribution of the nervous matter, the residuary legatee, *Sensation*, will come poorly off, unless we assume that it may be imparted by the *same* nervous material, wherever found, which has so many other claims to satisfy. So much, then, for the *probability of Sensation* in insects, *from an examination of their system*

\* Swammerdam, who has done so much for entomology, carried insect anatomy to a perfection which, before his time, seemed impossible, and is therefore held in the highest reverence among entomologists; not that I would venture, before the learned Society of which I am a member, to aver my belief in *all* his discoveries. A great deal of *uncertainty* as well as instruction must ever attach to reasonings founded upon *comparative anatomy*;—only think of *differences of opinion* as to whether a particular organ in an insect should be called its *spleen* or *liver*.

of *Nerves*. But we had already come to the conclusion that they *also* want *that organ*, without which we cannot *conceive* sensation : and if it shall have been rendered not improbable that they also want the rail roads of communication with such an organ, we not only can no longer argue that insects *feel*, from *anything* known to us in their *structure*, but from that very structure we seem to be led to exactly the contrary conclusion.

Since the argument for *sensation in insects* cannot then be supported in this way, those who maintain it must shift their ground, which perhaps they may be less reluctant to do, in the possession, as they may conceive, of a *much stronger position* in the *conduct* of the *living insect*, when accidentally or purposely injured. Writhing in a worm, or agitation in the limbs of an insect submitted to experiment, have been long held to be *certainly* expressive of *painful sensation*. We shall presently see how equivocal such signs are, however generally admitted. Nothing in fact can be less conclusive than the inference of *pain felt* from *motion induced* ; and if I were engaged as counsel on the popular side, I would throw up that clause of my brief altogether, and rather take my stand in maintaining the sensibility of insects, on some speculations of Bichat, (exceedingly ingenious ones,) which I shall presently lay before the reader.

Abnormal motion — motion under *any* epithet, is evidently not so general a result of pained sensibility in *man himself*, as to furnish the argument from *analogy*, which goes for so much in all our conclusions. Strictly considered, motion is purely an affection of the organism, while for sensation, *mind*, as well as organism, is requisite. All the *unconscious* movements are but organic ; and the mere organism (which involves matter only,) cannot be *essentially* in possession of, though it may be *united* to sensation, which necessarily involves the intelligent or immaterial part of our nature. Motion under pain, and sensi-



bility to pain, are such different and distinct things, that it is familiar to witness pain endured without abnormal motion at all. On the other hand, young persons affected with St. Vitus' dance, make grimaces which to those not in the secret, might, from their unfamiliarity, be supposed, falsely, to express pain, yet the most unseemly contortions notoriously take place without.—The epileptic, the hysterical convulsions are painless; of *tetanic* spasm, indeed the pain is much severer than that of inflammation; but here, in place of *motion*, the state is that of rigid *immobility*. Then, as to these particular motions in some creatures, concerning which so much is said, the little sand-eels that you poke out of their holes in the beach, at low water, *wriggle exactly after the fashion of the worm on the fisherman's hook*; and perhaps the shape of that worm, (like that of the eel, and the serpent,) may in great measure explain the *writhing* which is so gratuitously supposed to be expressive of its agony. In short, the "*winding bout*" of the reptile is probably but the consequence of "*its linked structure long drawn out.*" When we have pricked the insect, or wounded the worm, they may indeed move violently, and be thrown into apparent agitation; but, the only *certain* conclusion to be deduced from that fact, is, that we have stimulated the *inherent irritability* of a part of their organisation. It is certain that no *proof* of the worm's *consciousness* of the injury, or, in other words, his *sensibility* under it, can be *thus* obtained; and *motions* I will repeat it, can *never prove pain*, since muscular contraction, of every kind, and in every direction, is performed entirely without consciousness.\*

\* When we move our limbs indeed, we are conscious of this motion, and by that consciousness we arrive at the true state of the position of our muscles, and the flexure of our members, but we derive this knowledge probably from the proper nerves of sensation, which, when we bend the arm for instance, are compressed, and it is the mode and amount of pressure to which these nerves are subject, that bring the brain acquainted with the state of muscular contractibility. In cases too where muscular motion becomes in-

Motion then, being inadmissible in proof of painful sensation, let us next examine that speculation of the French physiologist, to which allusion has been made, which has *not* been, so far as I know, pressed into this service, and which it is therefore somewhat generous to start for the service of one's adversary. That the organic sensibility, *that* by which the heart contracts upon the blood, and the viscera on their contents, *is the same in kind* as the animal sensibility, and *so requires no particular order of nerves*, was the doctrine of Bichat, announced in a sufficiently remarkable passage, which the medical reader, at least, will not be sorry, from its great ingenuity, to have again placed before him. "There are two kinds of sensibility (says this eminent writer); one purely *organic*, and the other the sensibility of *relation*. The *organic* sensibility is that inherent property by virtue of which an organ receives an impression. Thus, glands are *sensible, in this sense only*, to the stimulus of blood which circulates in them; and thus excretory ducts react upon the fluids which they convey; so that upon *this kind of sensibility* depend the functions of circulation, respiration, digestion, secretion, absorption, — in a word, all the functions of organic life. But the sensibility of *relation* is that by which our organs are not only impressionable to stimuli, but are enabled to *transmit*, as well as to receive impressions, to a *sensorium commune*. It is by *this* sensibility that the animal holds communion with surrounding objects; upon it depend the phenomena of the *brain* and *senses*; it is its peculiar province, and *exclusive* prerogative, to preside over external, or, as it has been called, (for *animals* alone possess it,) *animal life* — the other kind of sensi-

tolerably painful, (as in spasms) still it is probable that we *suffer* by the nerves of sensation, not by any abnormal exercise of the nerves of motion, — but even allow that this order of nerves were capable of painful sensation or any sensations, this could only be true, provided there were a brain to which to transmit them.

bility having been imparted even to *vegetable* existence. Notwithstanding this distinction, however, the organic sensibility is the *principle*, the *element*, so to speak, of the sensibility of *relation*, and may be considered as its *first grade*; so that, *when it augments much in an organ, it takes the character of the sensibility of relation*, and the organ now carries to the *common centre* certain impressions, which before it either did not transmit, or transmitted very imperfectly."

Now, then, it may be enquired, since even insects possess (for no *living* thing can *want* it) the *organic sensibility*, why may they not have, in accordance with this doctrine, the *other* sensibility—the sensibility to external hurts—the sensibility of *relation*—that animal sensibility, concerning which we hesitate?—for the reason assigned before,—their *organic deficiencies*—for, grant to insects a nervous system capable, whether in a natural or an exalted state, of transmitting impressions, yet, till the *brain* can be shown to have any existence, it will be vain for the roads to be open; there is no *metropolis* to which all these roads converge; the existence of a brain, or common centre, being *for sensation* the; *sine qua non* for an *impression* may even be made on the external organ, and no *sensation* result. It may aid the apprehension of a difference between mere *impressions* upon the organs of sense, and the same impressions carried into *full sensation*, that some of the organs of sense being double, the mere impressions made on them must be also *double*; whereas *sensation*, because the brain comes in, is always *single*. In reading, the two eyes do not see two books; though the two nostrils convey two impressions, but one smell is the result; nor do two ears disturb the *unity* of the sense of hearing; but if the mind, which is *single*, did *not* come into play, we should *see* double objects, and hear two *prima Donnas* every time we went to the Opera. Though the arguments derived from examination of their

*structure*, might of themselves be held sufficient to raise serious doubts about the sensibility of insects, or at least any considerable degree of it, we are disposed to insist more particularly on the above views respecting sensation itself, which consider it as not *entirely* an organic, any more than *entirely* a mental operation. Into *sensation*, *mind* as well as *body* must enter. We entirely adopt the opinion of the *encyclopédiste*, that “the highest exercise of the intellectual faculties is not *more* incompatible with our conception of *matter* only, than the *simplest sensation*; and that there is infinitely greater distance between the most refined etherialised *matter*, however organised, and the lowest *perception*, than betwixt *perception* in its simplest form and the most *reflective* of the acts of intelligence.”\*

It is evident that the mind being strictly incorporeal, and not liable to the demands of the body, or susceptible of the injuries of the body, *cannot* be the proper *seat* of pain. Nevertheless, the discussion of sensation, or sensibility, necessarily introduces the incorporeal part of our nature; because sensation involves *perception*, and perception supposes *consciousness*. On the other hand, the mind can only perceive what the sense has first duly brought under its cognizance; a smell to be *recognised* and *distingnished*, as of musk, or acetic acid, of assa-fetida, or a rose, must have been transmitted from the *corporeal* organ to the *incorporeal* sensory, and nothing can be seen by the *mind's eye* which has not been *originally* transmitted by the nerve of vision through the optic apparatus.

