

*Mind in Plants.* By W. LAUDER LINDSAY, M.D., F.R.S.E.,  
F.L.S.

In studying, during the last five years, the phenomena of *Mind in the Lower Animals*, I have encountered as great difficulty in drawing any definite or definable Psychological Line of Demarcation between *Plants* and the Lowest Animals as between the Higher Animals and Man. In other words, it appears to me that *certain attributes of mind, as it occurs in Man, are common to Plants*. The only alternative is the omission from our conceptions and definitions of Mind of certain phenomena common to plants with all classes of animals, including man—those, namely, that do not involve what we distinctively call *consciousness*. But the difficulties of such an elimination seem to me insuperable.

What I hold to be a certain *Community of, or in, Mind between Plants and Animals*—in so far as concerns its lower or rudimentary manifestations—is, I think, of sufficient interest and importance to deserve special study in connection more particularly with the surprising results recently recorded by Naturalists as to the behaviour, under certain circumstances, of *Insectivorous or Carnivorous Plants*.\*

My present paper is intended simply to indicate to those who may have the necessary time to devote to such an inquiry, and who are favoured with due opportunities of residence or otherwise, some of the physiologico-psychical bearings of the subject of Plant-mind. What I now offer is, not an exhaustive essay, but a mere sketch or outline, the details of which may be filled up by the reader with the aid of the most recent works on Physiological Botany—especially those of Germany.†

In my own inquiries on the subject of what has been, by various authors, described as "*Instinct*" in Plants—inquiries which have arisen, in consequence of my non-access in a country residence to the latest works on Vegetable Physi-

\* As described (*e.g.*) by—

- (1.) Darwin: "*Insectivorous Plants*," 8vo., illustrated, London, 1875.
- (2.) Hooker: Address on the same subject, before the British Association at Belfast, 1874, and reported at length in "*Nature*," for Sept. 3, 1874.
- (3.) Balfour (Dr. Thomas A.G., of Edin.), in the "*Transactions of the Botanical Society of Edin.*," for 1875; as well as in the "*Garden*," for Aug., 1875, and in "*Chambers's Journal*," for Aug., 21, 1875.

† For instance (1) the English translation of Sachs; or of (2) Le Maout and Decaisne; (3) the first vol. of Brown's "*Manual*;" or (4) the larger *Manuals* of Professor Balfour.

ology—I have met with no assistance from British Botanists, who are, for the most part, mere collectors and nomenclators of plants, or rather of new forms thereof—real or supposed. The only one of them who took the trouble, indeed, of even replying to my queries was Prof. Thiselton Dyer, of Kew, who wrote me in May, 1875:—“*Instinct* in Plants appears to me an altogether meaningless expression. The most recent allusion I have met with to it is in ‘Observations on the Phenomena of Plant Life,’ by W. S. Clark, Boston, U.S.A., 1875.” Just as in the case of animals and of man himself, however, until a better term is introduced, *Instinct* is a convenient designation for a group of phenomena usually considered mental, or, at least, associated with our ideas of mind, and which cannot as yet be assigned to what we call *reason or intelligence*.

There is ground to fear that few of our Botanists are sufficiently acquainted with, or devoted to, Vegetable Biology or Physiology to be capable of dealing with phenomena of such a kind as those which, in plants, appear to belong to the category of *mind*—unless and until that comprehensive term be redefined so as to be applicable exclusively—should this be possible—to man or to animals. Moreover, some Botanists are influenced, apparently, by that most contemptible form of ignorance and bigotry which refuses to believe, or even to examine, facts, or to accept words, names, or phrases that seem to militate against their baseless religious preconceptions and misconceptions. They have acquired or assumed, as an article of their creed, that Mind is a prerogative of man alone; and hence they scout the very idea of its occurrence even in other animals, and far less, therefore, in plants. Unfortunately, this kind of error is not confined to Botanists. It is almost incredible to what extent such a form of religious intolerance and fanaticism prevails in the present day, even among persons of the highest education and social or professional position: among, for instance, the teachers of our youth, and the leaders of public opinion, in our Universities.

It may be desirable, in the first place, to point out that there is no *a priori* improbability that Plants possess certain characters of Mind in common with animals. They possess, in common many other physiological functions—some of them hitherto or long regarded as peculiar to animals. These—

I. *Concomitants of Mind, as it occurs in Animals—which are nevertheless, common to Plants*—include the following functions or phenomena:—

1. Respiration.
2. Circulation.
3. Nutrition.
4. Digestion—of animal food.
5. Secretion : including a solvent juice resembling the gastric.
6. Absorption.
7. Luminosity.
8. Evolution of heat.
9. Presence of electric currents.\*
10. Sleep.
11. Exhaustion : with reinvigoration after rest.
12. Spontaneous movements.
13. Same kinds of Diseases.
14. Same influence of atmospheric or gaseous Poisons.
15. Same results of chemical or mechanical Irritation.
16. Same effects of light and darkness, and of heat and cold.
17. Contractility—analogueous to muscular.
18. Heredity.
19. Mimicry.

It would be improper here to do more than merely refer to some of these phenomena, *en passant*. For details the reader is referred to the various botanical and other works quoted or mentioned in the text or foot-notes.

Quite recently Prof. Leidy, in a paper on the "Moving Power of Diatoms, Desmids, and other Algæ,"† has shown how this power of *spontaneous or automatic movement* enables them, when mixed with mud, to extricate themselves and rise to the surface. He describes them as very active—gliding hither and thither. These active movements, are, however, more familiar in the Zoospores of Algæ and Lichens; and they occur also in the Bacteria, which figure so prominently in current discussions regarding Spontaneous Generation and the Germ-theory of disease. *Solar heat and light*—or their absence—artificial as well as natural heat, light, and darkness—exercise the same sort of influence over plants as on animals.

