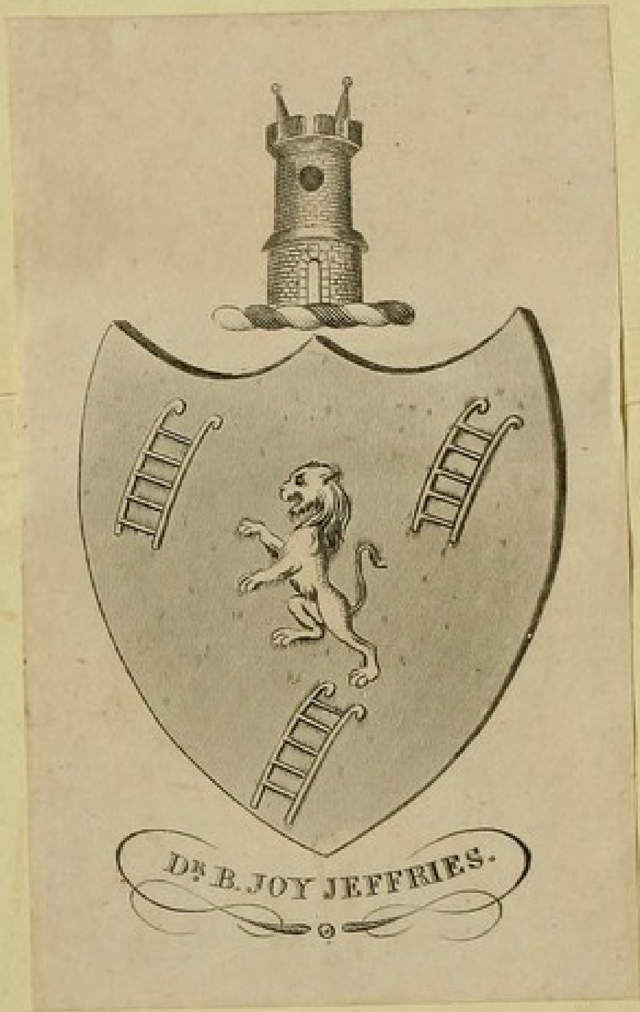
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A

THEORY OF SIGHT;

OR,

HOW WE SEE,

AND

WHAT WE SEE.

By H. F. GOBLET.

Read Sept 17/69

"Docti rationem artis intelligunt: indocti voluptatem."—*Quint.* 1. ix. 4.

"Exercer les sens, n'est pas seulement en faire usage; c'est apprendre à bien juger par eux; c'est apprendre pour ainsi dire à sentir: car nous ne savons ni toucher, ni voir, ni entendre, que comme nous avons appris."—*Rousseau's "Emile,"* vol. i.

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A THEORY OF SIGHT.

DIVISION OF THE SUBJECT.

Few people are really aware how little is commonly known of the information received through the eye, nor how difficult it is to see correctly. The extraordinary facility in the use of the organ, acquired by incessant exercise, misleads us; and we imagine that any one is competent to say what is before him. That "seeing at sight" is, however, not the simple process we are apt to suppose, the following pages may perhaps serve to show.

An inquiry into the history of the phenomena connected with the sense of sight, of necessity divides itself into two distinct branches.

One of these, and the first to be taken up, involves the consideration of the mode in which all information is accepted by the mind. The other, refers to the mode of constitution of the facts offered to a particular sense.

In other words, we have first to ask "How we see?" and then to ascertain "What we see." An inquiry conducted on this principle—besides that it follows from the nature of the subject, and simplifies our task—offers the advantage, that we separate at the beginning the only portion open to discussion, namely, the mode of the mental appreciation ; from that with respect to which no dispute can arise, namely, the mode of the actual constitution of external circumstances. Differences of opinion may exist in the former division ; but in the latter we have all the certainty that can be obtained from the concurrent evidence of our senses.

Want of attention, to this separation, has been the unsuspected source of many of the popular errors that we shall hereafter have to notice.

HOW WE SEE.

The form of apprehension accorded to the human mind is strictly limited. In the possession of what we consider practised powers of thought, we are apt to fancy that the mind is equal to any effort, and can embrace everything; but it is not so. It would, to begin with, be in vain that two facts should claim the attention at a same instant. We cannot listen to two readers, or follow up two subjects at one time: only one idea at any one moment can be the subject of apprehension. This seems so evident a truism that we fail to remark in our limitation the distinctive character of a *finite* intellect.

Why have we not the power of recognising two facts at a same time; and what faculties would be therein implied? We shall better perceive the wide gap which isolates us from full intelligence, by endeavouring to picture to ourselves the range of a form of mind uncontrolled by our limitation; but here, insuperable difficulties will at once meet us. We shall discover we are incapable of conceiving that which is not within the circle of our own powers. We may imagine our own faculties carried to the highest extent; but we cannot imagine other faculties. So true is this that, as Locke has pointed out, we only conceive Omniscience by lending to a word, God, *human* ideas and capacities. We ideally extend our own powers to perfection, and call the vague extent which the mind cannot reach, cannot fathom, cannot comprehend, omniscience, ubiquity, omnipotence. But these terms do not represent new capacities; they merely denote *excess* of our own powers. What omniscience really is we do not know. It is perfectly possible that to a higher range of mind than has been accorded to us, may be given the capacity of knowing two, or many, facts at one time: but the mode of action of this faculty, try how we will, cannot be brought within the grasp of our comprehension.

This intended limitation of our powers stamps its consequences all through the capacities accorded to us.

Our knowledge of the co-existence of two ideas or two facts, if we cannot know them both at once, must become dependent on time. We shall have no means of apprehending duality, but by *successive* acceptation. There is no escape from this conclusion. Where many facts press on the attention at a same time, we must take each fact in succession.

The rapidity of thought is so great, that we shall perhaps unwillingly admit the existence of succession. We appear to dart so quickly through argument to conclusion, that judgment is often supposed to be instantaneous. The disposition of the mind to generalise, is rendered stronger under the necessity for rapid decision among the exigencies of active life, and we are easily led into a belief our deductions are not necessarily the result of reflection. In truth, however, many years have been unknowingly spent in slowly building up the conclusions on which we afterwards act. The mind is a storehouse of decisions on a wide range of subjects. In mature age we slacken in the habit of analysis, making use of the generalisations we have been patiently accumulating. But generalisation can only mean the previous separate acceptation of particulars; and whether we go through the process slowly and laboriously, stumbling at every step over error, as in early life; or accept as certified facts the conclusions of experience and mature age; still the examination of separate parts is clearly implied as having already taken place. Each separate thought must have had its share of our attention. The rapidity with which this process may be performed by no means disproves its existence. "It is possible," says Dugald Stewart, "to pronounce and therefore to think of about two thousand letters in a minute." Now thought is far more rapid than utterance. Even a quick talker is always in arrear of his ideas.

Succession occurs in different individuals, and even at different times in the same individual, with an inequality of rapidity. When our inquiries fall into old channels, we run quickly over the circumstances that make up the result; we even at times lose sight of any succession, and deem the ideas of which we are conscious, to be simultaneous impressions. But in new and difficult subjects, we then perceive the true mode of formation of the conclusion we are seeking to reach. We take up thought after thought, weighing each, and giving to each a separate consideration, before we arrive at a clear conception of the whole. Our progress may be, and indeed often is, laboriously slow; so that we at times become painfully conscious of the several stages we pass through

Our limitation to succession leads to an important inference. If we are excluded from the recognition of two facts at once, then we cannot have had conferred on us a *positive* knowledge of any one phenomenon of mind or matter. A positive knowledge is omniscient, and overleaps the restrictions of time and space: the form of a *successive* perception would be uncalled for, if we knew everything positively. But even a slight consideration shows we could hardly have had this power. We shall try in vain to state what any one quality or property might possibly be in its full perfection. We are in the habit of speaking of simple facts, causes, elements, as though these ideas actually stood alone, and were known to the mind by themselves and for themselves; while in truth a strict examination will show that we cannot point to one material circumstance which is accepted by us independently; nor adduce a single thought which in all respects, excludes comparison with other phenomena, or attributes, of mind or matter. All our imputed elements and principles turn out to be possessed of properties common to other so-called elements and principles, and therefore are not ultimate facts. Though we are always striving to throw the line further back, yet the same discovery is continually taking place; we nowhere reach an uncompounded point, or a first fact.

If this be so, it is certain we can have no *positive* knowledge of the circumstances set before us. And if not a positive knowledge, then everything that mind or matter can present, must be, *ex necessitate*, constructed for us on a basis of relativeness. We *must* accept this mode of apprehension, with all its advantages, disadvantages, and difficulties. Excluded from the instantaneous perception of positive qualities, knowledge to us becomes the laborious deductions we may more or less perfectly make from related properties or qualities. We cease to know all alike, and all to the same extent : differences of perception, capacity, and power, are called into existence under the process of successive recognition.

Herein begins the wide field on which human reason has to weave its webs of thought. To measure value or meaning, we must incessantly compare. It matters little whether we do this knowingly or unreflectingly, comparison is the only road to knowledge left to a mind tied down to the acceptance of relative facts. "All our knowledge," says Whewell, "is founded on comparison." An infinite mind would not need to compare ; it would know everything of itself and by itself. A finite mind must compare at every step.

Comparison is rendered possible to us by the creation everywhere, of related qualities. Were relativeness absent, we should see nothing but differences ; and the power to correct thought with thought would at once be taken away from us. By the adoption of a relative base, quantity and value become questions of more or less, determinable means of an active comparison.

But what is relativeness ? What are the elements by which a creative power has produced sameness of character, under so vast a variety of aspects as those we find in the world of thought, and in the world of matter ? Not a single thought among the myriads that arise in our minds can be adduced, which is not susceptible of comparison with some other idea ; not a single property of matter can be pointed out that is not comparable with some other property. What is the mighty scheme by which such endlessly prolific results are rendered possible? Where does relativeness begin—where end? Is it permitted us to know the full extent and the full perfection of the scheme? Or do we only feebly wander from fact to fact, picking up single pebbles, detecting related phenomena at every step, but fated never to reach the end of our task? Each of the thoughts which a busy mind supplies, is one of a sequence suggested by the relativeness of each to each; every thought we take up may be the originator of a fresh series. There is literally no end to the growth of new trains of ideas, all the result of relativeness.

It is this fruitful connection of thought with thought, which constitutes the field of research first opened up by Locke, and afterwards further investigated by Hartley and by Hume, and termed the Association of ideas. Later works have only expanded the views these three writers offer us. It has been said that association is to mind, what the law of attraction is to matter: thought becomes connected with thought, and many thoughts can combine into one result; just as particles of matter, attracting each other, combine into one mass; but we do not hereby arrive at a definite knowledge of that which allows of the existence of association. The word simply conveys connection, without reference to the quality by virtue of which the connection is made. It has been further said that sameness in every respect constitutes identity; while sameness, in only one or more respects, affords the base on which association proceeds; this position, however, is but an exchange of one kind of ignorance for another; we are still left without information as to the nature of the property or quality involved in the connection. In truth, we know nothing more of the origin of association, than that some form of relativeness is the link which ties thought to thought. Its study only serves to show the existence of numberless forms of relativeness; but not what it is that has everywhere constituted the mysterious affinity of ideas recognized as relativeness.

Comparison reveals to us that ideas offer both related and dissentient aspects. The determination at which we arrive from co-existence in either class of facts constitutes a third idea, which bears the various names of inference, conclusion, result, deduction, according to the circumstances that may be before us, or the end we may have in view. We now enter on a very important branch of our inquiry.

From the co-existence of two ideas we deduce a third idea, which is the expression of some of the forms of relativeness we may have detected. The generic term under which all ideas thus derived are ranged, is that of *Relation.* We have here a family of thought so wide as to constitute the basis of all human knowledge. Relation involves all distinctions whatever, and all considerations arising from the comparison of one idea with another, or, in other words, the deductions we make from related qualities. Now the extent to which they may be carried is scarcely within the reach of determination. "The number of relations," says a modern writer, "discovered by the mind in a single day, a single hour, or even at times a single minute, far exceeds human calculation."

"The result of all inquiry," observes Dr. Brown, "must consist in the knowledge of relations. To see many objects, and, I may say even, to see all the objects in nature, and all the elements of every object, and to remember these distinctly as individuals without regard to their mutual relations either in time or space, would not be to have science. To have what can be called science, is to know these objects as existing in space, or as successive in time—as involving certain proportions or properties or resemblances, or certain aptitudes to precede or to follow. Without that susceptibility of the mind by which it has the feeling of relation, our consciousness would be as truly limited to a single point, as our body would become, were it possible to fetter it to, a single atom."

In accepting the generic term, relation, there is one fact always to be kept in view. The term expresses an idea derived from the successive apprehension of two thoughts or perceptions ; but then that idea belongs specially to neither, taken alone ; nor could either, taken alone, suggest it. Husband and wife—a man striking, and a stone struck—are severally relatives ; and the relations afforded us are the terms *matrimony* and *a blow.* But neither of these belong specially to either of their several relatives, considered singly. It is very common in philosophical discussions to find this distinction unheeded ; and thence a confusion arising which no after labour of explanation can wholly remove. Between two places at a distance from each other we form the relation, *length,* but the idea of length belongs to neither of the termini, taken singly and separately. Relatives are the facts from whose co-existence we derive an idea or relation ; but which neither, taken alone, could have suggested. Hence it is that a relation is always the expression of a pure operation of mind.

Distinctly recognising the mental origin of relation, it will be seen that it is not at all a necessary consequence of the co-existence of two relatives, that every individual should form the permitted relation between them. We may not, from a variety of causes, have the capacity of perceiving the particular relativeness, and then the idea would not obtain to the mind. Neither does it follow that the relation will be precisely the same to all; its very origin, excluding absolute perception, bespeaks its susceptibility to variation under the influence of accidental circumstances. General slowness or dullness of comprehension implies a want of readiness in perceiving the relations of which ideas are susceptible, and which connect one with the other. To some minds it is a labour to think; it is a work of time to form ideas, and to follow out a conception to its consequences. Any one relation formed, few others are suggested, and the train of thought stops short of the extent to which it might travel. On the other hand, quickness of comprehension bespeaks unusual facility in the detection of the relations which belong to the ideas suggested to us; one thought calls up scores of other thoughts; and connections are so widely perceived that we discover little or no limit to succession. Besides these differences of aptitude for the formation of relations generally, and which constitute differences of capacity; there may be observed differences of facility in the apprehension of particular sets of relations. Individuals may be quick in the formation of some sets of ideas, but of slow perception in others. Social life is full of such instances; and in these results both nature and cultivation may enter.

Attempted classifications of relations have been occasionally offered to the world, but there exist special reasons why we can never hope to have the history of this wide family of thought authoritatively laid before us. We have been told that relations belong to one or other of these classes—wholes and constituents; resemblance and difference; cause and effect; time and space; but beyond these, and a few similar general divisions, we have little to guide us. To attempt a complete classification, would really be to stride over the entire circle of human knowledge, and, after all, to find the effort ending in a gigantic failure.

It is strange, but yet undoubtedly true, that large classes of relations, with which we are perfectly familiar, and on whose properties or qualities we are hourly acting, are wholly without distinctive names. We have here one of the deficiencies of language. The relation deducible from the relatives father and son, brother and sister, cannot be named. To take the first, filial duty, besides being a periphrasis, would only express the relation of a son to a father. We neither want that, nor the duty of a father to his son. We want the word which shall describe their mutual and relative condition. It does not exist. It has been said that *passive* relations are all without names, and that we only find specific terms in the class of *active* relations. According to Locke, abstract ideas of *substances* have no names: thus, though we can say *body*, we cannot say *bodiness*. We shall show hereafter that the case is a great deal worse when we come to consider the ideas derived from the external world; for here a nomenclature is almost entirely wanting. Under such difficulties as these, we can well understand that a history of the relations known to the mind is simply an impossibility. How can we classify ideas for which we have no names, and where language fails us? Besides the extreme vastness of the subject, we have no terms to describe our conclusions.

The formation and apprehension of relations does not necessarily end with the comparison of any two related facts. Two or more relations, gathered from two or more relative facts, may become in their turn the bases of other relations; and this process may be extensively continued. In truth, a complex subject implies a long series of relations built one on the other, and rising in diminishing stages, till one last relation be reached expressive of the whole. And this last relation constitutes what is called a generalisation : a term of concentrated meaning. Generalisations afford a mental shorthand, not always in the power of the uneducated, and often wanting even in disciplined minds. They express the concentrated capacity and applicability of masses of relative facts.

The co-existence of relatives does not necessarily imply restriction in Time or Space. We may discover relative facts in such close proximity as that interstitial space is imperceptible, and succession is almost immediate. In this case we have what the external world everywhere offers us, *body*, or natural aggregations of material facts. Or we may trace the very same relatives in places, and under circumstances widely apart in time and space; and the mind alone combines them into a single idea. An occurrence of last year, presented to us by memory, may appear to have a same bearing as an event we have just witnessed or heard of; and we deduce a same relation or conclusion from the two. A material fact we have seen a hundred miles away, may present to us considerations of a nature the same with an appearance immediately before us; and we accept them as results of a same cause, or as possessed of a capacity to produce a same end. Comparison is not bound by considerations of time or space.

We have as yet only taken a hasty review of the features which characterise the mode of apprehension allotted to the human mind, in so far as its own abstractions are concerned. But other features arise to our notice under its relations to an external world.

The judging power not only speculates on its own thoughts, but can weigh the information afforded by the existence of a world external to its own existence. We are placed in the midst of matter endowed with various properties, all adapted to the wants of a finite intelligence. By the sweat of our brow, metaphorically and actually, we have to obtain for ourselves all the means of controlling these properties which our limitation of powers may render necessary. The exact relation between an internal mind and external matter has long formed a problem, which the learned appear to have investigated with wonderful acuteness and perseverance. But we scarcely need here to lose ourselves in the mysticisms of ideality and reality, subjectivity and objectivity; and may perhaps safely determine that, at all events, a co-ordination of mind and matter must exist, or we should fail to act on the external world with intent and success. The properties given to the external world, and the powers allowed to the human mind, must be co-ordered. That which the one has the other can recognise, or the former could not be utilised. Any theory which supposes the properties of an external world to be only those which the mind can create for itself, misstates the question. External properties may and do exist without our perception of them; and any failure to perceive, is not proof against an external existence: it may be only proof against ourselves individually; others may see that which we for the time fail to see, or have not the capacity of seeing.

To enable us to take cognisance of the properties of an external world, five senses have been allowed us. It is an old speculation whether perfect intelligence knows more than these five; and what others might be possible to a superior order of being. It may be a still further question, whether a perfect or omniscient mind needs senses at all. Their existence with us, is probably the necessary sequence of our finite powers. They show how we are fenced round, and tied down to fixed channels of information: how guardedly we are made to know only certain properties of matter. Our very inability to say whether there may not exist other properties than those we know, shows our intended limitation. But speculations like these are beside our present inquiry.

The following offers a rough sketch of the field of operation of the five senses, in their adaptation as exponents of the qualities observable in external nature and the material world.

The *touch* informs us of soft and hard, hot and cold, smooth and rough, wet and dry, or various conditions of matter.

The *taste* acquaints us with sweet, saline, bitter, sour, alkaline, acrid, nauseous, savoury, spirituous, or various modifications of flavour.

The *smell* conveys to us the ideas of fetid, fragrant, pungent, aromatic, savoury, putrescent, or various modifications of odour.

The *hearing* tells us of loud, soft, increase, decrease, pitch, melody, harmony, discord, or various modifications of sound.

The *sight* conveys to us the changes afforded by external appearances; and it is the object of the succeeding pages to show what these are.

Even a hasty survey of the mass of information supplied through these channels will advise us of such an enormous increase in the phenomena brought before us for judgment, that the task of enumeration becomes perfectly hopeless. Scarcely an instant of time could be found during a long life, when the mind remains free from influence through one or other of these channels. An instant's cessation of action is a marvel. We *must* hear, or smell, or feel, or taste, or see something. Outward phenomena crowd on us for judgment, without any intermission; and probably the only rest we ever know, is change.

Now all this external information must of necessity be co-ordered with the faculties that are to recognise it; or its creation would be a waste of power. However numerous may be the facts offered us, they must necessarily submit to the control of the judging power; and assume the shape and comply with the conditions required of all thought. Hence again, in every case, outward phenomena, whether few or many, must be successively accepted. The most powerful action will always be first noted; and according to the power will be the order of succession. And lastly, as we are denied a positive knowledge of phenomena, whether mental or material, we must judge everything and everywhere relatively.

Any qualities or properties of matter we can select will be found to be what they are, by comparison with some other facts. Heat, fragrance, bitterness, are not recognised through a positive knowledge of these properties, but by an estimate of value relatively to other facts of a same nature. We have no idea what they might be in a condition of perfection; and were they not created for us on a basis of relativeness, the power of the senses would be at once blotted out; since a mind having only finite powers could no longer compare and estimate value.

Each sense supplies the opportunities for the deduction of its own series of relations; and we attain varying degrees of skill in the formation and acceptation of the relations peculiar to each sense. For some sets, we seem to have a natural aptitude; and rapidly master even difficulties of perception. In others, cultivation of the faculties is required to attain a more or less of power. The epicure founds his opinions on a long series of trials, empirically conducted: certain flavours are selected or rejected; and an opinion is at last reached, that such and such means afford a result relatively preferable to all others. The musician deduces relations among succession of sounds: and their due selection, on a scientific basis, affords the melody he seeks to create. The artist, whose field of inquiry is far wider—indeed, is vast beyond conception—has a far more difficult task before him, to derive from the information profusely offered to the eye the laws which govern appearances. And probably no man will here ever do more than gather up a certain portion of the multitudes of phenomena spread before us; the portion selected bearing always the impress of the individuality of mind allotted to the inquirer. Hence it is we have schools of art; and students, more or less successful, of its various branches. And hence it is, we have never yet had, and probably never shall have, in any inquirer, an entire and perfect knowledge of all the relations that we are able to derive through the eye.

We shall now endeavour to trace the history of the information the mind receives through the organ of sight. And though the general principles to be offered will be found to apply more or less to the four lower senses, yet they are to be considered here with special reference to the chief sense.

There are important distinctions between the operation of an organ of sight and that of the four lower senses, which we require to recognise at the outset.

The relations we gather from the facts supplied to the organs of touch, scent, taste, and hearing, are not necessarily invariably before us. We may fail to exercise these organs for considerable intervals of time. There is no law or contrivance of nature which compels us always to hear a sound, taste a savour, scent an odour, or derive an impression from the material conditions of bodies. But there *is* this law with respect to the sight. We must, as a matter of necessity, continually derive sensations through the eye. Nature has so filled up space with objects of sight, that we cannot turn the organ in any direction without immediately receiving some kind of impression. The only relief allowed to the visive capacity is change, not cessation. While the organs of touch, taste, scent, and hearing may be ready to act—and yet receive no impressions of matter, savour, odour, or sound —the eye must always see something. We may escape from the impressions of the four lower senses by a removal in space: we cannot do so in the case of the eye; it finds vacuity and cessation of action nowhere.

In the exercise of the sense of touch we *may* have a co-existence of simple relatives. In the same mass or totality we may have at a same time several simple sensations of touch. Thus we may feel a body to be variously hard, or variously warm, in its several parts; but it is not a *necessary* condition of the exercise of the sense of touch that these different simple perceptions should always co-exist in space. Many bodies are equally hard or equally warm throughout; and consequently we may have only one sensation of touch offered in a same body.

The same uncertainty is traceable in the sense of smell. A body may—as it ordinarily does—present one scent throughout, or the odour may vary with the change of parts. But it is not a *necessary* condition of objects of scent that they should offer a plurality of simple perceptions.

The same fact is equally to be remarked in the exercise of the organ of taste. We are not *necessarily* bound to the recognition of a plurality of simple and co-existent perceptions of taste in a same object.

And lastly, we have a further illustration of the position in the economy of the organ of hearing. Differences of sound are not a *necessary* condition of any one totality. Different parts may give out different sounds; but some bodies only furnish a same tone throughout.

In remarkable contradistinction to these stands the organ of sight. It *is* a necessary condition of the exercise of this sense that we must ever recognise a plurality of simple perceptions co-existing in space. There is no such thing as a visual whole made up of or affording *only one simple perception.* We can scarcely overrate the importance of this fact. To know a simple perception by the eye, we must arbitrarily abstract. While the other senses imply at times simple perceptions, at times co-existent pluralities of these simple perceptions, the sight knows only the latter. We cannot cite one single effect coming before the eye which is not found to have parts and constituents, and to present many considerations of shape, and hue, and light.

These are the necessary consequences of the arrangements adopted by nature for the exercise of the eye, and for the supply of the information to be derived through that organ. While an aggregation of matter can exist altogether denuded of action as regards the lower senses —that is, while a body may be found without smell, or taste, or scent—it cannot exist without an action on the sight. The qualities the four lower senses present to our notice, are really accidents of a substance; and the substance itself is never allowed to escape our notice (though the accidents often do), for everywhere and at all times we see body.

It is clear that in the circumstances submitted to the four lower senses, or contrived for their use, we can discover nothing analogous to the multiplicity of facts aggregated by the hand of nature for the exercise of the eye, that we find in a flower, or a tree, or an animal. We cannot hear so many circumstances in a sound, or taste so many in a savour, or feel so many in a material fact, or scent so many in an odour, actually combined by the hand of nature, as we can see in a bird or an insect. We occasionally detect in a savour or an odour the presence of two or more constituents. We can recognise the harmonious combination of sounds; but this is about the extent allowed the lower senses. Objects of sight, then, in wide distinction from the other sensuous perceptions, having always to consist of a plurality of simple perceptions, it was evidently additionally necessary to form between these deductions such capacities of relation, as should permit the exercise of a natural faculty of the mind that would combine them into one idea or group. External co-existence in time and space, without a corresponding internal capacity of co-estimation of the relations implied, would, so far as the conception of a whole is concerned, mean non-existence. If we had not the power of appreciating the relativeness of the simple perceptions or relations gathered from the visual phenomena that nature has aggregated in time and space so as to form bodies, their aggregation as such would be totally useless to us; we should never understand the co-existing facts as making *one*. From the perception of two facts externally existing, we form a relation; from the perception of many facts brought together, we should form many relations; but to enable us to combine the relations perceived, so as to gain the idea of entity, we must have a further power conferred on us of recognising the co-existence of these relations in the mind, and thence deriving other relations. Without this power, we should see in the circumstances aggregated by nature merely arbitrary groups of simple perceptions; and should be unable to attain to the last generalisation which ties simple relations into a totality.

Sight, then, must in truth imply not only the perception of co-existent relations, as with the lower senses, but the further acceptation of the result afforded by the general character of these relations. The mind having gathered up the relations supplied by the aggregated facts, deduces a single idea from their co-existence expressive of the individuality of the group. This last general relation is conveyed in the terms a cloud, a flower, a man; or the expression of the totality. It will be remembered we have no terms expressive of such totalities for the lower senses.

We are perhaps unprepared to admit the existence of this complex machinery in the formation of ideas gathered through the eye. Sight is so instantaneously performed, that we conceive the visive sensation of external objects to exclude the recognition of intermediate processes, or the intervention of any reference to the causes whence the effects proceed; and to imply the simple effort of turning the organ towards objects. It is just here, however, that lies the question. It must be borne in mind that the almost miraculous rapidity of perception we are enjoying, is not the mode in which sight was originally performed when the eye was first exercised, and we were learning to see. Objects of sight become for the most part so familiar that we do not need to go through all the stages once necessary to give us a perfect idea of their individuality; but we *infer* a vast number. The glance of an instant is amply sufficient to gather up the relations that convey the general character of the circumstances offered us; we have been made to know that certain facts always imply certain others—that the existence of one implies the presence of a definite chain; so that eventually, instead of going laboriously through the whole series for every case, we seize at once on the most prominent relations—on those which tell as a key to the rest—and form to ourselves immediately a general idea, or final relation, expressive of the effect before us. But this is only an acquired facility. It is the result of a long previous use of the eye, and of cultivation of the faculties to which it ministers. When we read, we forget the individual letters employed, and think only of the sense made up; yet the power of each letter was first to be learned, and each has to be accepted before we can form a relation expressive of a whole word, or that which conveys the meaning of a sentence, or the aim of a volume. Facility of apprehension always slurs over, or reduces in importance, intermediate processes. Subordinate relations only become the objects of our recognition when we are referring to new circumstances, or take up the question of the difference between any particular effect and others of the same kind. In either of these cases, the minor relations are separately considered and weighed; and we take note of the several stages in the formation of our opinion. A difficult subject requires to be laboriously investigated before we can deduce the general relation expressive of its nature; and a new or complex object of sight must be attentively considered before we can form a distinct idea of its individuality.

There exist other considerations sufficient to show us that sight *must* imply the formation of the relations we have referred to, though our rapidity of perception might dispose us to doubt the existence of the process.

In the connection with the mind of the facts created for the exercise of the sight, it is obvious that one of two plans was to be followed. Either the consciousness through visive sensation, of the existence of external phenomena (and this, it is evident, we must have had by some means), was to arise from the perception of *simple* facts, or it must be made to accompany the perception of the *co-existence* of facts. If it had been determined that sight should be the result of the perception of simple circumstances, either the sensation must be one and invariable throughout—in which case all external objects would have seemed alike, and the knowledge to be derived through the eye would have been of an extremely limited nature—or it must be different and variable. If the latter had been the plan adopted (and any other arrangement would have lowered the sense of sight from its present state of primary utility to comparative insignificance), it would have required *first*, that the elements to be admitted into the composition of the effects intended for the use of the eye, should be as numerous as the sensations intended to be excited in us: for it could not have been, that to a same fact different actions could belong. If to the colour red, for instance, or to the shape a cube (assuming for the moment that these are simple circumstances), had been given the power of exciting definite feelings, these feelings being invariable and inalterable, there must have been as many other simple circumstances provided, as there were feelings to be produced in the mind through the eye, or ends to be answered. We may in some measure conceive the enormous amount of these that would have been required, by endeavouring to follow out and determine the varied information that we are in the habit of receiving from the visual world. And *second*, a plan of constitution of this nature would have implied that all the information we could derive through the eye, would obtain in the mind in a complete state of disjunction; the sensations acquired being the result of the action of simple facts, all external phenomena—like the assumed simple circumstances, the colour red, and the shape a cube, imagined to excite us definitely—would convey impressions having no connection whatever with each other. A power of perceiving an immense number of facts would, it is true, have been given us, but the ideas afforded by the facts noted would have subsequently obtained in the mind separately and disjunctively; and no means would have been supplied to us whereby we could ever combine any two of these conceptions for any required purpose.