Sensation, it appears then is, strictly, neither an affection of the *mind*, nor, exclusively, of the *organ*, but results from the *combined action* of the two—perhaps of the mind most; for that sensation is really *more* a mental pheno-

\* Art. Instinct, Encyclopedie.

menon than an affection of the apparently sentient organ, is probable, from the fact, that forced attention, pre-occupation, or distraction, of the *mind*, interfere, to a great degree, with the perception of painful impressions made on the *body*. The *extent* of this power of the mind over matter may vary much in different individuals, but we all possess some considerable share of it. When the *attention* is either voluntarily conceded, or involuntarily drawn off in another direction, we obtain, in requital of the effort, or as the result of the distraction, a *greatly diminished consciousness of pain*. On the other hand, who does not know that the unceasing *attention*, the unwearied vigilance which the hypochondriac devotes to his least symptom, aggravates his *malaise* into pain. It must be partly from alienated attention, (not entirely, for we know that the smart or the throb require an interval before they supervene on the injury; and we partly apprehend the reason of this, and call it reaction,) that school-boys and pugilists do not feel their bruises till after the fight. Soldiers occasionally discover gun-shot wounds, of a slighter kind, after the battle is over, and I know a gentleman who held the candle while an operation was performing on him for hernia. The story related in the "Diary of a late Physician," of a lady who bore the amputation of her breast without flinching, by causing her maid to hold before her the letter she had just received from her husband, about to return from India, on which she rivetted her eyes, while the knife of the surgeon divided her flesh, charms us from its air of truth. Mutius Scævola is related to have thrust his hand into the fire, *velut alienato ab sensu animo*, attentive rather to his glory than his bodily suffering. Could the Cranmers and the Latimers, the saints and martyrs of old, ever have been such, but from the autocracy of the high motives by which their attention was enchained? and, to

make a sad anticlimax! do we not daily experience that even the light distraction of cheerful conversation, or *luck at cards*, are as good as *colchicum* in twinges of a *second-rate* gout.\*

In order, then, to sensation, an impression (the *material*, so to speak, out of which the sensation is to be *forged*) is transmitted to the brain, (more or less vividly, according to the perfection and delicacy of the organism,) and the mind, receiving its intimation from the organ of sense, rejoices or is pained according to the perception it thus obtains. The acuteness, however, of the *mind's* perceptivity—of its full *co-operation* with that organ, will vary according to the nature, the force, and the duration of the impression itself; according to the fidelity with which the material instrument, the nerve, may have *transmitted* the impression; and according as attention has been concentrated, divided, or withdrawn. Thus that some persons bear *surgical operations* better than others, may indeed involve several circumstances; of these however it is probably one, to possess a mind capable of considerable effort in forcing the *attention* elsewhere; though it cannot be denied that a more obtuse constitution of the nervous system may materially assist. Such, then, seems to be the nature of sensibility, and such the organs it employs; but as those organs are so scantily, or not at all, developed in insects, if the above statement be correct, the popular and poetical opinion of their high sensibility cannot possibly be just.

But these views by no means exhaust the objections that

• “And how 's your pain?” inquired the gentle maid,  
 (For that was asking if with luck she play'd;)   
 And this she answer'd, as the *cards decreed*,  
 “O Biddy! ask not—*very bad* indeed;”  
 Or, in more cheerful tone, from spirit light,  
 “Why, thank you, *Biddy*, pretty well to-night.”

CRABBE.

lie against the belief in the great sensibility of insects. The very *existence* of an *organ of touch*—that sense which, in man, is the appropriate organ of general sensibility, and co-extensive with his body itself, being here highly ambiguous—is a fact very unfavourable to the opinion that insects were created with great susceptibility to pain. Their integuments are scarcely ever impressionable by simple contact, and as to those who, by placing touch in the *antennæ only*, restrict it almost to a point, they can hardly be said to allow to insects the possession of this sense, nor, of course, of *general sensibility* at all. At any rate, where *the surface adapted for receiving external impressions from contact*, is so exceedingly limited, in the same proportion, one would think, must that *sensibility*, (of which *external impression is the first condition*, though by no means all that is necessary to secure the *full result*,) also decline, or become very questionable, when we speak of creatures whose bodies are nearly covered with *horn*, whose breastplate is a sort of cuirass, and whose legs are encased in greaves. These, it must be confessed, are unpromising conditions for *superficial* feeling; but it may be urged that when we run a pin *into* an insect, we invade a *deeper* part of the organization; and that if upon such an injury, the legs seem to be violently agitated, the conclusion that pain has produced that agitation, is most natural, and indeed little short of certainty. But it has been already objected that motions of this kind, like those of a heart recently taken from the body, of which the pulsations can so easily be renewed, only require that property of the living solid known to physiologists by the name of *irritability*. Or, if it be said that though *some* insects are hard and horny in their integuments, others are the reverse; that *caterpillars*, for instance, exhibit such violent and convulsive movements when touched, as to make it exceedingly probable that sensation was painfully excited; that the sense of touch in the *spider* is known

to be acute; and that *worms* and *slugs* will not patiently be handled; yet there are other and opposite facts which seem to nullify these inferences. Spiders abound on nettle-beds; and *slugs*, which are softer than our integuments, lie upon them; the caterpillar *crunches*, or masticates, of course without producing irritation, the whole of this formidable weed; some insects habitually feed on vegetables of acrid juices, juices which would vesicate our skin, and inflame the mucous membrane. But what is most to the purpose, insects of *soft* contexture seem not to be harmed by mechanical irritants. If the thousand barbs of the stinging nettle so readily penetrate our comparatively hard integuments, that penetration must much *more readily* take place *through the epidermis* of the caterpillar; and if these needles of nature do not hurt him as they hurt us, (and he does not afford even the doubtful evidence of unusual motions that they do,) is it not a presumption at least, that he *cannot* be much pained by those with which the entomologist transfixes him. Besides, it has been *observed* that the caterpillar does not *wince*, when the *Ichneumon* pierces his flesh to *inoculate* him with her pernicious eggs!

Those, however, who feel indisposed to abandon the current opinion respecting insect sensibility, have still some objections to urge, though they can hardly pretend to the name of *arguments*. Some, perhaps, will say, that as God wills the *happiness* of his creatures, and as happiness is impossible *without feeling*, worms and insects *must* therefore be supposed capable of suffering;—that to imagine otherwise, is indeed almost an impiety, involving notions derogatory to the goodness of the Creator. Objections like these scarcely require reply. We do *indeed* “snatch from His hand the balance and the rod,” when we thus presume to create his creatures anew after our own notions of the fitness of things, and the general scheme of Providence! The worm exists according to his kind, and



man does no more. The plant, we see, was not created to feel at all,—why then should we insist that the worm or insect is full of sensibility? Is it because worms are *animals!* but who made this artificial division into animal and vegetable life? “Il n’y a aucune différence *essentielle* entre les animaux et les végétaux.” \* “Animals and vegetables are, in the eye of Nature, existences of a very similar order.” Now, none doubting that the vegetable kingdom is absolutely impassive, and the *transition* from vegetable into animal life absolutely eluding observation, it becomes impossible to refuse the admission that *some animals* at least, *may be* void of sensibility—and we act upon this persuasion. The oyster is eaten *while his heart palpitates*, without qualm or scruple; the Neapolitan batters down the quivering spines of the *echinus*, and lacerates him alive!

To such however as may still think it becoming to insist that the Creator must needs have willed to impart the advantage of *the senses* to the whole of His animal creation, the question may perhaps be addressed without offence, whether to have endowed those humble creatures, which we so unavoidably crush in myriads at every step we take, with an *impassive* body, might not in reality be that very dispensation of tenderness for which they contend?

In addition to so many *general* arguments which I have now endeavoured to state, against the *probability* of much sensibility *in insects*,—arguments I think fairly deducible from the consideration of what *they* are in structure, and of what *sensation is*—it may yet perhaps be by no means void of interest to scrutinise their pretension to *each of the senses* categorically; the question of the possession of any one of them, however, so resting upon the same *general grounds*, that while, if you can *prove* any one of them to exist, the existence of any other becomes possible; so, if

\* Buffon.

you make the possession of *one* improbable, you throw suspicion on the *whole*. If an insect *can feel without a brain*—that is, if it can have the general sensibility which is administered by the same organ which imparts the sense of *touch*, without a brain, he may also *see without a brain*; but if he *cannot* feel, because he wants both the *external* apparatus, and that *intelligence* which supposes and employs the *internal* organ, then it will not be *possible, from the same defects*, for him to *see, or hear, or taste, or smell*. On this subject it would be easy to enlarge, but I must now hasten to whatever *specific* objections appear to present themselves.