Nearly twenty years ago I showed—especially in regard to Cholera—that plants, and animals including man, are equally subject, *mutatis mutandis*, to all atmospheric influences—

\* As demonstrated more especially by Prof. Burdon-Sanderson, for instance, in his "Note on the Electrical Phenomena which accompany irritation of the leaf of *Dionæa muscipula*," in the "Proceedings of the Royal Society," No. 147, 1873 : which phenomena I had the pleasure of seeing for myself, when he showed them before the British Medical Association at Edinburgh, in August, 1875.

† Read to the Academy of Natural Sciences of Philadelphia, in September, 1874, and reported in "Nature," for June 3, 1875, p. 100.

healthy or morbid, including the Epidemic ærial Poisons of whatever nature.\* In other words, they all alike are subject to virtually the same *epidemic diseases*. An admirable series of articles on Vegetable Pathology will be found in the "Gardeners' Chronicle" for 1856, by the veteran distinguished Fungologist—the Rev. M. J. Berkeley. He discourses, for instance, on the "languor and decrepitude" of trees.

He also points out the similar effects of *poisons* on plants and animals. Certain poisons destroy both the irritability and lives of so-called "sensitive" plants; or this irritability may be suspended by *anæsthetics*—by the same means, that is, by which stupor is produced in animals. Irritability, therefore, is a property only of health, or of healthy tissue. In Dr. Thos. Balfour's experiments on *Dionæa muscipula*, chloroform, dropped on a leaf-hair, caused immediate contraction, and closure of the leaf—or, in other words, a *chemical* excitant or irritant produced precisely the effect of a mechanical one. Not only chloroform and ether, but opium and quinine produce the same kind of effects in or on plants and animals. *Narcotic and acrid poisons* arrest motion in plants. Brown points out the effects of poisonous gases.† "Darwin has somewhat startled us by the announcement that, by puncturing a particular part [of the *Dionæa muscipula*], he has succeeded in producing a kind of *hemiplegia*, or one-sided *paralysis*.‡

The *irritability* of the hairs of *Dionæa* is impaired or exhausted by frequent or excessive stimulation. Exhaustion is the result of repeated excitation.

The occurrence of Mind in plants is not, however, a mere matter of probability, possibility, or surmise. Plants exhibit, among others, the following phenomena, which, in man, are inseparably associated with Mind, if they are not regarded as—

## II. *Elements or Constituents of Mind—as it occurs in Man and other Animals.*

1. Sensation, Common: including Sensitiveness and Irritability, or Excitability; Feeling.
2. Excito-motor, Sensori-motor, Irrito-motor, Reflex, or Automatic, action.

\* (1) "Influence of the Cholera Poison on the Lower Animals and on Plants." Clinical Notes on Cholera: Association Medical Journal, 1854.

(2) "Suggestions for Observations on the Influence of Cholera and other Epidemic Poisons on Plants." Proceedings of Botanical Society of Edinburgh, 1856.

† "Manual of Botany: Anatomical and Physiological," Edinburgh, 1874, p. 257.

‡ Dr. Thomas A. G. Balfour, in "The Garden," for August, 1875.

3. Memory, Organic.
4. Consciousness.
5. Instinct.
6. Sympathy, Preference, Predilection or Partiality, Liking or Attachment, with their opposites.
7. Antipathy or Aversion.
8. Choice or Selection; adoption of an Alternative.
9. Volition or Will.
10. Recognition and Rectification of Error.
11. Power of Adaptation, or Accommodation, to circumstances. Including adaptive movements; appropriateness of behaviour, action or conduct; general adaptiveness or adaptivity.
12. Power of avoiding or Overcoming mechanical Obstacles or difficulties.
13. Purposive action: use of means to an End.
14. Sense of Life.
15. Polarity, or Sense of Direction.\*
16. Individuality and Eccentricity.
17. Knowledge of Consequences.
18. Judgment, Discrimination, or Sense.
19. Profiting by Experience.
20. Spontaneity of Effort or attempt: Repetition thereof: and Failure.
21. Investigation and Experiment. Testing or trial.
22. Desire, Longing, or Appetite.
23. Use of Natural and Artificial Tools.
24. Calculation or Measurement of distance or space.
25. Patience.
26. Perseverance—including Resolution or Resoluteness.
27. Energy or Activity: with their opposites, Slowness, Awkwardness, Indifference, Apathy, Lethargy.
28. Caution.
29. Acquisition of Knowledge, and the suitable application thereof.

It is generally admitted that Plants possess, what is called by physiologists "*common sensation*," identical with, or resembling, that which exists in the skin and other parts of the human body to which the sensory nerves are distributed: which sensation is excited by ordinary mechanical or chemical stimuli. In other phraseology, plants are endowed with certain of the "*sensations of organic life*." This power or property of Sensation includes sensitiveness or susceptibility to atmospheric changes or influences—just as in animals. Hence the opening or closure of leaves or flowers at night, or before rain. Hence the *prognostication of weather-change*

\* E.g. In the so-called "Compass-plant." Vide Brown, "Manual," p. 562.

by hygrometric or other Plants, such as the Pimpernel.\* But the phenomena of Irritability render it probable that certain plants, at least, possess a special sense of Touch; and some sense or senses that take the place of those of smell, vision, and taste. Or, how else do carnivorous plants learn that digestible food is in their power or in their neighbourhood? For it is by no means necessary to such knowledge that food comes into mechanical contact with the plant-surface. No doubt plants may, and probably do, possess—as do the lower animals, and man himself—certain *unknown, or unexplained faculties*—powers, of the nature of which we at present know little or nothing, and which may even belong to the category of the *unknowable*. Using the term in its physical sense, plants possess various shades of keenness and bluntness of *feeling*, or sensitiveness. Under certain circumstances—natural, or artificial—they exhibit various degrees of Insensibility, Insensitiveness or non-sensitiveness; *e.g.* to irritation, or the influence of stimuli—mechanical or chemical.

