



## XI. Some account of the spherical and numerical system of nature of M. Elias Fries

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XI. *Some Account of the Spherical and Numerical System of Nature of M. ELIAS FRIES.* By JOHN LINDLEY, Esq. F.I.S., &c. &c.

*To the Editor of the Philosophical Magazine and Journal.*

My dear Sir,

AT a time when the doctrines of spherical and numerical divisions in nature are attracting much attention, it cannot but be interesting to the public to be put in possession of the latest opinions of M. Fries, who is the founder of the system of quaternary arrangement, and the authority to which the most philosophical of our writers upon the subject has so repeatedly referred. These opinions are contained in the Introduction to a work published by M. Fries in 1825, under the name of *Systema Orbis Vegetabilis*, and may be said to exhibit the most condensed and well-arranged statement of the theory which has yet appeared.

As the work is at present very rare in this country, the following abstract of such part of its contents as immediately refers to the principles of the theory may possibly deserve your notice.

I make no comment, at this time, upon the laws of this or similar systems, which are far too difficult and important to be hastily discussed. I give M. Fries's words to the public as nearly as possible, in the order in which he has arranged them, and, I hope, in all cases in the sense of the author, in order that those who are friendly to the original opinions of that very acute reasoner may have the advantage of knowing the present state of his ideas, and of seeing how far they agree or disagree with the various theories which have been lately proposed among ourselves.

Such points only as have appeared to me to apply less to the immediate principles of the system than to the application of them have been omitted.

I am, my dear Sir, yours truly,

JOHN LINDLEY.

Acton Green, July 19, 1826.

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§ 1. Na-

§ 1. Nature is an universal complication of phænomena existing and acting in all places and at all times—an infinite power made manifest by the successive evolution of a finite power,—the sum of the whole creation in a continuous state—all existent matter proceeding from perfection and pregnant with futurity.

In nature there is a perpetual struggle, an uninterrupted rotation. The powers of formation and destruction operate alternately, whence nature is always dead and regenerate. The human mind viewing this last phænomenon in its most extensive and at the same time most satisfactory sense, calls eternity in a state of ceaseless variation by the name of NATURE.

§ 2. Nature must be considered as either perfect or approaching perfection (*vel ut naturans vel ut naturata*).

§ 3. The powers and the productions of nature are coexistent.

All power is as it were a law under which a given production holds its existence, but in such a manner that all power is the finite revelation of an infinite law. To act and to exist is the same thing.

Power therefore is nature without production; Production is matter without power. Neither exists in nature by itself.

§ 4. All the powers of nature are more or less perfect manifestations of one primitive power, which acts by its different productions according to the same eternal, immutable, absolute laws. But the powers of nature act only by mutual reaction; so that each power of nature becomes in its products impeded, interrupted, or quiescent.

The most perfect primitive power appears nowhere in nature absolute; but more or less impeded. Hence the powers of nature are various, some one among them being more perfect or active than the rest (less impeded).

The existence of nature depends upon this kind of control, and successive evolution; every power which is absolute and independent of restraint becomes infinite, and ceases to be perceptible as a finite power—(Nature).

Powers of low degree act upon those of higher degree; but the lowest powers, when not struggling with higher, contain opposing principles in themselves; for example, attraction (repulsion), electricity, magnetism, &c.

This opposition, which pervades all nature, is called *Polarity*.

The more agreement there is between powers, the greater also the agreement between their productions.

The more perfect a power, the more complex its actions; the more perfect its productions.

The more complex are actions, with the more difficulty are their laws explained: thus, for example, the laws of affinity and of motion are almost ascertained; by no means those of vitality or of sensation.

§ 5. All things which exist in nature are a whole, and at the

the same time a part of a larger whole. They are capable of being themselves resolved into other wholes until the human mind sinks under ideas of sublimity and subtilty which are imperceptible to it,—of the universe and of atoms.