1st. SIGHT of insects?—Of all the supposed senses in insects, sight is the *only* one, the existence of which is supported, by our being able to detect its organ—that of any of the others being only matter of deduction. The possession, you will say, of the organ *must* surely prove the possession of the same identical sense which it administers in man; and there is doubtless a much stronger case made out for the full admission of *this* sense, which appears from analogy so *necessary*, and of which, in *most* insects, the organ is *manifest*, than for those other senses which, however advantageous they might seem, would probably be less so than vision, and which present *no organ* to our observation,—*smell* for instance, or hearing. The eye then, in most insects is a thing to be seen; but the question remains, does it confer *vision* in the accurate and full meaning of the word?—for it *may let in light and not do this*, and *that* light may even be the appointed stimulus of an insect's eye, as of ours, and yet sight, *as we* exercise and enjoy it, (and we can *comprehend* and *speak* of it in no other sense,) *not* be the result—nay, the well known experiment of Reamur, which occurs to me here, and of the accuracy of which I have convinced myself, is *inconclusive*. He smeared the eyes of flies and bees with an opaque paste. The insect set at

liberty, instead of making for the hive, the window, or the luminous object, fell immediately to the ground, which proves, undoubtedly, both that in ordinary circumstances an impression is made upon the retina, and that *in consequence of that impression, the particular act of flying to the window or the hive takes place.* Well! but this is *sight!* on the contrary, it is even far from probable that the possession of sight with *intelligence*, which is what we understand by this word, can be legitimately inferred; for after all that we are ready to admit, and which indeed is quite undeniable, can we come to the certain conclusion that an insect *sees*, but by attending to the action which sight determines? by watching what follows, and is taken by every one as the result of sight? But who, you will interrupt me, yet ever doubted that a bee sees? we find him in possession of eyes; we observe him to go where he lists, and to return unerringly to his home. Nothing seems clearer! but if you adopt this conclusion you will have to proceed a *great deal further* before you stop, and make your bee more accomplished than you probably intend! You cannot disallow that *if* the bee's flight is directed by *vision*, it must also be regulated, as to its extent or velocity, by *will*: follow him awhile in those mazy, giddy, gyrations! now buzzing about your nose, now out of sight in the blue heaven, loitering over this flower or reposing upon that, to say nothing of courtship, or companionship when he finds a better *tap* than common! But, however well amused, the bee must *intend* to return, that is, must note time—must mark the progress of the evening shadows and say to himself, it is time to go home! At the very moment of going forth he must *propose* to return to the hive; and even where that domicile of his household gods remains *in sight*, he must, in order to return, exercise a *will*, founded as all volition *must be*, upon *comparison*, and a *judgment* in consequence! But place him *out of sight* of his hive, and you must now

also confer on him an extraordinary *memory*,—one vastly superior to your own (such a one as you would perhaps hardly concede him without better evidence) as he flies by object after object in endless succession, to be noted, observe! (*if he be guided by sight*) as *land-marks* on his return! Or take another instance in another insect—you attempt to approach a fly—he escapes,—you say from *fear*—he saw you and was afraid!—why it looks like it! but have you made up your mind to allow a *passion* or *moral emotion* to a fly? Consider *what generates fear*. Is it not the remembered experience of something hurtful? If a fly, instructed by his eyes, did indeed fear your approach, or was afraid to trust you, how is it that the very next minute he settles upon your hand? Do others of the insect race, who have *so much more reason* to expect *inevitable retribution*, exhibit *fear*?—is a *flea* afraid? But if a moth *flies* to the light, he must *see* the light, and be guided thither by vision! Here then, observe, you again allow volition, and with volition, intelligence!—but could *intelligence*—intelligence sharpened by plentiful *experience*, determine to this act of phrenzy, this *suicidal* exercise of will? Surely had *any*, the lowest intelligence been imparted to the winged fire-worshipper, it would *deter* him from rushing on his fate, which, however, he does with the determination of a Malabar widow! scorched never so severely, (one should like to know, at least, if *he* feels pain,) back he goes to the fatal wick!

“*Nil ergo est sibi tot olfecisse lucernas!*”

I presume not to conjecture the nature of that *exterior* agency, (for *exterior* it must be,) that *compels*, or *conducts* the bee to the inevitable hive, and the moth to the inevitable candle;\* but assuredly I cannot go the

\* They have just lighted the Boulevards with gas, and it is curious, these summer nights, to see the myriads of insects of various kinds that beset the glass lanterns, seemingly angry that they cannot fly in!

length of admitting an *intelligent exercise of vision*, or discern in these acts the evidence of *mental operations*. Is it possible to do so, when the actions which *prima facie* might appear to result from sight, are found in *one instance*, to involve a complicated, and salutary exercise of intellect, in another a perverse and ruinous fatality? Or, shall it be said of the moth which thus perishes by myriads, *Quos Deus vult perdere prius dementat!* No! the bee is too wise, the moth too foolish, to allow them the possession of *intelligent vision!* and the explanation of what they do must therefore be sought for elsewhere. Meanwhile, what would be *folly*, as an *act intended* by the insect, may be simply its *fate*,—an inexplicable appointment of the wisdom of God.

HEARING.—The same difficulty occurs as in the preceding case. Insects are *believed* to act as though they heard, and are therefore *supposed* to hear: but as any act, *consequent* upon *intelligent vision*, proves *will*, which throws us back on the necessity of a *sensorium*, and of a brain, its seat, to which all the organs of sense correspond, and report their discoveries—*hearing* can alone be *supposable* on the *same conditions*. But a swarm of bees *follows* the tinkling of a bell, or the more discordant clanging of a cymbal! That loud harsh sounds *generally intimidate* animals, rather than *allure* them, is sufficiently certain; but that some hundreds of bees, (who may have no ear for *music*, to judge from their own monotony,) should have a positive taste for *discord*, and all *consent* in a common action, to which that discord disposes them, would be particularly remarkable. But we need not rest here: *neither* the bee, nor *any other* insect, has any organ to which the name of *ear* can be applied, so that if you still determine to suppose such a sense in insects, from a solitary instance—for to be *led* by hearing, or *alarmed* by hearing is not, as far as we recollect, even *alleged* of any *other*;—if you still maintain that, at any rate, *bees hear*,

you first attribute to them an *organ* which is absolutely *undiscoverable*, and then allow them intelligence, and all that it supposes, or requires, into the bargain!

SMELL.—We have seen that those who would assign to insects the full complement of the senses, are in difficulty where to lodge some of them; and well they may! In the case of *smell*, to detect the ordinary organ is so impossible, that it has recently been conjectured by *Audouin*, to consist in a porosity of the whole body, thus rendering it accessible *every where* to volatile emanations. As to the *a priori* argument for the *necessity* of such a sense, it is alledged that insects, in an apartment, never fail to detect and resort to those substances of which the properties delight them; and that as this *could* not be accomplished by *sight* (supposing them to have it,) nor by *taste*, *before* they have tasted, it can only be by *smell* that the discovery is made; and that with them, the *invisible* nostril, as in man, the visible, must be purveyor to the palate. Yet how often do insects precipitate themselves with greediness on substances *without* odour? What smell is there in sugar, treacle, honey, flour, and the many vegetable substances on which insects swarm, and even *travel from a distance* to seek? How many tribes of them hover around flowers *perfectly void of odour*? The fact is that its *own* insect lodges and boards within almost every *corolla*, and that there is *hardly any thing in nature*, alive or dead, animal, vegetable, or even mineral, which does not invite and support its insect population. The forest fly stings the impatient herd; the bot burrows in the carrion; the moss-rose is powdered with its green parasites; the cabbage is eaten by the caterpillar; the galeruca rides upon the water lily!—in most of which instances, to suppose the allurements of smell would be perfectly gratuitous. It is not even necessary to conclude that the larvæ of *Dermestes*, *Necrophores*, *Anthrænæ*, *Staphylini*, etc. are invited by the *smell* of putrefaction;

may, that *circumvallation of cow-dung*, of which every specimen, as Mr. Geoffrey has observed, contains a perfect treasure for the entomologist, supplies but doubtful proof that its *effluvia* constitute the attraction.

Flies, however, abound near sugar; and the saccharine principle, in almost any shape, invites the wasp into our rooms. But can you make it out to be the organ of smell that conducts them? To us sugar has no smell; and to suggest that *wasps have a finer nostril than ours*, loses sight of a very obvious objection; which is, that before we invest the insect with such *gratuitous* delicacy in the perception of odours, the *existence* of the odour itself should be something more than a mere supposition, for it is *only by our own senses*, which are here at fault, that we can judge of the properties of bodies.