Now, it is either extremely difficult, or altogether impossible, to *dissociate sensation from mind, intellect, or consciousness*. Professor Bain thinks that “sensation without *intellect*, is a mere abstraction. It is never realised in fact.”† “We cannot suppose the existence of mere *sensation*, without supposing that there is something more”—says the late Sir Benjamin Brodie in his “Psychological Inquiries.” “All animals possess *consciousness*—that is have *sensations*”—says Lewes: and in this sense so must plants possess Consciousness. Dr. Carpenter, in common with Lewes and other authors, holds that “*sensations* are, indeed, but states or forms of *consciousness*—just as much so as are ideas and emotions.” Professor Laycock speaks of “ancestral endowments manifested in all organisms, whether they be plants or animals, and whether manifested as energies or functions, or *states of consciousness*.”‡

*Purposive action*—movements, having a definite and intelligible *object*, aim, or end in view—involving, apparently, *intention* or *design*—and possibly even *motive* and *will*—are most familiar in the phenomena of prey-capture by such plants as the *Dionæa muscipula*. In its case there is *trapping* of the most efficient kind; insomuch so, that its common English name is Venus' Fly-trap. Dr. Hooker goes the length

\* Brown, “Manual,” p. 567.

† Article “Sensation,” in “Chambers's Encyclopedia,” 1st ed., 1866.

‡ “Organic Laws,” p. 157.

of saying of *Darlingtonia*: "It is conceivable that this marvellous plant *lures* insects to its flowers for one *object*, and feeds them while it uses them to fertilize itself; and that, this accomplished, some of its benefactors are thereafter lured to its pitchers for the sake of feeding itself."\* His description does not necessarily imply a belief that there is *conscious* luring or object—his expressions being, presumably, *figurative*.† Dr. Carpenter obviously regards *prehension of prey or food* by *Dionæa* or *Drosera*, as a merely *mechanical*, automatic, or reflex, non-conscious act. "Just as mechanically," says he, "as the fly-trap of the *Dionæa* closes upon the unlucky insect that alights upon it, so do a frog's legs act, although the spinal cord has been divided both above and below the segment from which the nerves of the fore-legs are given off."‡ He is here drawing a parallel between the fore-legs of a male frog at the season of sexual excitement—which "tend to close firmly upon anything that is placed between them . . . and will retain that clasp for weeks"—and *Dionæa* in its seizure of insects or other bodies. But the parallelism is an unfortunate one. In both cases he omits all reference to the *choice* of the object upon which to contract; in the one case the female frog, in the other nutrient, albuminoid, nitrogenous substances. In the one case, as in the other, the legs or leaf margins may contract, under exceptional circumstances, upon "anything that is placed between them." But, so far as concerns at least the *Dionæa*, this does not always happen; and, when it does, it is to be attributed to an *error* which the plant not only *discovers*, but *rectifies*. There can be no doubt that, as a rule, it *distinguishes between suitable and unsuitable food*, or rather between bodies which may supply food on the one hand, or are incapable of doing so on the other. This eclecticism, *selection or choice*, can scarcely be set down, even by Dr. Carpenter, as "mechanical." He, himself, however, feels bound to admit, with regard to the frog, that "a few physiologists" still "credit the spinal cord of the frog with the power of *conscious self-direction*."§ He draws attention to the fact that the *headless*

\* Address on "The Carnivorous Habits of Plants," delivered at the British Association Meeting at Belfast, 1874, and reported in "Nature," September 3, 1874, p. 370.

† Just as such terms as *sleep*, *love* and *soul*, are used figuratively by at least the majority of those who employ them at all in regard to Plants.

‡ "On the Doctrine of Human Automatism."—Contemporary Review, Feb., 1875, p. 410.

§ *Ibid*, p. 412.

frog makes purposive effort without any "necessary excitement of *consciousness*"—as is proven, he thinks, by other similar cases that occur in man and other animals, in whom, by accident, disease, or experiment, communication is cut off with the brain.\* But a flaw in his argument is this—that it has yet to be proven that Consciousness is dependent upon *brain*, or is necessarily associated therewith. I hold, on the contrary, that unless we re-define the term *consciousness*, we must regard some form or degree of it as occurring in both animals and plants that are destitute, not only of brain, but of a nervous system.

The decapitated frog rubs off an irritating drop of acetic acid from one of its thighs; but we are not shut up to the conclusion that no kind or amount of Will or Consciousness exists simply because the *brain* has been removed. On the contrary, it is an equally legitimate inference that *will and consciousness may exist quite independently of brain*.