But these are not the only considerations which may be referred to. We shall find that visual sensation actually *cannot* obtain from a single fact; and that where a sensation exists, it implies a relation formed between at least two relatives. Let us endeavour to fix to ourselves an idea of that intangible mathematical supposition, a point having neither length nor breadth. We discover, when we attempt to bring it before the mind, that we are totally incapable of forming any conception of its being. It must be necessarily so: for as the point is supposed to have no parts, relations of space or figure cannot be formed, and there is nothing for the mind to seize. If we were to suppose a second point—a hundred such—and still consider them separately, we shall acquire no greater capacity of forming a determinate idea. The circumstances, however, become totally changed, directly we admit the opportunity for the formation of a relation; we then gain a determinate idea. Let us conceive of two of these same points existing at a given distance apart ; and the mind immediately apprehends *length.*

Our apprehension of a point actually the object of sight may be shewn to afford another illustration of the position, that visive perception requires the formation of a relation between two or more circumstances. Although a point appears to be a single existence ; yet it is known to us, and is the object of sight, only through our power of recognising some form of relativeness. To prove the position, we might refer to the relations which we must necessarily deduce from the mode of disposition in space of the parts constituting the point : it might be urged, if we see the point, we see its shape distinguishing it from the other objects near it, and from the disposition in space of the parts, we form the relation a square point, a round point. But we will make the difficulty as great as possible ; and will suppose that the point in question is so minute as to be but just visible; and that the power of distinguishing parts and shapes is thus taken away from us : yet we *see* it; and therefore under our own theory ought to be able to point out the two circumstances originating the relation to which visive sensation is attached. The difficulty is only apparent. If we see a point even having no definite shape, it is solely because the colour or tone of this point differs from that of the ground against which it is placed : a point identical in colour and tone with the surface against which it is placed, is invisible. The most minute dot we can make on paper with the point of a pen, is seen; but it is only seen through the difference of colour, or of tone, that obtains between the ink mark and the whiteness of the paper.

Remove the darkness—suppose it colourless—and the dot becomes invisible. Here then are the two circumstances originating the relation that we are seeking. Shape reduced in extent, so as to be beyond or below the power of the eye, it becomes a relation of difference of colour, or of tone, between the point and the ground against which it is seen, that permits the attachment of the sensation constituting the perception of the point. The blackness of the ink and the whiteness of the paper are the relatives sought. The relation formed is the idea of a black point.

It is by a process of this kind that all visive perception is obtained. However complex may be the circumstances set out for us, sight of necessity implies the acceptation of external relatives, and the formation of a series of relations, subordinate and principal, resulting at last in the conception of a totality. Whatever is to be the object of sight, can only be known to us by an observance of this process. The ability to affix a name to a totality, implies that the mind has united all co-existing sub-relatives under one idea; whether they be few or many; and whether the operations have been knowingly or unconsciously carried out. The term by which we express the presence of an external object, is simply a last generalisation of very many co-existent relatives.

Under the existence of this complex machinery for the exercise of the sense of sight, it is clear that in proportion to the almost unlimited supply of relatives, and thence of relations, will be the necessity for such an extensive subordination as shall ensure succession. An extensive supply of relations without this subordination would only mean rivalry of claim on the attention, incomplete apprehension of the aggregated facts, and confusion of idea where clearness of perception is imperatively required. It is equally evident that the necessity for a *successive* acceptation of particulars, increases with the number of relatives admitted. So far, we arrive at the knowledge of no new power, but only a wide existence of that already traced to exist. A fuller examination, however, of the process of visive apprehension, and of the nature of the information the eye gathers for the mind, shews us that features become developed, of which we only obtain faint traces in the four lower senses; and these we now require to notice.

The apprehending power may have to be exercised on phenomena that are not necessarily universally similar, or similarly aggregated, or similar in amount. We may have in the idea to be apprehended many relatives; or we may have but few relatives. We may have some conditions of relativeness supplied to us; or we may have different conditions. The relativeness may be of easy apprehension; or it may be of difficult apprehension. Hence arise the following forms of succession; and which are more or less familiar to every observer of nature:—

1st. Although the rule of creation for the eye is undoubtedly profuseness in the aggregation of relative facts, yet there are exceptional cases, of infrequent occurrence, where a marked limitation of relatives may be observed. When we are called upon to apprehend a whole made up of but few considerations, we are sensible of a state of things which we distinguish by the term *Poverty*. It is an impression which results to us from the succession of but few relatives in the circumstances coming before us. And in nearly every case it is displeasing to us: not, however, inherently, and as a necessary consequence of the state of being observed; but merely because of its departure from certain conditions commonly found to obtain in nature, and to which the mind is accustomed. Visive facts are, in the majority of cases, susceptible of consideration under a vast variety of aspects. Many circumstances require to be noticed before a complete idea is formed; many applications of observed qualities require to be made. The conditions are departed from in the state of things to which we give the name of poverty. The departure would not affect us were our minds of an unlimited capacity, but depending as we do entirely upon relativeness for the construction of our ideas—accustomed to rely on a highly developed system of relatives—we feel an emotion of disappointment when a diminished supply is offered us. The effect is by so much less able to suggest other circumstances—we can by so much less apply it wholly or in part to other ends or purposes. Our activity of mind has not its accustomed supply of food. Were natural facts put together on the basis of but few relatives, poverty would cease to be remarked by us, and consequently to be disagreeable to us.

It is only occasionally that we can trace instances of poverty in natural effects; and these, when they do occur, are not accidental, but intentional results. A cloudless sky of a uniform tint, a sheet of snow covering a wide extent of country, a bare and neglected waste, a level tract thinly covered with vegetation, a flat and barren shore, are examples of poverty resulting from general laws. We may add to these, the loss of foliage to which all deciduous plants are subject in winter.

In art, on the contrary, poverty of effect is of very frequent occurrence. The productions of human skill are only occasionally addressed to the eye: that is to say, the large majority of productions about which art busies itself, aims at ends and purposes distinct from mere visual appearance. Wherever matter is employed by art, we shall commonly find that it seeks its end by the shortest means; and that the relations of shape selected are principally of the limited kind—straight lines, and regular figures—and no more are admitted than are absolutely necessary to the end sought.

2nd. It is a part of the provisions of nature that the relations offered to our acceptation should be perpetually varying in kind, in mode, and in degree; and such a continued change is necessary to the constitution of our minds, which tires of sameness. When this rule of aggregation is departed from, we call the state of things that then obtains, *Monotony.* This form of apprehension displeases us, not from its being actually offensive, but from its tying down the mind to the continued acceptation of same circumstances. It is not from the occurrence of any one consideration that the feeling can arise; but from the *recurrence* of the consideration. Hence, monotony will be perceived to have no positive action: it only affects us relatively through the absence of our accustomed mode of acceptation and estimation.

In natural effects, monotony is a rare circumstance. Two forms precisely alike, presenting exactly the same modes of construction, placed in exactly the same situations with respect to us, similarly coloured, and enjoying an equality of light, are probably imaginary circumstances. Single bodies throughout all the higher forms of creation never present to us two successive lines, or two successive surfaces, of a same extent or shape. It is only in the lowest class, the mineral world, that parallel lines can be found entering into the composition of a body. With this exception the rule will be found to be, that two parts of same quantities, same values, same hues, same tones, are in nature never found *succeeding each other.* The same care to avoid monotony is observable even in the allocation of objects in space. In the vegetable world, where locality is dependent on the operation of general laws, trees, shrubs, and plants, will nearly always be found growing at unequal distances from each other. And in the animal world, where locomotion would seem to leave openings for the occurrence of monotonous arrangements, we may watch for a long while such circumstances as the flight of birds, the accidental situations of animals in an open country, those of fishes moving about in a river, the eddyings of a swarm of insects, before we can detect equality of division of space.

The monotony which nature offers, is really nothing more than an approximation to the effect, an appearance which fades on a close examination. Same formed and same coloured leaves might be supposed to exist on a same tree ; but on a careful comparison we can detect differences all through. The uniformity of hue spread over an expanse of country during the period of spring, is one of the most extensive natural instances of monotony we can select ; we see an apparently unchanging green covering every object, but then the forms to which this hue is attached are discovered to be extensively various.

It is remarkable that in art the case assumes a totally different aspect. Whether it be that the human mind, when called upon to exercise its inventive faculties, gets fatigued in imagining new relatives, or that in many cases in art same relatives are admissible, it is yet certain that the objects and arrangements which proceed entirely from ourselves, are often found strongly to evidence monotony. House-building, gardening, dress, furniture, machinery, commonly exhibit, in the allocation of the several parts, same quantities, same forms, same dispositions in space, same hues, same modes and arrangements of line.

With all monotony resulting from allocation in space, there is one general observation to be made. In any case in which it may occur, it will displease us much less when mixed up with a high development of parts than when combined with poverty. Detail then occupies the eye and mind, and leads us to forget the first impression. A dozen or two of straight poles, of a same height and bulk, placed in a row at equal distances, are both poor and monotonous in effect; but the eye would be less dissatisfied if they were converted into well-proportioned and elaborately ornamented columns.

3rd. In the daily acceptation of the considerations offered us, we experience differences of facility. Successive perception in some cases is readily performed; in others, it is a slow and difficult process. On some occasions we can at once acquire a clear idea of the facts before us; in other cases, a considerable period of time elapses before we can thoroughly understand them. The degree of facility with which we may apprehend an effect, depends on a variety of conditions. The more or less of development of members, of delicacy of differences among the values of the relatives that may happen to be present, of separation from other considerations, of our acquaintance with the particular circumstances before us, of arrangement under known or symmetrical forms, are perhaps the chief; but whatever may be the cause, when successive perception is readily performed, we apply to the condition of things before us the term *Simplicity*.

Simplicity gratifies us, and this through the facility we experience of apprehending the circumstances set out for us. We are apt to understand the term as implying some peculiar mode of arrangement of constituent or relative acting upon us positively; whereas it merely refers to a comparative feeling arising to us whenever circumstances facilitate succession of perception. Were simplicity a positive circumstance, its operation would be acknowledged to be the same upon all minds, and at all times; but this is not the case. There exist a vast number of aggregated facts which, to some persons, appear complex, and to others simple; and the facts which, to any at first sight appear complex, cease to be so when a further acquaintance has given us a facility of reading them. To the unlearned, the laws and interdependencies of sounds for the regulation of melody and harmony, seem extremely involved; but the musician knows them to be the conditions of a very simple system. To the majority, Chemistry and Astronomy appear studies of great complexity; but the chemist and the astronomer see only simplicity where we see confusion. All the investigations implied in the search after knowledge seem complex, till we acquire a power of reading readily the facts submitted to us; and then they cease to be so, and are admitted to supply additional manifestations of the admirable simplicity which pervades creation. That simplicity has not a positive action over us, is further shown by the fact that individuals differ as to the identity of the idea—that they are found not to agree as to the presence of the effect. The grasp of some men's minds is such, that they appear able, in any path of science, to accept the most extensive and involved series of relative circumstances, and almost to trifle with what would be to the common level of ability insuperable difficulties. There are others who seem by nature disqualified for more than the comprehension of a very limited number of relatives; and who, in any path of study they may take up, require to have the relations repeatedly impressed upon them before they can attain a distinct idea of the facts represented or conveyed. Now, which of these two classes is to fix the identity of simplicity? To the last, the effects which the former would term extremely simple, appear inextricably involved. We may not, therefore, consider that to be a positive circumstance which does, or does not obtain, according to the capacity of the observer.

Simplicity in truth merely indicates the degree of our natural or accidental power of apprehension. Its supposed presence is always consequent on our ability to read nature. To a superior intelligence the whole mysteries of creation are doubtless but simple facts. To us they present such difficulties that we experience a sense of gratification when any particular set of relatives comes before us in a shape allowing our ready comprehension; and we call the state of things which then obtains, simplicity. It may be that there exist circumstances whose influence to the common level generally facilitates succession of perception; but these circumstances will yet not be found to argue a positive base for simplicity; they will not be found to show a definite arrangement of constituent facts; but will be discovered to be connected with a regulation of the values of all constituents, insuring their ready and rapid acceptation by the mind. It is probably a correct conception of the nature of simplicity to contend, that though to some it will appear to be present whenever we have to read an effect in which a great number of relatives obtain, and that to others the same state of things, owing to an inability to grasp many connected circumstances, will not be able to excite the idea; yet that the majority will always agree it is present whenever these relatives are defined by broad differences, or are familiar to us; and will complain of its absence, whenever they are defined by delicacies of difference, or are at all new to us: it being understood that these indications of simplicity fail to affect us so soon as we have acquired a power of distinguishing delicacies of relative value, or have made ourselves familiar with the constitution of the effects in question, and that they have no connection with the feeling or emotion the completed conception of the aggregated relatives may subsequently produce in us; the gratification arising from overcoming the difficulties of *reading*, being distinct from the gratification intended to be supplied by the *thing read.*

4th. When the relatives submitted to us are expressed under a continued change of forms, and afford an unusually extensive change of considerations, we apply to our perceptions the term of *variety.*

Variety is the source of gratification to us, through the natural frame of our mind, which derives its knowledge from the comparison of facts, and further from our dislike to sameness. The more extensively compounded are the facts which come before us, the greater is the amount of deduction, inference, and application, we are able to form ; and the further are we removed from the wearisomeness of monotony. In variety itself, so far as mere change is concerned, we should probably find no gratification : it is made to be acceptable to the mind from the resources it opens to our capacities.

The effects created for the use of the eye are eminently constituted with a view to variety. "Let us," says the author of "The Journal of a Naturalist," "take only one yard square upon the first verdant ditch bank in spring, and the variation of form and character which will there be presented, may probably exceed general imagination." This is but an instance taken from one branch of vegetable life ; the same change of development is to be noted in all the others, and in the animal and the mineral world. Far from parsimony being traceable in the development of material arrangements, the series of combinations, of modes of appearance, and of kinds of relatives, seem to be inexhaustible. Wherever we turn our eyes, we find that not content with one or two changes of a mode of existence, a creative power has showered thousands ; and when we come to analyse any of these instances, far from finding the number of constituents employed easily determinable, or the amount of combinations and of relatives quickly followed out, the eye and the mind get tired in the pursuit and discovery of the inexhaustible variety. Not a tree, not an insect, not a blade of grass, but must forcibly demonstrate a liberality of creative power carried far beyond human means of imitation or enumeration.

Few circumstances are more expressive of the difference which distinguishes Nature and Art, than this variety. Art in its feebleness and limitation of power, is generally content with as few constituents as may suffice for the bare utility of the product it has in view: it seeks to attain its ends by the most direct modes; but so universally inferior is it to nature in the power to create and combine, that it finds itself exhausted so soon as the grand point *use* is attained; and without a sufficiency of energy to superadd to its contrivances those modes of embellishment which Nature delights in displaying, and which she seems to distribute in the mere wantonness and exuberance of productiveness. Art rarely ever wanders beyond the range of utility; it aims only at this result: and the point is further sought to be reached by the most immediate channels, out of which the mind seems not to dare to expand itself, lest it should, by the diffusion of its energy, lose the power of attaining the far distant and imperfectly perceived end, which necessity yet imperiously demands should be reached. Give Art the command of an unlimited number of relative facts, and it wanders confused and perplexed among its riches. Allow it to select a few, and it then, and then only, begins to combine and produce. Its combinations, however, are always of a limited character. The few products of human skill which do admit variety into their combinations, are either in themselves unimportant, or the variety they exhibit, compared with that of Nature, is of the most narrow and confined description—a variety that finite minds can produce; not that which springs from a power and intelligence embracing the whole mystery of creation.

5th. The circumstances that are presented to our apprehension may come before us under such forms of arrangement, as that we are unable to follow out the conditions of the several parts, or immediately to comprehend the meaning intended to be conveyed by the whole. Subjects or effects to which we are unaccustomed, consisting of many members, bearing involved relations to each other, are not apprehensible with the facility we commonly enjoy. To the state of things then before us, we apply the term *Intricacy.*

The perception of intricacy is generally of a displeasing nature. We are in the habit of apprehending external facts with a considerable degree of facility; and when intricate arrangements obtain, or subordinate and collateral questions become involved, our power of accepting aggregated facts as totalities becomes less active. There is uncertainty felt as to the comparative values and relative bearings of the components presented to our attention; we are at a loss to understand which component requires to be taken up first, and what share each bears to the whole, so that the subject is not completely possessed, and our full apprehension is baffled. There is, however, in this, only a comparative feeling implied, for it will be found that when once we acquire a clue to the relations and several bearings of the circumstances before us, the impression of dissatisfaction subsides. The state of things considered, becoming possessed by us, we call that only variety and richness of detail, which formerly was too intricate for comprehension. In all cases, intricacy will be subject to variable valuation. New subjects, if at all complex, are adjudged to be intricate; but the difficulty of apprehension vanishes on an acquaintance with the applications and inferences to be derived from the components. And it is further to be observed, that different minds estimate differently the amount of intricacy which may be supposed to be present at any one time.

Intricacy is by no means a common feature in visual nature. The effects submitted to the eye are intended to be read by all; they are created for the common level of capacity; and they are therefore not so compounded, as that apprehension is rendered a process of difficulty and labour. What is to be seen is, in the majority of cases, at once accepted. The instances of intricacy to be met with are really exceptions to the general rule, and are to be understood as conveying more frequently the mode of aggregation of *parts*, than that of general results. We can always determine that a tree is before us, though we may be unable to describe the mode of setting on the branches to the stem, or the varying positions of the leaves to each other.

6th. An attentive examination of the mode of reception by the mind of the thoughts that crowd on it, shows us that succession is at times liable to be disturbed by the intrusion of ideas dissentient from the end we are seeking to reach. Some form or aspect of relativeness exists even between thoughts of dissimilar natures; and association occasionally brings these forms before us in times and places, when and where they detract from our power of concentrating our ideas on the object sought. We recognise the presence of disturbing elements among the considerations on which we are seeking to found a decision, when we refer to such terms as incongruous, disordered, confused, dissentient, opposed, discordant, deformed. And the employment of the terms shows that we are eliminating incomplete relativeness, and are endeavouring to generalise on qualities and properties of some natures. Control, call it by what name we will, must exist over the multitudes of thoughts that rise up before us; or we should often be thinking without a purpose, and under the conflicting claims of perhaps widely opposed ideas. The power of marshalling thought so as only to accept and weigh those that bear to a same end, is correlative to the creation of qualities in ideas by which they can exhibit same aspects to us, or supply a susceptibility of consideration under same points of view. Now this control is provided for by the law that prohibits us from accepting two facts at a same time, and exacts succession. However complex may be the subject of thought, all the ideas that go to constitute it must be of one nature and tend to one general result, or we cannot accept them as parts of the deduction we are seeking to make.

This consentient character of ideas constitutes what is called *unity*. The moment we depart from the consideration of more than two facts, and get to number, unity becomes essential to our power of generalising. The more perfect the unity can be made, the greater our ability to accept compounded circumstances, and to gather from them one idea of totality.

Nature has carefully provided that the myriads of new thoughts admitted to us through the senses, shall not originate confusion; for it has itself selected the circumstances to be aggregated. Body is not a fortuitous concourse of qualities and properties taken at random; it is always and everywhere the result of a careful selection of materials, offering same, or nearly same, modes of relativeness. Were it not so, we should labour unavailingly to connect together in the mind as one effect, constituents of different meanings accidentally brought together in space. "To inquire," says Dr. Brown, "into the composition of a substance, is to consider as one, many substances which have not the less an independent existence, because they happen to be in immediate proximity to each other. They are one in our thought. The unity of the aggregation is no absolute quality of the mass." The term only expresses the consent of particulars in one end, and it has no reference whatever to the nature of this end, or to its mode of action over the mind. So long as *an* end is attained unity will be offered us, and it will be equally produced whether we are pained or are gratified by the result of the combined phenomena.

In examining the bodies set out for us, we shall find that we rarely pause to weigh the value of a part, or member, in the circumstances we see: the eye, by a rapid glance, conveys to the mind the sum of the information offered, and we are at once conscious of the existence of a definite totality—a cloud, a tree, a man. This facility of recognition is afforded to us, through the care with which nature has assembled materials of same kinds, in the effects submitted to the sight. The ends may be different, but they are each an example of unity, so far as the sameness of meaning of the constituents is in question; and they are thus always read at once.

But as complete perfection is nowhere intended in the phenomena offered us by nature, opportunities become afforded for the production of modes of unity. Wherever laws do not obtain, expressly providing that only circumstances of precisely like origin and character shall be admitted to the effects recognised by the eye, there will be offered us instances of inferior or imperfect unity, arising from the presence of one, or two, or more constituents, of a nature dissentient from the end to be produced. These departures from unity may, of course, range from the first degree of imperfection, caused by the presence of a nearly unimportant particular, down to the effect produced by the dissimilarity of character of a majority of the constituents.

In itself unity is pleasing to us, but its influence over the mind is merely relative. We have been limited universally to single perceptions, and the impossibility of apprehending two results at a same time, calls up a feeling of dissatisfaction when effects are offered us in which unity does not obtain. There is then a conflict of claims on the attention. We apprehend with facility when it does obtain, and hence is the origin of the gratification afforded by unity. But for our knowledge of the circumstances that take place where it is not, it would have possessed no influence whatever over us. Having perceived the effect of a departure from unity, we are relatively gratified when it is present; but without the knowledge of a departure, we should not, and could not, have become acquainted with that whose essence is in truth the utter absence of character and individuality.

This form of relativeness will be found to possess an influence which varies with differences of capacity in the observer. Obtuse perception, quick intelligence, tendency to analyse, aptitude for generalisation, will differ in the estimate of the presence and value of unity. Both the pleasure at its presence, and the pain in its absence, will be found to be different in different persons, and hence it will not at all follow we shall all trace unity on a same occasion, or to a same extent, nor experience an equal amount of gratification where it is present, or of discomfort where it is partially absent.

Such are the chief forms of relativeness with which succession makes us acquainted, and any, or all of these forms may at one time or other become known to us in the course of our daily experience. But before dismissing the subject, with all succession one general observation may be made. Under ordinary circumstances, our acceptation of an external fact means one same order of progression in our ideas. The mode of perceiving a whole pursued by one individual, is unconsciously followed by another; and we all arrive at a complete conception by about the same means and stages. This almost universality of same succession under same circumstances, is to be traced to the final reason, the intended connection between the circumstances that excite thought and the thinking machine. Our conception of a whole, implies nearly throughout a same mode of progress in every person.

But there are exceptional cases when this order, natural to the mind in an unbiassed state, is departed from, and a different, or even a totally opposite mode of acceptation is pursued. There are persons who, instead of beginning by the perception of a certain fact or certain results, turn to other and subordinate conceptions, who see only inferior phenomena, and who attach undue value to certain considerations not of general interest. It is difficult to point out the precise causes which may individually lead to these differences in the mode of acceptation; but, originally, they seem to spring from the influences of the numberless accidental circumstances to which the intellect in the progress of its growth and cultivation is necessarily exposed. The operation of these circumstances is to warp the natural order of perception, and to incapacitate us from following that succession which the conditions of external phenomena, and the ordinary constitution of the mind, would require us to pursue. In all such cases a judgment is formed which is a departure from the opinions entertained by the majority, and which may even seem to us quite unwarranted by the facts observable. In truth, only a part of the facts to be seen have been noted, and these have been taken in a disturbed order, so that the conclusions arrived at, though all founded in nature, represent imperfectly the sum of the effect before us. Many of the singularities of opinion that we meet with in daily life have been thus formed, and may be thus accounted for. Because an individual differs in opinion from ourselves, it does not follow that he has yet not seen in nature what he alleges to be the ground of his ideas, but that he has accepted certain facts without a due consideration of their value relatively to other facts. Just as we may have ourselves committed the same error, and have thence entertained unfounded opinions.

We have hitherto spoken of the ideas formed in the mind, and the thoughts called up through the senses, as a mass of deductions whose main interest to us is derived from their utility; and there seems no reason to suppose but that, had it pleased the Designer of the world, we might have been limited to the capacities we have been examining. A power of knowing the co-existence of determinate sets of relatives, is all we require to make us acquainted with internal and external phenomena. We should have had in nature the aggregation of determinate groups of relatives, varying in arrangement for every case, and in the mind that is to read them, a capacity of recognising the relations afforded by these aggregations. But this is not the plan adopted by the Creator to connect the mind with the external world. *More* than this perception has been beneficently allowed to us.

Placed as we are in the midst of an immense variety of external circumstances, fitted to act on us to different ends, and in different ways; and limited in knowledge to the more or less of information we can derive from these circumstances; it was of importance we should be made to feel an interest in their existence, beyond that of mere utility. All the essential capacities of the human economy have been so ordered, as that their being, their influence, their action, do not depend on the will of the creature. It has not been left to us to determine by reason, whether we shall or shall not, be affected in this or that way, through this or that source. But primarily, all the organs and capacities necessary to our existence, distinctive of our place in creation, have been so constructed as to affect us independently of any exertion or act of volition on our own part. That which we call *pain* and *pleasure* have been called into existence to become the motive powers which all through life shall lead us to prefer action to inaction. The economy of the senses has been thus ordered, that while they minister to our wants, their machinery cannot be put in action without at the same time conveying to us feelings of pain or of pleasure. Besides the mere exercise of the organs of touch, scent, taste, hearing, and sight, as channels through which myriads of thoughts are let in to the mind; we can, under certain circumstances, touch, smell, taste, hear, and see, pleasurably and disagreeably.

We have here what are called *sensations*. We must observe parenthetically, that the term sensation is often loosely taken to convey a certain capacity of our organs by which they feel; the information of the sense being thus substituted, for the judgment of the mind on the facts made known through that sense. But the senses are mere inlets—exquisite pieces of machinery, through which external information is received for the mind to judge; and the pleasure or pain perceived, is not in the sense; it is a condition of mind which is in question. The word sensation conveys no information as to the nature of this condition; an affection is experienced, of which we know nothing more than that its occurrence as a sequent to certain external phenomena has been determined by nature, independently of our own will.

We have said that the scheme of sensation would appear throughout to mean susceptibility to both pain and pleasure; and the necessity for the double feeling is apparent. The human mind has been founded on limitation of capacity. We have not had infinite powers bestowed on us, but only finite powers. We are not allowed to know positively. We are only permitted to judge relatively. To such a form of mind, to have given a power of knowing pleasure, and no more, would have been to have left it without that by which the value of this pleasure is to be measured. The perception of pleasure would require to be positive; and a positive knowledge is the attribute of an order of mind placed far above that in which we are to be ranked. We are tied down to comparison and deduction for the acquirement of our knowledge; and had not the sensation of pain been accorded to us, we should have been without the means of affixing a value to the pleasures we experience. The never ending savour of honey would, to the taste, become valueless: we need that to which sweetness can be occasionally compared. The knowledge of pleasure must, to human nature, ever mean the further knowledge of that which is not pleasure. Having no positive standard of value, we must have the experience of a relative standard. It is thus not a defect in nature to have made us acquainted with pain, since but for its experience, pleasure would disappear in the monotony of satiety. We might carry this idea still higher. It is no defect in creation that evil should be permitted to exist: without evil, what should we have known of good?

The history of the sensations belonging to the five senses, have yet to be followed out in their entirety. There is a large amount of obscurity to be removed, in the attempt to define to what circumstances pleasure and pain in the several organs owe their origin. The pleasures and pains of the touch depend on the taction of certain qualities of matter. Those of the scent, on the reception of odours; those of the taste, on the acceptation of savours; those of the ear, on the perception of sounds; and those of the eye, on the perception of appearances. Each of these represents a widely different class of effects.

In the histories of the touch, scent, and taste, scarcely anything has been done beyond the empirical enumeration of the circumstances, simple and compound, that are usually deemed sufficient to produce pain or pleasure. In the ear, some further progress has been made; and we have treatises on the *laws* governing the aggregation of sounds, with a view to the production of pleasure, and avoidance of pain. In the eye, the same attempt has been repeatedly made; but owing to the highly increased complexity characterising the operations of this sense, as compared with the others, and to much misdirected effort, the subject comes before us at the present day in a deplorable state of confusion.

For the pleasures and pains of the three lower senses, we have no specific names. We can only describe circumstances that ordinarily affect ourselves. For those of the ear, we have the terms melody, harmony, discord. For those of the eye, we have likewise specific names. But we here approach a branch of the subject that must receive a separate examination.

It has been already observed that our impressions as resulting from the exercise of the organ of sight—the same exactly as with the other senses—are of two great classes.

The first is pleasurable. In many cases, the wholes or effects that come before the eye, as soon as perceived or understood by us, are productive of a feeling of gratification. Without exertion of the will, without apparent reflection, there are appearances that are universally considered as sources of pleasurable contemplation; and it is a readily acknowledged feature of these impressions, that reasoning seems wholly out of the question. We experience a peculiar feeling, derived from the perception of an external circumstance, which is of a gratifying nature ; but why we are gratified, or how we come to be gratified, we can as little say, as why we are pleased with the scent of a rose, or the savour of a peach.

The second is disagreeable. There are effects coming before the eye, which as soon as seen are pronounced to be offensive ; and from the contemplation of which we unconsciously turn away. Here, as in the preceding class, reasoning seems wholly excluded. We are as little able to show why the perception of certain conditions of external being should displease us, as to explain why certain combinations or conditions of sounds, or of flavours, should offend the ear or palate.

It would not be correct to say that these two classes exist in nature with defined limits ; for, in truth, they are united by a third class, a long series of intermediate degrees, which neither greatly interest, nor greatly displease.

Of the two great classes of emotions, there can be no doubt that the former is by far the more common in nature. It is probably an unassailable position, that the immense majority of circumstances known to the eye, is pleasurable. If we had the choice, we should all prefer the power of exercising the visive faculty, to a loss of the capacity ; and this merely with reference to sensuous action, and wholly excluding the consideration of the knowledge derivable through the organ. It is to be observed that we lose sight of many of the pleasurable sensations of the eye—in truth, of all the medium and lower degrees—from the mere fact of their incessant recurrence. So continually are they coming before us, that we end by accepting them as matters of course; and are only roused to recognition by the unexpected appearance of an exception to the rule, either markedly gratifying or offensive.

Though the causes of the sensations or feelings constituting these two classes, be, as in all the senses, obscure, they are themselves recognised by a generic name. It is no anomaly to have distinctive terms for ideas which are yet not the objects of definition. On the contrary, many instances might be pointed out in the investigation of the history of thought. In this case, we are accustomed to call the conditions of external appearance, through which pleasurable visual emotion is afforded, by the mysterious term, Beauty; and the feeling itself which arises in our mind through the observed presence of beauty, the perception of the beautiful. For the feelings which are of an offensive nature, we have likewise generic terms. We call the condition of external being which displeases us, Ugliness; and the feeling or emotion excited by the presence of this effect, the perception of ugliness.

There are few phenomena which have been rendered more incomprehensible by a series of far-fetched and ill-directed attempts at elucidation, than this quality of the visible world that we call beauty. The word has been understood to mean almost everything, and we have often only investigated these meanings, instead of inquiring into the history of the circumstances to which the word is attached. Because the emotions connected with beauty—the ideas associated and associable with it—are of the most elevated cast, and enter into our purest enjoyments, writers and readers have accepted the quality as a circumstance known to us through modes not common to any other of our sensuous perceptions. Because of the elevated character of the ideas connected with it, there has been an unwillingness to refer its origin to a same source with all our knowledge of the qualities of an external world; and an inclination to consider its perception as a faculty standing in mysterious and dignified solitariness. Rather than thus degrade the idea of beauty, many are the attempts that have been made to show that the perception is the result of a pure operation of mind, only allotted to a certain amount of cultivation of thought; and independent of the existence externally, of any material quality whatever.