Think you that the minute and swarming hordes of *Apions*, whose burnished blue and green relieve the else unvaried yellow of the flaming *sun-flower*, do really insert those long snouts of theirs into the plant in quest of an unknown *aroma*, or not rather to extract its well known honey? The *OEdemera* haunts the perfectly *scentless* wild flower. Those minute insect *gems*, the *Alticæ*, do they for *this* lie blazing in the hearts of so many flowers quite inodorous to us, and, we will presume, to them? Do such *general* flower fanciers as the *punctuated Donacea*, the *Necydalis*, or the *Cistela Sulphurea*, do the blue and scaly *Hoplæ*, or the lovely sisterhood of the *Lepturæ*, take lodgings amidst scentless petals, *when others are to be had*, and yet pretend to noses?—as if it was not their *mothers'* doing, who placed every one of them there before they had any pretensions to a nostril!

We have now written certain pages, which of course we expect the *candid* reader so to examine as to merit this epithet at our hands. Perhaps he will think we expect too much. *Eyes*, he will say, and *not* to see with!—to what end the *organ*, if not to execute the *function*? Yet ex-

exercised *it cannot be*, in the sense in which alone it can be understood by *our experience of it*, as the instances adduced may perhaps have sufficiently shown. Not that I entertain any doubt that the *eye*, and so, that *other* organs, of which the particular office in insects is less certain, may be regarded as *avenues by which impressions come into their bodies*; but such impressions are clearly not, as with us, destined to become interwoven with the phenomena of mind. If in some of the more *remarkable* passages of insect life, acts are done which certainly imply *design and intention*, yet *many* others, in their economy might be sufficiently explained by *stimuli acting upon organism*, as in *plants* where this explanation would be held *sufficient*. And as to those actions which are placed beyond, far beyond this explanation, since there *can* only be two possible hypotheses on the subject, whereof the *one* endows the *insect* with powers that belong to mind essentially, and by implication, confers not only *skill and intelligence*, but *immortality*, on a *bee* or a *wasp*—for *mind is indistructible*: while the *second* considers him only as a machine moved unerringly by an *intelligence* not his own.—I cannot choose, but *adopt the latter*. Apparently, but not *really intelligent*, that is, *not intelligent with intelligence of theirs*, insects seem to me to come under some such denomination as that of *machines*, beautifully contrived *within*, but *worked from without*. The comparatively simpler objects of the mere sustentation of the *individual* and the secure *perpetuation of the race*, have been provided for in the *helpless and passionless plant*, and might be in insects, by no other than the *first* of the methods suggested, by *stimuli acting on organism*; and as to those more striking wonders in their economy which excite our admiration, and are the results of mind, they obtain an equal explanation, whether we suppose insects to *think* and care for *themselves*, and to be wise, and skilful, and frugal, and industrious, or what not, in *their own behalf*, or to be immediately *thought for and cared for* by the Supreme



intelligence ! Surely the creator may have suitably endowed the insect *that perishes*, for all its *corporeal* necessities, without conferring on it the nobler boons of sensation, memory, imagination, and judgment ; nor need we impose on ourselves the necessity of maintaining as often as a beetle runs across our path, that he follows this or that course *intentionally*, or that when our heedless footstep tramples upon *his osteology*, it is at the expense of as much *suffering* as “*as when a giant dies !*”

But it happens that among the many marvels recorded and perpetually reproduced, about the wonders of insect life, there are some, to explain which, *without* the admission, not only of intelligence, but of *inherent* intelligence, would be nearly impossible, *if they be authentic*. *Intercommunication between insects of the same species* which has been *seriously* asserted by some imaginative writers, *did it really exist*, could not be explained but by the admission of the *innate intelligence* of the creature endowed with it. Now, what a blessing it would be to it, and to us, if the *common fly* could be quoted in *proof* of so excellent a gift ! for flies to be able to impart their mutual experience would save many of *their* lives, and make *us* much more comfortable ; and it would be enough to make a snatch or two at a handful, or having chastised a few scores by diligent *flapping*, which must be attended with abundant loss of life and limb, permit the survivors to exhibit themselves, like Djeddar Pacha's patients,—dismissed with loss of nose or ear, or some other ingenious mutilation—*to encourage others*. But a fly never takes warning—in that community capital punishments never succeed ! It may also, I fear, be safely concluded that *butterflies* hold no intercourse with one another ! a score of papilionaceous beaux may be seen besetting a female of their species, *pinned to a card*, of whose *durance* they appear to be far from having any adequate notion. With *ants* indeed, the

case is different, as we shall find by the following narrative.

Some one had placed a pot of molasses in a bureau infested by ants, which they soon found out and ate away! The proprietor of the treasure drove them off, and slung up his pot to the ceiling, but in doing so, left by negligence, one of the tiny thieves behind. The overlooked culprit having first taken as much as he thought good for him, for ants are too prudent of course to commit excess, at length thought it time to depart. To effect this object, as ants do not fly, it was necessary to crawl up the cord, across the ceiling, and down the walls of the room—all which he duly and diligently did, and so in brief time rejoined his comrades. All this was straightforward work; ants of very *ordinary capacity* might have been equal to it. Presently, however, a whole regiment of ants, rank and file, is seen to leave its barracks, and direct its march upon the same object, by the self same course, making the most accurate use of the *carte du pays* which the spy had communicated! They scud along the ceiling, and by means of the rope-ladder descend into the happy valley, in which their friend had rioted before. The whole manœuvre was executed, according to the *historian*, in the best style—no jostling, no impeding each other's progress, like your foolish *human* crowds! The *fasting* descend into the pot in one column, the *fed* make their exit in another, and the rythm of march and countermarch is uninterrupted, till they have licked the pot clean! Now, all I have to say concerning this story, which Mr. Edwards relates as irrefragable proof of *intercommunication*, is, that we must henceforth give ants credit for *all* the following privileges. We must admit that they not only feel, but remember—not only remember, but compare—not only compare, but conclude,—not only conclude, but remember their conclusion! and consequently we have *settled* the point, that ants have *ideas*,

and therefore must be capable of mental hallucination, and be liable to go mad or melancholy! *But all this is not yet enough!* Having conferred on them ideas, and, together with ideas, of strict necessity all the *senses* by which *ideas are obtained*, we must still—as ants are found to communicate with others—extend their privileges! The shipwrecked mariner may have made his *wants* intelligible to savages – but only his *mere* wants—he certainly could not enter into the *details* of his mishap, or make the *manner of his escape* apprehended by signs and gesticulations. But as to the *Protagonist* in our tale, why none but a Mime in those latter days, when Drama had become *Pantomime*, and the stately Iambic was no longer acceptable to the mob, could have done as much as he did, in a few seconds, without the aid of the flexible features, or the hands and the fingers, in which man rejoices! by *which* of his *semaphoric* organs is an *ant* to tell a story, which it requires a printed page to record, even after conceiving a *wish*, or *intention* to set about it? Not by his eyes!—*they are fixed* in their sockets, and about as unintellectual as the glass eyes in a doll; he could not even look *up*, if he would. I presume he could not *improvise* his part, by the invention of *new* signs, and as to the employment of *old* ones, *traditional* in the *ant republic*, one would as soon believe they *had* a language at once. Intercourse of mind between insects! No! no! an exchange of intelligent signs for the execution of particular ends, in this order of created beings, *must* be deemed impossible in the face of whatever supposed examples, or you must at once concede to insects a full set of senses, and an intellect capable of employing them in the acquisition and advancement of knowledge?

I know that to engage in the task of depreciating the reputation either of man or fly, is not the way to increase our own. Every difficulty raised will be considered as a *cavil* by those who wish to believe what their child-

hood accepted as orthodox concerning the *wisdom* of ants and the *economy* of bees, but most of all, concerning the endowments which we are accustomed to admire in the *higher* animals. Why love a dog better than a watch, asks the Jesuit Bugeant, if we did not *believe* the dog had a *heart*, and a mind, and was capable of reciprocity of *affection*. But,—to indulge in a moment's *digression* from the affair in hand,—not only, my dear Jesuit! do nuns love canaries; not only do the Lesbians of all ages exhibit red eyes, and exact elegies when tame sparrows die, but such are the imperative *besoins du cœur*, that revolting things, and *inanimate*, become indisputable objects of attachment, for want of something better. The inmates of the dungeon have been glad to court the *society* of the *spider*; sailors become impassioned in reciting the wreck of their *favourite ship*; and oh! with what saddening delight does the man of a few years' standing, revisit the scenes of his youth! with what emotion would he interrogate the trees, those silent witnesses of early affections, or still earlier ventures!—how he gazes on the still *crumbling*, still *resisting* bank of some *unsung* stream, to him worth all the

— rura, quæ Liris quieta

Mordet aqua, taciturnus amnis

And grasps, alas, it is with hands of full stature! the trusty and rusty chain which he has so often furtively loosed from its moorings!—All this, it may be said, is from early association; it shows however, my dear Jesuit, that our hearts do not in *all* their pursuits exact *reciprocity*, nor needs there the eloquence of a Tully to assure us, that *non modo in hoc, quod est animal, sed in iis etiam, quæ sunt inanimata, consuetudo valet*.