An atom is a whole (an individual), a plant is a whole, the earth is a whole, the universe is a whole: hence all things which exist are parts of one highest whole.

The vital principle of every individual is one; the same vitality animates the universe; so that there is one and the same primitive power which is revealed, by divers phænomena, in divers degrees of perfection. § 4.

Let us imagine all nature to be an immense sphere; all the rays converging in the *centre* where they finally become confluent in a point, which may be called the point of *identity*. This point comprehends the perfection of all the rays; for that the most perfect and most completely formed creations, as the sun, are always situated in the centre, is testified by all authority, by all experience.

The powers of nature diverging from each centre in polar opposition, are continually passing into opposite series. A new sphere is formed by each opposition, whence the highest (most perfect) sphere is again and again resolved into new spheres which form wholes of themselves, and each of which, according as its power is a more or less perfect evolution, in itself reflects the whole in a more or less distinct degree.

The centres of these spheres may be exceedingly distant from each other, but their rays always impinge upon the rays of some other sphere: hence they are not the most perfect forms (*summa*) of each section which run into each other, but those which are least perfect (*infima*).

The different spheres therefore, being dependent upon the same eternal laws, and only varying according to the idea peculiar to each sphere, answer the one to the other. Hence among all natural productions, a *more near* or *more remote* resemblance is perceptible; the one of them being such resemblance as exists between subjects contained in the same sphere:—*Salts*, for example, which are formed of the same basis combined with different acids; the other being such resemblance as exists between subjects contained in different spheres of the same degree of evolution, as *Isomorphous Salts*, the bases of which are different but the form the same, on account of the identical relation of their elements.

The former is called *Affinity*, the latter *Analogy*.

§ 6. It is impossible for the human mind, itself a finite creation, to regard nature, whether her powers or her productions are considered, in the light of the whole manifestation of an infinite power, but only as parts or fragments of such manifestation. But to comprehend these as one whole, that is, as an eternal and immutable yet ever varying body, or, as innumerable forms of one highest whole, is the end of all disquisition, the sum of which we call a *System*.

It is necessary not to confound with systems, properly so called, those indexes of nature which are incorrectly called *Artificial Systems*. Indexes have references only to names, systems to ideas. "Tum primum homines res ipsas neglexerint, quum nimio studio nomina quærere inciperent."—Galen.

§ 7. A system contains within itself the seeds of some more complete evolution, but it does not admit of arbitrary alterations.

Not that any absolute system can ever be contrived; for I am by no means of the opinion of those who expect that a system is to be as unchangeable as if it were petrified.

§ 8. If nature be closely pursued, a system is called *Natural*; if this Ariadnean thread be not followed, it is called *Artificial* or factitious.

There is, however, no absolutely natural system; such is only ideal: neither is there any merely artificial system; because its principles must necessarily be borrowed from nature herself.

Besides, nature wholly disavows our sections, she being a whole; all systems, therefore, as far as their arrangement is concerned, are necessarily artificial.

It is by the comparison of various systems with each other that our notions of such as are natural and such as are artificial are acquired, those having the former designation which press most closely upon the footsteps of nature. Hence it is that a system which is today called natural, becomes tomorrow, by the accession of new ideas, artificial; as that of Tournefort, &c.

Is it not then a vain labour to search after a natural system, since such will never be found; and are not all attempts at it rash, until every thing which is capable of observation shall have been observed? If this were admitted, it would be useless to seek for perfection in any thing; for we can never hope that our experience will be perfect; and there will be no want of subjects for examination to a person who shall live a thousand ages hence. Such sublime truths as the present age shall strike out, are therefore not to be contemned because they will become more full and perfect hereafter.

§ 9. A system of nature proceeding from subjects of the most simple organization to such as are more perfect, or from the circumference to the centre, is called a *Mathematical System*.

For mathematicians assume that nature herself proceeded from forms of the most simple kind to those which are more perfect; and that that therefore is the most natural road, which nature herself has followed in forming her creations.