But beauty is strictly a term expressive of the visive recognition of an *appearance*. The pleasure and pain allotted to each sense, must necessarily be according to the nature of that sense. The palate cannot convey a knowledge of melody and discord to the mind: each sense is confined to its own province, and its own means of affording impressions to the judging power. A sense like the sight, whose office it is to report the conditions of external nature, can only derive its pleasure and pain from an *appearance*; and in the history of the external phenomena must we seek for the source of the impressions gathered. To deny that pleasure or pain can be thus conveyed, is to assert that the highest of the senses —the one whose information exceeds in importance that of all the others put together—is without the organic capacity accorded to the inferior senses, and which is the incentive to their action.

A review of the opinions that have been entertained on Beauty will show the uncertainty that from early ages has attended the discussion of the question.

Plato.—The earliest work that has reached us treating of the beautiful, is a dialogue by Plato, " the greater Hippias." Its object is to show how difficult is an answer to the question " what the beautiful is." Plato carefully distinguishes this inquiry from one with which it is liable to be confounded, namely, what is the beautiful ? the first, pointing to the history of the causes of beauty ; and the second requiring a mere enumeration of beautiful objects. He proceeds to show that the becoming, essential propriety and decorum, the useful, power, skill and knowledge, the profitable, the pleasant, and the profitably pleasant, are neither of them the sources of our ideas of the beautiful. The dialogue, however, is nothing more than a negative inquiry, for no answer is given to the question proposed.

St. Augustine.—It would appear that St. Augustine wrote a treatise on the beautiful, but the work has been lost. We learn, however, through a passage in another of his writings, "Omnis porrò pulchritudinis forma unitas est,"—that he supposed beauty to result from unity.

Armenini.—In a work of the date of 1678, Armenini explains the beautiful in the following terms:—"Jo trovo da più saggi huomini, quella (bellezza) non dovere essere in ogni cosa, che una convenevole e bene ordinata corrispondenza e proportione di misure frà le parte versa dì si, e fra le parte ed il tutto : e quelle di modo insieme composte, che in esse non si possi vedere, nè desiderare, perfettione che sià maggiore." " I find by the most learned men that beauty can be nothing else in all things but a fitness and well-ordered agreement, and measurable proportion of parts, either considered with respect to each other, or as regards the whole they make up, and put together in such a way as that it is not possible to see or to desire greater perfection."

Shaftesbury.—The opinion of Shaftesbury is thus given in his "Characteristics," 1699:—"The shapes, motions, colours, and proportions, of the common subjects of sense being presented to our eye, there necessarily results a beauty or deformity, according to the different measure, arrangement, and disposition of the several parts."

Addison.—In 1712, the *Spectator* (No. 412) refers to the beautiful in the following terms:—"There is not perhaps any real beauty or deformity more in one piece of matter than another, because we might have been so made that whatever now appears loathsome to us, might have shown itself agreeable; but we find by experience that there are several modifications of which the mind, without any previous consideration, pronounces at first sight beautiful or deformed. There is a second kind of beauty which consists either in the gaiety or variety of colours, in the symmetry and proportion of parts, in the arrangement and disposition of bodies, or in a just mixture and concurrence of all together."

Dr. Hutcheson.—Hutcheson, in 1729, in his work, "An Inquiry into the origin of our ideas of Beauty and Virtue," thus speaks of the former:—"What we call beautiful in objects, seems to be in a compound ratio of uniformity and variety; so that where the uniformity of bodies is equal, the beauty is as the variety; and where the variety is equal, the beauty is as the uniformity." The portions of the work that attempt to explain the beautiful, are perhaps but little adapted to ensure conviction. The treatise, however, is of interest as regards our inquiry, from the fact of its having given rise to many opposing and supporting theories. The modern history of the beautiful, at least in England, may be said to date from Hutcheson.

Diccionario Español.—In the "Diccionario por la Real Academia Española," 1734, the beautiful is thus explained :—"Hermosura es la perfeccion que resulta de la proporcion y symetrià de las partes, con que se hace agradable à la vista alguna cosa." "Beauty is the perfection which results from the proportion and symmetry of parts, by which a thing is made agreeable to the eye." This opinion seems to resolve itself into the form, that beauty is agreeable perfection ; a conclusion which leaves us about where we were.

De Wolff.—De Wolff observes, "Il y a des choses qui nous plaisent, et d'autres qui nous déplaisent ; ce qui nous plaît, s'appelle beau ; ce qui nous déplaît, est laid. La beauté consiste dans la perfection ; de manière que par la force de cette perfection, la chose qui en est revêtue, est propre à produire en nous du plaisir." "There are things which please us, and others which displease us : the pleasing is called beautiful, the displeasing ugly. Beauty consists in perfection ; so that by virtue of this perfection, the thing which is clothed with it is fit to produce pleasure in us." This is as marked an instance of confused perception and of reasoning in a circle, as we shall find in any author who has sought to throw light on the subject of the gratification the eye experiences. Reduced to an intelligible form, it amounts to this,—that the pleasing is perfect, and it is this perfection which pleases us. It is difficult to gather the nature of beauty from positions like these.

André.—Le Père André, in his "Essai sur le Beau," 1741, considers that there is "un beau essentiel, un beau naturel, et un beau arbitraire;" and he observes of the first,—"la régularité, l'ordre, la proportion, et la symmétrie, sont essentiellement préférables à l'irrégularité, au désordre, et à la disproportion." "Une figure est d'autant plus élégante, que le contour est plus juste et plus uniforme." He then adds, "J'adopte le principe de St. Augustin dans toute son étendue. Je reduis les sept couleurs de Newton à cinq primitives: le jaune, le rouge, le vert, le bleu, et le violet. Ne pourroit-on pas, en prenant la lumière pour la mesure du beau, leur donner à chacune le rang d'estime qu'elles méritent? Qu'y-a-t'-il de plus naturel et de plus raisonnable que de mesurer leur beauté par leur éclat?" "There is an essential beauty, a natural beauty, and an arbitrary beauty. Regularity, order, proportion, and symmetry, are essentially preferable to irregularity, disorder, and disproportion. A figure is the more elegant, in that its outline is more true and more uniform. I adopt St. Augustin's principle to its full extent. I reduce Newton's seven colours to five primitives: yellow, red, green, blue, and violet. Is it not possible by taking light as the measure of beauty, to place each in the rank it merits in our esteem? What can be more natural and more reasonable than to measure the beauty of colours by their brilliancy?"

Spence.—The author of "Crito, or a Dialogue on Beauty," 1752, gives his opinion as follows:—"Every object that is pleasing to the eye, may be called beautiful.

Beauty, by which I only mean here, personal beauty, falls under one or other of these four heads : colour, form, expression, and grace ; the two former are the body, the latter the soul, of beauty."

Hogarth.—The "Analysis of Beauty," published in 1753, is founded on the supposition that the principles of the beautiful are " fitness, variety, uniformity, simplicity, intricacy, and quantity." Hogarth's celebrated "line of beauty," is given as the predominant illustration in nature of these principles, as regards the construction of form. For an able analysis of the theory, see Hagedorn.

Home.—Lord Kaimes, in his " Elements of Criticism," 1761, says :—" The beauty of figure as a *whole*, arises from regularity and simplicity ; and as regards the relations of the parts to each other, uniformity, proportion, and order, contribute to the beauty."

Voltaire.—In the " Dictionnaire Philosophique," 1765, we have the following observations :—" Demandez à un crapaud ce que c'est que la beauté, il vous repondra que c'est sa femelle. Interrogez un nègre de Guinée, le beau est pour lui une peau noire huileuse, des yeux enfoncés, un nez epaté. Interrogez le diable, il vous dira que le beau est une paire de cornes, quatre griffes, et une queue. Consultez enfin les philosophes, ils vous répondront par du galimatias. Il faut conclure après bien des réflexions, que le beau est très relatif ; comme ce qui est décent au Japon, est indécent à Rome." " Ask a toad what beauty is, he will tell you his female. Apply to a Guinea negro, the beautiful to him is an oily black skin, hollow eyes, and a flattened nose. Inquire of the devil, he will tell you that beauty consists in a pair of horns, four talons, and a tail. Consult philosophers, and they will talk gibberish to you. It must be concluded on a full reflection, that beauty is very relative; in the same way that the decent in Japan, is indecent at Rome."

Hagedorn.—In Huber's translation of Hagedorn's work, 1775, it is said that "la variété et la subordination sont necessaire à l' unité : ces qualités renferment les principes de la beauté pour le goût, et les principes de la perfection pour la discussion. L'harmonie des parties entre elles, et avec le tout, charme le sentiment; et c'est à cette perfection, dont le sentiment saisit les rapports, qu'on donne le nom de beauté." "Variety and subordination are necessary to unity: these qualities contain the principles of the beautiful to the taste, and those of perfection as regards metaphysical inquiry. The harmony of parts among themselves, and with respect to the whole, gratifies our feelings; and it is to this perfection, whose relations are accepted by a sentiment, we give the name of beauty."

Burke.—In the "Essay on the Sublime and Beautiful," 1776, beauty is said to be founded on comparative smallness, smoothness, variety of direction in the parts, absence of angles, delicacy, and clear and bright, though not strong, colours. It is to be remarked that these are not principles, but observed effects.

Hume.—This writer in his Essays, 1777, observes of beauty:—"It is no quality in things themselves. It exists merely in the mind which contemplates them; and each mind perceives a different beauty. One person may even perceive deformity, where another is sensible of beauty; and every individual ought to acquiesce in his own sentiment, without pretending to regulate those of others. Yet it must be allowed that there are certain qualities in objects which are fitted by nature to produce those particular feelings."

Diderot.—In the "Encyclopédie" we find the following remarks :—"Beau est un terme que nous appliquons à une infinité d'êtres ; mais quelque différence qu'il y ait entre ces êtres, il faut ou que nous fassions une fausse application du terme de beau, ou qu'il y ait dans ces êtres une qualité dont le terme beau soit le signe. Cette qualité ne peut être du nombre de celles qui constituent leur différence spécifique ; car *ou* il n'y auroit qu'un seul être beau, *ou* tout au plus qu'une seule belle espèce d'êtres. Mais entre les qualités commune à tous les êtres que nous appellons beaux, laquelle choisirons nous pour la chose dont le terme beau est le signe ? Il est évident, ce me semble, que ce ne peut être que celle dont la présence les rend tous beaux—dont la fréquence ou la rareté (si elle est susceptible de fréquence et de rareté) les rend plus ou moins beaux—dont l'absence les fait cesser d'être beaux—qui ne peut changer de nature sans faire changer le beau d'espèce—et dont la qualité, au contraire, rend les plus beaux désagréables et laids—celle un mot par qui la beauté commence, augmente, varie à l'infini, décline, et disparoit. Or, il n'y a que la notion de *rapports* capable de ces effets. C'est l'indétermination de ces rapports, la facilité de les saisir, et le plaisir qui accompagne leur perception, qui a fait imaginer que le beau étoit plutôt une affaire de sentiment que de raison." "Beauty is a term which we apply to an infinity of beings ; but whatever may be the difference among these beings, either we wrongly apply the term beauty, or there must be in them some quality of which the word beauty is the sign. This quality cannot be of the number of those which constitute specific differences; for either there would be only one form of existence beautiful, or there would be at the most only one beautiful kind. But among the qualities common to all the beings we call beautiful, which shall we select as the thing of which the term beauty is the sign? It appears evident to me it can only be that whose presence makes them all beautiful—whose frequency or rarity (if it be susceptible of frequency and rarity) causes them to be more or less beautiful—whose absence leaves them without beauty—whose nature could not be changed without producing a change of kind in beauty—and whose constitution is yet sufficient to make the most beautiful objects disagreeable and ugly—that, in a word, by which beauty begins, becomes more powerful, changes *ad infinitum*, subsides, and disappears. To effect this, there is but one idea adequate; that of *relation*. It is the indeterminability of these relations, the ease with which they are read, and the pleasure which accompanies their perception, that have caused beauty to be considered more a matter of sentiment than reason."

Mengs.—In the translation "Pensées sur la Peinture," by De Longrais, of Mengs' work, 1782, we are told—"Nous avons une perception purement objective de la perfection, et c'est ce que nous appellons beauté. Lorsque nous ne trouvons point d'imperfection d'après l'idée que nous attachons à l'objet, pour lors nous appellons cette ressemblance de la perfection du nom de beauté. Comme la perfection n'appartient qu' à Dieu seul, la beauté est un attribut de la divinité : plus il y a de beauté dans un objet, plus il participe de la substance spirituelle; elle excite l'âme de l'homme, lui donne pour ainsi dire plus d'énergie, et lui fait oublier qu'elle est renfermée dans un si petit espèce. Voilà d'où naît l'attrait de la beauté." "We have a perception of perfection which is purely objective, and this it is which we call beauty. When we find no imperfection in the idea which we affix to an object, then we call this resemblance of perfection, beauty. As perfection belongs to God only, beauty is an attribute of the divinity: the more there is of beauty in an object, the more it partakes of a spiritual nature. Because it is thus spiritual, it moves the soul of man, gives the mind as it were more energy, and causes it to forget that it is confined in so small a space. It is hence that springs the influence over us of beauty."

Dr. Reid.—This author in 1785 writes:—"Beauty or deformity in an object, results from its nature or structure. To perceive the beauty, therefore, we must perceive the nature or structure from which it results. The sense of beauty is of two kinds, instinctive and rational. Beauty itself may, I think, be distinguished into original and derived. The qualities of inanimate matter in which we perceive beauty, are sound, colour, form, and motion: the first, an object of hearing; the other three, of sight. The sense of beauty in colours is, in some cases, instinctive; although straight lines and plane surfaces have a beauty from their regularity, they admit of no variety, and therefore are beauties of the lowest order. Curve lines and surfaces admit of infinite variety, joined with every degree of regularity, and therefore in many cases, excel in beauty those that are straight. But the beauty arising from regularity and variety, must always yield to that which arises from the fitness of the form for the end intended."

Alison.—In the work, "Essay on Taste," 1790, we are told that "the sublimity or beauty of forms, arises altogether from the associations we connect with them, or the qualities of which they are expressive to us. In colours, white expresses or brings to mind, cheerfulness; black, gloom; blue, serenity; purple and ermine, dignity; scarlet, martial qualities. Wherever colours are felt as producing the emotion of beauty, it is by means of this their expression, and not from any original fitness in the colours themselves to produce the effect. It is the colours only of the dress of the great, of the opulent, or of distinguished professions, which are ever considered beautiful." This work will be found to be markedly deficient in a practical knowledge of the subject it professes to explain. It is a history not of taste, but of *associations.* For an able analysis of its merits, see Sir G. Stewart Mackenzie's "Essay on Taste."

Reynolds.—Sir Joshua Reynolds, in 1790, considered beauty to consist in "Mediocrity, or conformity to that which is most usual." For a refutation of this theory, see the Supplement to the "Encyclopædia Britannica," article Beauty.

Dugald Stewart.—In the "Elements of the Philosophy of the Human Mind," 1792, the following passage occurs:—"The influence of association on our judgments concerning beauty and deformity, is still more remarkable than in our speculative opinions, a circumstance which has led some philosophers to suppose that association is sufficient to account for the origin of these notions; but this is undoubtedly pushing the theory a great deal too far." And in the "Philosophical Essays," he adds:—"It is not necessary for any of the purposes which I have at present in view, that I should attempt to investigate the principles on which colours, forms, or motions, give pleasure to the eye. With the greater part of Mr. Alison's remarks on these qualities I perfectly agree; although in the case of the first, I am disposed to ascribe more to the organic impression independently of any association or expression whatever, than he seems willing to allow."

Payne Knight.—In the "Principles of Taste," 1805, we are informed that "the beauties of light and shade, and colour, are all that affect the eye, or make any impression on organic sense and perception;" and that "beauty consists in harmonious but yet brilliant and contrasted combinations of light, and shade, and colour; blended but not confused; and broken, but not cut into masses; and it is not peculiarly in straight or curve, taper or spiral, long or short, little or great, objects, that we are to seek for these, but in such as display to the eye intricacy of parts, and variety of tints and surfaces."

Cicognara.—In the work, "Del Bello," 1808, we are told by Cicognara that there are two kinds of beauty, *positive*, and *relative*; and the author adds—"Il pretendere di dare una giusta definizione del bello, e che appaghi anzi convinca gli nomini tutti con precisione e con chiarezza, io lo credo quasi impossibile. Ma l' analizzare le qualità, gli effetti, e l' indole delle cose, può però con una certa evidenza tener luogo di definizione. Se non v' ha dubbio dunque che la sensazione del bello nell' armonìa sia determinata intrinsicamente e invariabilmente da essenziali proporzioni—tutt' al più la difficoltà portrà consistere nel trovare il misuratore di questa proporzione, base del bello assoluto." "The attempt to give a just definition of beauty, and which, by its precision and clearness, shall satisfy and convince all men, I take to be an impossibility. But the analysis of the qualities, the effects, and the natures of things, may, with some degree of evidence, stand in lieu of a definition. There is no doubt that the sensation of beauty in harmony is determined intrinsically and invariably by essential proportions. At most the difficulty may consist in discovering the measure of this proportion, the base of positive beauty."

Barry.—In the "Lectures on Painting," 1811, this author observes:—"There is then a beautiful which is positive, essential, and independent of national or temporary institutions or opinions. Men have differed more in their definition and manner of explaining beauty, than in their ideas of it. According to the definitions generally given, beauty consists of unity, and gradual variety; or of unity, variety, and harmony. This may be admitted as true, at least as far as it goes; but it is neither full nor satisfactory; for though it be certain that unity and variety are found in beautiful objects of all kinds, yet it is equally certain that they are compounded differently; and that though in every one of these species we may further increase the variety, or simplify the unity, yet we should not proportionally add to the beauty, but the contrary. From the whole of what has been urged, it is very evident that beauty and perfection are but different names for the same thing; and consequently the most beautiful form of body must be that which in all its qualities, most perfectly corresponds with the idea we have of its species, of whatever kind, sex, or age."

Hope.—In the "Art of Gardening," the following passage occurs :—" If, as I take it, all beauty consist in that contrast, that variety, that distinctness of each of the different component parts of a whole from the remaining parts, which render each individually a relief to the remainder; combined with that harmony, that union of each of these different component parts of a whole with the remaining parts, which renders each a support to the remainder, and enables the eye and mind to glide over and compass the whole with rapidity and ease; then," &c.

Steuart Mackenzie.—In the " Essay on Taste," by Sir G. Steuart Mackenzie, we have the following observations :—" Beautiful appears to me an expression, not for an object nor its qualities, but for some *effect* which the perception of its qualities impresses on the mind. Beauty and beautiful are the signs by which we express the consciousness of certain pleasurable effects following in a particular high degree, the perception of certain qualities of objects." This author's evident practical acquaintance with his subject, has enabled him to show the unsoundness of the theory of Alison. In fact, the essay is principally directed to this end.

Fuseli.—In Fuseli's third lecture on " Painting," 1820, we find a reference to the nature of beauty in these terms :—" For as the notion of beauty arises from the pleasure we feel in the harmonious co-operation of the various parts of some favourite object to one end at once, it implies their immediate co-existence in the mass they compose."

Dr. Brown.—In the lectures on the " Philosophy of the Human Mind," 1820, Dr. Brown observes :—" The feeling of beauty is not a sensation, but an emotion; a feeling subsequent to the perception or conception of the object termed beautiful ; and which, like other emotions, may or may not follow the particular perception or conception, according to the circumstances in which those primary feelings to which it is only secondary, may have arisen. The greater part of the beautiful we note is founded on compound associations, and is therefore unfixed and variable ; but there does obtain some original feeling of beauty, of which instances are found in colours, sounds, natural signs in forms such as smiles, and natural perceptions of moral beauty. The writers who would reduce our emotions of beauty entirely to the influence of association, and who endeavour to justify their theory by instances of the power of particular associations, seem to make far too great an assumption. They do not prove the influence of original beauty to be nothing, by proving the influence of other principles to be something more."

Jeffrey.—The paper on "Beauty" in the Supplement to the "Encyclopædia Britannica," 1824, asserts that :—"Beauty is not an inherent property or quality of objects at all, but the result of the accidental relations in which they stand to our experience of pleasures or emotions ; and does not depend upon any particular configuration of parts, proportions, or colours, in external things ; nor upon the unity, coherence, or simplicity of intellectual creations ; but merely upon the associations which, in the case of every individual, may enable these inherent and otherwise indifferent qualities, to suggest or recall to the mind emotions of a pleasurable or interesting description. It follows, therefore, that no object is beautiful in itself, or could appear so antecedently to our experience of direct pleasure or emotions ; and that as an infinite variety of objects may thus reflect interesting ideas, so all of them may acquire the title of beautiful, although utterly diverse and disparate in their nature, and possessing nothing in common but this accidental power of reminding us of other emotions.—The beauty which we impute to outward objects, is nothing more than the reflection of our own inward emotions, and is made up entirely of certain little portions of love, pity, and affection, which have been connected with these objects, and still adhere as it were to them, and move us anew whenever they are presented to our observation. Every feeling which it is agreeable to experience, to recall, or to witness, may become the source of beauty in external objects, when it is so connected with them as that their appearance reminds us of that feeling."

"*Oxford Encyclopædia.*"—In this work (1828), beauty is stated to be "either intrinsic or relative," and the writer adds that "the beauty of a body, considered as a whole, arises from regularity and simplicity; but viewing its several parts with relation to each other, we find that uniformity, proportion, and order, contribute to render it beautiful."

Gilpin.—In the "Forest Scenery," edited by Sir Thomas Dick Lauder (1834), the passage occurs, "there is no such thing as an inherent quality of beauty existing in objects or forms."

The above references will suffice to show that wide differences of opinion have existed with respect to the nature of the beautiful. A study of the subject, guided only by the written works extant, leaves us in extreme vagueness and contradiction. In too many cases a word or a theory has been selected, independently of a *practical* acquaintance with natural facts; and the external world has been referred to, only so far as it supports the abstractions selected.

From among the many theories that have been proposed, diverting the inquiry from its right ground, we select a few that seem to have been regarded with special favour by writers on this question; namely, unity, variety, fitness, and association; and these may require a short notice.

Unity has been supposed by some writers to be the principle of the gratification afforded us by the external world; and this opinion unquestionably betrays a wide misconception of the constitution of visual nature. It is an error whereby a law of mind—a state of mind at the time of judging—having reference to no one character in particular, is assumed to be the cause of that which is offered to the mind to judge; and which *is* possessed of a particular character, or it could not have been accepted as a distinct totality. We may have the perception of unity both from mental and sensuous considerations; and its essence is to express no definite character of parts, or of a whole; but merely the consent of particulars in a result, but which result is unnamed. It is as equally producible through the aggregation of offensive materials, as through that of materials which are able to gratify us. Now, if mere unity were beauty, the aggregation of parts in themselves disagreeable ought to be productive of pleasurable results; but this is inconsistent with reason and experience.

The argument that nature is continually exhibiting instances of unity, and that beautiful nature especially appears under this dress, will not prove unity to be beauty; it merely means that complex effects have throughout been so ordered and constituted, as to permit a facility of apprehension. All beautiful objects must possess unity, in that we have recognised them to be beautiful; that is, we have acknowledged them to be possessed of one character. But we do not admire objects of this class because of the unity, but because of the quality perceived. It is *after* we have felt the beauty that our attention is open to be called to the perfection of the methods employed to produce the effect. Unity was our mode of reading the appearance; beauty was the thing read. But conformity of aim admitted to the constituents, the result might equally well have been some other character. To perceive unity at all we must first be cognizant of some effect, and it is after the perception that our attention is liable to be called to the perfect subordination of each particular in the result attained. Ugliness may offer us equally perfect examples of unity.

Variety. There is no feature of nature which strikes us more forcibly than the enormously extensive change of appearance and character made to occur, as well in the world of thought as in the outward and material world. To this *excess*—if the term may be used—of the proof of creative power in nature, many, by an inaccuracy common enough in the history of the sight, have referred a great portion of the pleasure we derive from a perception of the beautiful. It is obvious to all that poverty is an unsatisfactory visual effect; and as it is equally evident that nature has sought to avoid this effect and to produce variety, the conclusion seems reasonable that in variety, is to be found the principle of the gratification we derive from the exercise of the sight.

Mengs, Hutcheson, Sulzer, Lessing, Crousas, have adopted this erroneous view.

By the theory of variety, the eye, wandering with delight over the varied face of creation, and seeing at every moment fresh exemplifications of the beautiful, confounds one with the other; and we ascribe to the *change* of mode that feeling which is excited by the operation of some principle through these modes. The mere *succession* of diversified effects is thus assumed to be identical in influence and character with the effects themselves. Though variety may exist in nature, and to an excessive extent, yet change of appearance cannot be the cause of our perception of the beautiful, since the beautiful is universally a same feeling; and mere change expresses no connection or continuity. Because the beautiful appears under a variety of forms, it will not follow that the changes themselves constitute the quality. We can only wonder at the inimitable skill which has produced one same result from so many different elements, and with so many different means. To infer variety to be beauty, merely because we have observed that nature is as generally beautiful as it is extensively various, and that the repetition of a same mode of appearance is displeasing to the eye and mind, is totally to forget that the idea of variety is as derivable from a world of ugliness as from a world of beauty; that it could as well be produced by differences of deformity as by differences of the beautiful.

Variety is mere diversity of appearance. We need incessant change, or the mind would be deprived of some of its sources of information. But ugliness may as well come under the dominion of variety, as beauty. A world of forms might have been produced variously ugly, instead of variously beautiful ; and still we should have had incessant change. To consider variety to be beauty, is to say that the instant ugliness shows itself under a change of shapes, or that it exhibits many relatives in its construction, or affords a wide range of relations to the mind—that instant our distaste for it ceases ; and we experience in its perception the same delight that we do in a perception of the beautiful.

It must not be forgotten how essential it is to the acceptation of the theory, that the identity of the feeling we derive from mere change, and that called up in us on a sight of beautiful nature, should be clearly shown. But this has never been done. Because the existence of a distinction has been slurred over, and its non-existence assumed, we may not safely conclude the effects are actually one and the same.

Fitness—have maintained certain persons—or the due application of means to ends, and of results to purposes, is the origin of our feeling for the beautiful. We are gratified in proportion as we discover the perfection with which nature has fitted its material to the production of results, and the extensive applicability of these results to new purposes ; and we call the arrangement exhibited in these relations, the beautiful. Such is the theory of fitness. Let us now look to the objections to which it is open. Fitness, we shall understand with Dr. Brown, to be " relative suggestion, or succession seen in looking forward to effects, or backward to causes." We see that certain circumstances are fitted to produce a given effect, or that a certain effect has followed from certain causes. If fitness be the source of our feeling for the beautiful, it will be a consequence that an object is beautiful to us, only when we have discovered its applicability to some end, or the dependence of its being on its causes. If this be the case, the beauty which exists to us in the world, or rather our feeling for it, is the result of laborious investigation and deduction; of a long continued process of analysis and synthesis carried on from our early years. Can we admit the application of this legitimate inference? Is it not evident that there exist a vast number of objects which, on a first sight, we instantly pronounce to be beautiful, but whose mode of constitution and applicability to any end, we do not know? Take, as the first instances coming to hand, many individuals in the gay insect world, many flowers, mosses, petrifactions, &c. When we see a beautiful object, do we suspend our opinion till we have discovered its mode of constitution, or its applicability to some end? By insisting that fitness constitutes beauty, we say that "the form of a monkey (to use the words of Burke) or the snout of a hog, please the eye, so soon as we know them to be well adapted to their modes of life." We really assert that a toad, a crab, a sow, a baboon, becomes beautiful, in the sense that a flower is beautiful to the eye, directly we discover the fitness with which their forms have been compounded. We assert that a mass of putrefying substances gratifies the sight, so soon as we learn how it was made, or what is its applicability to the purposes of agriculture as manure!

But there are yet further arguments. The acceptation of the idea of fitness, as gathered from material circumstances, necessarily supposes that we have perceived or know of, the existence of some subject which constitutes either the *result* or the *cause* referred to by the term. To gain the idea at all, we must either have investigated the constitution of some result, or have applied some result to a purpose. In both cases, we necessarily imply that we are capable of receiving, and have received, some material impression to be thus investigated or applied. Now the knowledge of the existence of a material circumstance, is the acceptation of the character that results from the assemblage of its parts. We only know that an object is before us, because the eye has received the impression conveyed by the mode of formation of this object. Here then is the fallacy. In an inquiry into the beautiful, it is precisely this *previous* material impression which is in question. We really require to know what is the nature and origin of the previous idea, before we recur to a subsequent one. Fitness slurs this over. The theory takes no note of the nature of our acceptation of the original effect observed; and substitutes in its place an inquiry into the idea which may be derived (or may not be derived) from the discovery of the adequacy of the means employed to constitute this effect, or the applicability of the effect, when accepted, to some end. It drops the original sensation, which is the true object in dispute, and takes up the idea created by and in the mind, through the subsequent investigation or application of this first impression. The supporters of fitness have no right to assume that the original sensation is thus to go for nothing. It is this very sensation which is contended for.

And lastly, even granting that fitness does gratify us, the question of the beautiful remains *as it was*. It has never been shown, or even attempted to be shown, that the pleasure arising from the perception of the perfection of constituents, or of the applicability of their results to particular purposes, is identical with the feeling of the beautiful. So important a link is not to be assumed. We may freely admit that the perception of fitness is a source of gratification to us; but it will not become a necessary consequence of this admission, that fitness is beauty. We require it to be shown that the two feelings do not exist independently of each other.

The theory of fitness in times past acquired considerable popularity, as the solution of the question of the beautiful—a solution, too, which, under the absence of any formal refutation, was held to be beyond dispute; and there is perhaps a something in the idea of fitness which causes it to be especially acceptable, to all who are not disposed to investigate very closely the causes of our sensations and feelings. The variety of objects around us adapted to our wants, real and superinduced, and our dependence on external nature, insensibly lead us to consider the value and perfection of these objects, with reference to, and resulting from, their degree of capability of becoming subservient to our wants and purposes. We require to use almost all the objects by which we are surrounded; and the impossibility of creating things and qualities for ourselves, makes us derive an additional pleasure from the discovery of the construction, or varied applicability of those existing. We thus come to see nature through a medium of fitness; and as, from a variety of circumstances, we only eventually see as much as we have been taught to see, we find no great difficulty in accepting this principle as a sufficient cause for any indistinct pleasure we may experience on a perception of the external world. We know it is the source of pleasure on many occasions; it may therefore be supposed to be the source of all our pleasure derived through the eye. The theory, once suggested, was enabled to hold its ground through the moral considerations it afforded. It became the fashion to advert to it, whenever writers were in want of additional arguments in support of the opinion, that forethought and intention characterised the scheme of creation. It long formed a stock argument, and the well-intentioned purpose to which it was applied served to guard it against attempts at refutation. There is no question, however, that a powerful argument *against* the theory is, that it really limits, instead of extending, our ideas of the wonders of the creation, and of the power of the Creator; for it reduces the contrivances of the visual world to a question of bare utility, and supposes that by the exhibition of a highly developed system of visual relations, only that end has been sought which could equally well have been attained without them.

Association is the principle which of late years has met with the most favour, and we shall endeavour to ascertain its value. It has been maintained by certain writers that our experience of the beautiful is not founded on the perception of any positive qualities in things themselves, but on the ideas which have been insensibly associated with these things, during a long course of years: that an object is beautiful when it is capable of exciting us agreeably, which capability it acquires when once it has been connected with any gratifying emotion.