And it must, I conjecture, my equally dear reader! be somewhere about this passage that *you* will come upon me with an overwhelming question—“What do I mean to

do with that amazing faculty exhibited in the higher animals in such *uncial* characters that all who run may read ! whether, you will tell me, we can, or cannot detect, *organs*, in these minute forms of being, which are so appreciable in the *higher* ones, it will remain certain; that even insects do often exhibit the same marvels, which under the name of *instinctive*, we enlarge upon in the dog or the elephant ?” “Thou wondrous Faculty,” (let us try our hand at an *apostrophe*), “that art far less fallible than that *Reason* of which we are so *unreasonably* vain, what a *Giaour* must he be that hesitates to recognise *thee* as the sufficient and inscrutable guide of the microscopic myriads that go forth under *no other* auspices, and fulfil their destiny under no other inspirations ? Is it not *thou* that teachest the voracious *rat*, by some mysterious intimation, to anticipate the moment when the centre of gravity which gave security to the walls he haunted, and to himself, is about to be lost, and makest him scan, like a surveyor, the sufficiency of beam and rafter ? Led by whom (and never since creation dawned, *mised*) the *swallow* continues to depart, almost to a fixed day in the calendar, the same for the same place, since Aristotle, in *quoting* that primæval proverb that “*one swallow does not make a summer*,” attested also that even the bright autumns on the banks of the Peneus had no charms to detain the migrative bird ? \* Prompted by thee, the thirst-stricken *camel* is seen to mend his flagging pace, and rejoice his weary master by

\* “*Who* taught the nations of the field and wood  
To shun their poison, and to choose their food ?  
Prescient, the tides or tempests to withstand,  
*Build* on the waves, or *arch* beneath the sand,  
*Who* bid the Stork, Columbus-like, explore  
Heavens not his own, and worlds not known before  
*Who* calls the councils, states the *certain* day ?  
*Who* forms the phalanx, and *who* points the way ?”

POPE.

the dumb announcement that the well cannot be distant! and canst thou have forgotten the *insect* tribes, that so much excel in number and variety, *all the rest of creation*? Is not that miracle of winged creatures, whose aromatic honies have imposed the celebrity of their name, alike upon the Canaans and the Atticas of old, have nourished prophets in the wilderness and armies on the march,\* an object of thy peculiar care! and though that silly *moth*, who hastens to his own funeral pile with such precipitate impetuosity will not attend to thee, (for such fatuity can be no work of thine!) who shall deny that the *Silpha*, the *Phalæna Cossus*, and the *Carabus* are directed by thy hint, to discharge, on suitable provocation, that caustic venom which one of the family, † (a sharp shooter is he!) is mischievous enough to direct into the *eye* of the prying entomologist? What though the songstress *Cicada*, careless of thy lessons, involves herself in *froth* in the vain hope of eluding observation, (for her froth is more observable than herself) yet there can be no mistake in attributing it to *thy* suggestion that *Tortrices* roll themselves in leaves, that the *Grillus* (that *Schænobatist* of the insect reign), escapes us by a series of jumps which make the chase hopeless; that the *Cicendella*, deeming “discretion the better part of valour,” runs out of harm’s way, leaving the *Cimex*, motionless and knowing that he is loathed, to stink in security! Incited by thy resistless *æstrum*, see where that amorous spinster, the *Lampyrus*, hangs out her beacon light, to lure the winged gallant to her bower, from that ocean of air which he is navigating! Tribes without number, and without name, are instructed by thee to wait for the evening star, and go forth into the “*all-eyed firmament*” § to the positions best adapted for defence, snare, or subterfuge? Thou admonishest the *Bombix* to

\* Xenophon Anabasis.

† The Procrustes Coriaceus.

§ Cowley, not Coleridge.

cling to his *cord* till the danger is gone by; thou persuadest the *Elater* to pretend to be dead, and whisperest to the whole *hypolithic* community to crouch like hares at the approach of human foot step! As to the higher animals—the *cerebral* part of the creation—they indeed may have heads and hearts, and minds, and conduct themselves like half-reasoning creatures; but in the economy of *insect life*, Legislator, Tactician, Geometer, and Layer-up in barns, thou reignest paramount and alone!——”

To this *Feu de joie*, which I have out of politeness permitted my opponent to *let off*, what can I reply? Verily what he has alleged is sufficiently formidable! but I shall decline the rhetoric, in which I feel he has the advantage of me, and throw into the *notes* chiefly, a few instances a little out of the common way—cases, no doubt, in which he would suppose the *personal* intelligence of his *protégées* beyond *suspicion*; and if it shall appear thereafter, that the promptings of this *ubiquitous Captain Rock*, whom merely to *name*, has hitherto either silenced objection or satisfied inquiry, are sometimes of a very *ambiguous* character—that, for instance, *the instinct of an animal is often positively foolishness, as far as its own security is concerned*,—why we *must* either modify our creeds accordingly, or cling to that “*mentis gratissimus error*” which led the *dreamer* of the orchestra to be angry at those who woke him.

It is far from our object to invalidate *a single fact* either of those we have, or may not have related; but we are not all compelled to look at facts in the same way; and though, like others, we can endure to hear of “*the ants’ republic and the realm of bees*,” we have taken leave to doubt, if the Supreme Intelligence hath indeed lodged such profound wisdom in the small frame of which the motions are directed by it. We desire to “*sing praises with understanding*;” and without vain conjectures concerning what we take upon us to call *final causes*, to study, as

best we may, the operations of that Power, which

“ Changed in all, and yet in all the same,  
Lives through all life, extends through all extent,  
Spreads undivided, operates unspent.”

POPE.

Though the word “Instinct” be familiar to men’s ears as “household gods,” there is, it would appear, no unity of opinion as to what is to be understood by it. For while some would oppose instinct to reason, and others would have it something beyond reason, all agree, by the very *invention* and employment of the word, to make instinct and reason different. *To my notion instinct is reason*; but it is reason acting *from without*. Is it explaining any thing, to use the language of a French philosopher respecting bees, and say that they fulfil their destiny “*par un sentiment aveugle.*” What, in the name of French philosophy, is an *sentiment aveugle*? A *blind* sentiment is a *contradiction in terms*: define sentiment, which cannot be organic, as you will, some element of mind will adhere to it. Sentiment is the result of a conception, and what conceives but the mind? wherever we see what is called Instinct displayed, God forbid that we should doubt the hand of God to be at work! but is it necessary to suppose *that* wisdom to be concrete, as it were, and resident in the insect that displays it. If it is his *own* knowledge that a bee displays in what you call his *instinctive* actions; if it is his *own mind* that he exercises in the construction of his cell, or the economy of the hive, I contend that you allow more knowledge than man himself can muster, for *that particular task, to a bee!* A profound problem is proposed to the society of the hive for the first time, and *understood at once by all!* But this is only the intellectual part: now comes the practical. The school of mathematicians has become a colony of architects, of whom each not only performs his own share of the task previously concerted together, but also works



in reference to his neighbour's, which if he did not, the parts would not tally, and the work, as a whole, would be an *amorphous failure*, in place of a *geometrically accurate model*! This labour completed, the *Commissariat* department is to be placed in activity, and the work of provision forthwith commences. But, does *innate* intelligence, then, guide the bee to make *more* honey and wax than can ever be necessary for his own or his family's consumption? and, if he acts by *his own sagacity*, of course *he does not intend* to elaborate it for *yours*: but make the operation *not* the instinct of the bee for his own sake, and it may well be conceived, and agreeably to the strictest analogy, that the wisdom which *created*, may have imposed the task upon the insect of performing this recondite chemistry *for the use of man*.

“*Sic vos non vobis mellificatis apes!*”

The more I reflect on the subject—of the facts on which I ground my reflections I have thought it best to place the greater number in the notes that are to follow—the more am I led to believe that, whatever there is of wonder in the economy of insects, (and where is there so much?) is the result of an *exterior* agency, and that, alike in their wisest and their most foolish actions, *they intend nothing*. The first thing they do is as perfect as the last. They never profit by misfortune, or modify their actions from *experience*; and as all knowledge, except that of the *pure intellect*, (which is not in question here, where things are to be *done* as well as conceived) *comes from experience*, therefore can they accumulate no knowledge; without knowledge, it follows that they can have no *will*, and so, that their *supposed instinctive* actions, cannot be the result of choice; and all this is strictly in conformity to conclusions at which we had long since arrived, by *another process*, in the first pages of this

\* Παθηματα ου μαθηματα Cræsus apud Herod.