Dr. Carpenter also points out that a *headless Centipede surmounts obstacles* it cannot see; while the *headless Mantis religiosa* clasps its claws round any object introduced between them.† And he cites both as instances of original or primary *automatism*; secondary or acquired automatism being that which is begotten in man, and, probably, in certain other animals, by Habit.‡ If, in an *Ascidian*, "the ciliary current should draw inwards a particle of unsuitable size or character, the contact of this with the guardian tentacles excites a *reflex* contraction of the muscular sac, whereby a jet of water is squirted out that carries the offending particle to a distance. It is obvious that this act no more represents *conscious intention* . . . . than the cough of the infant represents a desire to get rid of an uneasy sensation in its throat. In the one case, as in the other, the *adaptiveness* of the action to the *purpose* it answers, is simply that of a piece of *mechanism*, and we characterise it, therefore, as *automatic*."§ Darwin speaks of certain movements of the tentacles of *Drosera rotundifolia* as "partaking of the nature of those actions which, in the nervous systems of animals, are called *reflex*;"|| and yet he describes it as possessing *volition and selection*, in choosing only such materials for digestion as conduce to its wants.

*Reflex* action is not necessarily, however, the simple

\* "On the Doctrine of Human Automatism."—Contemporary Review, Feb., 1875, p. 402.

† Ibid, p. 406.

‡ Ibid, p. 407.

§ Ibid, p. 400.

|| Review in "Nature" (July 15th, 1875, p. 209), by Dr. A. W. Bennett, of Darwin's "Insectivorous Plants."



mechanical matter it is now too generally supposed to be. Professor Laycock observes—"It may be said generally that there is just the same Law of Relation between the tissues of the Sensitive Plant and the impression or the touches which make its leaflets contract, as there is between impressions on the Senses and the Brain tissue. In short, there is a Law of Trophic Reflex Action running throughout all those phenomena up to the *highest mental manifestations*."\* On this subject, also, Dr. Brown remarks—"Even in some higher animals, where no nervous system has yet been detected, very complex vital movements are performed, apparently quite as much due to *animal irritability*, as those described in the preceding paragraphs are to *vegetable irritability*."†

The curious phenomena of *choice* or *selection* are best seen and known in connexion with *food-search* or supply. The *Dionæa* leaf either does not embrace indigestible substances, such as stones; or, having clasped them for the moment, it speedily relaxes hold; it does not pour forth its solvent juice, which is said to contain substances that either are, or are analogous to, formic or propionic acid, and pepsine.‡ In *Drosera*, though contraction occurs in response to mechanical irritation by an indigestible substance, this contraction does not continue; whereas, in the case of digestible bodies, contraction continues till digestion has been completely effected—that is, till all nutriment has been extracted. Moreover, in regard to food-selection, it would appear that plants commit, discover, and correct Errors—as animals do—*e.g.*, the *Drosera*, which—in the hands of Mrs. Treat, an American lady-experimentalist, whose experiments are quoted by Darwin, Hooker, Balfour, and all recent writers on the subject of carnivorous plants—was so far deceived by a piece of moistened chalk, "that it curved its stalk-glands inwards towards it, but, immediately thereafter, on discovering its Mistake, withdrew them."§

*Preference* in plants is, however, by no means confined to food-selection. Darwin evidently implies Selection in what he says of "the more perfect tendril-bearers" among climbing plants, bending towards or from the light, or disregarding it, "whichever may be *most advantageous*."|| In the

\* "Organic Laws," p. 161.

† "Manual," p. 585.

‡ According to the recent researches of Professor Dewar, of Cambridge, and Dr. Lawson Tait, of Birmingham.

§ Dr. Thos. A. G. Balfour in the "Garden."

|| "On the Movements and Habits of Climbing Plants," Journal of Linnean Society: Botany, Vol. ix, 1867, p. 118.

latter expression he would appear to attribute to the plant even a kind or degree of judgment or *judiciousness*. There are, however, many other interesting phenomena exhibited by *climbing plants*, some of which lead to the conclusion that they—like their carnivorous colleagues—may, or must, possess some sort or amount of *good sense*. Thus, some twiners—central American forest Lianas—show a marked *antipathy* to certain trees, refusing to coil or climb round them; the singular coincidence being that the trees thus slighted are physically unsuitable for their support.\* The tendrils of various climbers frequently attached themselves for a time to objects presented to them experimentally by Darwin; but withdrew on finding these supports unsuitable. Here, again, we have *experiment* or tentative action: *error*, and its rectification. The tendrils of *Bignonia capreolata*, he says, “soon recoiled with what I can only call *disgust* from [a glass tube and a zinc plate], and straightened themselves.”† In the tendril-bearing *Bignonia speciosa*, “the whole terminal part (of the tendril) exhibits one odd habit, which, in an animal, would be called an *instinct*, for it continually *searches* for any little dark hole into which to insert itself. . . . The same tendril would frequently withdraw from one hole and insert its point into a second one.”‡ Here we appear to have *investigation*, *search*, *survey*, *examination*, *observation* and *discovery*, without vision; but by what faculty or means we know not. Spirally-twining plants—such as *Hoya carnososa*—move in *search* of supports round which to twine.§

In the search after both food and supports, carnivorous and climbing plants develope conspicuous *effort* of a perfectly spontaneous kind; and they do so repeatedly, till they succeed in obtaining what must be considered their *object* or *purpose*. Thus, there is spontaneous effort in the movement of the leaves of *Drosera* towards flies not touching them, but placed in their immediate vicinity.|| According to the observations and experiments of Mrs. Treat,¶ on an American Sundew—*Drosera filiformis*—“when living flies are pinned at a distance of half-an-inch from the apex of the leaf, the leaf actually bends towards the insect until the plant reaches it and sucks its juices.”\*\* Here we must have some estimation, measurement, or *calculation* of *distance* or *space*, unless we

\* Brown, “Manual,” p. 580.