Under this theory, all objects to the eye are originally equally perfect, or, rather, equally indifferent. There is naturally no reason for choice between an Esquimaux and the statue of the Apollo. A baboon and a toad, as mere objects of sight, are of the same interest as the young elm and the race-horse. To use the words of the great supporter of this theory—Jeffrey—"the mere forms and colours which compose the visible appearance of a Welsh or Highland landscape, are no more capable of exerting any emotion in the mind, than the forms and colours of a Turkey carpet. It is sympathy with the present, or the past, or the imaginary inhabitants of such a region, that alone gives it either interest or beauty; and the delight of those who behold it will always be found to be in exact proportion to the force of their imaginations." But it is to be noted that this theory of associations proceeds all through on assumptions. It begins by assuming that an organic origin does *not* exist; it assumes that associations *can* grow up to produce the emotions in question; and it assumes that the gratification resulting from association, and that consequent on the perception of the beautiful, are strictly identical. No existing work has proved the correctness of these three assumptions.

In Jeffrey's paper on "Beauty," in the Supplement to the "Encyclopædia Britannica," we have, first, an examination of existing theories. An organic origin is rejected on the very insufficient grounds of diversities of taste and varieties of beauty; and the theory of association is then substituted, to be supported by the enumeration of circumstances in which not necessarily beauty, but association, is the source of our gratification. The paper is closed without the question of the identity of the feelings of association, and of the beautiful, being even mooted. He tells us that "external objects affect us only as they have the power of recalling to our recollections certain other forms which in times past have been connected with the common feelings of the mind. Their beauty depends on the reflection of our own inward emotions, and is made up entirely of certain little portions of love, pity, and affection, which have been connected with these objects, and still adhere, as it were, to them." No attempt is made to show how these associations originally grow up, or how "certain little portions of love, pity, and affection, which still adhere, as it were," can account for all our feelings of the beautiful. To prove that association is beauty, he describes first "a common English landscape, made up of green meadows, with fat cattle, canals, or navigable rivers; well-fenced, well-cultivated fields; neat, clean, scattered cottages; humble, antique church, with gardens, and crossing hedge-rows; all seen under bright skies, and in good weather"—and then observes of them, "there is much beauty, as every one will acknowledge, in such a scene; but in what does the beauty consist? In the picture of human happiness that is presented to our imaginations and affections; in the visible and unequivocal signs of comfort and cheerful and peaceful enjoyment; and of that secure and successful industry that ensures its continuance; and of the piety by which it is exalted, and of the simplicity by which it is contrasted with the guilt and fever of a city life; in the images of health and temperance and plenty which it exhibits to every eye; and in the glimpses which it affords to warmer imaginations, of those primitive or fabulous times when man was uncorrupted by luxury and ambition; and of those humble retreats in which we still delight to imagine that love and philosophy may find an unpolluted asylum." It is to be observed that in the picture thus offered us, we are supplied with a number of circumstances naturally fruitful in associations; and as if further to ensure the adoption of the theory, each of the circumstances enumerated is coupled with an adjective which, in spite of ourselves, carries off the mind into the desired channels: thus we have *English* landscape, *green* meadows, *fat* cattle, *navigable* rivers, &c. But the question really lies with the landscape, and meadows, and cattle themselves. Under what conditions do they appear to the eye? We may admit association to be the source of much gratification to us; but are these landscapes in themselves beautiful, or not? and, if so, is the gratification they afford identical with the pleasurable feeling derived through association? If these questions cannot be determined in the affirmative, the analysis of the beautiful remains untouched.

In estimating the importance of the evidence for and against association, we have to take into the account that some of its most talented supporters have fairly come to the conclusion, that though much of our feelings of gratification may be ascribed to this source, yet that there are cases in which it fails, and in which our perceptions may be admitted to have a different base. The works of Dugald Stewart and Dr. Brown afford evidence of this candid admission. The theory, therefore, does not come before us as claiming an unreserved adhesion; and if it be not sufficient to account for the whole of our impressions of external nature, the doubt arises whether, after all, we have been investigating the question of the beautiful, or have been carried off into other channels.

It seems probable that much of our uncertainty on this question may primarily be referred to the fact that beauty is not a rare, but a common effect. In the ear, and, indeed, in the four lower senses, pleasurable action is only an occasional sequence. We hear, smell, feel, and taste only now and then pleasurably. But this is not the case with the eye. In the sensations derived through this organ, pleasure is so common as to be the rule; negation of feeling is the exception. "Our active and perceptive powers," says Dr. Reid, "are improved and perfected by use and exercise. But with regard to the agreeable and disagreeable sensations we have by our senses, the very contrary is an established constitution of nature, the frequent repetition of them weakening their force. Sensations at first very disagreeable, by use become tolerable, and at last perfectly indifferent; and those that at first are very agreeable, by frequent repetition become insipid, and at last perhaps give disgust." Now, if a man were brought up from his earliest days under such an arrangement of things (let us admit the possibility for the moment) as to hear nothing but harmonious combinations of sounds, there is little doubt but that the long habit of receiving impressions of one kind only would in the end have so deadened him to their existence, as that, instead of experiencing an excitement on every repetition, he would treat their occurrence as a mere thing of course, not worth his attention. Were circumstances ever to lead him to inquire into the history of harmony, he would be met by the difficulties which would arise from his own acquired deadness and indifference to organic perceptions.

Having lost the power of recognising his sensations, he would fail to perceive the origin of the feelings he is investigating, and would be open at every step to erroneous assumptions and false reasonings. This supposititious case is, perhaps, a fair representation of our peculiar relation to visual nature. The beautiful has been before us from our infancy ; we have grown up accustomed to the same round of material effects, occurring, besides, to an extent not known to the other senses. Our natural activity of perception has thus become merged in the deadness of habit ; and when we seek to investigate the nature of the circumstances before us, finding we have only indistinct feelings to guide us, we are apt to impute that uncertainty to the cause, which is really the consequence of our acquired indifference to the effect. But it would be as unfair to consider that feeble perceptions of the beautiful disprove the existence of an organic feeling, as that feeble perceptions of harmony to the ear, disprove the existence of an organic knowledge of sound. Before association can be accepted as the cause of the beautiful, we must be sure that we are not unnecessarily recurring to this uncertain origin.

But, leaving these objections, we come to one which has an important bearing on the question. There is room to suspect—and the fact is very remarkable—that association proceeds, as a matter of necessity, upon the very theory it attempts to displace, that it is founded on the very base it afterwards assumes to deny. The eye, says association, has no organic perception, and the beautiful is known to, and arises in, the mind, by our connection of certain emotions of gratification with certain objects. Now, it is to be observed that association here takes for granted we are capable of *recognising form.* To begin the work of the distribution of associations, it is evident we must have a power of interdistinguishing between the outward forms offered us. They cannot originally appear to us all alike, or else they would all be liable to call up the same recollections and feelings. To obtain an idea of association in the class of external perceptions, we must have a sensation to begin with. We cannot form an association which shall be connected with the qualities of an external effect, solely and wholly from the operations of the mental faculties. We must start whether we will or no, on the connection that nature has established between an external effect and the internal mind, a *sensation.* We must first recognise this sensation, to be able to apply it to other purposes. But here is the very organic perception conceded that has been in question, and that is assumed by association to be non-existent. Now, if we do possess this organic perception, beauty is more probably made known to us primarily and originally through our apprehension of sensuous perceptions, than secondarily and derivatively through associations that we may many of us fail to form.

In reviewing the solutions of the beautiful that have been offered to us, it does seem strange to find the large majority deliberately placing the question on ground so certain to lead to failure as that of a reference wholly and exclusively to the world of mind, for the causes of that which springs from the external and material world. When writers begin by utterly ignoring the laws of matter in an inquiry which is specially connected with the sense of sight, we can readily account for the superficial vagueness with which many portions of the subject are afterwards treated. When the very existence of laws of form, or of colour, or of tone, and the relations of the outward world to the mind, are entirely passed over, it becomes a case of necessity that the beautiful should be treated as a purely mental creation, dependent on metaphysical propositions for its evidence and its explanation. But however ably this mode of inquiry may be conducted, a not very great amount of practical knowledge suffices to detect assumptions made, and conclusions adopted, that are either unnecessary, or insufficient, or impossible. Were a philosopher to treat of melody, and the pleasure sounds can confer, without any knowledge of, or reference to the laws on which their relations depend, we should suspect the sufficiency and value of the conclusions adopted. Yet at all times it seems to have been supposed that no special preparation is needed, beyond that of a general cultivation of the mental powers, to enable us to explain the nature of beauty, or of our recognition of the beautiful. When a writer tells us that red pleases the eye because of its suggestion of martial qualities, we feel tempted to inquire what those persons are to do for a base for their admiration of red, who happen to be born in a country where the national uniform is blue? If an organic base be denied, or not recognised, we may wander into suppositions of an entirely arbitrary character, verging oftentimes on absurdity.

No explanation of the beautiful can possibly reach the truth, that deals solely with associations, or secondary ideas, and which may, perhaps, never be called up at all, even in an educated mind. The existence of any one case of a perception of the beautiful, where yet a knowledge of the assumed association does not exist, is fatal to the sufficiency of the theory of a purely mental origin. Even the rudest minds show themselves open to the softening influences of the beautiful around them, and in but few of these instances can we suppose the existence of the delicate chains of reasoning and connection which constitute derived or associated ideas. If we need to reason before we can feel the beautiful, what would be the lot of those in whom the reasoning powers are undeveloped? So partial a bestowal of good would be a departure from the wide benevolence which freely extends sunshine to all.

If it were true that the idea of the beautiful is entirely a creation of the mind, and is to be accounted for solely by means of some of the many operations of the reasoning faculties; what is there to prevent a man born blind from being as sensitive to the beautiful as we are? If the beautiful be association, why cannot the touch suffice to originate the idea to him? He can think as well as we do. But the ideas of the blind in respect of beauty are known to be entirely undeveloped. Some of the mere external qualities of matter—smoothness, absence of angles, warmth—supply the base for the few suppositions a blind man has formed of the beautiful. The craving for the effect may exist in his mind; but he is doomed never to know the highest of all the gratifications bestowed on us through the senses, the perception of the perfection which nature has so profusely scattered around us.

To take a right estimate of beauty, we must dismiss from our minds all those ideas concerning it, which arise *subsequent to its perception.* The objects in which it occurs must be taken as mere visual effects, connected with nothing, and applicable to no purpose. Our business is solely with their visual qualities, with that which causes them to be to the eye what they are, and their suggestion of extraneous questions is wholly beside the inquiry. The idea of beauty, when thus strictly abstracted from all association, will be found to be, like the other emotions derived through the senses, totally undefinable in its nature. On perceiving beauty, we experience a gratification; but the nature of this gratification is no more communicable by words to others, than is the nature of the pleasure we know ourselves to experience from sweet savours, or from harmonious sounds; and like every perception known to us through the senses, it cannot be the object of proof to others, for it is an emotion subject only to the consciousness of our own minds.

Beauty—since we have no other term to express pleasurable *visive* sensation—equally with our other sensuous perceptions, has a relative origin. It arises to us from our apprehension of certain relative circumstances. We know that the perception of the forms offered to the eye, is the acceptation of the relatives aggregated by nature into groups. We accept the constituent facts by virtue of a natural capacity to form relations, and we thus apprehend *body*. To *some*—and special attention is called to this distinction—to *some only*, of the relatives permitted, have been affixed certain (unknown) conditions of being intended to gratify us. To others, has been given a power of offending us: while to the mind that perceives these conditions, has been given a susceptibility to their action. We have here a co-ordered provision, whose result is the impression of the presence of the beautiful, or its opposite.

The adoption of this base for the origin of beauty, comes to us recommended by the fact that it is precisely the scheme on which our other sensuous perceptions are founded. The ear, taste, touch, and smell, are contrivances by which the mind estimates external impressions, all derived from the apprehension of related circumstances: and for the result of their action, we can offer no other reason than that the Creator has so willed it. Choice on our part is out of the question. "To a certain length," says Dr. Reid, "we are able to proceed; but in every research we meet with a line which no industry nor ingenuity can pass." "The investigation of physical laws," says Dugald Stewart, "must always terminate in some general fact of which no account can be given, but that such is the constitution of nature."

Any note in music, or sound emitted from a body, is recognized by the ear through a relation of difference between the sound, and some previous impression whether of noise or of stillness. We can see this is the case by supposing the given sound to occur among many others of exactly a same pitch and strength, when we should be unable to recognise the individual. It is thus not to the note itself, and taken alone, that the idea of its nature is attached; but to the relation the mind forms between it and the previous external conditions observed. Further, two notes, or two sounds struck together, afford a new relation, and which complex sound the mind apprehends in precisely the same way that it did the simple sound, by the perception of some relation of difference between this and other sounds. But the two sounds thus struck together *may or may not please the ear.* Thirds, fifths, and octaves, satisfy the sense: seconds are offensive. The result is the same if the notes no longer struck together, be heard in quick succession. Certain modes of succession of harmonic sounds please the ear, and constitute what is called melody; but why they do so is utterly unknown to us. How it is they shall be unerringly created at will, is equally hidden from us.

Precisely in the same way, certain modes of succession of surface afford relations of shape that please the eye; while some offend it. For the impressions called up we can adduce no reason, and not knowing the conditions of the causes, we are unable to reproduce them at will, and with unerring certainty. To inquire why any one man considers a given form beautiful, is much the same as to inquire why any particular melody gratifies him. To ask why any person prefers this or that form of beauty, is to ask why he should select this or that melody.

We do not require to accept these positions for the organ of sight, without consideration. It is plain that visual beauty must be either *positive* or *relative* in its origin: the idea of its existence must arise to our minds either from a positive or a relative perception of the effects of the visible world. If it be *positive,* the following consequences will ensue. Positive beauty must either be the attribute of a whole form, or it must be resident in some one particular part of the body adjudged to possess the quality. If it be the attribute of a whole, this whole must have a definite configuration, or it would be unlimited in space, and therefore not visible. If it have a definite configuration, it must follow that all bodies possessing beauty have a like shape. This we know is not the case, for beautiful objects are exceedingly variable in shape. Moreover, this shape must be entirely simple, uncompounded, and indivisible; for else we shall get to a question of parts, and therefore of relative facts. Now, there is no form known to the eye which complies with these conditions. All have parts, and consequently beauty cannot exist positively as the attribute of a *whole.* If, on the other hand, it be the attribute of a *part* of any object, all other portions of this object having no power to interest the eye, must be so distinct from the favoured part, as that we should in all cases be able with infallible certainty to point out the seat of beauty. Now this we are never able to do: we can never refer at once to the particular part in which beauty resides. But the objections do not end here. Having selected a part in which the beautiful is assumed to reside, we should have to show that in this part so selected, we have arrived at a final division of quantity. The part we take up must not be susceptible of division into any other portions, or it is again a relative perception of minor parts making up a whole. Now what quantity of matter is there we can assign fulfilling these conditions? Let us, in order to favour the case, suppose it to be a quantity which the eye can no longer divide: let visibility be the limit. But where shall we place this portion, which, as regards the average bulk of bodies, will be a mere speck? In what portion of given objects shall it reside? Supposing the human form to be in question, shall we place it in the forehead, or in the knee? What reason of selection have we for any one? Further, what right have we to take visibility as the limit? Any quantity that we can *see* is not an indivisible point; for the microscope shows us the figure of its parts; and if we see the whole, we see the parts by which the whole is made up; but this again is a relative perception. There is only one thing that really complies with our ideas of uncompounded space, and that is a mathematical point—a point which has neither length, nor breadth, nor parts—to this only can we suppose the beautiful attached so as to have a positive existence. But this will involve a gross absurdity: we shall give a visible quality, beauty, to that which has no visible existence, to that which is not cognizable to our sense: the beautiful which we admit we do see, we shall assert to be the attribute of that which we cannot see.

Such are some of the objections to which the attempt to give the beautiful a positive origin is open. We shall, indeed, appear to avoid these objections by going back to the opinion that beauty does not really belong to any aggregations of matter, but is the attribute of one of its qualities, *colour;* wherein parts are not implied. But this is only shifting the ground; and it is moreover proceeding upon an assertion (that beauty does not belong to form) which never has, and never can, receive proof. It could not be the perception of any single colour without any condition attached to it, which is the origin of our feeling, for if it were, all objects having any colour ought to be equally beautiful to the eye; and this we know is not the case. And if it be the perception of more than one colour, we have abandoned our own position, and have passed to the question of a relative origin.

That the perception of the beautiful implies the formation of definite relations, may be shown by further arguments.

It is a circumstance of common acknowledgment that the perception of the beautiful, in various individuals, appears to be extremely unfixed in amount: we admit that a given object is beautiful, but we differ in opinion as to degree when it comes to be compared with some other beautiful object; one person thinks it more attractive, another thinks it less so; some deny altogether that the object possesses beauty; nay, further, we ourselves are not invariably the same in this respect; there are times when a beautiful object meets with a warmer degree of approbation from us, than we feel any necessity for bestowing at other periods. A person shut out for some time from the sight of beautiful objects, and suddenly placed in the midst of them, feels their perfection more vividly than one who has continued to be surrounded by them. Again, when we look at a beautiful object, we are never able to say exactly wherein the beauty consists, or where it resides; we may point generally to a part, but we can never tell unhesitatingly what arrangements of constituents make this part beautiful. All persons experience this difficulty. It is a parallel fact of common experience that the recollection of beautiful objects is invariably vague. If after having looked at an effect of beauty, we turn away our eyes, or if, recurring to our memory, we seek to paint a beautiful object, we can never so describe it as that an exact conception of its nature shall be given to others, for we find ourselves unable to point out the constituents or states of constituents which made it appear beautiful. These are circumstances connected with the beautiful which all must have observed. Now if it were possessed of a positive origin, if it were the attribute of any determinate portion of matter, it would be felt the instant the object is perceived, and it would be felt equally, since a mere exercise of sight would be implied; it would appear to us at all times the same, and it would be the same to all persons; we could always point out how objects come to be beautiful. But it is because beauty is *not* possessed of a positive origin, and is entirely a relative conception, that we experience the difficulty of defining the conditions of its existence.

We can readily trace how the difficulties arise. To understand why we differ as regards the acknowledgment of the amount of beauty in any given object, we must recollect, first, that the mere use of a sense does not by any means imply that which we call perception; the organ may act, but the mind may appreciate imperfectly, or even not at all, the information supplied to it. The organic machinery is probably given to all men in much the same degree of perfection; but fully to make mind cognizant of matter, we must be able to *estimate* sensuous impressions; and this is a capacity which is very unequally possessed. Perception requires that we should have gathered up and weighed all the relatives presented in the coexistent facts. If we omit to mark any, the idea of the object is deficient in some particulars,—some of its attributes or qualities have not been perceived. It comes to the same end, if by any circumstances we are unable duly to appreciate the relativeness of the facts considered; that is, to form the relations derivable from their coexistence; this is an exercise of the mind which is very unequally performed. We are open to be influenced by many circumstances—indisposition, lassitude of mind or body, preoccupation, dullness of intellect, slowness of conception, habits of seeing, long neglect of organic perceptions, over rapidity of thought,—and in all these cases a difference of opinion must necessarily obtain, for the facts are differently accepted. Some persons under the action of these causes, notice only a few of the relatives offered by an object; others are cognizant of the whole; some accept the chief only; some accept subordinates; some take relatives of each class; some are capable of accepting only a few sets; a few persons are naturally blind or insensible to the sets which call up the idea of beauty, just as there are persons who are indifferent to harmony of sound: the organ is open to receive impressions, but the mind has no power to appreciate, so that perfection is really *not* to them. The existence of these differences of opinion do not prove an uncertainty of beauty, but merely the existence of different modes of estimating, or rather of the ability to estimate, the relations constituting it. The relativeness is supplied by nature, and is fixed; it is our mode of accepting it which varies; the capacity, in short, is as unequal in power and extent, as any other by which the human mind is distinguished.

To understand why we can neither point out the constituents of beauty, nor describe its composition by words, we require to note the following considerations. If beauty be the result of the apprehension of co-existent relations, it is at once evident that we shall want two sets of terms to describe the nature of our emotions. We shall want words descriptive of the parts or things whence the effects arise; and we shall want words distinctive of the relations formed, that is of the impressions received. Let us now see what extent of nomenclature we possess in these respects. We will first look to the names of parts. Any instance would suffice, but let us refer to the best known—the human form. There is a portion which we call the head, and another which we call the arm; we know these are relatives to each other, and help to make up a whole—*man*. The head is made up of nose, mouth, &c.; the arm, of upper and lower arm, elbow and wrist. Further, the nose is made up of parts, called bridge and nostrils; but here the nomenclature suddenly ends; each of these, bridge and nostrils, has yet subordinate parts, plainly distinguishable by the eye, but *we have no terms by which to express them severally*. So it is with the arm; a variety of parts and of inflections of surface are present, but they are nameless to us; we know they exist, but they are not interdistinguishable by language. The difficulty is still greater if we would verbally seek to define *varieties* of these unnamed subordinate parts. The upper lip follows a particular curve, for which we have no name; but that curve is varied for every individual; now where are the terms that can express these myriads of varieties? If we recur to any other portion of nature, a leaf, a cloud, an insect, and examine it in the same way, we shall become still more convinced that our nomenclature of parts or relatives is of a very limited kind; we shall find that we have only terms for leading divisions, and none for the constituents of these divisions.

So much for the amount of terms descriptive of the *parts* whence an effect of beauty may spring; let us now look to the nomenclature of the *relations* we form from these parts. Two relatives are combined into one idea, by a conception mediate to the two; a person striking and a substance struck, are circumstances existing for the moment in a state of relativeness, and giving rise to the relation we term *a blow*. Now it is a remarkable fact that a very large proportion of the relations we are thus capable of forming, that we recognise, on whose powers or capacities we are accustomed to act, and that are momentarily coming before us, *have yet no names.* We have here one of the deficiencies of language. Copious though any language may be supposed to be, it yet leaves a vast number of impressions and conceptions totally unnamed; and this omission is markedly apparent all through the series of sensuous perceptions. Taste, touch, scent, hearing, offer us a wide extent of affections, of which we are perfectly cognisant, but which we cannot describe by name. It is precisely the same with the eye. We express certain conceptions, say of shape, by the terms angularity, curvature, flatness, annularity, squareness, sphericity; but when we attempt to describe varieties of these modes of being, or, to speak more generally, the conceptions we derive from the myriads of combinations of the elements of shape, we discover that beyond a few of the primary relations, we are wholly without the power of expressing our ideas. In a form before us we see a particular mode of inflection of surface which is instantly acknowledged to be pleasing; but where are the terms which shall describe the modes of these inflections, that is, the impressions we derive from the consideration of the several parts? Let the reader try to name them. Under these circumstances, it ceases to be surprising that to this day no one has succeeded in describing by words the composition of beauty; it is a fact dependent on relation, and whose constituents and conditions are indefinable by language.

Should the view of beauty here taken need further elucidation, an experiment may be made which would seem to decide the question of its relative origin in a satisfactory manner. It has already been pointed out that if beauty had a positive origin we could always be able to point out the seat of its existence; we could place a finger on the part where it resided (we refer here to a part, since positive beauty never could be the attribute of a whole, unless we could discover in nature uncompounded bodies, and which we cannot do). If, therefore, we could recognise the part, no matter how large or how minute, in which beauty positively obtained, the destruction of the remaining portions of the body ought to be of no avail as regards the destruction of the idea of beauty in our minds. If all other portions of the body but that possessed of beauty were destroyed or hidden from the eyes, our conviction of the amount of beauty would remain unchanged. Now this is not found to be the case in beautiful nature. If we take any object admitted to possess beauty, and mutilate or destroy its surfaces, we instantly find that the influence over us it exerted has disappeared. From the statue of the Venus broken into shreds the size of an inch, we could pick out no piece which would call up in us the idea of the beautiful the whole object had excited. From the pieces of a beautiful flower, crushed and torn, we could select no one which could give us the idea of the beauty the whole flower gave. We are not to say that this loss of the perception of beauty is the consequence of the superinduction of the pain which arises from the perceived destruction of objects in which skill and an admirable adaptation of parts had been displayed; for the same effect may be shown in a mode which the objection will not meet. Let us take any object, no matter of what nature, that we ourselves shall distinctly admit to be eminently beautiful: then let us take a sheet of paper, or an opaque body, in which there is a small aperture of say an inch square; let this paper be slowly passed over the surfaces of the object acknowledged to possess beauty, so as that only the portion of it which can be seen through the aperture in the intercepting body is in view at one time. Wherever or whenever this process is gone through, we shall invariably fail to perceive any beauty. The most beautiful object, or part of an object, we can select, ever ceases to be beautiful if we only see it piecemeal, and without the acceptation of the series of relations afforded by its surrounding surfaces.

If we have not been mistaken then, the idea of the beautiful arises to us from the consciousness of the co-existence of certain relations derived from external facts. But we are not to understand it as arising from the perception of that class of relativeness which may be considered as the simple apprehension of a constituent. From two points in space we form the relation length; but the perception neither of the points nor of the relation deduced, will give us the idea of beauty. Length is only one of the elements of form. It is through complex apprehension only, that is to say, the appreciation of many co-existent relations forming body, or a whole, that the idea can arise to the mind. Farther, we are not to understand it as the result of the perception of any kind and mode of relativeness. Had the beautiful been given to relation generally, and not to certain relations only—that is, without the control of any condition,—it would necessarily have implied both the existence of a world of effects exciting us equally throughout;

and the existence of an invariable equality of perfection and sameness of appearance. If the mere presence of relativeness conferred the power of exciting us, all objects —since all are compound—would excite us equally; and all would appear equally beautiful. Here was the error of Diderot. He had detected beauty to spring from relation, but conceived it to be from relation generally; that is, without any conditions; and which, as Dugald Stewart has pointed out, is manifestly incorrect, since ugliness, equally with beauty, is founded on a perception of relation. The beautiful is really attached to certain states of co-existence in and among the relatives supplied by external facts—states at present to us unknown. Not relation generally, but only given conditions, can have the power of exciting us agreeably or disagreeably. It is precisely the same with the four lower senses. Not combinations generally, but only certain kinds of combinations of the facts supplied, have the power of interesting us. Not all combinations of sounds please the ear. Not all mixtures of savours please the palate. Not all odours combined please the scent.

It remains that we should briefly examine the class of visual emotions which are commonly considered disagreeable.

Disagreeable sensation, as has already been observed, is of a very limited extent in visual nature. The occasions when we find ourselves displeased with the effects before us, are comparatively rare. And it is worthy of note that these instances do not argue the existence of a *genus* of offensive results, but are always distinctive of a *species*. Certain races of men are ill-formed; certain quadrupeds are unpleasing to the eye; certain birds are considered inelegant; certain fishes appear clumsily made; certain vegetable productions tend to deformity. But these are all exceptional cases. The predominant character of the classes to which they severally belong is the reverse of offensive. And this serves to explain why in all cases in which a disagreeable effect comes before the eye, we detect it so quickly. The organ of sight has been accustomed to a series of effects whose general tendency is the beautiful; and this impression becomes a habit; we receive it as a matter of course. But when a departure from the common law occurs, a change of sensation excites our attention. The eye no longer acts with the indifference of habit, and the mind notes an effect distinct from those to which we are accustomed.

If we examine the circumstances whence a disagreeable effect arises, we shall find that our impression of it springs from our recognition of a departure from the interarrangements to which the eye has been accustomed in similar forms. We call an object unwieldy, or clumsy, or deformed; but these are strictly comparative terms, and imply a violation of some rule of proportion ordinarily recognised by the eye in forms of the same class. But for our knowledge of the rule we should not note the exceptions.

Further, it may be found that if the constituent portions of any offensive effect be separately examined, we fail to perceive an objectionable result. In an instance of deformity, if the parts be looked at one by one, and each disjunctively from the rest, the eye ceases to detect fault. There is no such thing as a constituent in itself and by itself, visually offensive. For deformity to be perceived we require to estimate the relations of co-existent particulars.

If, then, our perception of ugliness implies, first, that we accept constituents not independently, but conjointly, and second, that we recognise it by means of its departure, as a totality, from the standard afforded by objects of a same class, it will follow that to learn what are its principles, we must ascertain what are the laws on which beauty depends.

WHAT WE SEE.

The foregoing pages serve to convey a sketch of the process necessitated by the constitution of a finite intellect in the apprehension of external facts. We shall now turn to the history of the facts themselves.

There is this important distinction to be made between the action of the four lower senses and that of the organ of sight: The lower senses are all confined to an action of one kind only: The ear, for instance, knows that which we call melody, and harmony, and discord; but then the circumstances in and through which they are evidenced, are but of one kind: we appreciate phenomena of a same nature: we hear *sound*, and only sound. So it is with the other senses: their action over us implies only modifications of *a same impression.* Now this is not the case with the eye. Instead of a limitation of the organic capacity to the recognition of one set of phenomena, the scheme for the eye has been extended and rendered more complex, so as to ensure the supply of the greatest possible number of facts and relatives, through the most important and most active of the senses. We are allowed to be cognisant through the organ of sight of no less than three distinct elements for the production of relations. Every effect the eye can see arises from three causes, and both the causes and the laws which regulate their results are widely different.

The three circumstances which constitute visual appearance are technically called form, colour, and tone. That is to say, instead of having one source of sensation —as sound in the case of the ear—supplied to us, we have in the eye these three distinct classes of relatives to constitute the base of our organic capacity. We will endeavour to show that they are distinct considerations.

If an object be placed before us, or if any visual effect be examined, we shall find it to be of a definite *shape*, by which we know it from all others. We shall further find that it possesses a peculiarity of *hue* distinguishing it from surrounding objects, and we shall finally remark that its several surfaces present differences of effects of *illumination*. All objects are thus compounded, and they cannot exist otherwise to an organ of sight.

The necessity for the introduction of form arises thus. The object of the sight is the appearance matter assumes. Either space must be continuously filled up by matter, or the substance introduced must be broken into masses; if the latter, either these masses must have different modes of limitation in space, or they must be all of one quantity and configuration, and thence be liable to be mistaken one for the other. It has pleased the great Designer to adopt the former principle. Differences of limitation of matter obtain, and every effect we see becomes an individual in shape. Hence arises what is called form.

Limitation of matter adopted, it is necessary that means should be devised whereby we shall become sensuously cognisant of its existence. To create a world of forms without a contrivance which shall render them apprehensible by the sense to which they are addressed, would be to leave the connection between the external world and the mind incomplete. To each sense is given this connection with matter ; and each has it through a mode peculiar to its own nature. For the touch, we bring the nerves of sensation spread over the hand into actual contact with the surface to be examined : it is felt. For the taste, the object is brought into contact with the nerves of the tongue and palate. For the three remaining senses there is no actual contact, but sensation is made to obtain through an intermediate agency. For the scent, the atmosphere conveys exhalations from the body to the olfactory nerves. To the ear, the air conveys the vibrations of sound given out by bodies. For the eye, a wholly distinct machinery has been called into existence: the independent element of light has been created, and its rays received on matter are reflected back to the nerves of the eye, to afford the communication required between the external world and the sense. Without this reflection to the eye, there would be nothing before us but a darkened void. The *modes* of this reflection of light constitute the second element of sensation, or tone. According to the nature of the surface is the kind of tone we see, and the latter becomes the exponent to the eye of the former.