Essay, where we endeavoured to show the very small probability, that insects are in possession of the *organism*, *external*, *internal*, or *both*, which is indispensable to *sensibility*, and which, *if they had*, they must also have *those* perceptions out of which all *practical* knowledge is formed, and experience acquired.\* Or, in other words, without the power of comparing and combining ideas, which *requires a brain*, it would be gratuitous to suppose *ideas at all*, or *organs of sense*, by which to get them:—for of what use would *abstract truths* be to a *beetle*, or wherefore should he be placed in a condition to acquire the elements of knowledge, which from want of the power of combination could *never serve him*—thus anatomy supports our metaphysics, and metaphysics our anatomy.

And the argument which proves them incapable of acquiring ideas, does it not also show them to be impassive creatures? And such I conclude them to be; for conclude I must, that the moth, who burns himself over and over again in my candle, as if he could not have enough of it, does *not* feel pain; or, if you will not listen to this conclusion, you at least will admit that he is not a voluntary agent, and is *incapable* of obedience to the salutary warning which would save his life. Am I then forced to be the expositor of the law by which he burns himself? The whole insect race is comparatively *ephemeral*! they do not all die (very few do) *a natural death*, † but are *destined*, some to perish by flood, and some by field; some in the mustard-pot, and some in the

\* All knowledge is from *sensation* and reflection, as *Locke*, or from *sensation*, memory, and judgment, as the Scotch Metaphysicians say; at any rate the *practical* knowledge concerning which we enquire is doubtless so derived.

† It may be said of *them* as of the short-lived *despots* of antiquity,  
Ad generem Cereris sine cæde et sanguine, pauci  
Descendunt — —

sugar-bowl; some to devour one another, and some, like our moth, to perish *painless* in the *fire*. The *superfætation* of insect life, as it seems, must be kept under; indeed, we do not know why insects, except a very few,\* were made at all, as to any thing they produce for our advantage; but the folly of supposing every thing made for us and our advantage!

“ Has God, thou fool! work'd solely for *thy* good,  
*Thy* joy, *thy* pastime, *thy* attire, *thy* food?”

The ingenious author (I do not know who he was) of a treatise “*sur l'âme des bêtes*,” after having confuted the Cartesian doctrine of the automatism of the whole animal kingdom, finds less difficulty in bringing into discredit that Aristotelian anomalous “*something betwixt soul and body*,” which was certainly not the brightest excogitation of the great Stageirite. Having expressed as his own immediate and strong conviction that animals have *minds*, he proceeds to inquire what sort of minds they are,—with what felicity or infelicity we shall presently see. “I represent to myself,” says he, “the *mind of beasts*, as an immaterial and intelligent *something*, an *active principle* possessing *sensation*, and *no more*.” A parallel being next instituted between our minds and those of beasts, in which he allows to both alike, whatever of good and evil, of pain or pleasure, comes of the possession of the *sentient principle*, he proceeds to allot to man *exclusively* the faculty of forming those *clear and distinct ideas*, upon which, by the action of the *will*, are formed (he says) *reflexions*, *judgments*, *reasonings*, *free preferences*. Now it is here, and in what follows, where he concedes to animals “*little invo-*

\* The *bee*, the *coccinella*, the *coscus*, which the ancients ate, the *locust*, the *silk-worm*, the *vesicating flies* (to which we are indebted for the luxury of blisters) and many that cleanse foul fish ponds, partly by feeding the fish, and partly by eating the impurities—

luntary ideas," that so acute a writer, who had "done the state good service" in exposing the dogmas of Aristotle, Descartes, and Malebranche, commits himself by manifest contradictions. Surely the very notion of a *mind in brutes*, capable only of *feeling*, and of *forming ideas* requiring to be qualified by the epithets *little* and *confused*, is preposterous! Surely if an animal be conceived to have the power of forming *any idea* at all he must be allowed the power of forming a *clear* one! Surely it is on the *process* by which *ideas* are formed at all, that all ulterior and higher phenomena of mind depend; and if an insect have that power, and can institute that process he is in full possession of a *mind*: and that mind must be a mind like our own, for mind has no essential differences. *Mind* must be intrinsically alike in all beings that possess it, and can differ but in degree. *To will, to judge, are the self same mental acts in biped or in quadruped.* *Confused ideas*, moreover, if the expression itself can be used without a solecism, could be of no use whatever to the possessor. But take an instance. Suppose an insect endeavours to escape before he is touched — i.e., before the *sensitive mind*, conceded to him by this author has been reached. Is it from *fear*? But what *mental acts* does that emotion imply?—to admit that the insect *fears*, is in effect a full admission, as we have seen, of its possessing that *judgment* and that *will* which he formally denies to them. Again, "Insects," he observes in another passage, "have not the *rational* mind, have not the mind capable of containing the knowledge on which sciences and arts are founded; yet the spider's *web*, the bee's *cell*, or the chrysalis' *cocoon*, are works continually under our eyes! How do insects with *confused* ideas, and *only sensitive* minds, make them? In short a purely *sensitive mind*, if the supposition were not absurd, would be wholly inadequate to any of the *wonders of insect architecture*. Their economy, their stratagems, or

their provident care of their young, all suppose not *confused* ideas, but *deep laid thought and design*—so that it follows, that insects must *either* have a mind to *think*, as well as to *feel* with, or, as we have concluded, *no mind at all*.

But it may be said that wasps and bees often seem to sting *vindictively*, and that this implies not only that they have *passions*, but *design and will*. I answer, that wasps and bees do indeed occasionally sting, but so do mosquitoes and gnats, and sand-flies, and ants, and fleas, and many other insects. If the bee really *intends* to sting, it must either follow, that all insects which sting, *intend* to do so, or we must conclude that the bee and the wasp are alone malignant, in their natures, and bear us more ill will than others, while the ant, and the many troublesome flies of declining summer, who dispute with us our peaches and our plums, sting without malice and unintentionally. Here, as in all the other difficulties which this subject presents, that some *purpose* is intended by an insect's sting, we profess not to doubt. But that stings were given to *protect* the insect we rather disbelieve; for 1st, all insects have not stings, (it is generally the females alone) nor any other compensating apparatus;—2dly, such insects as *have* stings *seldom* use them, at least offensively;—3dly, such conspicuous and formidable instruments should be judged of by their *habitual use*, which we know not, rather than by their occasional employment;—4thly, instruments *really impotent for defence*, would not have been given, if *defence* were the main object, and stings are in this predicament of inutility;—5thly, still less probably for the mere purpose of inflicting *pain*, unless some moral lesson were to be taught by the pain inflicted;—6thly, insects *leave* their stings in the wound, and so die; the completest of proofs that stings were not given them as a *means* to their *own* safety:—7thly, *weather*, which makes us *waspish*

has the same effect upon the *cattle flies*, who may object to rain on their own account, but would be very unreasonable *in stinging horse or cow* as if they occasioned it. *Who* does not know that a multitude of flies sting, and only sting *before rain*?—From all which considerations, the sting in insects not only may, but I think *must* have been conferred for purposes widely different from those popularly attributed to it. “When,” says Cowley, “we trust man concerning God, we *then* trust not God concerning man.”

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## APPENDIX.

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### THE BEE

I shall say a few words of the Bee first, in consideration of the non-entomological reader, to whom an insect with a new name, might present more questionable pretensions to sagacity; but from Theocritus and Horace, down to Huber and Watts, the "busy bee" has gone on affording lessons which it is hoped tend to the improvement of those to whom they are addressed; and truly, certain of the acts of this singularly interesting insect, which is a considerable contributor to the wealth of nations (as the entries of foreign honies at the custom-house may certify) *do* afford astounding evidence of the perfection of divine workmanship! "The *patriotic* and *republican* spirit of bees is so remarkable," says an eminent French naturalist, "and the *views* which *guide* them seem so premeditated, and are so invariable, that even philosophy would derive light from an attentive consideration of their proceedings." Meanwhile take the following as accredited instances of the *instinct* of bees.