† “Climbing Plants,” p. 57.

‡ “Climbing Plants,” p. 55. § Brown, p. 580. || Balfour in “The Garden.”

¶ These experiments are noticed paragraphically in “Nature,” February 26th, 1874, p. 332, and July 15th, 1875, p. 207.

\*\* Brown, p. 577.

are to suppose the existence of some irresistible physical attraction proportionate to the contiguity; for the plant makes its singular effort only when the fly is within physical range. Darwin describes the "continued *striving* of the tip" of a tendril of *Echinocystis lobata* "to curl itself closely inwards" round a stick with a flattened side.\*

*Attachment* to place or things, which are obvious in the case of many climbers, may, perhaps, in other plants explain much that the botanist, horticulturist, arboriculturist, floriculturist, or agriculturist cannot otherwise satisfactorily account for, viz., how it comes that the same species will grow in certain localities, and not in others—the circumstances of temperature, soil, exposure, and so forth, being apparently the same. In connexion with which subject, it is desirable to bear in mind, further, that plants exhibit occasional *individuality*, and even *eccentricity*, for which we cannot account, any more than we can for similar personal peculiarities in man or other animals. Thus, only certain individuals of a species are sometimes affected by atmospheric influences—or by artificial light or heat. The side leaflets of *Hedysarum gyrans* are so eccentric as to make it appear "as though the whole plant were actuated by a feeling of *caprice*."†

Poets talk of the *sense of life*, or of its active or positive Enjoyment, in plants; they describe them as being endowed with the capacity of being affected by *pleasures* and *pains*. All this may be purely fanciful and poetic; but it is possible there may be more of truth in these fancies of the poet than is generally supposed. They may prove to be previsions of what, some day, may admit of something like demonstration. Wordsworth says, for instance—

" 'Tis my faith that every flower  
Enjoys the air it breathes.  
The budding twigs spread out their fan  
To catch the breezy air;  
And I must think, do all I can,  
That there is *pleasure* there."

Professor Laycock describes what he calls "*organic memory*" as a vital process common to plants and animals. But he also speaks of it, unguardedly, as "cerebral." "Organic memory," says he, "consists in *cerebral* processes regulated by the Laws of Evolution and Reversion, and common as vital

\* Climbing Plants," p. 77.

† Professor Lawson—"Vegetable Physiology," p. 78.

processes to both plants and animals.”\* The sentence certainly requires reconstruction, in so far as, though it may be quite legitimate to speak of “organic memory” in plants, it cannot be correct, unless in a fanciful sense, to refer it to a “cerebral” process, or action. He is supported, however, in his fancy by Dr. Erasmus Darwin—the well-known author of the “*Zoonomia*”—who asserts “that Plants are only an inferior kind of Animal, and that . . . some of them have *brain* and a *stomach*, and are endowed with the *lower senses*.” According to this fanciful doctrine, the *medulla*, or pith, was made the seat of *sensation*, and was considered analogous to the spinal marrow of animals. . . . The doctor . . . had no followers, as his Hypothesis presented too many difficulties to be even partially believed.”† His doctrine is not, however, so “fanciful” as Professor Lawson here evidently believes. However eccentric may have been many of his views, Dr. Darwin was a philosophical Naturalist, with opinions far in advance of his age; and there can be no doubt that there is good ground, to a certain extent, for the parallel he draws between Plants and Animals.

Not a few authors ascribe *soul* to plants—another instance of an attribution that must, in the meantime, be considered *fanciful and poetic*—a mere matter, as in Wordsworth’s case, of personal Faith. But it must be remembered, in this connection, that we know nothing of the human Soul except as a similar matter of Faith. There is no such thing as a satisfactory Definition of the Human Soul, scientific or otherwise; and it is impossible to demonstrate, by any kind of scientific or ordinary evidence, that such a thing as Soul exists in whole Races of Man. In early savage philosophy, Plants were endowed with Souls. “The doctrine of transmigration allows plants to enter into the line of successive tenancy of a spirit. Moreover, the existence of tree worship carries with it, by inference, the belief in *tree souls*.”‡ Aristotle applied the term *soul* (= *psyche*) “to all the characteristic functions of living bodies, from nutrition up to the loftiest attributes of intellect.” He recognised—(1), a nutritive soul common to *plant* and animal; (2), a sentient and percipient soul peculiar to the

\* “A chapter on some Organic Laws of Personal and Ancestral Memory,” “*Journal of Mental Science*,” July, 1875, p. 155.

† Section on “Vegetable Physiology,” in Chambers’s “*Information for the People*,” 1857 [by Professor Lawson, of Dalhousie College, Halifax, Nova Scotia].

‡ Sir John Lubbock on the “*Origin of Civilisation*,” chap. v.