Light thus created to render limitations of matter the objects of sight, might have been an uncompounded fact. White light reflected back to the eye might have been all that was offered us, since it is all that is needed to constitute perception. But by a beneficent forethought, too often passed over by us, light was made compound in its nature, and the element of *colour* was thus additionally called into existence for the adornment of the surfaces supplied by modes of limitation of matter.

It is not an unimportant proof of the perfection with which nature has aggregated these three classes of effects, that there are many persons who never think of referring their visual sensations to more than one source. The unity of the effect is extended to the cause. We do not stop to inquire if the circumstances we observe owe their peculiarity to a question of shape, or of colour, or of mode of light; but are content with the assumption that visual effects are simple throughout. Even where a triplicity of origin is recognised, we are apt to suppose that all circumstances are to be accounted for by one set of laws, and that sound deductions as to the general question can be safely made by reference to one only of the constituents. These are errors that very commonly prevail. Nothing, however, is more sure than that, to trace the history of the effects known to the eye, we must begin by carefully separating the inquiry into the three branches marked out for us by nature. That which is true of shape, does not apply to tone, and bears no relation to colour; and truth in the three cases requires distinct modes of expression.

HISTORY OF FORM.

It has been pointed out that every visible circumstance is made up of form, tone, and colour. The present section is devoted to the history of Form.

If the space over which the eye exercises its powers were unmarked by separations and inflections, the circumstances we call *Form* would be totally unknown to us. Were matter spread out in space so as to be continuous, and to offer the eye no opportunity for the discovery of limit, we should remain totally ignorant of the circumstance we call *body*. An aggregation of matter, or body, is in itself regulated division of matter ; but with regard to the eye, which knows nothing of matter except as the object of sight, it admits of a different definition ; it then becomes mode of limitation in space. The generic term by which modes are expressed is *Form*.

It will certainly one day be regarded as a singular fact in the history of philosophy, that a doubt should have been gravely put forth, and as gravely investigated and kept up, whether we know that which we call form directly through the eye, or mediately through some other channel. It has even been decisively asserted by some of the learned, that we do *not* know form through the eye. The organ of sight, they tell us, only knows length and breadth. Now, as body implies three relations of quantity—length, breadth, and depth—we must, they assert, know figure by some other means. It is to Berkeley we are to ascribe the opinion that we do not know depth by the eye. The difficulty of accounting for our knowledge of form under this exclusion of the agency of the eye, was got over by calling in the aid of another sense. It is the *touch*, we are told, which makes us acquainted with figure. Having, say these philosophers, passed our hands over and felt the bodies around us, we learn by degrees to distinguish one body from another. It was from these opinions that arose the unnecessary distinction in the philosophical works of the last century of "visible figure" and "tangible figure;" a distinction, by the way, which in itself conveys an absurdity, since tangible figure must mean the *taction* of an *appearance*, a confusion paralleled by that of the phrase, the taste of a sound.

The theory of touch calls upon us to believe that the eye originally and in itself, has no power to distinguish a point of matter from a mass, a right line from a circle, or a cube from a bunch of grapes: we are to conceive that an infant distinguishes its nurse from its father by having carefully felt both. There is here the assumption of an unnecessary machinery, till it be shown that it is unsound to conclude we know an appearance by the eye alone. It may be asked how it is, if we do not know form by the eye, we yet come to distinguish between the shapes of bodies which are either too remote, or too vast, or too complex for us to feel? The moon, a house, and a tree, are instances. If it be answered, it is because they are seen to be *like* other bodies which have been examined by the sense of touch, we shall admit the very visual power the theory has been denying: we *see* them to be alike, so that the eye has the power of recognising form. Touch thus involves a contradiction: it assumes the existence of the very faculty it is intended to deny. We must have a power of knowing form by the eye, or we could not at first connect certain tactual impressions with definite bodies. We must either through life have felt every object offered us, or we must from the beginning be in possession of a natural power of seeing the differences of forms.

The fact that in very early life children appear to recur to the use of the hand in examining the objects presented to them, merely shows that at first they are unable to judge of *distance*. A question of form is here not at all implied; it is merely ignorance of the distance at which the object may be placed, that leads them to extend the hand and seek to touch the object before them. In truth, the very circumstance that the hand is thus extended towards an object, is a proof that this object has been *seen*, or that its existence is already known. Medical works show us that in operations for certain states of blindness, where the power of seeing has been very early lost, the patient, on recovering the use of the organ, is observed to complain that surrounding objects appear to touch the eye, and that he is unable to distinguish the distances at which they are placed. It is probably the same uncertainty which is experienced by children.

It was an extraordinary error to exclude the relation depth from our conception of the existence of form; and the long-continued adoption of this position illustrates the pertinacity with which preconceived opinions are often clung to. Were we to apply the principle rigidly, it would end by depriving the sense of sight of all organic power whatever. The exclusion of depth actually means the exclusion of length and breadth, and therefore of sight. This may easily be shown. It is clear that there is no such circumstance existing as a perfect *plane*, for everything we see has thickness and depth; if so, our perception of visible figure under the theory of touch must obtain through the arbitrary selection of some *one* of the surfaces of a given object. Now how many are the occasions when we can do this? In the first place, all bodies compounded of, or containing curved surfaces, must be put aside ; for in all bodies made up of curves, there are parts retiring more or less from the eye ; and these parts exist under precisely the same conditions which determine us to exclude depth from visual recognition ; they are surfaces foreshortened, that is to say, presenting a less angle than ninety degrees, with a ray drawn from the eye to the object. The instant that any surface, or part of a surface, departs from a right angle with the visual ray, be it ever so little, that instant it falls under the ban of the "tangible" philosopher ; for it retires from the eye under the same conditions as a plane expressive of depth. Curved bodies, therefore, must be totally excluded from our conception of "visible" figure ; and there will only remain for us the class of plane surfaced bodies. Now we know that this latter species of formation is only found in the mineral world, so that the eye will thus be supposed to make us acquainted with but the lowest division of forms ; or in other words, it has power in one division, but it has none in the others. But even this knowledge is not secure. Every plane surfaced body which may come before us, must always be so posited as that one of its surfaces obtains at an exact right angle with the ray proceeding from the eye ; for if it be not exactly so, the surface considered is a retiring plane, and we again have the conditions which constitute depth, namely, perspective appearance ; but how can we secure that mineral forms shall always be so placed as to present one plane exactly at right angles with the visual ray ? Finally, it will not be forgotten that by adopting this idea of "visible figure," we say that the same form may, and may not, be the subject of visual apprehension. It is so when a surface is in a particular position; and it is not so when it departs from this position.

The perception of an object by the eye is in truth a perception of *extent*, filled up in a variety of ways. There is no necessary condition of sight which determines that this extent shall only refer to length and breadth: its limitation to these two elements is entirely arbitrary. Extent implies a certain portion of space accepted by the organ of sight. The figure of a definite external space, existing in a definite manner, is imprinted on the optic nerve; and a sensation is received. But the manner may be, and really is, variable for every figure; and many of these variations of necessity depend on modes of depth for their development.

The smallest subdivision of matter we can conceive, is a point. But we annex no definite idea of shape to the point, for relativeness of parts is absent, and thence relations of form do not arise to the mind. The most simple shape in which the apprehension of external facts can come before us, is that of the perception of two points, and between which we form the relation length. Other examples are afforded by breadth and depth, which equally imply the formation of a relation of space between two termini.

A series of points in juxtaposition constitutes the relative, a line.

Lines are of two kinds only, *straight* and *curved;* no others can exist in nature, that is to say, the aggregation of particles of matter to form a line, must follow one or other of these courses of direction; and the terms express the two great relations or ideas derivable from the aggregation of points.

The parts of a straight line lie all in a same plane. It therefore admits of but one mode of change, namely length; in this particular only can straight lines differ among themselves. Directly we attempt to vary the appearance of a straight line by the admission of inflection, we pass from the first class to the second. A straight line is one in all its parts: the separate consideration of any of its constituent portions thence gives no new idea to the mind, but merely repeats that which was already known. It thus can by itself only offer to the eye the relativeness of uniformity.

The relations afforded by two or more straight lines, are those of length and those of situation.

The relations of length are for the most part without names, and primarily because the eye cannot by itself determine ratios. Of two lines before us we can roughly decide that one is the longer; but the *how much* not being determinable, we cannot give to either the individuality of a name. Measurement may show us that one is a quarter the length, or three times the length, of the other; the eye, however, by itself has no power to fix these proportionate quantities; and hence, though it readily detects the existence of some difference, a long series of relations is formed for which no names are to be found. Between two pieces of straw in the hand, or two streets before us, we are quite sure there is a difference of length; but language fails to designate with precision the relation detected. It is to supply our want of a *positive* knowledge of quantity, that certain arbitrary relations of length have been adopted—an inch, a foot, a mile, a degree.

The relations of situation are two. Lines placed equidistantly from each other, enable us to form the relation called *parallelism*. To this there are no sub-relations. A departure from the condition of parallelism, gives rise to the second relation, *convergency* or *divergency*. Here an extensive series of sub-relations arises, conveying the more or less of departure of the lines from each other; but these, like the relations of length, are nearly all nameless, primarily through the inability of the eye to determine individuals. We can refer to an *acute* angle, and an *obtuse* angle; but it is not certain that every eye can detect the occurrence of a *right* angle: all other degrees of divergency, though clearly the objects of sight, escape identification, and thence possess no special names.

The parts of a *curve* line do not lie in a same plane; and they are not the same in all their parts. The consideration of any one portion does not acquaint the mind with the nature of that which is to succeed. Curve lines may be inflected in a vast variety of ways; and the relations they afford not only imply, as with straight lines, length, and situation, but additionally differences of kind. The differences are infinitely variable.

These varieties or sub-relations are nearly all without names. The eye distinguishes a certain number of primary forms, sufficiently for rough identification—a circle, an ellipse; but language supplies no terms by which the larger proportion, consisting of derived forms, can be referred to. It is not possible to find a word which shall call up in the mind of another, a line we have detected to be compounded of circular, elliptical, and ovoid portions, in unknown varying quantities. We cannot ourselves determine the true character of the elements that may be present, nor fix the limits of their appearance and disappearance, nor their relative amounts ; how then can language express what the eye may see, but which the mind fails to comprehend ?

A series of lines constitutes the relation a *surface;* and we have here the commencement of aggregation for the production of body. Surfaces, like lines, are of two kinds ; and bear the same designation, straight and curved.

A straight line employed as the element of a surface, gives rise to a plane. A plane must necessarily come before us with a limit, or it would by its vastness cease to be the object of sight. The limitation gives rise to the relation, *extent,* which is the chief idea resulting from a consideration of the space occupied by the plane. Variations of extent are modes of form ; but they are only imperfectly named, and afford but a restricted nomenclature. We can refer to the words square, triangle, parallelogram, &c., which figures result from the use of straight lines, and to those of circle, ellipse, &c., springing from the use of curved limits ; but beyond a few of these leading sub-relations, language entirely fails us. We have no names for the wide class of planes, regular and irregular, producible by an unlimited union of the straight with the curved element, and which are plentifully found in nature.

A surface constituted on the basis of a curve, cannot present a plane, since inflection changes it. Curved surfaces may have an inflection of only one kind—circular, ovoidal, &c. ; or they may be made up from a combination of many. These latter forms are innumerably extensive ; and though the eye has often the power of recognising the presence of difference, and thence the mind that of forming individual relations; yet language supplies us with no names for their identification. The terms required would perhaps extend to millions.

Surfaces aggregated to surfaces, give rise to *body*. This is the final relation formed from the co-existence of very many subordinate relations. In each case of perception of body, some individual mode of aggregation is implied, since the differences of bodies among themselves are readily detected. Here we have an extensive nomenclature—a man, a horse, a tree, a hill; but yet by no means an exhaustive one, for some forms of matter have never yet been named.

Bodies are compounded either purely of the straight element, purely of the curve element, or by a mixture of the two. The first class comprises such figures as the cube, prism, &c.; the second is illustrated by the sphere and its varieties; the third by the cone, cylinder, &c. This third class is by its nature without fixed limits: a curved surface may be made to undergo any degree of flattening in its several parts, from the first abrasion of a small portion down to the total extinction of the curve character; or a plane figure may be changed by the gradual addition in any of its parts of any of the modes of curve lines, till it totally lose its original type. It is unnecessary to point out that all these variations are without names.

The first mode of constitution, straightness, is only found pure in one division of creation, the mineral world: but even here not invariably, for some portions are not made up of combined planes. The second mode, the curve element, is the base on which the animal world has been formed. The last mode, a mixture of the elements, is that which constitutes the shapes of the vegetable kingdom. We here meet with planes circularly bounded, cylinders, and the other types which result from the combination of the curve and straight line. Nature, however, has not kept these three modes of constitution distinct for each case, but has united them to each other by insensible stages. The lower animals, for instance, betray a limited use of the straight element; of this, the legs of most quadrupeds, birds, and insects: the fins of fishes, are instances. In the vegetable world we have examples of the employment of the curve element purely; some fruits are spherical bodies, and we observe the same facts in the mineral world: pebbles are curved forms.

A reference to nature will show that the vast majority of the forms offered us, are those compounded through the use of the curve element. In carrying our thoughts over the long series of creations spread out for us, we shall find that while figures compounded of straight lines are with difficulty instanced, those presenting curve surfaces are so incessantly offering themselves, as to become to the eye the rule of material construction. Connected with the common observation of this fact, is a set of opinions which it is necessary we should here notice.

It has been supposed by some writers that in the predominance of the curve type in nature we have a clue to the origin of the pleasurable feelings suggested by the eye. The curve form, they urge, is that which calls up in us the idea of the beautiful. The opinion is an exceedingly specious one; for on a recurrence to natural effects, it is found that beauty and the curve type are nearly always co-existent.

If we select any effects in nature that are commonly admitted to be beautiful, we shall be compelled to acknowledge that an idea of curvature always arises to us. The highest degree of beauty of which material creation is susceptible is supposed to obtain in the human race; and here it is certain that the curve element solely constitutes the form, and that there is not a single intentional instance on its surfaces of a straight line, still less of the mode of space, a plane. Other instances of effects generally admitted to be beautiful are found in the waving of trees, the convolutions of vapour, the soft rise of hills, the drooping of flowers, the curling tendrils of a vine, the graceful motion of an elegant woman, the plump fullness of a healthy child; these, and a thousand more that might be adduced, are the results of the employment of the curve element.

As we go down the scale of creation we discover a more free use of the straight element of form, and coincidently we detect a deterioration of beauty. The straight legs of birds, the jagged and flat fins of fishes, the straight stems of shrubs, fail to please us; and curvature is absent. We prefer a hilly landscape to a flat plain, an undulating meadow to a precise Dutch garden, a meandering rivulet to a straight canal, a drooping flower to a newly-grafted tree, a weeping willow to a furze.

If in any of the forms with which we are acquainted accident interfere to injure the curvature of the surfaces, we consider that the beauty of the shape is proportionately affected. In the human race infirmity and disease operate to reduce the rotund and swelling forms which youth and health are accustomed to exhibit. In these cases we always complain of a loss of beauty. Compare the flattened outlines of an emaciated man with the form of a female in full health. In what is called general thinness of body, we are offered an assemblage of parts which have lost their original and intended prominences, and have sunk into straightness ; and this state is confessedly less beautiful than that which is marked by rounded and flowing outlines. We may trace the same results in the vegetable world. The petals of a rose, flattened and stiffened, lose in beauty ; the tendrils of a vine, or the waving forms of long grass, straightened like wire, would fail to satisfy the eye. A bunch of grapes converted into a collection of cubes and triangles, or a young elm clipped into the shape of a rhomboid, imply a loss of beauty.

These are some of the considerations which may have led to the opinion, that the beautiful is the necessary result of the employment in nature of the curve element; and at a first sight we do not perceive the objections to which the theory is open. It is plain, however, that if beauty be the necessary result of this element, all bodies framed on it in its greatest purity ought to appear to us the most beautiful. Hence, a sphere should afford the eye the utmost possible amount of gratification ; but we do not find such objects as a melon, an orange, a pumpkin, admired beyond every other species of form. Our rejection of the theory becomes confirmed when we further note, that the curve element is equally found to exist in bodies which by general consent are esteemed the reverse of beautiful. The toad, the sow, the Dutch pug, a hump-back, bandy legs, &c., are instances.

An escape from the difficulty is furnished in the suggestion that it is not the curve type generally, but a certain species of curve, that produces beauty: Hogarth's celebrated line, for instance. But this again, as an absolute cause, will not stand the test of rigorous examination. If it be a species of curve, it is an individual: it therefore must imply certain conditions by which it is individualised. The line itself then ceases to be the cause of beauty, for it is only a sequent of certain conditions; and we are driven back upon the question of the principles that regulate these conditions. It is no longer a question of a line, but of certain laws. It is to be observed that Hogarth himself was aware of the want of title of the "line of beauty" to be considered as the absolute cause of visual gratification; for he enumerates no less than six principles through which he supposes its value is derived. In spite of this admission, many admirers of his interesting work are yet in the habit of quoting the line as an absolute cause. The title given to it, and inattention to its compounded nature, are probably the sources of this misconception.

We shall now endeavour to trace the laws that regulate the aggregation of surface to surface, for the production of the material results we have been examining.

In the occupation of space by matter, two considerations require to be determined, namely, what amounts of matter are to be taken, and what relative positions these amounts shall occupy. A line is an assemblage of parts; now first, we may have a more or less of these parts; and second, they may be variously disposed in space. A surface is equally an assemblage of parts, and the same considerations continue to hold good. The aggregation of matter, therefore, for the production of body, must fall under one or other of two heads—*quantity* and *situation.*

It will be perceived that these are of necessity relative terms. A given quantity is not a positive existence; it is an amount whose extent is defined or pointed out, by some other quantity, smaller, or equal, or greater. In like manner, situation is not a positive existence. In the consideration of the unlimited and unmarked void, space, situation can only be accepted as a relative locality; that is to say, one spot must be taken relatively to some other spot: otherwise, situation would mean *anywhere.* Quantity and situation are in truth the two primary relations of aggregation.

Quantity.—Quantity is to be understood as comprising three subrelations of extent, namely, *length, breadth,* and *depth.* Any amount of matter we can take must, as a solid body, offer these three considerations.

With the reasons which may have determined the assignment to each created body, of the total quantity that we see it naturally possesses, we have nothing to do. Why an orange, or a horse, or a man, should be precisely the size they are, and not twice the size, or one half the size, is not a question we require to take up here. Our inquiry must confine itself to the point, how is it that bodies, as we find them, are constituted.

Were the objects set out for us always to assume the condition of a perfect sphere, the only difference among many spheres would be the extent comprised within the periphery; and the question of quantity would then be presented in its simplest form. But this is not the mode of aggregation adopted. The bodies we see have surfaces broken up into an extensive variety of inflections and shapes; change in the mode of continuity of any one surface of a body, gives rise to a second surface; and this change may be, and is, carried on to an indefinite extent: members and subordinate parts are evolved. Hence the estimation of quantity becomes extremely complex. We require to notice amounts that are ever varying.

The aggregation of part to part must of necessity comply with one of two conditions. We may take equal amounts, or we may take unequal amounts. That is to say, the extent allowed to one surface, may either be the same as, or different from, that given to the preceding surface to which it is attached. Aggregation implies like quantities and unlike quantities.

The result of the aggregation of *like* quantities, whether accepted continuously or disjunctively, is the formation of the relation, uniformity; and, under certain circumstances, of that of monotony. We have a repetition of one same effect, and which may either be limited, so as to be a relief to the eye; or too frequently repeated, so as to fatigue the eye.

When we come to examine natural effects with a view to discover the modes of aggregation of quantities commonly pursued, we shall find that successive like amounts have very rarely been permitted to constitute a form. If we separate any visual circumstance from surrounding objects, we shall perceive it to occupy a given portion of space definable by a line running all round it, and bounding its several dimensions; the space thus marked out being filled up by a variety of surfaces. Now the closest scrutiny, both of the several divisions of the bounding line, and of the contained parts, never enables us to detect in any of the *higher classes* of creation, such a circumstance as two lines, or two surfaces, or two parts, placed continuously, of equal quantities. This mode of aggregation would really appear to be distributed in nature under the following general arrangements. It is plentifully admitted into the mineral world, where we have crystallised bodies offering equal faces. It is sparingly allowed in the vegetable world, where we only here and there find continuous equal divisions of parts ; such, for instance, as may be seen in some members of the cactus family ; and it is still less visibly traced in the animal kingdom, where the only approximation to it is in the equality of length and bulk given to the developments called arms, wings, legs, &c.

On a reference to art, instead of nature, we immediately find a reversal of the limitation we had been tracing. Nothing is more common in the products of human skill than the aggregation of like quantities. Indeed, it would seem as though art were unable to combine on any other basis. House-building, machinery, furniture, &c., are full of examples of continuous like quantities. The original reason for this may be perceived. Like quantities determine themselves, at least the determination of one is the determination of others in succession. But the aggregation of unlike quantities, raises the question of proportion. If a second continuous surface or part is to differ, by *how much* shall it differ ? and after some extent of aggregation, this question becomes extremely involved and confusing. Hence, art may be often detected in endeavouring to avoid it.

The result of the aggregation of *unlike* quantities, is the formation of the wide field of relations that may be comprised under the head of variety. They include every idea that can spring from the perception of dissimilarity.

Unlike quantity is to be considered as constituting the rule to the eye, of the effects presented to us in the visible world. Variable amounts of extent occur in the surfaces of the greater proportion of the forms we know. Length, breadth, and depth, and their subordinate relations, continually differ; and in the majority of cases these differences are evidenced with such delicacy, as totally to defy an analysis; they imply, in truth, possible divisibility of matter. It is to be observed, however, that in consequence of our inability to do more than rudely set limits to this divisibility, the nomenclature of the relations is highly defective; and we cannot refer to them by language.

Unlike quantity is the only mode of aggregation through which succession of perception can be ensured. Like quantities joined together, imply equality of value to the eye. Between two equal amounts there is no room for choice, and we may accept which we please first. Among many equal quantities, chance or individual liking will direct the order of perception. With unlike quantities, the case is different. We must accept the several amounts with reference to their values as set out by nature; and according to the arrangement of these values, will be the mode of our perception.

In adopting the aggregation of unlike quantities as the rule of creation, it is yet manifest that nature has subjected these differences to system. We find that visible appearances are always the same, for the same class. The relation of extent which we trace among the parts of any one object, is never departed from in others of a like kind—that is, beyond the amount necessary to constitute individuality. Classes, orders, genera, and species, continue to be repeated. The subdivision of the surfaces in the human form is always of a same general kind: the relative lengths and breadths and depths of the parts constituting the leg, or the arm, or the head, have probably remained nearly of one amount since the creation. The same may be said of any other species of form. Even deviations from the rule, or monstrosities, only go to prove its existence. A bird with gigantic legs, or a fish with an unwieldy head, are adaptations to some particular purpose; and these adaptations continue to be repeated.

Unlike quantity is the channel through which it has pleased the great Creator to enable us to gather the pleasurable sensation communicable by the eye: that is to say, that among unlike quantities, are found *some* to which has been given a power of affecting us pleasurably; and it is necessary to bestow a careful consideration on this branch of the subject.

It will be readily understood that no quantity in itself, and by itself, can be either pleasing or displeasing. It is merely one of the circumstances to which relativeness is attached, and through which we attain an idea of body. It is only by the union of all the elements of quantity forming definite shapes, that any meaning can be conveyed to the mind. The relations of these elements to each other will require to be examined, to detect conditions which affect us pleasantly.

Taking quantity in its enlarged sense, and considering it as including all relations of extent; that is, of length, breadth, and depth, with its subordinates; there are not wanting indications that definite arrangements do obtain for the production of the beautiful. Every class of object with which we are acquainted appears to possess a fixed amount of quantity, within which individuals of the same class are confined. Now in all cases we find that a change in the amount of either relation of quantity, materially influences the effect the body has upon the eye. If we were to select a beautiful object, say a female form, and keeping breadth and depth as now, drag out the length to double the present amount; or, preserving the length, double bulk; we should at once admit that beauty had been affected in a very high degree. The form would be considered to have lost some of the perfection it originally offered. Any beautiful object treated in the same way, a race-horse, a lily, a butterfly, would offer just the same result: the neck of the swan, the body of the stag, the legs of the moth, extended to twice, or reduced to half, their present amount, would produce a disagreeable effect. On the other hand, there exist many objects whose modes of formation we should consider would be improved by a change in the relative amounts of their quantities. We would willingly add length to the legs of the duck and terrier, and reduce it in those of the crane, or in the arms of the spider-monkey. We would add breadth and depth to the body of the starved horse, and take them away from that of the corpulent man, or over-fed lapdog. In all these cases, we should judge, not with reference to the class of forms to which the object may happen to belong, but solely from a consideration of individual effect upon the eye.

It is through this perception of the relativeness of the elements of quantity that we are enabled to recognise the existence of the two widely extended classes of effects or relations, grossness and elegance. Most forms that have to go through a state of growth, exhibit the last of these characters at one period of their existence; many forms continue to retain it through life, and the source of the effect is deficiency of breadth and depth. It is exemplified in the slim youth, the young elm and willow, the foal, as arising from incomplete growth; and in the greyhound, the heron, the race-horse, the poplar, the swallow, the jessamine, as springing from permanent arrangements of quantity. With respect to the former quality, grossness, we may observe that it is comparatively a rare occurrence in nature; and that it differs from elegance in that it is not a necessary consequence of early development or youth, but is rather an accident of maturity. The effect is owing to excess of breadth and depth. We see it exhibited in the bull, the elephant, the toad, the turtle, the owl, the dray-horse, the sow, the prize ox; and in all these instances the reduction of the excessive elements of quantity would remove the effect. Now if we have thus the power of recognising effects like grossness and elegance, and the causes be as here given, it follows that the eye must be naturally cognisant of some measure in which the elements of quantity should coexist; for we imply that we are able to recognise and do recognise some standard by an estimation of variations. Excess or deficiency of any element of quantity points to an acknowledged law of relation.

We are able to trace our recognition of the same relativeness of the elements of quantity in the subordinate divisions of forms. We are commonly in the habit of saying that a part is too long, or too short, or too thick, or too heavy, for the remaining portions; and we assert this without reference to the uses or capabilities of the object. In the human form, which is better known to the majority of persons than any other portion of creation, we point out that we observe a low forehead, a long chin, a short nose, a wide mouth, small eyes, a broad face, a thick neck, short legs, long arms, &c.; by all which terms we convey our recognition of some violation of the due relations of quantity. It has even been attempted in several divisions of form actually to define the precise relations of quantity which should obtain for the production of a pleasurable feeling. For the human head to offer the arrangements of quantity required by beauty, the following relative adjustment of spaces should be found. If the distance contained between a line drawn horizontally across the top of the head, and a second line drawn horizontally to the junction of the chin and throat, be divided into ten spaces; the second division counting from the top will define the point of commencement of the hair on the forehead; the fourth will mark the top of the eyebrow; the fifth, the outer angle of the eye; the sixth, the orifice of the ear; the seventh, the base of the nose; the eighth, the opening of the mouth. One of these spaces gives the length of the eye from angle to angle, and between the two eyes is a space equal to one eye; the mouth is one eye in length; the ear, two eyes; the nose, from the base to the eyebrow, three eyes; from the base of the nose to the chin, three eyes. It is minute departures from these standard proportions which afford the various characters and expressions we daily remark. In the same way, for the human form to be beautiful, say certain works on art, it must be divisible into so many parts, each of which shall define the commencement or limit of such and such portions. The same attempt has been made with respect to the horse. These divisions are found in practice to be only available as rough guides, yet they argue the general recognition of some definite relations of quantity.

The imitation of natural forms by means of art, is continually affording indications of the existence of definite relativeness of the elements of quantity acknowledged by the eye. It is exceedingly rare that in drawing or designing, the precise arrangement of amounts that can satisfy the eye is at once attained: a portion is added here, subtracted there, pared from this, joined to that, and a variety of effects tried, before the quantities are determined which produce the pleasurable result sought for. There is no other guide than the eye in the amount to be given to the limb of a tree, the fold of a piece of drapery, the introduction of a cloud, the disposition of a figure; and it is not indifferently any quantities that can be admitted, but a careful interadjustment must take place before the result of the whole is considered satisfactory.

Architecture affords another class of proofs that the eye recognises the relativeness of the elements of quantity. The first inventors or perfectors of the five orders of Greek architecture had nothing to guide them in the decision of the quantities to be given to the various members making up that which we call base, shaft, capital, entablature, cornice, but the natural feeling of the eye in the aggregation of quantity. Architecture is an imitation of no existing natural type; but is a totally artificial arrangement of matter. The inventors of the rich and complicated effects of Gothic architecture stood in the same situation; and the Egyptian edifices are only other forms of the same fact. It will be no answer to say that the parts or elementary surfaces making up these styles exist in nature, and were borrowed thence, since we still have the question, how the effects came to be compounded as at present? To reply that they were aggregated in accordance with the general laws of nature, is to admit the fact of the existence of a recognised relativeness of quantity.

Manufacturing art is full of indications of our preferences for certain effects. In all branches of skill that imply the creation of modes of form, and more especially in those whose products are partly addressed to the eye—pattern designing, or furniture, for instance—the designer entirely relies on his power to detect the relations of extent which are most capable of affording a pleasurable effect. In such ornamental constructions as iron or bronze castings, a reference to existing forms is of course excluded: a chandelier, or a tripod, are like no natural types, and yet it is evident that the interadjustment of the quantities selected, can produce displeasing, as well as pleasurable results.

The above are some few, and only a few, of the indications that are supplied us of the existence of a definite relation of quantity affording gratification to the eye. This relation is sufficiently the subject of general recognition to have obtained a determinate generic name. It is conveyed in the term in daily use, of proportion.

But what is proportion? In adopting the term to express our appreciation of a particular relativeness of quantity, we shall always require to bear in mind that the word itself does not determine the condition of the facts to which it is applied. We are accustomed to speak of a violation of proportion, and of good proportion, as though the conditions of its existence were thereby defined; but the term, in truth, conveys nothing more than a perceived result, the question of causes is left untouched. No light is thrown on the nature of proportion when we are told that it is the "measure of relative quantities;" for we do no more in this than substitute one word for another: we substitute measure for proportion, which is but an exchange of one kind of ignorance for another. What is this measure? If it be not pointed out, we are merely told that proportion is a certain measure—that the eye is pleased, or displeased, by the observance of, or departure from, some unknown measure of quantity, a knowledge that we had before we recurred to the use of the term proportion.

There is strong probability that in the selection of the states of relativeness implied in proportion, and which are to convey pleasurable excitement to the eye, nature has not worked blindly, but according to system. The very fact of a common belief in the presence of beauty, proves the exclusion of chance in the production of the effect, without recurring to the argument that the chief sense could hardly have been left to an unregulated supply of phenomena; while an inferior sense, the ear, has had its information systematised. Indications are not wanting—and the opinion is not offered wholly unsupported by experiment—that in according pleasurable feelings to the eye, nature has proceeded on some system, not identical with, but possibly analagous to, that pursued in the case of the ear, and that there are primary relations of successive quantity which hold an influence over the organ of sight, just as certain primary relations of consecutive sound exercise it over the sense of hearing.