The working bees, which are mules, having no sex, exhibit notwithstanding, an affection purely disinterested for the female who is to maintain the race. These eunuchs of her harem follow and protect her wherever she goes, building cells for her ungrudgingly, and doing everything for her accommodation, *so long as she is in a capacity to lay eggs*. If however the *queen bee* be so wounded as to



prevent the discharge of this office, the working bees, becoming *aware*, as it is alleged and believed, of *her sterility*, decline to labour as heretofore for her accommodation, "*foreknowing*," says one of the writers of authority on bees, "*that there are to be no eggs!*" Again, should there be too many female bees in the hive, the working bees kill some of them off to *prevent jealousy*, or the too frequent and expensive emigrations, which would take place under a plurality of queens. The working bees take equal care of their males, in spring, (when the hive is looking out for a new generation), but *destroy them as useless in August!* Nay, some writers of credit are not afraid to tell us, that the bees *know beforehand*, when the young queen is about to leave her chamber, and *before* any opening is made, buzz about the future door and are in punctual attendance at her yet undeclared vestibule. As soon as the cells are emptied of their eggs, (a task executed by a delegacy of the community,) they are filled with honey by others appointed to the labour. The queen bee has her biographers. She possesses a *character*, and it is not a very good one,—her *morals*, it seems, are by no means irreproachable, and some of her actions, as related by Reaumur, exhibit her less as the Lucretia than the Messalina of insects!—Thus we see, that, without any the least misgivings in those who celebrate its accomplishments, the bee enjoys the reputation not only of *knowledge* which we could not reach, but of *foreknowledge*, to which neither *instinct* nor *reason* could possibly contribute. Yet it is for *one or other* of these two Candidates that your suffrage is asked, and it is easy to see for which of them the prejudice of education will carry the election; for if one should write a folio against the admission of a *self-directing power in animals which have no brain or nervous system*, we still prefer the poet to the philosopher.

“ Say where full *Instinct* is th’unerring guide  
 What pope or council shall they need beside?  
 Reason, however able, cool at best,  
 Cares not for service, or but serves when prest,  
 Stays till we call, and then not often near—  
 But honest instinct is a volunteer.  
 This too, serves always,—reason never long;  
 One *must* go right, the other *may* go wrong!”

POPE.

But my vote is elsewhere recorded. To believe that the actions of the bee are instinctive, or the result of any cerebral process of *its own*, I find *impossible*; to ascribe them to the *Reason* that conducts the universe, I deem an *impropriety* of expression—for *perfect wisdom acts without comparing*, i. e., without *reasoning*: Omniscience embraces the conclusion with the commencement of the act, and arrives at the essence of all knowledge without a process.

## ANTS.

La fourmi tous les ans traversant les guérets,  
 Grossit ses magasins des trésors de Cérès ;  
 Et dès que l'aquilon, ramenant la froidure,  
 Vient de ses noirs frimas attrister la nature,  
 Cet animal, tapis dans son obscurité  
 Jouit l'hiver des biens conquis durant l'été.  
 Mais on ne la voit point d'une humeur inconstante,  
 Paresseuse au printemps, en hiver diligente.

(BOILEAU.)

And thus they all say and *sing* concerning the *providence* of that "*magni formica laboris*" who figures in common-place, wherever sloth is to be reprehended or frugality advised. But alas for the correctness of statements with which our ears are familiar! This insect, which fabulists and moralists, from Solomon downwards, have been so fond of extolling and recommending to *our imitation*, must, it now seems, be censured by the veracious historian, as a laborious idler, or as a miserable hoarder up for hoarding sake. It is now *ascertained* that ants *never open their mouths to eat or drink the whole winter through*, so that they collect *without object*, and accumulate *what they cannot enjoy*. It is *we* who have put designs into ants of which they never dreamt; the ant-hills, or supposed magazines, turn out not to be *granaries*, as a respectable author in his memoir on these interesting insects recently assures us; not that they are constructed *with less design*, but the *end proposed* in their construction is different. The grains thought to be *provision*, are merely *rubble or loose building materials*; "*ce ne sont point des provisions de bouche, ce sont de simples materiaux qu'elles*

font entrer dans la construction de leur édifice, comme elles y font entrer des brins de bois, de paille, etc." The solicitude of ants for the young race, and the care which they take in transporting them from place to place, has not been over-stated. They cherish and protect them with equal intelligence and courage; the working ants *know* what precise degree of heat their health requires, and never fail to bring them to the surface when the heat of the atmosphere is favorable, or bury them at different depths, according to the intensity of the cold. As soon as the larvæ are hatched, the working ants begin bringing in the *débris* of dead insects found by the way, or drag a struggling worm into the fatal shambles, where it is divided into pieces, and apportioned to each, in rations most accurately served out, the elder members of the community never touching food, till the young have been fed and are satisfied. We are also assured that when one of the labourers is accidentally wounded at his work, he is *assisted* off by the others, and taken to the hospital; but if his case be *past skill of surgery*, his body is thrown away with the rubbish from the nest. Now all these, and a great many more things recorded in the book of ants, are indeed, to use the common phrase, surprising instances of *instinct*.

#### WASP.

Edwards relates the following extraordinary case of *instinct* in a *wasp*, from Darwin. This wasp, it appears, was detected by our poet philosopher *in the act* of endeavouring to carry off a fly of nearly the same size as himself; in order to be able to fly away with him, he first cut off his victim's head, but the wings of the deceased fly *being found to offer too great a resistance to the air*, this very clever wasp was obliged to descend again into the garden with his booty, where, to the wonder of Dr. Darwin, he *bit off the wings* very neatly one after the other, and then bore him aloof without difficulty!

I subjoin Edwards's own interpretation of the wasp's behaviour in the series of acts which were sworn to by competent witnesses:—*Wasp loquitur*. "Quelque chose agit sur les ailes de cette mouche, et m'empêche d'avancer; si je veux regagner rapidement ma demeure, il faut que je m'en débarrasse, et pour cela le meilleur moyen,

c'est de retourner à terre et de les couper." "Nothing short of *reason*," says Edwards, "will account for this series of actions."

See here the confusion of half-thought thoughts, respecting *instinct*! An act, or series of acts, is found too complicated for *instinct*; *design* is too apparent; *instinct* therefore is *deposed*, and *reason* placed upon the throne! the commentator sees that *instinct* could not do the work, and has recourse to *one who can*. We are then, it seems, to believe that wasps *reason* when *they act reasonably*!

In all nature there are but *two* existences, mind and matter—mind active, matter inert; whenever *matter* is moved, it is moved by *mind*, as here, ("*mens agit molem*;"') and where actions are too complicated, *design* too profound to be imputed to creatures to whom we *must* deny *mind*, where else can we look for a solution of our difficulty than to the perfectly intelligent Creator? The very word *instinct* is not a happy one, it is equally unsuitable to express those actions of animals, to which they are impelled by some exterior necessity, or those in which the mechanism of organs is merely put into activity by their appropriate stimuli.

#### CASSIDÆ.

The Cassidæ, whose name sufficiently explains their shape and general appearance, (*cassis*, a helmet,) are frequently of gaudy and beautiful colours, and so *aware*, it seems, of their charms, (vide the nonsensical entomologists *passim*,) that they smear themselves with dung, in order to *look hideous*, and so *think* to escape the cruel good taste of a bird of prey! Without having read Juvenal, they have fully *reflected*, it appears, on the dangers of beauty, and have adopted, without consulting Rabelais, the very expedient employed by that celebrated person—"Je m'envelope en ordure pour rendre ma personne inviolable."

#### LAMPYRIS.

The female glow-worm uses the *voluntary* power which this insect so curiously exercises over its light, to *forward the propensities of sex*; she is said not only to attract the male by the light

which emanates from her body, but to make it brighter in proportion to the force of her inclinations! If entomologists tell the truth and there be no mistake, Hymen might light his torch at a glow-worm's tail.

#### ELATERS.

The Elater forms a subdivision of the Buprestidæ, a name by which the ancients designated the vesicating flies. Naturalists are wont to give, in a proof of the *instinct of self-preservation* in these insects, which are very agreeable to the eye, *that they draw in their legs and fall as if dead at your approach!* If the expedient is so capital, why does no other insect hit upon the same? But if *design* guided this insect, he would not *always* fall, as when a palpable trap was laid for him to fall into. The fact is that that the action is not understood, and a false interpretation is worse than none.

#### SPIDERS.

It is said that certain male spiders approach their females, who greatly exceed them in size, and whose *anger they dread*, (*minime-que libidine peccant*,) with *manifest timidity*. A rope ladder (such rope as spiders make) conducts the gallant to the bower of bliss, and when the interview is over, he *knows* he must not loiter. But, expeditious as he is, he gets now and then caught in the act of retiring, and is torn to pieces by his unnatural mate! But the *maternal* impulse is more exemplary than the *conjugal* in this ill-conditioned *ménage!* It is a singular spectacle to see the mother engaged in the work of liberating her progeny from their shells; when this extrication is accomplished, they mount upon her back, and are carried about by her for sundry days, during which she entertains them with such insects, as may suit the delicate appetites of spiders still in the nursery. So thickly does she allow these unfledged spiderlings to occupy her back, that she consents to be made hideous and bloated to look upon, for the sake of her progeny, like other slatterns in the biped conditions of life. Before she has a family, she is represented as timid, but once become a mother, she is a very lioness! Knock off the brood from her back, and she stoops to pick them up again, and would rather perish than

part with one. Seize the sack of eggs containing her *posterity*, she runs away a few steps, pauses, and returns to look for it, attaches it anew to her person, and carries it off in triumph! Or, if you still withhold it, marvelous are those rapid movements of *inquietude* which exhibit her *distress*!—she hovers about the spot, from which she is *unable to tear herself*; and when at last you surrender back her treasures, after thus trifling with her *feelings*, she makes the best of her legs and carries it to a place of security! The family, however, turns out not to be worth all this prodigality of affection; while living upon their mother's exertions, they are orderly enough, but in a few days, when she bids them go about their business and try to find food for themselves, they attack each other without mercy, and seem only to long for an opportunity of committing both fratricide and cannibalism, if the accidents of life should make it necessary!