*animal*; and (3), a noëtic soul—the “nous” or intelligence—the special prerogative of *man*. That is to say, he distinguished three kinds of souls—(1), plant soul; (2), animal soul; (3), human soul: the first being devoid of *consciousness*.\* In such a classification a rigid, artificial, and erroneous line of demarcation is drawn between *sensation* and *intelligence*. “Mr. Tylor would say that the *plant soul* of Aristotle was the survival of the plant-soul of the lower races (of man), rather than his own independent reflections on the community of plants and animals as living things.”† Like Aristotle, Thomas Aquinas held that there is—(1). A *vegetable*, or nutritive-unconscious soul; (2), an *animal*, conscious soul; and (3) the intellect‡ of *man*. “According to the ancient doctrine (of Palingenesis), if the ashes of a plant . . . be treated according to certain rules, there will be seen in the smoke its *soul*, produced as the colour and form of the plant.”§ . . . . “Again, if the ashes of the plant be frozen, the Soul-form of the plant will be exactly represented in the ice. This was termed a re-birth, or re-generation, of the plant” . . . . *Palin* against, *Genesis* birth.|| Figuiet, in his “Day after Death,” holds, “as to the origin of a Soul, that Animal-germs are contained in Plants . . . . which pass at the death of the latter into the body of the organisms next in the scale of development.”¶

No doubt I will be told that an essential difference between animals and plants consists in the presence, in the former, and absence in the latter, of *consciousness*. Even Professor Bain contrasts “life without consciousness” (as in plants), and “life with consciousness” (in animals and man).\*\* But, on the one hand, it seems to me impossible to resist the conclusion that some form or degree of Consciousness exists in Plants—unless, to be sure, mental philosophers shall succeed in so re-defining that term—in so restricting its meaning—that it is made applicable exclusively either to man in particular, or to animals in general. And, on the other hand, there is much mental action—there are many phenomena, at all events, that are generally considered mental in their nature—that are exhibited by Animals, including man himself, without the concomitance of Consciousness.

\* Sir John Lubbock on the “Origin of Civilisation,” p. 181.

† “Mind and Body: the Theories of their Relation,” by Prof. Bain: one of the International Scientific Series, 2nd ed., London, 1873, p. 155.

‡ Lubbock, p. 181.

§ Laycock, “Organic Laws,” p. 183.

|| Laycock, “Organic Laws,” p. 184.

¶ Quoted by Laycock, *ibid*, p. 185.

\*\* “Mind and Body,” p. 155.

As to *plants*, it is difficult, to say the least, to dissociate the idea of Consciousness from that, for instance, of free *choice* and *will*. No doubt it will be objected that in plants Choice is "instinctive," and consequently unerring. We have been told the same thing for ages as regards Animals; whereas the fact is (*e.g.*), as regards that operation common to both plants and animals—food-selection—Animal Instinct is so very fallible that, even in the higher animals, the young require the special instruction of their parents what to eat, drink, and avoid, while the seniors themselves are constantly making fatal mistakes as to quantity and quality. We have already seen that Plants commit *errors* of a similar kind; and we must bear in mind that the Commission of Error is totally irreconcilable with current opinion, especially among ignorant theologians, as to the "unerring" character of what is called "instinct." In food-selection, in certain plants, there must be a certain Consciousness or perception of what is, or is likely to be, noxious or salutary. On what other supposition can we account for the refusal or avoidance of the one, and the selection or acceptance of the other? There may even be a certain *knowledge of consequences*—for instance, of the ingestion or digestion of special kinds of food. In carnivorous and climbing plants there is a *choice*, or alternative, between action and inaction—acceptance or refusal; and the choice made is not always judicious. There may be an Error, and the error may be *corrected*; but, in order to such correction, there must surely be some kind of *consciousness* or perception that a mistake has been committed; an exercise of *will* in making further efforts at success; and a knowledge of means to an *end*, with their proper adaptation or application.

In regard to *animals*, including man, there can be no doubt that—

1. *Consciousness* may not exist where it appears to do so.
2. Just as it does really exist when it is seemingly absent.
3. Throughout the animal kingdom there is much mind without demonstrable Consciousness or with demonstrable unconsciousness; while
4. Even in man himself of the highest culture, there is a whole series of phenomena belonging to the category of "*unconscious cerebration*" or reflex action. In him the Conscious is constantly passing into the automatic.

The late Dr. Forbes Winslow thus sketched the genesis and nature of *consciousness* in animals and man:—"All that

we can say of Consciousness itself, in its simplest form, is this—that when certain impressions reach the vesicular neurine, which is the seat of Consciousness, the mental principle experiences a change in its condition, viz., a feeling of *pleasure* or of *pain*. If it be pleasure, then the order of events in the organism, which result from the reception of the impressions, are in accordance with the order pre-arranged for the good of the organism; if it be pain, then the order of events excited are inimical to the organism. Concurrently with this feeling—coincidentally, but not casually—there is a simultaneous action of the machinery pre-arranged for the given end of either attaining what is good, or avoiding or propelling what is inimical.”\* Exactly parallel phenomena occur in such Plants as *Dionœa*, which nevertheless possess no “vesicular neurine,” though they are not necessarily devoid of Consciousness. We are told further—“that a Nervous system is not necessary for such an arrangement in living organisms is proved amply by the phenomena of vegetative and cell life; but in the higher animals it is absolutely necessary, apparently from the complexity of the machinery to be co-ordinated and combined. . . . It is not difficult to advance a stage further, and conceive another *degree of consciousness*. In this there is, in addition to the capability of feeling pleasure and pain, the perception that it is something external to the organism which induces the feeling—the notions of *outness* and *causation* in their simplest forms, and the foundation of the instinctive belief in the existence of an external world. This state implies the existence of machinery for conveying impressions of external agents to the seat of Consciousness, or, in other words, *external senses*. Still, there is *neither reason nor will*; the external agents may be desired or abhorred, according as they are excitants of pleasure or of pain. But the predetermined arrangements in the ganglionic neurine are the source of all the apparently rational and voluntary movements.”†

“Is it at all certain,” asks the late Sir Benjamin Brodie, “that a Polypus is endowed with any higher properties than those which belong to *vegetable* life? Do the motions of its filaments afford any better evidence of *sensibility and volition* than those exhibited by many *plants*, such as the *Mimosa*

\* Review of Sir Benjamin Brodie's “Psychological Inquiries,” “Journal of Psychological Medicine,” October, 1854, p. 495.