This opinion stands but as a bare assertion, while the form of the relation cannot be stated and proved. But there may be reasons why the determination of this form comes before us under almost insuperable difficulties. It involves, in truth, the determination of the minimum amount of quantity that can suffice to constitute difference to the eye, a difficulty to the sense of sight as great as that to the mind, of determining the extent of the divisibility of matter. A sensation of change can arise to the sight by the addition or abstraction of a quantity that is too minute for separate estimation. Invisible parts added together may make up a visible whole. The power of the eye only reaches to a certain limit, and quantities below this limit escape notice : conjoined, however, to other invisible quantities, visible effects are produced. It is impossible that through mere theory alone we can see the full force of this truth : we require long and patient practice to estimate it properly. Now, to give the form of the relation of quantity that has been supposed to exist, the mere information of the eye, deprived as it is of the power to fix limit, is not sufficient.

But even were means devised to overcome this difficulty, let it not be forgotten that by proof or disproof we should be no nearer a decision of the question of the beautiful, or nearer the reason why this or any other form of relation acts upon us pleasurably, than the determination of the ratios of a perfect chord has brought us to the constructive history of that which we call melody, or the reason why any given melody should act pleasurably on the organ of hearing. A melody is a series of relations of sounds successively accepted, the relatives being mere repetitions of one octave, only struck higher or lower in the scale. In the same way, beauty may be the result of a series of quantities, or relations of sight, successively accepted, and possibly mere repetitions of original elementary forms. But why a series of notes should produce the melody, and why this series should please the ear, are parallel questions to why any series of quantities should produce a certain result of form, and why this result should afford pleasure to the eye.

Our inability to show the conditions of the relations constituting beauty, is not proof that their existence is mere assumption. We are accustomed to be moved by many influences whose causes are beyond our definition. The senses are continually bringing such cases before us. The quantities and succession of sounds making up the airs "Auld Robin Gray," "Non più mestà," afford us pleasurable results; but it is not in our power to say on what principle of construction the results depend. Were it so, the production of continually new effects of sound, all equally pleasing, would become an easy matter: the law once known, melody would become of certain production. But this, the highest difficulty of musical science, is not within the reach of every composer, who may yet be well acquainted with the values of musical sounds.

To ask why, in the case of the eye, the majority of persons are pleased with any particular aggregation of quantity, or why one person should prefer this effect, and another that: just as in the case of the ear, why certain melodies please unequally,—can have but one answer. Nature determined the connection when it made mind cognizant of the qualities of matter, and it intentionally opened the door for preferences when it created individualities of mind. We like that which nature meant we should like, and fitted us to like.

If this view be correct, we shall be led to suspect that the question of the beautiful, so far as it depends on aggregation of quantity, *is one not meant to be answered.* This would be an unexpected termination to our researches; but the deduction is probably well-founded. And it would be something to reach even this negative information, seeing that we avoid a barren waste of strength. In the inquiry why melody pleases us, even granting that we arrive at the conclusion it is a certain determinate relation of sound that constitutes melody, still we should have to ask why this determinate relation was made to please us. Shift the ground how we may, we should be driven back ultimately to the connection of mind with matter—*nature so ordered it.* So it may very possibly be with modes of aggregation of quantity: nature willed that pleasurable sensation should result from the perception of certain relations of extent. Granted that we could determine the condition of the relations, still we cannot explain how they cause a sensation of pleasure.

Situation.— Every quantity taken for aggregation must occupy some situation in space with reference to the other quantities to which it is annexed. A plane would have all its parts placed on a same level, and the relations afforded would be simply those of extent; but inflection of surface admitted to the plane, a series of relations arise, resulting from variety of situation in space of the parts: every portion added, every development allowed, offers a fresh series of relations of situation. Body is simply an extensive group of these relations, so originated, and occupying a determinate portion of space.

Situation is divisible into two classes of relations— similar and dissimilar. That is to say, the parts implied in an aggregation may occupy a same position with respect to the body to which they belong, or they may occupy different positions.

Similar relations of space more frequently occur in nature than the class of relations originated by like quantities: while subordinate parts are rarely of equal lengths, they are not infrequently placed in similar positions. In the mineral world, it is to this condition we owe the appearance of regular bodies like crystals, which are forms whose planes occupy same situations in space with respect to each other. In the vegetable world we continue to see the condition observed, in the manner in which leaves and branches are affixed to their stems: in many cases there is an almost mathematical accuracy and regularity in the arrangement of the points of departure of vegetable developments; even in trees the law is not wholly neglected; their branches do not grow all from one side of the trunk, but are tolerably balanced in position.

In the animal world similar relations of space are traced in the mode of arrangement of all developments and members: the two sides of an animal form are alike; the subordinate members, eyes, horns, ears, legs, &c., start in pairs, from same places with respect to the form to which they belong.

The result of the perception of same relations of space, when the condition exists only to a limited extent, is the suggestion of the idea of regularity; when still further extended, it is probably an idea of uniformity that arises; and when repeated to a considerable extent, we are liable to the formation of the idea of monotony.

Dissimilar relations of space express the rule to the eye of natural construction. The greater part of the bodies that come before us are instances of an extremely complex arrangement of situation, carried out to an extent, and expressed with a delicacy, that at first sight we fail to perceive. It is necessary, however, that we should recognise these differences, and an illustration may assist us to their comprehension.

The leaf of a tree is a plane bounded by curve lines; the bounding outline, therefore, expresses parts not only of different extent or quantity with respect to a common centre, but placed in a different situation in space. It is an old observation that scarcely two leaves on a same tree are precisely alike; hence, as many leaves as there are on a tree, so many variations of a different relation in space of the parts of the bounding outline should we find. But this view limits leaves strictly to the conditions of planes, which does not accord with the arrangements of nature; they are surfaces presenting every kind and degree of flexure, so that our idea of variable situation has to be extended for the consideration of the component portions of the surfaces of leaves. Let us carry the view still further, and remember that each tree has an individual type of leaf, so that the variations of position, or relations of situations, have to be multiplied by the number of types of leaves. Lastly, the same infinity of change of relation which we thus trace in the parts of leaves with respect to the leaves themselves, we have to apply to their situations in space with respect to each other, and to the stem to which they are attached : they lean, and bend, and turn in every possible direction.

This indefinable variety of situation that has thus been traced in a few vegetable forms, runs throughout nature ; and animal forms only differ from other material arrangements in the superior delicacy of the changes they exhibit.

Differences of situation in space are of the utmost importance in the construction of forms. Had they been omitted in the arrangements of nature, the nearest approach to body that could have obtained, would be a plane. Had they been limited to same modes of change, we should have existed in the midst of regular figures. The admission of unlimited change in relations of situation opens the door to the extensive varieties of construction actually offered to the eye. But it is not difficult to perceive that dissimilarity of situation must yet have been subjected to determinate laws, since we have the continuous division of forms into classes and kinds of being. Were the aggregation of surfaces left without control, we should have no such thing as a distinct class of vegetable shapes, or a distinct class of animal forms : the appearances that would be presented to us would result from the amalgamation of parts in all possible positions, and these appearances would not necessarily continue to be the same for the same cases or classes of being. By the introduction of system in the arrangement of situation in space, the surfaces of given forms invariably assume certain relations to each other, and these they ever continue to present. The arrangement in space of the surfaces great and small that make up a man, never clashes with that which is set apart for the definition of a tree; and all forms keep rigidly to the types set out for them.

And yet though dissimilarity of relations of situation be thus sufficient to produce the differences of shape that are daily the subject of sight, and thence though the conditions must both possess a definite existence and be recognizable by the eye, yet we cannot enter upon their history, or point them out separately, mainly for the reason that we cannot determine what amount of difference constitutes individuality. Among the myriads of possible relative situations, we are without a clue. We can imagine and define a few situations in which two planes for instance could be relatively placed, but we shall find it difficult to follow out all the situations afforded by five or six planes; and the mind gets lost in attempting to fix those which are possible with sixty or a hundred. And when we come to the consideration of curve surfaces in which, instead of a uniform course of direction, we find in each case an extensive series of compound inflections present carried in every direction and all through the form, we become utterly confounded at the myriads of changes of relation, primary and subordinate, which open to us, and which require to be noticed.

To these difficulties add that each change is susceptible of, and is expressed by, a delicacy of difference that evades definition, and of which, separately taken, our gross senses are quite incompetent judges: the results we acknowledge; but the states of the causes are minute beyond our means of detection. It is not surprising if, under such circumstances, the extensive family of relations included under the head of dissimilarity of situation, should be nearly throughout without specific names. The few we possess are borrowed from the original types of form, a sphere, a cube, &c. We can say the portions of a given effect of sight are disposed circularly, or angularly; they are quadrated, or radiated, or cubical, in position, but the nomenclature is very limited. It is through a perception of this deficiency that modern botany has been led to endeavour to extend the nomenclature of terms expressive of arrangement in space, and to adopt the words aciculate, reniform, cuneate, lunate, trifid, serrate, dipterous, flexuose, lanceolate, &c. These terms, however, only serve to express an effect that is *like* some other effect, and do not convey to us any information as to the condition of the constituents severally making up the effects themselves.

It remains to inquire whether relations of situation exercise any influence in the production of the beautiful.

It must be understood that situation is not to be restricted to a consideration of the positions of only two relatives in a mass. This would be an arbitrary selection. A portion added to a body must be referred not only to a common idea, but to every other part of the body that is liable to become successively observed. A constituent surface, while it is seen to be placed high or low, to the right or to the left, with respect to the general mass, is likewise high or low, to the right or to the left, with respect to every neighbouring part. So that situation would comprise the relative positions of *all* the parts making up an effect.

This is still, however, only another form of the question of proportional quantity. It is a relation of quantity no longer applied lineally, but as existing between aggregations of masses in space. The same sense of relative proportion that determined distance, determines position in space, whether of points among themselves or of masses among themselves. It would follow that if quantity under certain regulations produce beauty, situation, observing same regulations, must possess a same influence.

It may be possible to offer an illustration of this view. Let us imagine a limited number of small planes, say surfaces of a foot square, hung up in the air in a right line, and at equal distances from each other, and from the eye. Here would be same quantities, producing the relation of monotony. Now having these surfaces at command, let us set about altering their several relations in space, by elevating some and depressing others, by carrying some forward and pushing others further back, by inclining one this way and another that way, the whole at unequal degrees. It would be found that a change could not take place in one portion without necessitating a change in some other portion, and that the eye would be pleased with some arrangements while others would be deemed faulty. Let us further suppose that instead of planes of a same size, we are dealing with solid masses of unequal amounts, we should then find that the eye would require not only the same inter-adjustments to produce a satisfactory result, but additional adjustments to compensate for variations of quantity, large masses occupying wide spaces would demand change in the positions of the smaller masses. The total results, the same as with planes, would vary in the amount of pleasure they gave the eye.

This assumed case closely represents the circumstances that are afforded us in natural aggregations: we have only to substitute continuous curve surfaces for a series of independent planes, and we obtain the constructive history of all the bodies around us. While the eye can be more pleased with some arrangements of parts and surfaces in an effect than with others, there is very little doubt that situation in space of the surfaces making up the effect, is one of the sources of our pleasure.

If we take any beautiful form, say a female face, and examine it in its perfect state, and then under circumstances which imply changes in space of its surfaces, we shall invariably find that our opinion of its beauty is in the latter case more or less affected. Take the precise arrangement of parts which defines a face in full health and beauty, fix these lines clearly in the mind, and then imagine the same face swollen in some part by accident, bloated by disease, or wasted and sunk by hunger or care, and we shall gain an idea of the share exerted by relative situation in space of parts in the production of the beautiful. We are not to suppose that the change of feeling arises from a knowledge of the causes whence the alterations spring, for it is by the perception of a change of *appearance* that we are led to ask of causes: we see that the face is not so beautiful as it was, and the cause may or may not be then instantaneously suggested by experience. No example of beauty can continue to obtain to the eye under a change of situation in space of the surfaces making up the form to which the idea has been attached. It matters very little to what instance we refer for an illustration of this position: the human countenance has been here selected only because it is an example which all are able to estimate.

Painting is founded on an imitation of the constructive processes of nature, as evidenced in objects of sight. Parts are added to parts, till wholes are made up with which the eye is satisfied. Now, no student of this branch of knowledge can doubt for a moment that a great portion of the pleasurable effects he may labour to represent, depends on the relative adjustment in space of component parts. The very first step he may take, that of designing, evidences it clearly. By the word designing is understood the relative allocation of parts in space, and it is an operation practically performed by means of lines—*outlines*—so disposed as to separate and define the limits and situations of the surfaces that are required. In the practice of composition it is extremely difficult (on account of the infinite divisibility of matter) so to arrange and dispose the lines as that they shall produce an effect which can satisfy the eye; or, to use the technical term, which shall compose well; but they *can* produce this effect; so that designing affords a proof of the influence of situation in space, in the production of pleasure to the eye. It is to be observed that the admission of the ability of lines to compose well, does not depend merely on professional habits of seeing; for it is sanctioned by the acknowledgment of all classes, an outline expressive of a beautiful effect is the object of general recognition—witness Flaxman's Homer.

Tone, or degree of light, is another exemplification of the dependence of beauty and its opposite on definite arrangements in space. Tone is in nature the guide by which the eye distinguishes the several situations of parts in the various effects offered us. Without gradations of tone, the surfaces making up a given appearance would seem to be on a same plane; the reduction of the illumination on this portion, and its increase on that, enables us to distinguish at once the relative situations in space they severally occupy. These changes are caused by changes of position in space of the surfaces; and a beautiful form having its own peculiar arrangements of surfaces, has likewise its own peculiar arrangement of tones by which the surfaces are recognised.

A consideration of the sculptor's art will offer a same general result. Painting and sculpture, we must bear in mind, are distinct in the following particulars. Painting is not confined to the representation of any one class of effects in nature, but is competent to any; while sculpture commonly limits itself to the animal kingdom. Painting *imitates* three circumstances, form, tone, and colour; while sculpture *produces* one, form. The latter consideration renders the evidence of sculpture of moment. The actual production of a form must make us acquainted with the constructive laws of nature; at least, in so far as that form is concerned. Now, it is unquestionable that upon certain modes of disposition in space of surfaces, depends the power of sculpture to represent the beautiful. In modelling any given form, say an Apollo, or a Venus, the sculptor does not at once attain the arrangement of surfaces of which his eye approves; he has to go through a long series of trials and changes; it is only by degrees, and after a number of minute alterations, that he gains the effect—that is to say, the inflections—he has been seeking to produce. But it is not indifferently by any change that he succeeds; he may easily add *a* chin, forehead, nose, and mouth, to eyes and cheeks; but he will not thereby certainly produce a beautiful totality; he must adjust them one to the other: one part must be elevated, another depressed; one surface must be pared, another must be rounded; one inflection must be softened, another must be modified; and all these changes must be strictly adapted with relation to each other. By changes of this kind, carried to an extreme delicacy of interadjustment, he at last attains the required result. No sculptor can doubt that to the beautiful belongs some definite arrangement of situation in space of surfaces, which we are unable to seize immediately and at a first trial; nor would he hesitate to admit that by violating this arrangement, we can produce at will offensive or hideous totalities.

That which people call taste, that is to say taste as referring to visual effects, is partly founded on some ill-defined perception of the laws of relative situation obtaining in beautiful nature. Persons of quick perceptions take a delight in the observation of a thousand facts, that dull intellects pass over carelessly. They note the common arrangements of nature in the occupation of space, and their eye becomes at length so accustomed to the operations of a general law, as that it acquires a power of deciding readily, and apparently independently of all reasoning, on any effect in which relative situation is in question. We hear persons assert authoritatively, that in a natural or dressed landscape, a mass of trees is wanted here, or should be taken away there—that this portion of a wood should be brought forward, or should be carried back—that a space should be opened in this quarter, or be filled up in that—that the ground should be broken in this part, or be raised in that—that the elm or the oak which occupies the foreground would look better if a bough had grown on this side, or were taken away on the other. These assertions might appear arbitrary, but they are often the result of a sound view of the general operations of nature, in the construction of effects of the beautiful. It is the same taste, similarly derived, that enables us to say of the clouds rolling over our heads, that such and such portions are ill-placed; and that the effect would be better if they were moved to this or that quarter—that these aërial forms are now diffused over too great a space, or are heaped into ill-assorted masses—that in the flight of birds sailing past us, whose allocation in space is momentarily changing, some of the total arrangements were better than others—that in the picture submitted to our judgment, the groups and masses are not so placed as to satisfy the eye—that in the arrangement of the handful of flowers we have plucked, this individual should be brought here, and that fixed there; that this flower is too high, and its opposite too low; that a portion should be removed here, to be affixed there. These, and other circumstances, we are enabled to decide, by virtue of our previous observation of the arrangements of nature, and of the feeling of visual right and wrong we have thereby acquired.

We may observe generally that all constructive art is founded on these perceptions (at least, so far as the visual perfection of exterior form is concerned), and its consideration supplies us with some important reflections. In art we shall universally find that the precise arrangement of parts which will satisfy the eye, is not gained till after many trials; and that this final arrangement differs from others that have been taken up, merely in a higher degree of delicacy and exactitude, in the relative adjustment of the constituent surfaces. A beginner in any mechanical art, whose results are open to be estimated by the eye, only produces clumsy effects; his eventual success in the production of pleasurable arrangements depends on his knowledge of the places where, and amounts to which, he is to pare or to add; and this is only attained by repeated trials and experiments. A part is removed here, and the whole is found to be injured in effect; another is added there, and the consequence is more, or equally, or less offensive. A change in this part of a certain kind is felt to necessitate an alteration of a particular nature in that portion; and finally, by many changes, the arrangement settles down into a whole with which the eye is satisfied, but whose effect is demonstrated to spring from relativeness, by our observation of the consequence that has ensued on the removal or displacement of any one of the constituent surfaces employed. Architecture, as immeasurably the highest of the constructive arts, affords as good an illustration as we can offer of these facts. It is not an imitation of anything existing in totality in nature; yet no one denies that its effects are capable of calling up in us an idea of the beautiful. In the disposition and interadaptation of the external parts of a building, the architect can have no guide of totality already existing in nature; he decides that a part must be put here, or carried back there, because his eye tells him that such a disposition accords with the modes of construction commonly pursued in natural forms. It is true he is controlled in some measure by authorities. But to derive any argument against the position from these authorities, would be merely pushing the question further back; the *first* authorities must have been guided by a perception of the constructive laws of beautiful nature. Besides, we may ask why authorities have been recognised at all. General consent proves a natural feeling.

These are some of the many indications that may be referred to, of the existence of a connection between the beautiful and definite modes of occupation of space by surfaces. Perhaps the most convincing proofs we can attain are not circumstances which can be described, but they are to be traced among the many minute consequences and impressions that are forced upon our notice during a practical investigation of natural effects, and for the expression of which language is wanting.

The attempt to define the precise states of these relative facts, would come before us under the same difficulties that have already been traced with regard to quantity, only greatly magnified. If the definition of quantities present insuperable difficulties, they become multiplied *ad infinitum*, when quantity in *every* direction (for such is situation) is to be determined. It is a perfectly hopeless task.

And finally, there is the consideration that even were the relative facts determined, we should yet fail to discover why it has pleased nature they should possess the influence over us that has been ascribed to them, since it is a question of sensation, and in which our own will is entirely passive.

We have now briefly reviewed the separate nature and capabilities of the elements of form, *quantity* and *situation;* and it remains that we should see how they are combined to make up the bodies and effects presented to us in nature.

Everything which we can perceive, or which has being to the eye, must owe its appearance to the aggregation of a *more or less of parts, relatively disposed in space.* Certain amounts of matter are taken, and these, instead of being scattered disjunctively, at uncertain distances from each other, whereby we should have had a series of independent points to accept, are aggregated into determinate masses, whereby that which is called body or form is produced. We may assume the aggregation to be originally some of the simple types, a cube, a cylinder, a cone; and then that varieties are produced by the addition to these, of parts of various amounts placed in various situations, so as to afford in the end complex figures. An egg, a melon, a pine-cone, and the human head, are four varieties of spherical bodies; the trunk of a tree, and the human arm or leg, are examples of the development of a cylindrical type. All the forms known to the eye are instances of this development of an original type. It is a rare exception that such shapes as spheres, cubes, cones, &c., in pure states, are found to constitute natural bodies. Indeed, to so extreme a degree is the principle of variety carried in nature, that we find many forms where the original type is obscured by excessive development; a tree is an instance; and there are others where the parts are varied, not on the base of one type only, but of several. In the human form, the cylinder, sphere, and cone, may all be traced. Limited development is really the exception to the rule of creation.

The addition of part to part for the production of the developments allowed to forms, is evidently the subject of general laws. It is not indiscriminately any surface that may succeed another given surface. There is reason to think that a system of aggregation exists whose history is yet to be traced. Indications are afforded in the following features of natural development.

In certain of the effects known to the eye, development argues the use of definite *modes of lines* in the process of construction. Thus animals have rounded surfaces and forms; minerals are made up of planes; the trunk and limbs of a tree tend to straight lines; fruits are curved forms; the surface of water is a plane; vapour tends to sphericity.

In other cases development implies definite arrangements of *extent*, either of surface or part. Compare the length of limb and smallness of body of the spider, monkey, or gnat, with the general make of the seal and whale. Compare the terrier with the heron, the bull with the stag, the bear with the greyhound, the oak with the poplar.

Developments implying curve surfaces will be found to be nearly always produced by a succession of *different* curves. In all the higher forms a recurrence of a same mode of line is avoided. Whenever it is allowed to take place, the production of some peculiar effect is intentionally in view.

Lines or surfaces constituting developments in the animal and vegetable kingdoms, will never be found in construction to take parallel directions: they are either *convergent* or *divergent*. It will be extremely difficult, if not impossible, to find a single exception to this rule.

The convergence of lines, surfaces, or parts, appears universally to avoid the condition of a *right angle*. The junction of parts is either at an acute or an obtuse angle, and in the animal world this angle is further always rounded off.

Developments in the animal and vegetable world will be observed to evidence *unequal* additions of quantity. It is extremely rare that we can detect instances of a succession of lines or surfaces of like extent. Any given surface will be found to be connected with surfaces either greater or less.

Developments are throughout strictly *subordinate* to the character of the mass to which they belong. Parts do not ie vin importance with wholes. The inflections admitted to any surface are just enough to introduce change and variety, but not enough to constitute separate effects disturbing the intended expression of the whole. Every elevation is strictly relative to the curve or sweep of the surface of which it forms a part; it is kept down in impórtance, and the depressions which separate these subordinate parts are so slightly given as not to form marked divisions, constituting effects catching the eye by their own importance, but mere undulations of an inferior value. It is principally through the observance of this law of construction that the effect is originated, which in the fine arts is technically called *breadth;* and it is a departure from this law which produces what is called *littleness*. Surfaces "cut up" by undue elevations and depressions offend the eye, and are opposed to the mode of aggregation commonly followed by nature.

In some cases development appears to imply a succession of surfaces of such characters, or arranged under such conditions, as to convey a *same meaning* throughout; in others it is so ordered as to permit the introduction of *local changes* of effect. To take instances of the first, we find in every part of the cart-horse a same superabundance of weight and strength; in the greyhound we observe a general lightness and delicacy of make; in the elephant we have throughout a heavy massiveness of form. Instances of the second are found in the introduction of high cheek-bones to the Chinese face; flat lips to the negro; the dorsal fin to the dragonet; the bill to the crane; the horns to the stag; which are departures from the general character of the rest of the form.

In a large number of effects development assumes the forms of aggregation that we call *regularity* and *symmetry*. Wherever it is carried to any extent, or the existence of a multiplicity of surfaces is admitted, a mode of aggregation appears to be selected which does not leave the succession of parts to proceed in an uncontrolled luxuriance of change, but which systematizes it; parts are made similar in extent and position to other parts, and are placed in situations bearing determinate relations to each other.

One peculiarity connected with animal and vegetable developments is, that they are so arranged as that the greater masses throughout are *supported*, and the inferior masses are the *supporters*. Almost universally we may trace in these divisions of creation a general resemblance to the effect of an inverted cone. Trees and plants are large visual masses, springing from an inferior amount of quantity, the stem. It is the same with birds and animals; the bulky portions are upwards; the supporters are diminished extents. Again, in man, the legs are of inferior quantities to the trunk. There will be found but few exceptions to this arrangement of parts in natural constructions. Art commonly pursues exactly the opposite mode of aggregation, namely, wide bases, and diminishing superior extents.

These are some few of the features that are presented to us in an examination of the arrangements under which development in form takes place. They are, however, not offered as conveying either a systematic or a sufficient view of the subject. The relations that obtain in material constructions, or the laws under which form is produced to the eye, are yet but imperfectly known. Some obscurity is probably necessitated in this division of the inquiry, since it in truth implies in several cases a question of the possible divisibility of matter; of which, as has been already pointed out, we have but an incomplete knowledge; but besides this, the subject has never been sufficiently pursued, to entitle us to say that we can point out all the laws of construction whose conditions *are* within our means of detection.

We conclude then, that every effect we can see is, of necessity, the result of the addition of surface to surface, or of quantity to quantity, in continually varying, yet certainly regulated, situation. A given mode of succession of surface, or the addition of surface to surface in a peculiar mode, produces a given form, and this departed from in any way calls up a different effect or appearance. It is because peculiar modes of succession are followed in each case, that different results are made up to the eye. The mode of succession of surface which produces the appearance, an apple, is departed from by the introduction of fixed modes of inflections, to produce the effect of an egg. This again is further varied to produce the succession that makes up a pine-cone, or that constitutes the human head. As it is in these forms, so it is all through creation ; *modes* of succession of surface produce to us all the effects the eye distinguishes. The question of the amount of complexity admitted to this scheme, does not affect the existence of the principle. A body may be given by highly complex and involved developments, still it remains an instance of a mode of succession of surface. A tree, with its multitudes of branches and leaves, is yet only an effect produced by a peculiar mode of succession of quantities.

Quantity in situation is the simple base on which the whole series of effects the eye can recognise is constructed. From this apparently limited origin, and with these simple means, the great Designer has produced the myriads of circumstances of shape that we find are offered us.

The consideration of the extent to which the arrangements have been carried out is by no means an uninteresting inquiry, and it is one that forcibly teaches us the enormous distance between even the highest exertion of human skill we can suppose possible, and that which has planned and has actually produced the long series of wonders submitted to the eye, and daily passed over by us with the unthinking indifference of habit.

It is stated in works directed to the subject of natural history that there are on the surface of the globe not less than one hundred and fifty thousand examples of vegetable life, and that probably two hundred and fifty thousand instances of animal life may be pointed out. Taking these numbers as exactly defining the amount already known to exist in both classes, though they are probably far under the truth, we have here four hundred thousand appearances so distinct as to be the objects of general recognition, and all produced by modes of succession of surface peculiar to each case. The condition of surface which constitutes one plant or animal is slightly varied or departed from in this or that particular, and a second form is created, and so on through the series. But this enumeration, however considerable, is manifestly imperfect, and unduly restrictive of our view, in that it only relates to two great divisions of formation, the vegetable and animal classes. We require equally to consider the long series of forms that constitute the mineral kingdom. A mineral body exists under precisely the same conditions that give visible being to the animal and vegetable worlds. It is a new mode of succession of surface; still it continues to be but succession of surface. We have here a considerable addition to the list of differences of formation. But this is not all. The animal, vegetable, and mineral kingdoms by no means comprise all the kinds of effects the eye recognises. A very large number of appearances have never been reduced to classification, and these require to be taken into the account. The inflections of the surface of the globe, the continually changing undulations of its waters, the varying arrangements of the clouds and vapours that float over it, the long series of productions resulting from the exercise of human skill in the arts of construction, are, equally with the preceding, mere instances of difference of succession of surface. All these constitute new varieties of shapes.

Extensive as this view is, we have yet only an incomplete idea of the amount to which results derivable from combinations of quantity in situation, may be carried. We have but established the existence of a certain number of *classes* of effects; we have now to refer to the long series of *individuals* that may be produced in each class. Any one mode of existence may comprise a vast number of distinct existences. Taking two hundred and fifty thousand as the number of animal forms, each of these is to be understood as constituting only a type, and of each type a long series of individual variations will be found to obtain. It is not the number of existing animals which is here given, but the number of recognised *kinds* only. Precisely the same is to be understood of the numbers given as constituting the vegetable and mineral worlds.

To form some idea of the extent of the field that now opens to us, let us take one single type, and only one, in the two hundred and fifty thousand animal forms set out for us, namely, man. It is supposed that there are existing on the surface of the globe at any one time no less than eight hundred millions of distinct individual variations of this one mode of formation! That they *are* distinct is clear, since we know it to be a case of the rarest kind that two persons can be found in any one nation precisely alike, and are assured that nations are separated from each other by marked peculiarities of make. Here is, therefore, an extent of distinct combination we were hardly prepared for. Without assuming that each of the types composing the four hundred thousand examples of animal and vegetable life is carried out to this same luxuriance of individual illustration, without attempting to calculate the number of variations that may obtain of each of the types constituting the forms of the mineral kingdom, without attempting to enumerate those which may be found under the unclassified effects of nature and art already mentioned—it is yet evident that an amount must exist which leaves the mind lost in wonder at the creative power displayed in the production of shapes offered to the eye. A series is thrown open, before which the productions of human skill shrink into nothing.

It is difficult at first to conceive how changes of quantity and situation can be made to produce differences of form to the extent of the myriads the eye thus recognises; but the difficulty becomes less mysterious as we learn to appreciate the extent of the divisibility allowed to matter, and the sensibility conferred on the eye in the detection of differences. It is not unimportant for the due conception of the machinery employed to produce individuality, that we should have the means of forming a rough estimate of the amounts within which we can recognise differences of quantity or situation. Some slight assistance, therefore, will be offered.

A drawing of an object is simply the definition of shape on a plane surface—paper—as the object appears from a particular quarter, or at a particular moment. We can sufficiently define the relative quantities and situations of the surfaces making up any appearance that comes before the eye, to reproduce a same effect. It would seem in theory to require but a slight degree of skill to do this. It would be argued, since we *see* an effect, we have but to mark down what we see to reproduce the effect. In practice, however, we find it by no means the easy matter we had supposed. Our perception of the whole does not imply our recognition of the conditions of the causes, nor our power to represent them. The relations and interadjustments of the surfaces constituting visible effects, depend on differences so minute, as that long practice is required before we gain the power of separately distinguishing them ; and our first attempts at defining what we see are but rough approximations to the truth. Improvement in the ability to draw merely means the acquirement of greater delicacy of eye in the estimation of the several differences of quantity and situation constituting the effects we see. It is a power analogous to that possessed by the musician in distinguishing the ratios of sounds, and equally subject to cultivation.