All natural bodies, indeed, originate in successive development, yet in a contiguous series within a determinate sphere. Every new sphere originates in a digression from a series which is otherwise continuous. Whenever a more perfect sphere is separated from one which preceded it, and has acquired a higher station than its parent, it may be itself pressed down by such new ones

as

as emerge from itself; but the depressed sphere is also capable of continuation in its descent, and under this mode of development the same principles and the same types are regenerated under more perfect forms in the higher spheres.

Those therefore are mistaken who assume that nature proceeded in a simple series to her most perfect productions. Thus, for example, all parasites, both animals and plants, must necessarily have been created later than their matrix (and should therefore be the most perfect parts of the creation). But Fungi, which are the latest in the series of vegetable development, are the most simple of all in their structure.

In Minerals, of which the most simple are at the same time the most perfect, the Mathematical system may be employed, because it corresponds with the Philosophical. But in higher spheres, in which vitality must be considered, the laws of mathematics are of no avail.

§ 10. A system of nature which takes for the basis of its arrangement the order of development of individuals is called Physiological.

But take care not to imagine that the first series of evolution is a simple one. As the evolution of the animal and vegetable kingdom may be said to have proceeded with nearly equal paces, so the different sections of vegetables cannot be said to have arisen out of a simple series, but out of parallel or radiant series. Many Algæ must have been created more recently than the most perfect plants, Entozoa than the most perfect animals. Whence it is to be inferred; 1st, That nature, properly speaking, can only be said to have proceeded from the most simple forms to those which are more compound, in theory (*de ideis*); but, 2dly, to have often operated in an inverse order in her forms.

§ 11. *Philosophical systems* do not depend upon individual productions which are subject to continual variation, but upon eternal and unchangeable ideas. These always proceed from the centre to the circumference, or from the most perfect productions to those of a lower order.

This is the method of my Mycological system, and it agrees with the mathematical system if the order be inverted.

A Philosophical system depends upon the laws of logic; for the laws of logic are by no means notions contrived by man, but eternal and immutable, and established by Nature herself. As the rotation of the heavenly bodies, discovered after the laws of mathematics, must necessarily follow those laws; so also no observation in nature can invalidate the laws of logic. For the laws of logic are the laws of nature.

It must be observed, however, that a system, although logically true, may be naturally false, because it may have been deduced from false principles; but every true system cannot deviate from the rules of logic.

§ 12. A Philosophical system is superior to all others.

It may at first appear, perhaps, of little moment, what way we follow

follow in enumerating the productions of nature ; but if one way is more certain and more facile than another, that is surely to be preferred.

To me it appears most advisable to commence with that which is most perfect, most completely developed, and therefore most easily understood ; and thence to descend to forms of a more imperfect kind, and therefore of a more doubtful nature. The half-developed portions of the lower forms would never be understood, if they were not more completely developed in the higher forms. This is the path which is pointed out both by experience and common sense ; the idea of a seed is not derived from an *Uredo*, nor that of a vegetable from an *Erineum* ; but the reverse.

This is especially true of those lower spheres which bring up the rear : the last point of simplicity will never be attained, and will never be determined ; although our microscopes are daily extending our views, the poles of vitality will never be reached. It is better therefore to set out from a *certain* point (the centre) than from an *uncertain* point (the circumference) which may be extended to infinity.

So it is more wise in studying Man, to take our notions of humanity from those in whom it exists in the highest degree of perfection, rather than to search over-curiously for a man whose intellect is approximating to that of animals.

§ 13. In a systematic arrangement the higher forms are always to be taken before the lower.

The highest arrangement is always to be taken from the highest and most essential characters—from each highest character originates a particular section—and all the sections which are subordinate to this character are to be comprehended under its common title. The higher the distinction, the greater its dignity and importance.