† *Ibid.*, p. 495.

*sensitiva*, the *Dionæa muscipula*, or the *Hedysarum gyrans*? Or, than the folding up of many Flowers in the night and in rainy weather? Or, than the motions of the minute bodies described under the name of Cilia in animals? Or, if the sensibility of the Polypus be taken for granted, may it not be a compound animal, with distinct centres of sensation and volition, in like manner as, in a tree, every bud is, in fact, a distinct individual?\*" . . . On which queries the late Dr. Forbes Winslow thus comments:—"There has been too much assumed in investigating the class of phenomena here referred to as to the existence or absence of *feeling* or *consciousness*. The question is one of *inference*, and not of *observation*; and all experience shows that errors may easily be made either way. Thus, the adaptive and conservative nature of the *spinal reflex* movements are so strikingly indicative of a *rational will*, that even yet the hypothesis that *sensation* is an endowment of the spinal cord, or even of sections of it, is maintained. On the other hand, the entire absence of such movements has led observers to the erroneous conclusion that Consciousness is abolished—nay, that vital action has ceased for ever."†

Mr. Douglas Spalding, in a paper on "Instinct and Acquisition," read before the last meeting of the British Association (at Bristol, 1875), "claimed that the actions of the higher animals and man were quite parallel with those of insects; and that *consciousness* only ran alongside, without having the slightest influence." ‡

Dr. Brown is of opinion that there is no *conscious* effort in the protective *mimicry* either of Lepidoptera or Plants;§ and it may be that the prehension of prey as food is unattended with *consciousness* either in predatory Animals of the lowest class, or in such insectivorous Plants as *Dionæa* and *Drosera*. It cannot be said that such purposive actions are *necessarily* attended by Consciousness; but neither is it capable of direct proof that all kinds or degrees of Consciousness are absent.

Fortunately, I am not quite singular in the views I have above expressed, as regards what amounts essentially to the *psychical community of plants and animals*. Prof. Asa Gray, of Harvard College, Cambridge, Massachusetts, one of the most experienced and philosophical Botanists of the day,

\* Quotation in "Journal of Psychological Medicine," Oct., 1854, p. 493.

† Ibid., p. 493.

‡ Report in the "Athenæum," Sept. 11, 1875, p. 346.

§ "Manual," p. 558.



thus writes on the subject:—"When we consider that the *excitability* of sensitive plants is often *transmitted*, as if by a sort of *sympathy*, from one part to another; that it is soon *exhausted* by repeated excitation . . . . to be renewed only after a period of *repose*; that all plants require a season of repose; that they consume their products and evolve *heat* under special circumstances, and with the same results as in the animal kingdom; that, as if by a kind of *instinct*, the various organs of the vegetable assume the position or the directions most favourable to the proper exercise of their functions, and the supply of their wants, to this end *surmounting* intervening *obstacles*. When we consider, in this connection, the still more striking cases of *spontaneous motion* that the lower Algæ exhibit, and that all these motions are arrested by *narcotics* or other *poisons*—the narcotic and acrid poisons even producing effects upon vegetables respectively analogous to their different effects upon the animal economy—we cannot avoid attributing to *plants* a vitality, and a power of making movements tending to a determinate *end*, not differing in nature, perhaps, from those of the lower Animals. Probably life is essentially the same in the two kingdoms; and to Vegetable life faculties are superadded in the lower Animals, some of which are here and there indistinctly foreshadowed in *plants*."\* Dr. A. W. Bennett, one of the translators of Sachs' "Lehrbuch der Botanik," and one of the editors of "Nature," says:—"Biologists generally are probably hardly prepared to apply the terms *intelligence* and *will* to the Vegetable kingdom. But the use of the term vegetable life seems to me to imply, of necessity, that there are powers at work in the economy of the plant, as well as of the animal, which it is in vain to attempt to reduce to manifestation of the forces which govern the inorganic world."† Such are the views of *botanists* of the advanced school. Here is the opinion of a veteran *psychologist*, the late Dr. Forbes Winslow:—"If a psychologist, thoroughly imbued with the truth of this proposition—that the nature of the human mind, and its relation to organisation, may be investigated through the mental phenomena of the inferior animals—sees in all the acts of these, his lower fellow-creatures, the reflected image of the working of his own mind—he cannot watch the instinctive or other acts of the smallest or lowest without feeling those touches of nature

\* "How plants behave," 1872, p. 350, quoted by Brown, "Manual," p. 585.