The human face is contained within a space that is about the same for every individual. The variations of general extent are comprised within a certain limit. Now, that which makes one face unlike another is simply that the minute surfaces of which each is composed are of different quantities, arranged in different situations. The inflections of surface which make up one mouth are not those, either in kind or number, which go to form another, and so of every portion and feature. Exact identity, or the impossibility of distinguishing between any two faces, is perhaps an imaginary case. That which we call the expression of a face is nothing but the perceived sum total of arrangements of quantities and situations, either permanently obtaining, or impressed by the influence of some passing feeling of the mind, producing momentary modifications in the relations of the surfaces; and it is the excessive delicacy with which they are combined, that causes us to overlook their separate existences, and to accept only the sum total they afford. The ability to "take a likeness" is but the power of recognising, and of representing, by means of art, the peculiar sets of relations that constitute a given set of features. Persons who possess sensibility of eye estimate correctly the amounts that confer differences in quantity and situation, and take likenesses with facility; those who have only a blunted sensibility find likeness-taking a task of extreme difficulty. It is a matter of common knowledge that portraits of a same individual are continually coming before us, all sufficiently like to enable us to say at once who is represented, yet widely differing among themselves, and presenting each a peculiar individuality. We continually meet with paintings and engravings of public characters, by different persons, and each is a new reading of the face intended to be represented. These facts show an extremely minute series of changes from a given set of quantities and situations.

Every person is familiar with the operation of tracing. By means of transparent paper we can produce an assumed fac-simile of the outline of an object. If we take one of the engraved portraits referred to above, and subject it to this operation several times in succession, we shall find, on comparing the copies with each other, and with the original, that no two are exactly alike in expression; there will be found in each some slight variation or individuality. Few things can show more distinctly than this the delicacy of the relations of quantity and situation on which individuality depends. We have here, not copies by the eye, but actual tracings, of a given appearance; and these are not made by different persons, so as that different amounts of skill might be in operation, but by a same hand, yet they will present differences of expression.

That which we call *writing* is simply the definition on a plane surface of a certain set of arbitrary shapes and forms, to the combinations of which the world has agreed to attach a meaning. A written letter is, to all intents and purposes, as much a definition of form, or an arrangement of quantities in situation, though on a plane, as the most complex design furnished by the fine arts. To each letter belongs in theory a standard form, which all persons are supposed to keep in view in writing. In practice, however, it is clear that an extensive amount of variations can obtain with the quantities, and within the spaces usually allotted to each letter; for when we compare the writing of different people, we find that each is of a different character. The case may be made still stronger, for if we ourselves will write the same letter some twenty or thirty times in rapid succession, we shall find that variations may be detected in each shape.

It is stated that Fraunhoffer, a German optician, has perfected a machine which is capable of drawing no less than 32,900 distinct lines within the space of an inch. Each of these lines must have a definite thickness, and intervening spaces must occur between each line.

One grain of gold may be so distributed over a bar of silver, as to cover a surface of 1400 inches. Now, the gold is yet visible on the one-millionth of a square inch of this space; so that gold is thus shown to be susceptible of reduction into particles of an extent expressed by one billionth four hundred millions of a square inch. But is this extreme minuteness really the ultimate limit? What authority have we for assuming we have here reached the limit of divisibility of matter. The scope of our vision, or our means of division, may be far short of the scale actually existing. The fair inference really is, that since we have got thus far (much further than was once supposed possible), we may yet discover means of extending our power.

But divisibility of matter, even if determined, would not be exhaustive of the difficulty. Modes of matter are simply modes of occupation of *space*. The differences, or the extent of divisibility among modes of matter, constitute a subordinate question to that of the divisibility of the space itself. But here we get to an inquiry more intractable than ever. While we can subject matter to recognisable tests, space and its relative constituents elude our definition. For ordinary comprehension of the latter, we employ such arbitrary terms as a mile, an inch, or one-billionth part of an inch. For greater exactitude, we are driven to mathematical language, unintelligible and inconclusive to the unlearned. Matter limits itself; space is without natural limits.

These instances will assist us in conceiving the extremely minute spaces within which differences of quantity and situation can obtain, all in their results distinctly appreciable by the eye. In a large number of cases they are of so delicate a character as to be in themselves beyond the range of power of the sight. We do not see them individually; we only see the effect they make up. Wherever high development is found, this rule holds good. The microscope shows us that the substance of which a surface is composed, is given by the aggregation of particles of various forms placed in various positions ; but the naked eye only sees the direction in which the mass trends, or the general level of the surface made up ; so it is all through the material world. In the arrangements of quantities in situations, the eye is cognisant only of a total effect ; individual causes escape our notice from their minuteness.

It has already been pointed out that to *some* of the coexistent relatives of quantity and situation, making up the forms around us, has been given a power of exciting the eye pleasurably, and that the result they produce is known under the name of beauty, while the feeling they call up in us is termed the perception of the beautiful. Beauty is thus to the eye simply the perception of conditions of *appearances*, an analogous result to that traced in the history of the sense of hearing, where it is influenced by conditions of *sounds*. In the ear, the ratios of sound have been ascertained. In the eye, the ratios of quantity and situation have yet to be determined. In both cases, the reason why gratification should necessarily be a sequent to certain outward perceptions is a question connected with sensation, and determined arbitrarily by nature. We have had no choice in the matter.

With reference to the difficulty of offering the ratios of the elements of appearances, there are arguments presenting themselves, which would seem to show that nature has yet in this obscurity, acted with intention.

While we acknowledge visual gratification to arise from the perception of a *result*, we may ask how long this impression could have continued, had *causes* of an extremely complex character been allowed to rise into notice. Our attention would have been occupied with the means, instead of the end. Admitting a complexity of origin far greater, as we have yet to show, than that allowed in the case of the ear, it was additionally necessary that causes should be softened down out of the range of visive power allowed us. It may thus be an intentional arrangement that in an effect of beauty the eye should see no origin, and should be made to glide unconsciously over it, like the hand over a globe of polished ivory, detecting no openings which can tell of the mode of production.

It is true that beauty might have been attached to the perception of relatives of an immediately obvious character, but then it would have been a necessary consequence of the repetition of these relatives to meet the number of instances of beauty required in creation, that the quality would become monotonous. We should always see a *same* beauty, and the very constitution of this beauty would exclude the existence of degrees or modes of illustration. In calling beauty into being, every step towards distinctness of the causes would be a loss of the power of producing variety. The greater the delicacy of interadjustment of the relatives employed, the wider becomes the sphere within which change can be produced. Render the causes evident, or, in other words, allow the relatives to be markedly and distinctly given, and but few forms of expression can be permitted. Begin the series of subdivisions of quantity, and the range of variation of expression becomes instantly widened. To form a world so infinitely various in the examples of being as that which is offered us, an extreme delicacy of interadjustment of quantity was necessary; and to attach beauty to the co-existence of relatives, was necessarily to make it depend on some of these delicacies of interadjustment. An unlimited range of expression of a principle, necessitates an equally unlimited extent of delicacy in the adjustment of the proportions on which the effect depends. We have an extensive variety offered us in the visual world, but then, as a necessary consequence, we have a reduction of the expression of the proportion from which beauty results, below the range within which human eyes can distinguish separate quantities.

We probably owe to this intentionally subdued nature of the causes whence beauty springs, much of the misconception that has nearly always attended the discussion of the subject. Causes are so hidden from sight, that beauty has been commonly considered more with respect to its impression on and connection with the MIND, more with regard to its association with operations of the machine of thought, than as the necessary result of certain external phenomena. The world of ideas has been tortured for an explanation of its nature, and the world of things has been forgotten. This would hardly have been the case had causes been allowed to remain, like the broad angularities of a rudely-carved surface, so marked and distinct as to be the immediate objects of sight.

It is to be observed that the system of the dependence of beauty on remote arrangement of quantities in situations, is admirably adapted to allow of the existence of *degrees* and *modes* of perfection, and is therefore well fitted to a world of intentionally imperfect forms. It is obvious that we may have by these means an endless series of changes of value. First, the relations, depending on the divisibility of matter, are in themselves infinitely variable in degree, or in exactness of expression; besides this, any amounts, more or less, may be present in an effect; and, further, they may be distributed in a variety of modes. The result of these conditions would be, that a body might be beautiful in a high degree; or it might offer only low degrees of perfection; or its beauty might be confined to a part or parts; or it might offer a beauty of a peculiar kind. All these are features that we recognise as belonging to nature.

It has further to be remarked that the scheme of a law of relation is the only means whereby we could have a beauty that could be evidenced under a variety of shapes. A form of perfection would mean a definite shape, and perfection could not then be reproduced without repeating the same form; this would lead to a world of same shapes. By causing beauty to spring from relation, as afforded in certain arrangements of the elements of form, we have a means of producing beauty under any required number of shapes. We have but to cause the elements that constitute parts to obey a certain law in their combination, and the beautiful is at once produced to us, whatever may be the total shape given to the body.

However obscure may be the law of relation on which beauty depends, it is yet to a perception of its existence that we are indebted for our power of reproducing effects of beauty by artificial means. The synthetical processes of the fine arts would be insufficient for the ends sought, did they not proceed by virtue of a general law. It is true that the required conditions of being are, in the present state of our knowledge, not the subject of language; but the artist finds his guide in an increased susceptibility of eye, consequent on a long continued and patient practical examination of effects of beauty; and he is certified of the existence of some law, by his success in disposing and arranging quantities in situations, that suffice to produce effects allowed by others to be beautiful.

There is a passage in Pliny, lib. 35, which has puzzled learned and unlearned commentators to a considerable degree, and which may illustrate the matter before us. Apelles, says Pliny, went to the study of Protogenes, and, finding him absent, marked some lines on a tablet. These lines Protogenes, at his return, saw and corrected. Apelles, on his next visit, again in the absence of Protogenes, went over the lines, further correcting them, and to such a degree as to cause Protogenes, when they were subsequently shown to him, to confess himself beaten. It has been a question what were these lines, or in what did their merit consist. The words *tenuitas* and *subtilitas* have been understood as referring to a peculiar dexterity of mechanical execution, by which a line already delicately drawn, was again and again improved: "Lineam ex colore duxit summæ tenuitatis per tabulam." It is to be observed that Pliny does not point out what these lines represented; he only says, "Apellem venisse, non cadere in alium tam absolutum opus;" and further, when he himself saw them, "nihil aliud continentem quam lineas visum effugientes." Now if the lines had been a representation of any natural object—a landscape, a horse, a man, or a building—though decayed in Pliny's time, report would have told him of their intention. The idea of De Piles is probably correct, that *subtilitas* "n'est pas dans la ligne, mais dans l'intelligence de l'art, qu'on fait connoitre par des lignes;" and the trial of skill may probably refer to the combinative capabilities of lines, exemplifiable under a high degree of delicacy in the aggregation and allocation of quantity; not expressive of any definite object, but probably merely of an effect of the beautiful. The recollection of the exquisite taste in form evinced by the Greeks accords with this construction. Many compositions of lines might be made which would represent no particular thing, yet would to the eye of an artist exemplify some character or effect of beauty.

The classes of effects we call plainness, homeliness, ugliness, express forms of violation of those relations of quantity and situation that belong to beauty. The eye perceives a state of things to obtain, which is contrary to that through which we experience pleasurable emotion: it is pained by the perception of arrangements of quantities and situations not in obedience to the law of relation with which its economy is connected; surfaces or parts, here or there, are unduly extended, or contracted, or protruded, or depressed: though we are ignorant of the exact measure that should obtain, our sense of visual right and wrong yet tells us that the relations of parts we are accustomed to meet with has been violated. To those who have no knowledge of beauty, ugliness is non-existent.

It is not impossible but that the study of effects of ugliness, and of character generally, may be a means of reducing within narrower bounds the question of the law of relation on which the existence of beauty depends. The investigation of error always leads to some degree of truth. An examination of what is not, enables us to infer what is, and the application of a *reductio ad* *absurdum* process to the discovery of the conditions which confer beauty, might result in the detection of means to circumscribe the difficulty, though probably never to extinguish it.

The above are some of the considerations that are presented to us in an examination of the history of Form. They are offered, however, more as indications of the path to be pursued in this inquiry—more as a rough sketch of the mode in which this extremely complex division of visual effects would have to be studied, than as affording a sufficient view of the points requiring to be noticed. There is in this branch alone enough to occupy a whole life—many lives; and we know as yet too little of its history to entitle us to speak with certainty of the conditions under which its many phenomena obtain. The laws of Form constitute a subject that has yet to be followed out, and in the present state of our knowledge we must, perhaps, be content with an endeavour to throw it into such a shape as that it shall be stripped of some of its difficulties, and that we shall at least know to what points our future inquiries may be most usefully directed. It will be something to possess a map of the ground to be studied, however roughly laid down.

In pursuing this subject, we shall require to insist on a rigorous exclusion of every idea which does not immediately spring from the perception of an external phenomenon, and which does not express our judgment of the qualities of this phenomenon. Form is the framework to which a host of ideas is attached; some of these are the immediate and necessary results of our perception of the existence of an external world, and are directly consequent on sensation; others are but attached to certain forms, and spring up posterior to our conception of external appearances, to be variously associated. This second class is wholly foreign to the inquiry. It is necessary to draw this distinction, for nothing is more common in works relating to this subject than to see *associations* confounded with our *primary perceptions* of external appearances, and the causes of the influences of the latter sought, in the general laws by which the former are governed.

It does not belong to a history of Form to enter upon the consideration of the associations that can be connected with, or founded on, a perception of the external qualities of matter; but, as a general example, we may adduce the conception or impression that is ordinarily supposed to possess a material origin, namely, the *sublime*, and some little attention may be usefully bestowed upon this character.

If that which we call the sublime be an attribute of any form, the body possessing it ought to appear of this character to every one who should see it; or at least the sublimity should be as generally admitted as is the beauty of a perfectly-shaped object; but it will be difficult to adduce a form carrying with it this degree of consent. The form that is sublime to the man of education is not so to the peasant; the object that we consider sublime to-day may be made the subject of ridicule to-morrow; the savage, who shows his feeling for the beautiful by decorating his person and adding ornament to his weapons, stands unmoved at that which we consider high examples of sublimity: the Jupiter of Phidias, the Moses of Michael-Angelo—the rocks, the mountains, the cataracts, the deserts of nature are equally uninteresting to him. If we rigidly examine our trains of thought at the time when we suppose that an example of sublimity is before us, we shall find that there is more present to the mind than the mere perception of an external effect; the phenomena are considered as capable of producing something in us, or as suggesting some past circumstance by which the mind has been excited, or some future event to which we look forward with interest; we do not stop at the mere conception of the object before us, but imagine ourselves as having been acted upon, or as likely to be acted upon, by some of the perceived qualities or properties of the object. Not only this, but in many cases of an acknowledgment of sublimity it is undeniable that the perception of Form, or body, is *entirely absent*, and that thus the mind obtains the feeling of sublimity without the presence of that to which the sublime has been assumed to belong. "Let there be light, and there was light," is one often-quoted instance; and we may find very many others in written works, turning entirely upon a described event or action. This is not the case with beauty, which is the direct product of Form. No man can suggest the idea of beauty to another by mere language, and under the exclusion of *any* reference to body or shape. If Form can thus be shown to be absent at any time when we have a conception of sublimity, the character must be considered to have been erroneously assumed as a necessary attribute of visible nature.

The true light in which we probably ought to consider the sublime is, that it does not arise to us directly from the perception of the material effects coming before the eye, but that it may, or may not, *succeed* this perception; that it is a mental construction, founded either on some applications of perceived effects, on some suggestions their observed qualities afford, or on some deductions we make through the recognition of their properties. It is the result of an exertion of the reasoning powers, sometimes of an immediately evident character, at others only faintly marked; and it never arises at all to the mind, but subsequently to such a development of the intellectual faculty as is sufficient to make us acquainted with our subordination to the powers and properties of the circumstances and elements among which we are placed. A child, a savage, and an ignorant man, know nothing of the sublime. To a being of a reach of mind greatly superior to our own, that which we call sublimity would appear mere necessary phenomena, or would fade away into an uninteresting and commonplace effect. No character of matter, no association of thought that we can conceive, would affect with the feeling of anxious admiration implied in the perception of the sublime, an intelligence possessed of a positive knowledge of the operations of nature.

By considering the sublime to spring from association, we are enabled to understand why the recognition of the character comes to be of its acknowledged amount of variability. Chains of association are infinitely different. The peculiar trains of thought necessary to give birth to the feeling of the sublime are in one man shut out by nature, in another by accident. One man forms the idea perfectly; another is deficient in a few links of the required train of thought. One man can conceive the sublime in a great number of occasions; another is restricted to a few cases. It is the different degrees of ability in constructing the required links of thought that cause different individuals to see the sublime in different places, and of different amounts in the same place.

It is unnecessary to examine other instances of effects supposed to have a material origin, but really resulting from associations of ideas. With any one that may be adduced, we only need to ask, can we recognise it on occasions where form is *not* before the eye? and, further, does it arise to the mind *subsequently* to the perception of some external effect? In either case, the effect certainly has not a physical origin, and its causes are to be sought for, not in the laws of matter, but among the operations of the thinking faculties.

HISTORY OF TONE.

It has been endeavoured in the preceding pages to offer the constructive history of the aggregations of matter with which space is filled up, and to show the laws regulating their appearances; we now require to enter upon the consideration of those arrangements of nature by which the Forms set out for us become the subjects of visive apprehension, or are made to be recognised by the eye.

The mere aggregation of matter and its presentation to the eye, do not alone ensure that which we call *sight.* Supposing we had, on the one hand, the power to aggregate matter into shape, and, on the other, the ability to confer upon an animated being precisely the same organic capacities that we ourselves possess; granting these, still we should not have done enough to enable the being to *see* the Forms produced. Though they might be brought within reach of the eye, yet they would not be known to the mind. Nature has willed that an additional circumstance should be necessary to constitute the phenomenon of vision. An object is visible to us, not because it is a definite mass of matter, not because we have organs of sight, but because the element of light is present to connect the eye with the object. A Form without the agency of this element is invisible to us; in common language, it is in darkness, under which privation, as we know, the power of sight ceases.

It is obvious that some mode of connection was necessary between the aggregations of matter constituting the external world and the organ to which they are offered. In the two lowest senses, touch and taste, the communication is immediate between the body to be apprehended and the apprehending power; the substance is *handled* for touch, and is applied to the *tongue* for taste. In the other senses the communication is not immediate. In the case of the nose, an *exhalation* departing from the body and conveyed through the air gives rise to the sensation of smell. In the case of the ear, a *vibration* in the particles of the body is communicated through the air to the organ, and gives rise to the sensation of sonorousness. In the eye there is a still further development of the scheme; the communication is performed by the aid of an independent means. Light, which is not a property of bodies themselves, but exists independently, is *reflected* from the body to the organ of sight to form the connecting link. Destroy or remove the means of communication in either of the cases, and sensation no longer ensues.

A visible object is an object appearing to the eye under certain effects, namely, those which light produces on the several surfaces. A peculiar property has been conferred on matter—that of reflection. A body exposed to a stream of light does not absorb this light; such a portion of the stream as the nature of the object and the arrangement of its surfaces permit is *thrown back*, or *reflected*, and this reflection received by the eye constitutes or gives rise to the sensation of the object. Were matter of such a nature as to allow a free passage to light, Form would cease to be visible; perfect transparency, which is complete permeability to light, is invisibility. Were the passage of the rejected light to the eye hindered, no sensation of vision could occur; an opaque body interposed would leave us without knowledge of the form beyond. The reception of the rays constitutes vision.

In considering the mode of communication allowed between the organ of sight and the objects applied to it, we require to note its intentional superiority, compared with the economy of the other senses. We may not be sufficiently near the objects around us to subject them to the sense of *touch*; indeed, the immense majority of forms are placed beyond our reach. We may not be able to bring a body within the action of the *palate*; indeed, it is only a certain number of bodies that are adapted to the use of the organ of taste. It may fail to act on the sense of *smell*, either by its not exhaling odour, or by its removal beyond the sphere within which we can receive an exhalation. It may fail to interest the organ of *hearing*, either by its privation of sonorous properties, or by the non-existence of causes to draw out the effect of sound, or by the fact of the sound being carried away from the ear. Now these possibilities of an interruption between matter and the apprehending power in the four lower senses, not only do not obtain in the case of the eye, but Nature has expressly provided against their occurrence. Light, which is the communicating medium, does not originate in any of the aggregations of matter set out for us ; it is not a property of bodies themselves, each shining by its own power, like the glowworm, but it is an independent circumstance. The sun spreads illumination everywhere, and some of the light striking upon the objects around us, is returned to our eye to constitute sensation. The action is of necessity continuous to us, while sight can be exercised. Now no sound, no taste, no odour, no tangible quality of matter, has this necessarily continuous action. While bodies have all tangible properties which we can recognise if we can reach them ; while many give out odours, supply savours, or afford sound; while the four lower senses may be open to act, yet receive no impression—the medium of communication in the fifth is unceasingly active. Light reaches the eye from the objects around us, whether we will or no. Wherever we turn, we must see something, and it is only total privation of light, or of the sense, that interrupts action. This circumstance of the continuous operation of the organ of sight, together with the fact of the enormous amount of sources of excitement supplied to it, compared with the non-continuous and interrupted action of the other senses and the limitation of phenomena adapted to them, would be richly suggestive of considerations, were our inquiry to diverge to a general history of the senses, and of their comparative value as inlets to the ideas formed by the mind.

If we endeavour to conceive by what other means than those adopted matter could have been connected with the sense of sight, we shall be led to acknowledge the insufficiency of our capacities for a work of creation. Think as long as we will, we can by no possibility suggest any other means than that which we find to exist. Without light we know the eye loses its power of making us acquainted with the existence of an external fact. If we take away light, by what quality or property or circumstance shall we render the apprehending power, the organ of sight, cognizant of matter? The eye cannot *feel* an object. Matter affords no *exhalation* of which the eye in darkness could be sensible. What quality or property, then, shall we confer upon matter which, in the absence of light, shall act upon the eye and supply to us all the information we require to receive? The attempt to afford an answer to this question will either end by our desiring to throw out the eye altogether from the capacities to be conferred upon the human machine, or by our concurring in the means adopted by Nature as the only one that could be employed or that can be suggested.

Supposing that a surface be placed before us, and that light be excluded; it is obvious that we should then not *see* the object; its presence would not be known to the eye. But let us suppose the light admitted, and allowed to fall upon it, and we conceive it becomes visible; that is to say, its capacity of reflection is immediately put in action; a mass of light is given back by the object to strike upon the optic nerve, and we have at once the sensation of the presence of matter. Suppose the object completely transparent, and no light being then thrown back it is invisible to us. Suppose an opaque body placed between the object and the eye, and the reflected light becoming intercepted in its passage to us, we have no sensation of its presence. Reflected light, therefore, constitutes visibility.

Light is returned from objects to the eye, not invariably of a same kind, or in a same manner; but subject to certain appreciable modifications. It is not a stream of uniform light that we receive in our sensation of the presence of an external object, but a light of various intensities: the reflection is of different power in its different parts. Were a uniform stream of light to be received by the eye as returned from matter, we should have the sensation of the presence of a *plane* surface. Were the stream invariably of a same intensity, we should have the sensation of a plane always in a same position with regard to the light. The perception of changes acquaints us with the presence of various arrangements of surfaces in the bodies offered us.

Light is found to be governed by certain laws. It is in these laws, operating on different qualities of matter, that we are to seek the origin of the changes of reflected light we are considering.

The circumstances we call bodies are aggregations of surfaces placed in various situations with respect to the light which reaches them. Now light is not similarly returned from these several surfaces; each position of surface has its own mode or degree of reflection, and this mode and degree are invariable for all surfaces complying with the same conditions. The mode or degree is generally called a *Tone;* and the reception of varieties of tones by the eye informs us of the conditions of the surfaces from which they depart. Tones are, in truth, visual exponents of kinds of Form. They are known in practice by the terms High-light, Half-tone, Shade, Reflection, and Cast-Shadow; and the history of these effects is as follows :—

High-light.—Light received upon a surface is thrown off or is returned according to a law common to other species of motion. The rays that strike upon a body may not be rejected in any direction indefinitely : they pursue an invariable course of departure. The manner of rejection is dependent on the manner of arrival. Sound and motion reflected from a body follow a law expressed by the form,—*the angle of reflection is equal to that of incidence;* and light is subject to a same regulation : it departs from a surface at an angle equal to that which it subtended on arriving.

But the law of reflection is variously expressed through the nature of the body exposed to light. Surfaces, in the matter of which they are composed, are of several kinds. In some cases, the constituent particles lie in close approximation, and with their planes at a same angle: in others, the particles are more loosely connected, and the planes they present are ranged at various angles. Different effects are hence caused. The first case is afforded by bodies which are naturally dense, such as metal, and by bodies which have smooth or polished surfaces, such as glass, certain fruits, &c. The reflection from these is always vivid, and possesses defined edges. The eye recognises them by what may be called a sparkle or glitter of light. The second case is given by bodies that are naturally porous, such as wool and sandstone; and by bodies which, though dense, have rough or unpolished surfaces; such as wood fresh from the saw. The light reflected from these surfaces is always of a diffused character, softened at the limits, and inferior in brilliancy to the first class. It is further to be noted that reflections from the first reach much further than from the second class. The glitter of arms may be seen from a distance that would destroy our perception of the illumination on a piece of rough stone. The cause of the differences of these characters is to be sought in the facts that polished surfaces, or those whose constituent planes are all on a same level, return light in one direction only; while roughened surfaces, or those whose constituent planes lie in every possible position, return light in many directions, each constituent plane according to its situation; so that the stream is diffused and weakened by divergency. In the representation of natural forms, art requires to consider carefully the species of surface that may be in question, in order to offer correctly the corresponding mode of reflection. To give the same character of high-light to a real grape and one made of rough stone, would be contrary to nature. Glass, wax, flesh, linen, silk, hair, feathers, cork, metal, water, vapour, have each a particular character of high-light, which we daily unknowingly accept.

The reflection of light is continually taking place from the bodies around us, under the circumstances described; and there is no position in which we can be placed, or quarter to which we can look, but some of these reflections will strike upon the eye. It will materially assist our comprehension of their origin and conditions, if we consider them as effects of precisely a same nature with those which take place from a mirror exposed to the rays of the sun, only more or less subdued according to circumstances. As observed on the bodies around us, they are really attempts, so far as the condition of the material will allow, at representation of the colour and form of the illuminating principle. If the reflecting surface of a rough body be highly polished, we shall find the high-lights it may offer will gain in vividity as the process proceeds, till at last they become too dazzling to be looked at; and a power of reflection is evinced equal to that of glass. In the same way, if a mirror in which we can see a reflection of the sun, be roughed, or its polished surface be ground down, it will be found that its capacity of returning light diminishes as the process proceeds; its power of reflecting an image or the form of the illuminating principle, fades away; and, by total destruction of the polish, it affords at last a light exactly similar to that observed on naturally rough or porous bodies.

High-lights are again modifiable by the form of the surface from which they may be thrown. A curve surface cannot return rays that are parallel, since the application of the rule, that the angle of reflection must be equal to that of incidence, to different parts of the curve, shows that the returned rays must proceed in different and divergent directions; each single ray in accordance with the position of the surface. It will follow that the high-light of a curved surface must appear to us less in extent than that afforded by a plane occupying a same space, since we can only receive a portion of the rays returned by the surface: and further, that several persons looking at the same curve surface, will see the high-light in a different place; that is, will each receive distinct parcels of the rejected rays proceeding from distinct portions of the surface. We can test this by ourselves moving to different places. On a polished artificial globe, we shall find the spot of high-light moving as we move. Plane surfaces, on the contrary, always afford high-lights of an extended character; and though the seat of reflection must still appear to change by our own change of position, yet the variation is evidenced in a much less degree than on curve surfaces. Again, both curve and plane surfaces may be of such a form as to offer interruptions of continuity, or indentations on the portions that supply a high-light. In this case interruption of the reflection ensues to an extent corresponding with the alteration of surface, and only to that extent; the character of the other portions of the reflection remains uninjured.

Whatever be the nature or the form of the surface when we are so placed as not to receive the rejected rays, or when the shape or position of the body is such as to afford no sufficient space for the reception of light, and its consequent rejection in the direction in which we may be placed; then the effect of high-light is *not* to us on that particular body. But these cases form rare exceptions to the general rule: it is seldom that objects present themselves without the effect of high-light.

High-lights thus indicate to the eye the situation, shape, and colour of the illuminating principle, together with the form, situation, and texture of the receiving surface: each of these circumstances impressing its own variation on the effect.

Half-tone.—Many of the surfaces of a body are so placed as to return the rays of light in other directions than precisely those which correspond with the situation of the eye of a spectator. Further, many are so situated with respect to the stream of light, as to receive the rays only incidentally, or at less than a right angle; whereby a diminished amount of illumination is afforded in a given space. In both cases, a reduction of value of light appears to obtain on the surface; and we call the effect then exhibited to the eye half-tone. The first cause of its appearance would afford effects invariably of a same value; since mere non-reception of returned light excludes distinction of degrees. The second cause admits of a great variety of values.

If a surface be held or placed in such a position as that the rays of light fall on it at a right angle, we have the situation in which the greatest possible amount of light can be received; and this surface would express high-light. If it be slightly inclined from this position, we have the relation of surface to light which gives the commencement of half-tone. In continuing to increase the angle of the surface with the rays, or increasing the inclination, the tone of light exhibited by the surface will be found to diminish in vividity; till at last, when the angle has become extended to a right line, or the surface has been placed parallel to the course of the rays, the half-tone reaches its greatest intensity, and the effect of shade begins to appear.

It is indifferent for the illustration of these facts, whether we suppose a plane or a curve surface; a same principle is in question. The inclination of the surface to the light is the source of the effect; and it matters nothing whether this inclination be caused by change in the position of a surface, or by a fixed curvature of parts. Wherever a diminished light obtains, there half-tone is observed; and the value of the tone is strictly proportionate to the inclination of the surface to the rays.

Perceiving the principle on which half-tone depends, we can readily understand the separate characters produced by a curve surface and a plane. Planes bear tones of a uniform value throughout; that is to say, so long as the plane is not moved, the tone remains fixed and of a same intensity throughout; but curve surfaces bear tones of unequal values; the intensity increasing with the increase of the angle which the several portions of the curve subtend with the incidental light. On a continuous curve the part which is nearest the high-light, will be the brightest; and that which affords the greatest angle with the rays, will bear the darkest tone, the extremes being connected by intermediate degrees proportionate to the changes of angle. Inflection introduced in surfaces thus illuminated, produces no other alteration of the gradation of tone, than occasional interruptions where the change of surface occurs; the series for the whole will be the same; but minor independent effects arise at the parts which are either above or below the general level. We may suppose any amount of developments or depressions introduced, without destroying the gradation of the general series of tones.

The appearance of any species of half-tone is liable to be affected by the texture of the surface on which it occurs. Surfaces are unequally dense; and incident light exhibits these variations to an extent which influences the character of the tone. By a light striking at right angles, a uniform effect of illumination is obtained even on porous surfaces; for the cavities afforded by the incomplete aggregation of the particles employed to make up the surface are equally illumined with the minute projections among which they occur; but on rough surfaces, incidental light only strikes on one side of these projections, leaving the opposite sides, as well as the cavities between them, in darkness. Hence on porous surfaces, the eye does not accept a uniform tone: it sees only an *average*, made up of minute points of light scattered in a field of shade. The greater the porosity of the surface, and the greater the incidence of the light, the more distinct are the extremes of light and dark by which the general tone is made up, and the wider apart are the points of light and of shade. This character of half-tone can be well seen on a column of Portland stone, or on a rough pebble. On polished surfaces, half-tone appears darker to the eye than on porous surfaces; and for the reason that there are then no minute particles and projections lying beyond the general level, each of which would return its own high-light, and thus aid in diminishing the intensity of the tone. For this same reason, it always flows close up to the high-light, limiting it distinctly, and without the admission of intermediate stages. This character of half-tone may be clearly seen on a polished billiard ball, or on smooth marble.