Nature is always passing into series in polar opposition : hence a dichotomous mode of distribution is not only the most natural, but almost the only true one. Logic and nature, which are ever in accordance, prove this continually. Thus, for instance, natural bodies are more properly divided into organic and inorganic, than, overlooking this distinction, into minerals, plants, and animals ; so also is the distribution of vegetables into cotyledoneous and acotyledoneous preferable to that of monocotyledoneous and dicotyledoneous.

But as the most sacred things are the most open to abuse, so also is the dichotomous disposition, which is of the highest value when nature is strictly followed, the most artificial of all when arbitrary distinctions take the place of those which are essential ; as the analytical *index* of Lamarck. Many for this reason altogether object to such a form of arrangement ; but the abuse of a thing does not destroy its use.

When the members of a bipartite section are again dichotomously divided upon analogous principles, four sections are created,

ated, of which the first and second, and the third and fourth, are in affinity; but the first and third, and the second and fourth, are in analogy.

But when this method of division becomes circuitous, a more direct path is undoubtedly to be discovered: hence other numbers are admitted, especially the quaternary (or double dichotomy), and also others in which dichotomy is understood.

There are other and most acute observers (Oken, MacLeay), who contend for other fixed fundamental numbers. Care must be taken, however, that no cabalistical or occult virtues are attributed to any particular number; in the higher spheres a higher number is, on account of the multiplicity of organs, admissible than can be used in the lower spheres; the only object of such a contrivance being to explain in what direction rays pass off from their centre, and at what points the rays of different spheres impinge upon each other. To do this a determinate number is required.

We must, moreover, avoid extending too precipitately any system whatever to specialities. We can proceed in no direction further than the power of arrangement acquired by what we positively know of nature, admits. I certainly am not of the number of those who assume that infinity is to be circumscribed within strict limits; although I may be of opinion that infinity and universal harmony are better explained by them than according to any arbitrary rules of arrangement.

In the formation of sections and genera it is most especially necessary to beware that they do not depend upon characters alone; so that if the character should hereafter prove defective, the section or the genus may still remain unchanged. In this lies the difference between an artificial and natural arrangement; the former depending upon characters, the latter upon affinity. Hence Linnæus did not characterize his families of plants, nor Ehrenberg those of fungi, rightly perceiving that affinity is of the first importance, characters of secondary.

It is occasionally necessary to admit into a particular section a genus or species in which the most important character of such section does not exist, but then its truly essential character cannot have been detected. Thus when we say that Rosaceæ are dicotyledoneous, perigynous, polypetalous, &c., and refer to them *Alchemilla*, it will be easily seen that the really essential character of Rosaceæ remains to be discovered.

§ 14. Every sphere (section) expresses a particular idea; thence its character is best expressed by a simple notion.

But to effect this, it is necessary that the character which is really most essential shall have been detected. For if a section, of which the primary character is unknown, be circumscribed by a simple notion, the most arbitrary and artificial arrangement possible would be the result.

When the essential character is once detected, all others will be wholly dependent upon it (for when this character is changed  
the



the others are changed also), and those which do not depend upon it are accidental.

It must not however from this be understood that a system is to be applied to one part only of its subject: on the contrary, it embraces all parts, arranging them upon the same principles,—but when they diverge in opposite directions, one is to be chosen in preference to another.

§ 15. Physical or Physiological marks are capable of distinguishing spheres (sections) of the highest order only; but in those of the lowest they are always to be consulted.

Physiological characters, as being those which are most essential, are little subject to variation, and therefore will not suffice for distinguishing the lower spheres (orders, genera, species); they are nevertheless to be continually consulted as to origin, station, geographical distribution, &c. which illustrate the series of affinities in various ways.

§ 16. Essential characters are generally the most hidden, and demand acute investigation; the most superficial being those which are accidental.

Hence it is that accidental characters, or those of a lower order are first seized, as being those which are most immediately under our eyes: thus the low distinctions of species and varieties are easily acquired by mere tyros, while the higher are within the comprehension of masters of the science alone.