† Quoted by Brown, "Manual," p. 558.

which make the whole world kin, or without obtaining wonderful glimpses into his own mental being, and thus, day by day, acquiring fresh knowledge. Nor will his observations and sympathies be limited to Animals; for as the mind evolves the ideas, which naturally flow from so suggestive a principle, it passes from one gradation of life to another, ever descending by imperceptible steps until at last the ever-varied phenomena of *vegetable* life are brought into the same category, and the identity with his own of Mind in Creation, as well as in animal life, is made manifest. . . . . The fact is, that no man is properly qualified to observe, compare, even estimate these mental phenomena in the organised beings below him, until he has . . . . . descended from that lofty pedestal upon which his Pride of Place has exalted him. That pride hinders the operation of his powers, whether of observation or of reflection, by restricting them to the narrow sphere of his own life. His prejudices blind him, or pervert his judgment; they harden his heart by contracting his sympathies; and so the hidden chords of his nature, which are in unison with those of the creatures below, rarely vibrate to the awakening of new ideas, or vibrate but imperfectly.”\* And again, he remarks:—“Vegetable life is so universally *assumed* to be, as a matter of course, *unconscious*, that it appears a mere folly to express a doubt of the assumption. But let a close observer and admirer of Flowers watch carefully their proceedings on the opposite assumption—namely, that they not only feel, but *enjoy life*, and he will be struck with the immense array of facts which may be adduced in support of it. Endow them hypothetically with *consciousness*, and they appear to the observer in an aspect altogether different. Their Instincts seem, indeed, *mutatis mutandis*, to be easily compared with those of the higher Animals. Unquestionably they are in the same category in this respect with the lower forms of animal life, respecting which it is impossible to determine whether they have Consciousness or not.” †

Many other writers—botanical and psychological—speak of the *instinct* or *instincts* of plants; sometimes correlating them with the instincts of animals; in other cases regarding them as something *sui generis*—simply because of their occurrence in Plants, and of that curious bias or prejudice which leads even the most highly educated men to differentiate,

\* Review of “Psychological Inquiries,” p. 481.

† Ibid, p. 494.

so far as they possibly can—evidence to the contrary, notwithstanding—Plants from Animals. A work entitled “Indications of Instinct,” by the late Dr. Lindley Kemp,\* contains a chapter on the “Instincts of Plants,” as well as of all classes of animals. Remarks on the “Instinct of Plants,” are also contained in the “Sacred Philosophy of the Seasons,” by the late Rev. Dr. Duncan, of Ruthwell.† Professor Laycock describes in Plants, as in animals, “new Instincts and special hereditary adaptations to new conditions;”‡ and he speaks of “the atavistic transmission of Instinct, and of other capabilities, whether in Plants or animals.”§

De la Mettrie, who has been introduced to English readers by Carlyle, as one of the boon companions of Frederick the Great in the early part of his reign, wrote a book having the title “Man a Plant.”||

There can be no doubt that, at present, the *Terminology* of mental philosophy is most defective, and perplexing; and that it gives rise to much of the difficulty connected with comparisons—as to mental aptitudes, real or supposed—between Man, the Lower Animals, and Plants. The same terms are frequently applied to these three groups of living beings in very different senses. Thus, the *irritability* of the *Dionæa* or *Drosera* is something very different from that of the caged baboon or ape. In the one case, the designation is applied to an action supposed to be purely reflex or excitomotor—unassociated with Consciousness; while, in the other, expression and action are said to result from a morbid Consciousness, and to be directed by disordered Reason or Feeling. *Contractility* under the influence of a stimulus, and *irascibility*, or irritability of temper, are very different things. Such terms as *sensibility* and *sensitiveness* are also very vaguely and very variously employed by physiologists, metaphysicians, and the general public; sometimes as denoting mere physical—muscular or nervous—excitability, sometimes in reference to keenness of moral feeling. In order to apply appropriately such terms as Mind, Consciousness, Intention, Design, Desire, to *plants*, it is obvious we must change, or, at least enlarge, our conceptions of their character, and our Definitions. The only alternative is a complete revolution in the terminology of

\* A vol. of the “Traveller’s Library,” 8vo., London, 1854.

† Vol. on “Winter,” 4th ed., 8vo., Edin., 1841.

‡ “Organic Laws,” p. 157.

§ *Ibid.*, p. 156.

|| Mentioned by Bain, “Mind and Body,” p. 186.

mental and pseudo-mental phenomena in man, the lower animals, and plants. For myself, I am not prepared to inaugurate any such revolution, being content to adopt the terms currently in use in their vague and comprehensive significations; applying them to all classes of organised beings; in other words, to regard *mind*, and all its essential or concomitant phenomena, as common in various senses or degrees to *plants, the lower animals, and man.*

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*Skæ's Classification of Mental Diseases.* By T. S. CLOUSTON, M.D., F.R.C.P.E., F.R.S.E., Physician-Superintendent Royal Edinburgh Asylum.

When I saw in the last number of this journal that Dr Crichton Browne had essayed the task of criticising the system of classification of insanity devised by the late Dr. Skæ, I knew the fact could not but be gratifying to Skæ's friends. To have any system or theory subjected to independent criticism is very good for it. Then I could not forget that some of those who had advocated most earnestly Skæ's classification had been pupils, assistants, and friends of his during life; and I was conscious, from my own experience, how much anyone in that position was inclined to look partially on his work. I felt sure that Dr. Browne, while seeing this, would not, in those circumstances, consider it a mortal sin, and would pass it gently and generously by. Indeed, I was a little afraid that he himself, as an old pupil of Skæ, might be tempted to soften the stern tone befitting a critic, by something of the same pardonable feeling. He has striven to resist this impulse, and with much success. Another reason why I rejoiced that the merits of this system should be canvassed was, that I thought with, perhaps, natural partiality, that everyone must necessarily see something good in it; and that the fact of its being looked closely into by a competent and unbiased mind would produce a better understanding of Skæ's point of view, and a more thorough sifting of the tares from the wheat. Not that such criticism had been wanting either at home or abroad. The system had been before the world for twelve years. The authors of all the standard books on psychological medicine and papers on classification published since that time had discussed its merits; and it did seem as if it were growing in favour. Maudsley, in