Dumeril, and, if I mistake not, White, in his natural history of Selborne, records that he more than once remarked a cloud of floating silk in the air, on examining carefully into the threads of which, he had invariably found a small spider attached to one end, while the other extremity was free. These spiders, it seems, which are unprovided with wings, but destined, nevertheless, to move occasionally in that element for which wings are usually given, are enabled, being already very small and light, to make themselves buoyant by spinning this flocculent material, of which, of course they *intuitively know* the quantity and the strength. They have only to keep open their silk bags, and the slightest current of air suffices to unravel the material—which is an animal juice suddenly consolidated. The *loom labours*, indeed, of all spiders have attracted curiosity from the earliest times: the beautiful parallelism of the threads, “Sure as De Moivre's, without rule or line,” deserved the couplet in which Pope has recorded it.

#### ICHNEUMON.

All the large tribe of flies which we call Ichneumon, have the *instinctive* propensity to plant their eggs in, or upon the body of some other insect, whose unfortunate carcass perishes in consequence; and if insects be susceptible of pain, it must be most pain-

ful, for they are *eaten alive bit by bit*. By an extraordinary appointment, the unnatural parasite begins, as soon as his strength permits, to devour its living foster parent, and desists not till he is quite consumed. The ichneumon mother is not nice in her choice, but settles her progeny impartially upon friend or foe; every insect is liable to this *prima facie* cruel dispensation. The largest caterpillar, the strongest larva, cannot elude the fatal *depositum*, and will assuredly be turned inside out, by the nascent traitor. The mother ichneumon, they moreover tell us, always fixes upon an insect *just adequate* in size to the future wants of her family, and whose skin is not *too tough* for the unborn young to eat their way through: what discernment!—Sometimes they *inoculate* their own eggs *into* a butterfly's, and the young comes forth an ichneumon. They will watch a nest which another insect has just made, and while its proprietor (fearful of some danger of the kind, for has not she too, her *instincts*?) is gone in quest of materials to cover the aperture, they have already taken *their* opportunity, and when she returns with her *mortar*, it is too late! If they cannot gain direct admittance, they are satisfied with leaving the *eggs* of their mischief which, of course, they *know* will be duly hatched afterwards, taking care to push them in as far as they can, and *trusting* the rest to the sagacity of the future larva itself! The hopeful progeny not only never fail to accomplish what is expected from them, but show good taste almost as soon as they are born! for instead of eating up *any* part of their foster-parent that comes nearest, they begin with his *fat*, and it is only when they have attained a certain size, and are become lusty on their infantile diet, that they begin to tear him piecemeal and prey upon his vitals!

#### LES CARABIQUES.

This family is immense! the collector who would have specimens of most of the genera which it contains, will find no difficulty in filling a dozen boxes out of 100 in a general collection of *Coleopteres*: all are remarkable for *carnivorous* propensities, and most of them being very active and swift, carry on a successful war of extermination against all other insects. One of the many proofs of their *cunning*, in procuring a dinner without trouble, may be

worthy of relation, and the more so that it takes place, not in the full intelligence of the perfect insect, but while he is yet a *nursling*! The larvæ of the Cicindelæ, are said, to resort to the following device for their livelihood, nor could the sagacity of Ulysses have imagined a better. They drill a series of perpendicular holes in the earth, which they excavate with great care as dwelling places for themselves, and a snare for their prey. Within the immediate embouchure, which is a perfect circle, sits the larva, and when an insect passes over it, he is liable to find himself seized upon by a pair of unrelenting jaws, which twist him over, and consign him at once to the black abyss, there doomed to remain till the inhospitable host is sufficiently hungry.

The Hydrophiles, another predatory tribe, living mostly in the water, are obliged to come up to the surface occasionally, to breathe;—this they effect in the following manner:—being a very little lighter than the element itself, their *backs* only are just visible above the surface; in order to emerge sufficiently, they push their wing cases outwards from the flat position which they occupy against the body in a quiescent state, and so form a vacuum into which air rushes, and finds its way into their *stigmata*, or lungs, which are situated under these wing cases.

### CATERPILLARS.

These insects have been studied with peculiar attention by Reaumur and Lyonnet, and much information respecting their mode of life is to be found in Malpighi, Swammerdam, and Bonnet. For their *instincts*,—"as soon as a new-born caterpillar finds his way to a leaf, he is followed by another, then by a third, fourth, fifth, sixth, etc., who establish themselves, as by mutual consent, all of a row, like guests on the same side of a long table; thus arranged, they begin to eat, in society, their first leguminous dinner. But another row is already placing itself behind the first, and a third line of new arrivals is followed by a fourth, and so on till the whole surface, down to the very stalk, is covered by lines of invaders. When all are fed in a manner, which makes waste impossible, they begin to construct a silky awning over their heads, and carry a series of threads from one border of the leaf to the other, which collapsing in the mid-



dle, from the loss of substance which they have devoured, promotes the success of their labors; nor do they desist till the awning is sufficiently strong to protect the whole family from *weather*. To this place of shade and protection the caterpillar resorts when about to exchange his old dress for a new one, or when the heat is too great, or when it rains. That they never go farther from their nest than the length of the bough which bears them, is unhandsomely imputed by their historian to a want of *courage*; whereas it is only a little of that salutary caution which ensures success in biped life, and a fixed home to the unambitious, who never forsake the bough that *can* bear them, for the one that *may*. The thread they spin is the boundary of their walk, and the clue by which (as they are blind) they feel their way homewards. In the morning, when the sun's cheerful rays are full upon their nest, they all turn out for a walk, either loitering along the branch, or sitting in the balcony of their own construction. "C'est un spectacle très-amusant que de voir ces petites chenilles aller et venir, les unes d'un côté, les autres d'un autre et s'entrebaiser comme les fourmis quand elles se rencontrent." The reader sees that in all this the caterpillar leads a not less agreeable than intelligent life, and if he can impute to a *blind* and *brainless* insect the *design* of spinning a thread by which to feel his way home, as if in consciousness of that blindness, and can believe that the *necessary intelligence* for these actions belong to the *living worm which executes them from generation to generation*, why I desire not to meet with a more liberal comrade in my journey through life; he will make the most candid allowances I am persuaded, for the most anomalous and equivocal actions of his *fellow-creatures*, and put the very kindest construction on these *lucubrations of mine*.

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## Appendix (A.)

Lamarck has expressly declared that neither *insects* nor *worms* have *brains*.

“ Les insectes *manquent* de cerveau, mais ils ont une moelle longitudinale *noueuse*, et des *nerfs*.”

“ Les vers sont encore plus imparfaits, ou plus simplement organisés que les insectes, puisque le plupart sont sans *yeux*, que leur *tête* n'est jamais libre, que souvent même on ne saurait la *distinguer*; leur système nerveux est une moelle longitudinale, et de nerfs dans la plupart.”

## Appendix (B.)

“ Il y en a (des vers) qui, étant *coupés en deux*, parviennent à *réparer* et à *cicatriser* l'extrémité tronquée de chaque portion de leur corps, en sorte qu'il en résulte *deux individus* qui vivent séparément.” \*  
 Certain leeches also may be cut into many pieces, of which each becomes in a few hours a perfect leech after it's kind. These facts of course entirely destroy the speculation in which some indulge concerning the head ganglion, and show that there can be no more reason for investing it, than any of the other ganglia arranged along the central nervous cord with cerebral attributes. The propagation of these creatures in the way mentioned, (which, by-the-bye, affords a *striking analogy* with the *propagation of plants from slips*, where

\* Lamarck.

each slip contains the rudiments of the future plant) could not take place in creatures who had any thing *beyond* mere matter in their composition, (for we cannot divide what is immaterial) and accordingly it never occurs in such creatures as present that tangible seat of mind—a brain. When a worm, which is said to move aside at my approach, from *fear*, is treated as above, does the fear, the moral emotion, split itself *into two portions of panic*, according to the pieces?

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FINIS.