The whole progress which has been made in natural history has been a succession of triumphs of the more essential characters over those accidental ones which had been previously received, Thus in the following comparison, how much more important are those distinctions which are

ESSENTIAL	than those which are	SUPERFICIAL.
1. Mammalia, Amphibia, Pisces, of Linnæus.		1. Quadrupeds, Serpents, Fishes, of old authors.
2. Monocotyledones, Dicotyledones, &c.		2. Trees, shrubs, herbs, &c.
3. Hymenomycetes, Gastromycetes, &c.		3. Fungi stipitati, sessiles, claviformes.
4. Lichens from their fruit.		4. Lichens from their thallus.

The foregoing proposition must not however be inverted, by supposing that *the more hidden characters are, the more essential*; Natural History would then become not only micrological, but very difficult and erroneous. Where an object is easily distinguished by marks immediately under our eyes, microscopical differences are not to be sought after. Besides, characters indicated by highly magnifying microscopes are, in fact, as superficial as those seen by the naked eye.

§ 17. The primary powers of nature are arranged according to the following laws. They are these:

A. TER-

- A. TERRESTRIAL (*Tellustres*) acting together or in contact.
  - a. *Acting together and continuous in their productions.*
    - 1. *Sensibility*, or the power of motion, sensation, and consciousness. The object of *Psychology*.
    - 2. *Vitality*, or the power of absorbing heterogeneous matter, of assimilating it to an internal circulation, and of bringing forth progeny of the same nature as the parent. The object of *Physiology*.
  - b. *Acting in contact, and absolute in their productions.*
    - 3. *Affinity*. The object of *Chemistry*.
    - 4. *Electricity*. The object of *Physics*.
- B. SIDEREAL (*Siderales*) acting from a great distance.
  - a. Reproduction. 1. *Light*.
  - b. Production. 2. *Attraction*.

§ 18. The productions of nature, which are coexistent with these, are also considered as,

- A. TERRESTRIAL; various in form, placed in juxtaposition or cohesion with each other, arranged both by terrestrial and sidereal influence, and composed of parts which taken together form a whole. *Natural bodies* properly so called; the objects of *Natural History*.
  - a. *Organic*; reproductive, composed of various definite organs, and formed by internal development.
    - 1. ANIMALS, possessing sensation. The objects of *Zoology*.
    - 2. VEGETABLES, possessing vitality (not sensation). The objects of *Botany*.
  - b. *Inorganic*; productive, homogeneous, formed of particles in juxtaposition (and not possessing the qualities of organic bodies).
    - 3. MINERALS; ponderable. The objects of *Mineralogy*.
    - 4. ELEMENTS; imponderable. The objects of *Physics*.
- B. SIDEREAL; a system of EARTHS, which are spheroidal, very distant from each other, subject to the influence of sidereal power alone, and composed of the heterogeneous, but individually entire, productions of nature. STARS, the objects of *Astronomy*.
  - a. Possessing light and attraction, reproductive, central.
    - 1. *Suns*.
  - b. Possessing attractive power, but no light of their own, productive, circumferential. 2. *Planets*.

## VEGETABLES

are Living, insensible organic bodies.

§ 19. The end of life (and therefore of vegetation) is twofold: the preservation of the *individual* and of the *kind*; the former

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former is called Nutrition, the latter Generation. Hence there is a twofold system of organs; namely, of nutrition and of multiplication. But the organs of nutrition are either prepared by the mother (*Germination*), or developed by the plant itself (*Vegetation*); so also the organs of multiplication are either confined to the plant (*Flowering*) or continued in a new individual (*Fructification*).

There are therefore four primary functions of vegetables: germination, vegetation, flowering, and fructification. This is the basis of my system.

§ 20. According to these two systems of organs, and four primary functions of life, the following arrangement is produced of

#### VEGETABLES.

##### A. Organs of Nutrition.

###### a. in *Germination*.

1. Cotyledoneous, *producing cotyledons.*
2. Nemeous, *producing a thread.*

###### b. in *Vegetation*.

1. Vascular, *having cellular tissue and spiral vessels.*
2. Cellular, *having cellular tissue, and no spiral vessels.*

##### B. Organs of Multiplication.

###### c. in *Flowering*.

1. Phænogamous, *having sexes or manifest flowers.*
2. Cryptogamous, *having no sexes, and destitute of flowers.*

###### d. in *Fructification*.

1. Spermeous, *bearing seeds.*
2. Spondeous, *bearing sporules.*

§ 21. Upon the same principles COTYLEDONEOUS Vegetables (Vascular, Phanerogamous, and Spermeous) are divided according to

##### A. Their Organs of Nutrition.

###### a. in *Germination*.

1. Dicotyledoneous, *with a double expanded cotyledon.*
2. Monocotyledoneous, *with a single inclosed cotyledon.*

###### b. in *Vegetation*.

1. Exogeneus, *the trunk youngest at the circumference.*
2. Endogeneus, *the trunk youngest, and softest in the centre.*

##### B. Organs of Multiplication.

###### c. in *Flowering*.

1. (Androdynamous?)
2. (Gynodynamous?)

###### d. in *Fructification*.

1. Seminiferous\*. *Ag.*
2. Graniferous. *Ag.*

\* Agardh defines a *Semen*, or Seed, to be

"A separate fully-formed embryo, divided into cotyledons, and with or without albumen."

A *Gratum*, or Grain, he defines as "An undivided leafless embryo, adnate

§ 22. NEMEOUS Vegetables (Cellular, Cryptogamous, Sporideous) are also disposed according to

A. Organs of Nutrition.

a. in Germination.

1. Heteronemous, *threads in germination copulating into a heterogeneous body.*
2. Homonemous, *threads in germination either separate or confluent into a homogeneous body.*

b. in Vegetation.

1. Diplogeneous, *formed of regular connected cellules.*
2. Haplogeneous, *formed of anomalous somewhat filamentose cellules.*

B. Organs of Multiplication.

c. in Flowering.

1. Cryptandrous, *something analogous to sexual distinction.*
2. Anandrous (Link), *nothing analogous to sexual difference.*

d. in Fructification.

1. ? Sporiferous. Agardh\*.
2. ? Sporidiiferous. Agardh.

§ 23. The Organs of Vegetation, offer modes of subdivision in proportion to the lateness of their evolution.

Germination offers very few, Vegetation a greater number, Flowers many, Fruit very numerous modes.

Their dignity is the converse of this; the most essential modes depending upon germination and vegetation, the less essential upon flowering, and almost accidental modes upon the fruit (at least the pericarpium).

In this manner the vegetable kingdom, or rather world, is divided into two hemispheres by Germination, and into four quarters by Vegetation, into Classes by Flowers, and into Orders and Families by Fructification.

§ 24. Systems truly constructed upon these principles, also comprehend all other essential differences, and at the same time explain them.

nate to an albumen which performs the functions of cotyledons, perforating the same in germination and included in a double membrane."

Of these definitions I must remark, with much respect for my very excellent friend Professor Agardh, that most of the differences he indicates between a grain and a seed are rather of words than of reality, and that many are not correct in fact. The embryo of a Monocotyledoneous seed, or as he calls it of a grain, is not adnate to the albumen, neither does it perforate that substance during germination; the membranes in which the nucleus is enveloped are the same as the membranes of other seeds, and the embryo itself has certainly no proper integuments different from those of a Dicotyledoneous embryo.

\* "A *Spora* is an albuminous embryo included in a simple integument which is destitute of a hilum, and producing in germination a leaf analogous to a cotyledon (*cotyledonidium*)."

"A *Sporidium* is a naked embryo destitute both of hilum, radicle, and cotyledon." Ag. Aph. 125.