Half-tone is an effect of light peculiarly grateful to the eye. Bright light contemplated for any length of time, produces pain in the optic nerve : direct reflection can only be glanced at, not dwelt on. Half-tone offers opportunity for repose : the irritation caused by the glare of high-light subsides, when the eye is turned to the consideration of the more subdued effect. Besides this, half-tone derives an additional value from the fact, that it is from this portion of illumination the eye mainly gathers its information. In a glare of reflected light, we see little beyond the confusing glitter; but in the sobriety of half-tone, we can compare and combine, undisturbed. The circumstance by which it is produced, namely, incident light, of necessity goes to exhibit inflection of surface with the greatest distinctness, and thus to define form ; so that we habitually turn to the portion of bodies covered by this illumination, for evidence of the nature of the effect before us ; and Nature has bountifully contrived that it shall be by far the most extensive the eye can trace.

Half-tone thus indicates to the eye position of light, together with position, form, and texture of surface.

Shade.—It is one of the observed characters of the element of light only to travel in right lines. Now matter is commonly opaque ; and further, no form exists in the state of a perfect plane. Through these, the indeflectibility of light, the opacity of matter, and the solidity of form, an effect becomes produced, which we call shade.

Suppose a surface is before us in the shape of a plane ; suppose the light strikes on it incidentally ; in this case we shall have a uniform effect of illumination spread over the plane, expressed by half-tone. But suppose that the plane is bent or curved at a certain point; the tone will now begin to grow darker as the curve turns away from the light. Let us now imagine that at a given line, the curvature is so suddenly increased, as that the surface trends quite back from the stream of light; we shall here have the condition of things which allows of the commencement of shade; and the effect will begin to appear at the point where the rays of light cease to strike on the surface. If this relation of light to surface can be clearly fixed in the mind, we have only to determine, in the effects before us, what parts cannot be reached by a ray of light from any given quarter, to know exactly where shade will occur. Complexity of form, however far it may be carried, in nowise influences the operation of the principle; it only leads to a more extensive illustration of the effect. Whatever may be the inflections, shade always begins to appear where the rays of light fail to strike. A surface which shall be so placed with respect to the rays as to exhibit half-tone, may have a number of projections of various shapes affixed to it at right angles with the stream of light; each of these on its underside, or on portions where the rays do not reach, will offer a shade; and this, in addition to the principal shade exhibited by the whole body, of which the assumed surface forms a part.

Shade would theoretically mean absolute non-illumination; but as exhibited to us in nature, it is really to be understood as a tone: for both reception and reflection of light are, of necessity, implied in the effect, since we *see* the parts covered by it. Shade is removed from the intensity of a complete privation, and constituted a tone, by the agency of the atmosphere. The element of light is extensively diffused through the air, among whose particles reflection and refraction are constantly in operation. The absolute privation of light which the opacity of matter would cause, is affected by these circumstances; and shade, where it occurs, receives from the atmosphere such an amount of re-illumination as destroys the appearance of absolute darkness, and converts it into a tone.

The effect of shade is of extreme importance in affording repose to the eye, after the consideration of the illumined bodies around us. The contemplation of light is, in truth, an exercise of the nervous energy. It acts as a strain upon the eye, and it is one that is especially felt when bright surfaces or substances are in question. The *continued* contemplation of light even of a weaker kind calls up, though in a minor degree, the same feeling. We afford no respite to the sight, and we thus fatigue it. To this state of things shade is a relief; the glare is interrupted; we need no longer exercise the sense so vigilantly; and hence opportunity is given for rest. We should be offered an instance of the value of this tone, were we to look for some time at an extensive series of architectural effects under bright sunshine, and were then removed to the relief of a shaded portico; the eye would immediately feel the transition from an over-tension of the nervous power, to relaxation and repose. Light requires shade as its counterbalance.

The appearance of shade indicates several circumstances to us. It is, in the first place, a sure exponent of solidity in the aggregations set out for us. It proves that the effect considered, neither exists in the state of a plane, nor is permeable to light. In the second place, it points to the kind of surface employed to constitute an object. Angular forms, that is to say, bodies made up of planes, offer an appearance of shade which is marked by distinctness and suddenness of commencement; the ridge of the angle produced by the junction of the planes, forms the line which separates the light from the dark portions. Curve surfaces, on the contrary, bear shades which are invariably characterised by softness of commencement. In the third place, it is an exponent of situation of surface; for it can only occur on those portions which cease to be parallel with the incident rays.

Reflection.—Besides the general reflection of the atmosphere to which we have just referred, shades are subject to the influence of local circumstances, which further affect them. It was mentioned that the eye is made cognizant of high-light by a reception of the rays returned in a concentrated form from material surfaces; and that half-tone would appear to follow from the non-reception of these rays. When, as in a case of the last kind, the rays, instead of reaching the eye, happen to strike on a surface deprived of light, an appearance of re-illumination is produced in the shade; and this effect receives the name of reflection.

The general character of reflections, when resulting from a material surface, will be at once understood if we bear in mind that, as re-illuminations they are bound by all the laws of light, with the sole difference that the effects produced appear to us under extremely reduced values. The very same consequences that accompany direct light, must all through result from reflected light.

But surfaces are found to possess unequal powers as reflectors. Smoothness of texture and lightness of colour, afford the capacity in the highest degree. In the first case the reflection is of a concentrated kind; that is to say, it is only thrown off in one direction, in obedience to the law that the angle of reflection is equal to that of incidence; and, therefore, it is a combined power we witness. In the second case, though the returned rays are less perfectly concentrated, yet the range of operation is much extended, so that we have a large body of light returned. Porous surfaces and dark-coloured surfaces have a very inferior power of reflection; not only do they return a greatly diminished amount of light, but the distance at which they can act is considerably reduced.

All these conditions are, however, modifiable by the distance that may intervene between the reflector and the dark surface re-illumined. A reflector of the superior class, placed at a considerable distance, may re-illumine a shade less powerfully than an inferior reflector placed near to the shade. The general law is, that the power of light is inversely as the squares of the distances, and to a great extent the eye judges correctly of the observance of this law; but the calculation is liable to disturbance, from the inequality of capacity already spoken of among surfaces to reflect light; and though in many cases, were the reflector hidden, the eye could decide almost unerringly at what distance the reflector is placed, yet there are some occasions when it would be unable to determine if the reflection proceeded from a high power placed at a distance, or a low power placed near.

Reflections are not always necessarily present in a body. It may happen that no second surface exists near enough to return light to the shaded portion, and that its own form is too simple to supply developments which shall act on it. An apple suspended from a bough, with no leaves near it, would exemplify the case; the shaded side of the apple could only offer atmospheric reflection. A second illustration would be a column standing alone. But wherever developments are allowed to obtain, reflections must occur.

It is further to be remarked that a coloured reflector not only transmits light to the shaded portions of a body, but at the same time its own hue. A bright scarlet surface would reflect a light of the same class. These reflected tints are, however, so much fainter than the hues by which they are caused, that they commonly escape our notice; add to this, that colours have naturally unequal powers as reflectors, a bright yellow would act more strongly than a dark green or blue. Still the relation is a necessary one; and it would be a violation of truth to suppose a reflection of a warm hue could proceed from a cold coloured surface, or *vice versâ;* a green reflector cannot produce an orange-tinted reflection. And yet errors of this gross character are not infrequently seen in manufacturing art, and even art of higher pretensions.

Reflections are important as indicators of the proximity of bodies or parts to each other; they further acquaint us with the colour and texture of the reflecting surface, and the texture and complexity of shape of the surface re-illumined.

Cast-shadow.—Cast-shadow results from two circumstances: indeflectibility of light, and opacity of matter. Light, as we know, can only travel in right lines; now, as matter is solid, any one body that shall be placed between the source of light and a second surface, must deprive this second surface of a portion of its illumination. The space thus shut out and darkened is called cast-shadow. An illustration of the effect is afforded when we stand in the sun; our shadow is then thrown on the earth. But it does not need a second independent surface for its exhibition. In aggregations of form, developments or parts frequently reach forward into the stream of light, without totally excluding it from the surfaces which are placed further back; that is to say, they abstract only a portion of the illuminating stream, leaving a certain amount of rays to reach the surface beyond; if these projecting portions were transparent, or permeable to light, no additional effect would ensue; but being opaque, they deprive the surfaces placed further back of a portion of their light, and thus produce subordinate cast-shadows.

Cast-shadow is always the darkest of the tribe of tones implied by non-illumination; the circumstances under which it arises excluding the operation to any amount of local reflections; but it has yet a right to the denomination of tone, since equally with all shades, it undergoes reaction from the atmosphere.

This effect is subject to modification from three sources. The distance that may obtain between the intercepting body and the receiving surface is one cause of variation; the form of the intercepting body is another; and the form of the receiving surface is the third. The characters of these changes may be thus described.

The influence of distance is under the control of the law, "the power of light is inversely as the squares of the distance;" that is to say, the strength of a cast-shadow diminishes as the distance increases; an intercepting body placed far off, produces a weak and faint cast-shadow; but brought near to the receiving surface the shadow is marked and strong; each intermediate degree of distance has its own degree of strength. The shape of the intercepting body is equally of moment in the appearance of a cast-shadow; for as the effect depends on an interruption of the rays of light, it is evident that it must correspond to the number or extent of the rays shut out; a spherical intercepting body will produce a circular cast-shadow; an angular body will produce an angular cast-shadow; an elongated body will produce an elongated cast-shadow. Lastly, as the appearance depends on the presence of some surface on which the evidence of the interruption can be thrown, it is plain that the effect allowed to appear will be variable with the capacity of the surface to receive it; the cast-shadow of any kind of intercepting body thrown upon a flat surface, will be widely different from the appearance produced by the same cause, acting upon involved and broken ground; the shadow of the human form thrown upon a pavement will not be the same as when received on a flight of steps. The capacity of a surface to receive reflection varies not only with change of form, but with change of position. If a cast-shadow be received on a flat surface placed at a right angle with the intercepting body and its place marked, we shall find that if the surface be shifted to an angle of 30°, the cast-shadow will occupy a less space than before; while if it be removed to an angle of 70°, the shadow will extend much further than at first. These variations of effect are familiarly seen in mid-day shadows compared with the elongated shadows afforded by the setting sun.

Cast-shadow is always imperfectly traced wherever too much light exists. In the open air the atmosphere is so illumined as to destroy the evidence of cast-shadow; the natural result of the light striking from any one quarter is nullified by rays striking from every other quarter; and the consequence is, that no cast-shadow at all can be seen. The characters of cast-shadow are best studied in a room with only one source of illumination or window.

Cast-shadows indicate several circumstances to the eye. Their degree of intensity allows us to guess at the amount of distance which may obtain between the intercepting body and the receiving surface. Their distinctness enables us to estimate the power of the illuminating principle. Further, they inform us of the general shape of the intercepting body, and they acquaint us with the more or less of irregularity of the surface on which they are received.

The above comprise all the tones which can occur on a body; that is to say, we have here all the varieties of illumination to be traced. No others can arise by the action of light on Form. The first four, are of necessity co-existent in every aggregation of matter offered us; the fifth may be either a co-existent or an accompanying effect. Every form has a high-light of some kind, whether vivid or diffused, since all matter reflects light; every form has half-tones, since the aggregations of matter presented to us do not obtain in the state of planes invariably placed perpendicularly to the rays of light, but appear as solid bodies, which necessarily implies that the surfaces making up their figures receive varying amounts of illumination. Every object offers shade to the eye, since matter is never perfectly transparent. Every shaded surface must offer a reflection, since atmospheric action never ceases. We should be able to add to this enumeration of the tones always co-existent on forms the effect of cast-shadow, were objects invariably to obtain of a complex shape; but as there exist such figures as spheres, and cubes, and other simple forms on which, from the absence of projecting members, cast-shadow cannot occur as a part of the effect; we can only say that so far as complex forms are in question, cast-shadow must always be present; and that, at all events, it must ever occur as an accompanying effect wherever opacity obtains, and a second surface is so placed as to receive the evidence of the interruption of light. The only possible modification to the invariability of the existence of the five tones is in the greater or lesser space within which they may be exhibited. In some instances spaces are so contracted by excessive development of parts, as apparently to leave no room for the display of one or more of the effects; and at first sight we should be tempted to conclude that there has been a total omission; but on a close inspection, we shall find that it is really a question of contraction of space, not violation of the necessary conditions of light and matter. High-light is thus sometimes apparently absent through a peculiarity of form, which at the part that should be occupied by high-light, offers only a sharp ridge or ridges to perform the office of reflectors; still the high-light is present, though greatly diminished in extent. In the same way half-tone occasionally appears to be wanting.

Now, when we consider the almost infinite variety of shapes which are offered to the eye, simple and complex, of a uniform exterior, or extensively involved, with no development of parts, or with many; there is, at first sight, an apparent difficulty in conceiving how the five kinds of tone we have been tracing out can suffice for the demonstration of the various individualities of formation we behold. The system, however, is, in truth, easy of apprehension, when once the causes or modes of production of the tones are fully understood. We may perhaps render the operation of these circumstances more evident by assuming a case. We will suppose, then, that some simple form, such as a sphere, is before us. This kind of body would be defined to the eye by the following scheme of illumination. One high-light would be observed on it, surrounded by and dying off into, one half-tone, which would be united, by intermediate degrees, with one extensive shade covering about one half the form; the shade would be re-illumined by the action of the atmosphere, so as to offer the effect of reflection; and we may add, that if the sphere were not self-supported, but were placed on or against some surface, we should remark a cast-shadow thrown from it. Such would be the effect of illumination of a sphere. But now let us suppose that from the illumined side of this sphere, a projection, no matter of what shape, is allowed to extend itself; under these circumstances an addition to the effect must ensue. The projection being of the same substance as the sphere itself, has the same capacity to return modes of light to the eye; the highest portion of the projection, therefore, will bear a high-light; the sides of the projection will be in half-tone; the part removed from the light will be in shade; the shade being exposed to the action of the illumined surface on which the projection is supposed to be placed and of the atmosphere, will offer a reflection; and the projection being opaque, will deprive a portion of the surface behind it of light, and thus give rise to a cast-shadow. These, the natural series of tones, will ensue, in addition and subordinate to, that which we have already pointed out as demonstrating the existence of the original body. We shall, therefore, have a gross series defining a sphere, and a minor series defining the projection attached to it. As a further step, let us imagine that, instead of one projection, two or three, or very many, obtain on the sphere; under this arrangement we shall have to take note of as many subordinate series of tones as there are variations from the previous uniformity of surface; we shall have further repetitions of the original scheme, expressive of new aggregations of matter added to the form.

These suppositions will suffice to give an idea how development in natural forms comes to be defined to the eye; each development has its own series of tones. But we shall yet require to ask, how we deduce the distinction of kind among the developments. We have here supposed projections of indefinite shapes; let us now assume that each of the projections has a different form, and is of a different amount. Any material development exhibits the five tones described by virtue of its being of sufficient extent, or of its surfaces complying with the conditions, as regards the incidence of light, necessary to give them birth. If a projection have not a sufficiency of extent, or if some of its surfaces depart from the necessary relation to light, a change ensues; no more or no further tones can be produced; but the manner of each may be varied; they may be differently combined, and an omission of some may occur. In a projection which offers curved surfaces retreating at an obtuse angle from the rays, we shall have half-tones, defining the situations of these surfaces; but these half-tones will increase in strength with the amount of the angle, till they terminate in shade, each mode of situation producing its own manner of tone. If the projection be combined with the original Form in such a way, as that the surface, the most distant from the light, is yet within reach of the rays, both shade and cast-shadow will disappear, and the projection will be united to the assumed sphere by its half-tone. If the projection be of such a shape as that it offers a plane on its highest portion directly opposed to the stream of light, we shall have high-light, shade, reflection, and cast-shadow, but no half-tone. If the projection present the ridge of an angle to the rays, no apparent high-light will be offered us.

This is the general principle on which the eye discriminates between kinds of Form; it is in this way that all the forms which exist become demonstrated to us; the system is one throughout. Each aggregation of matter acted upon by light, presents the series of tones described; each projection from the surface of a body, by virtue of its being equally matter with the mass from which it proceeds, exhibits a subordinate series of the same tones. The series, according to the differences of mode of being of the projections, is subject to differences of arrangement. The co-existence of many series informs the eye of a complex shape; the modes of being, and of union among the members of the series, define the kind of form.

It would thus appear that for the definition of differences of form to the eye, we have not only the combinations producible from five tones, but those which follow from the modes of inter-arrangement of all the varieties of which each is susceptible. Every relation of situation of surface to light has its own tone, and according to the mode of succession of the surfaces required to constitute a given form, will be the arrangement of tones presented to the eye. Complexity of shape through the development of parts, merely adds to the complexity of the arrangement of tones; it introduces no new mode of illumination. In all cases, the clue to the mode by which tone demonstrates kind of form, is gained through the fact that certain situations of surface, whether considered singly or as parts of a whole, taken with respect to incidence of light, necessitate certain degrees of the five effects of illumination. Every surface we can see, is defined to us either by a high-light, or a half-tone, or a shade, or a reflection, or a cast-shadow; the modes of inter-arrangement of these constituting the visual definition of kinds of form. A complex form is, in truth, nothing but an aggregation of surfaces variously inflected and connected together, each of which must exhibit the necessary result of the action of light on matter, and which can offer no other. It is of no consequence whether we suppose a more or less of surfaces or of situations, the principle remains the same in all cases.

Tone, then, is the exponent of kind of form; it is the means whereby form is *defined to the eye.* Now it will follow from this position, that modes of illumination are likewise the exponents of value of shape. If tone define form, it must equally define the degrees of perfection of which form is susceptible.

In the description already given of the various appearances created by the action of light on material aggregations, it will have been seen that these appearances spring from certain positions with regard to the course of the rays, assumed by the several surfaces of which forms are composed. A shade arises exactly at one part, because the surface which bears it happens to retire from the reach of the light just at a certain point. A half-tone of a given intensity is spread over another part, because the surface on which it is thrown possesses a given inclination with regard to the rays. And were either of these surfaces to undergo a change even of the slightest kind, the shade or the half-tone would no longer be the same either in extent or character. Now perfect forms only differ from those which are imperfectly framed by a difference of arrangement of surfaces. If we take two forms of the same kind, one perfect and the other ill-made, we shall find the first differing from the last, only by slight amounts of changes of the constituent surfaces, as regards extent, inflection, elevation, or depression. These differences of surface cause corresponding differences of tones. One surface in the perfect form is long; in the imperfect it is short, whence the extent of the tone is influenced. In the perfect one it is so inclined to the light as to bear a half-tone of a given strength; in the imperfect it assumes a different degree of inclination, and thence either offers a half-tone of a darker kind or a positive shade. In the perfect form it is inflected in a peculiar way, whereby the half-tone presented to us is made to assume a certain order of gradation in intensity and value; in the imperfect form it is either not inflected at all, whereby these changes of intensities are not allowed to obtain, or it is inflected in a different mode, whereby a different order of succession is necessitated. But for these differences of make, differences of illumination could not appear; and but for the differences of illumination, the eye could not know of the peculiar arrangement of surfaces which distinguishes a perfect form from an imperfect one. It is by following out the order of tones that we know the individualities of formation that come before us.

We have reviewed the several effects that light calls up on the surfaces of the bodies around us, and by which they are made the subjects of visive apprehension; we now require to proceed to a more extensive consideration of its action. Sight is not limited to the acceptation of single bodies only; we are often called upon to apprehend effects in which many aggregations, independent of each other in space, co-operate to make up a whole; we have such circumstances offered us as groups of objects. It becomes, therefore, a question what are the results that follow from this more extended field for the action of the principle of light?

All the portions of which a group may be composed are yet matter possessing common properties. It will thence follow that we cannot suppose to any one portion of the compound effects we recognise, other than the consequences of light we have already followed out. No portion can, because many are acted on at once, cease to exhibit the necessary results of light:

every individual must of necessity continue to offer the circumstances of tone with which we have already become acquainted. We are to understand, therefore, that however a group may be composed, we shall have in every individual portion, simply a repetition of the five effects of illumination already described.

A group of objects, of whatever it may consist, or whatever may be its shape, is really a whole, whose parts are more or less separated in space. The question of separation in nowise affects its right to be considered as a whole, so long as the circumstances which constitute it a group, and which only partly depend on distance or space, continue to be observed. The shape the whole may assume, is the consideration we have to take up in investigating the action of light on it.

All aggregations of bodies must of necessity be founded on some of the shapes employed as types for the construction of single bodies : that is to say, aggregations cannot be supposed to imply any new principles of formation ; they can only be produced under the laws already observed to direct the aggregation of matter in general. Parts brought together must continue to exhibit some original type : we may have the several bodies that make up the group spread out into a plane ; we may have them inflected into a curve ; we may have them compressed into a cube, or into a spherical form ; or we may have some of the many arrangements produced, simple and complex, regular and irregular, that the combinations of original types afford.

Clearly fixing this position in the mind it becomes at once evident, that in all the cases of modes of aggregation to be supposed, only that effect of illumination will ensue on any one group as a *whole*, that would occur in a single body of the same total shape. We shall have an extension of the scheme of tone already noticed, but nothing further.

A group of objects arranged in space as a plane, will exhibit the effects of light natural to this mode of aggregation. The several portions exposed to the rays will present illumined surfaces of an equal power of light; all those removed from the reach of the light, will be in a shade of a same value. A group of objects arranged in a curve form will present the effects of light that we should trace on a continuous curved surface; that is to say, the portion of the curve complying with the conditions that permit light to be reflected back to the eye, will appear under the highest power of illumination; the portions of the curve where the rays can only strike incidentally, will appear under a subdued effect; and this reduction of value will continue to increase, as the inflection from the rays becomes greater. These effects, it is to be understood, will obtain, without in anywise removing or destroying the results that light must produce on each object separately taken; we shall have the five tones still accompanying each portion, only that the *values* will be consequent on the situation it may occupy in the curve.

These facts may be at once illustrated by a reference to a simple object. A bunch of grapes is a group of spherical forms more or less separated in space. The mass as a *whole*, when exposed to the rays, presents a light side, and a shaded portion. In the light side some of the berries appear to sparkle brighter than the rest, and this is because they happen to be so placed in the group as to comply with the conditions by which an increased amount of light is returned to the eye : we have here the high-light of the group; others are of lower values; and this is because they occur in those portions of the group on which the light can only fall incidentally ; they offer half-tone. In the darkened side, we observe some berries of a lighter tone than the rest ; these are the portions where atmospheric re-illumination or reflection is evidenced. And we shall find that the mass, like any other aggregation of matter, throws a cast-shadow on the surfaces near it. While the group as a whole must of necessity offer us these characters, the action of light on each single berry reached by the rays is in nowise obviated or prevented ; we have in each case the necessary result of the influence of light on matter, namely, high-light, half-tone, shade, reflection, and cast-shadow ; only that the value of each series is given by, and is consequent on, the position each berry may happen to occupy in the group of which it forms a part. The values of the tones in the parts occupied by high-light will be vivid ; in those offering half-tone they will be subdued.

We have now but to suppose the berries irregular in form and situation, and separated from each other by unequal distances, to gain a view of the result produced by the action of light on any groups of objects. We may assume any sets of shapes to the berries ; we may suppose they pursue any mode of disposition in space with respect to each other ; that they make up any species of form as a totality ; the fact will still remain, however, that while the parts each separately exhibit the necessary effects of light, the group as a whole will additionally offer the results of tone that a connected figure of the same form and magnitude would afford. It is mere disconnection of parts in space that prevents us instantly seeing this in nature.

In landscape effects we have a succession of objects arranged on the basis of a plane, or on that of a gentle curve. Groups of flowers, clouds, animals, men, &c., offer us masses aggregated on the basis of some of the modifications of the cube and sphere. In all these cases of aggregation, there is an effect of light on the totality to be accepted, as well as the effects of tone that belong to the individual portions.

The preceding observations have gone to show, first, the means whereby form is made the subject of visive apprehension ; second, the action of light on single bodies ; and third, the action of light on groups of objects. Other considerations require to be taken up to complete the history of Tone.

The circumstances we have been reviewing are results of light considered as a principle *invariably* the same ; but this is only a simplified examination of the subject, and will insufficiently describe the effects of illumination known to the eye. Light is in nature by no means an element always the same : it is of variable power. From these changes of value arise modifications of tone, which we proceed to notice.

There are five distinct modes of light known to the eye : sun-light, day-light, subdued light, moon-light, and artificial light. Each of these has its own character of tones.

Sun-light.—Sun-light is the highest power of illumination offered us, and its action on form is proportionately decided. The first impressions arising to the eye from objects exposed to the rays of the sun, are the dazzling vividity of the light, and the marked distinctness of the cast-shadows—the latter are always so clearly defined as to offer at a glance the shape of the intercepting body. Though clear and decided, these shadows are not, however, so dark as the power of the light would warrant, and that through the agency of high atmospheric reflection. A further examination shows that half-tone does not appear with its common character. Shade under ordinary circumstances is always preceded by a darkened half-tone, but under the action of the sun the illumined space seems to flow directly up to the limit at which shade commences, so that the latter becomes edgy and distinct through the absence of an intermediate tone. We may likewise remark a modification of the effect of reflection: surfaces in the open air exposed to sun-light can re-illumine a shaded body at greater distances than under common day-light; but at the same time the reflections are more strictly under the law, that the angles of incidence and of reflection are equal. Surfaces out of the range of rejected light remain unaffected, while by common light they would be slightly influenced, if brought near enough.

The vividity of sun-light when not carried to such an excess as to strain the nervous power, is generally considered to be suggestive of feelings and emotions of a gratifying character. There is a clearness and cheerfulness spread over the face of nature by the action of a brilliant illuminating principle, with which the eye is immediately impressed. The recognition of the relation may be traced in poets and writers of all ages, who have connected ideas of cheerfulness, purity, gaiety, happiness, and other congenial conceptions, with the openness of a clear day and glittering sunshine: consigning characters of guilt, misery, suffering, remorse, to gloom and darkness. The basis of the relation is probably the increased distinctness allowed to form and colour. When light is carried to an extreme point it becomes physically painful, because it exceeds the range of power allowed to the organ of sight, and destroys our perception of form, whose outlines we strive in vain to follow out in the blaze.

Day-light.—The effects of tone produced by the influence of common day-light are simply those that have already been described in tracing the history of the five tones of light. A medium effect is offered, and the chief character to be remarked is a general softness of gradation: no tone is sudden or defined in its commencement or termination. It may be added that in the open air shade and cast-shadow become lighter through atmospheric refraction and reflection, which are then in abundant operation. In an enclosed space—a room, for instance, these tones resume their original characters.

Subdued light.—Tone under the operation of light of low power is subject to distinct modifications.

Subdued light presents us a character of surface that is commonly distinguished by the term *breadth.* Objects under the influence of a low illuminating power appear to offer only two tones; namely, an expanse of illumination, and a corresponding expanse of shade. The reduction of the power of the illuminating principle, affects the appearance of high-light; it is softened down and spread into the half-tone, and the latter is thereby apparently increased in extent. Colour is likewise affected, for weak light only faintly evidences hue; hence the illuminated expanse is made to appear greater by the diminution and reduction of subdividing effects. The space occupied by shade appears to be greater by the loss of the capacity for reflection in the atmosphere, consequent on the presence of a low power of light: less of this light is floating about, and the shaded portions of objects are thus but little influenced by re-illumination. The increased darkness of the shade serves to confound it with the space occupied by cast-shadow, and, both being melted into one tone, we have an extent of non-illumination apparently greater than usual. The result of both these changes is the production of an effect of *breadth* to the eye.

Low tones of illumination appear to be connected with ideas and emotions of a serious character. Their occurrence gives rise to conceptions of solemnity, mystery, sublimity, &c., and the reason for the production of these feelings is probably to be found in the fact that subdued light renders the definition of form uncertain, whence we remain at a loss how far we shall be affected by it. Our knowledge of the external world is originally and primarily a knowledge of shape and kind. Light is the means whereby form is visually evidenced, weak light only indistinctly exhibits limit; hence uncertainty and confusion are left on the mind, and the imagination is at liberty to supply the void with its own creations. The fear experienced by children in darkness is simply the result of fancy operating to fill up indistinct limitation of form; more matured minds and less excitable imaginations, only find in the undecided limitation of matter consequent on subdued light, opportunities for the indulgence of feelings of curiosity, awe, wonder, repose—not of fear.

Moon-light.—The effect of illumination produced by moon-rays results from the action of reflected light, and it is remarkable as being the most extensive instance of this class of tone known to us. Suppose that one end of an enclosed space—a room, for instance—containing objects, be darkened; suppose a mirror to be so placed at the opposite end as to receive the rays of the sun and transmit them to the objects in the darkened space, we shall here have the conditions offered us in moon-light: the darkened space will represent the portion of the globe from which the direct rays of the sun are excluded during the period of night, and the mirror re-illumining the objects in shade will represent the surface of the moon receiving the light of the sun, and reflecting it back on our darkened earth. The difference between the two instances is in the extent of the one compared with the other, and in the circumstance that a mirror reflects light of a same hue with that of day-light or the sun, while the moon reflects light coloured of a particular hue.

The influence this mode of illumination exerts on tone is as follows: The high-light it affords on polished bodies is always vivid and sparkling; but, as occurring on porous surfaces, the effect is hardly to be traced. Half-tone is always broad and clear, and is carried close up to the line of commencement of shade. As parallelism obtains among the rays, the darkened portions of objects are always distinctly defined, and the cast-shadows are marked and decided; but as the power of the rays is less than in day-light, reflection is only faintly evidenced.

The peculiar character of moon-light resides, perhaps, less in its tones, than in the colour it throws over the objects exposed to its influence. It is of a yellow-green hue, and it tinges every object of this hue. The effect is, of course, variously exhibited, according to the colour that naturally belongs to the surfaces it illumines, the laws that govern the mixtures of hues coming here into operation; hence some surfaces will show it more distinctly than others.

Artificial light.—It was mentioned some pages back that objects were rendered cognizable to the eye by the existence of a circumstance, independent either of external facts or the organ to which they are addressed. Light does not originate with the material facts offered us. Derived independently, it is first received by, and then returned from, the surfaces around us. While in the four lower senses we cannot create for ourselves the means of communication that must obtain between qualities or properties, and the capacity to which they are supplied, we *can* do so in the case of the eye. If no exhalation proceed from a given object, the latter ceases to act on the sense of smell, and we cannot render the organ cognizant of its presence; but if light, which makes form known to the eye, be absent, we can artificially supply the medium of communication, and the organ will continue to act. This is a peculiarity in the history of the eye, which is rendered possible by the mode of its connection with external phenomena. The artificial light supplied, is effectual in the production of vision, although in several of its qualities it falls far short of its natural prototype.

By artificial light is to be understood the illumination that is afforded by various modes of combustion—a fire, a lamp, a candle. The tones produced present characters that are distinct from those afforded by Sun-light.

It is a consequence of the enormous distance at which the seat of natural light, the sun, is placed, and of its extent, that we find effects of tone called up that would arise under *parallelism* of rays. In artificial light we have small *foci* of illumination, and these are always near at hand; hence, we have no longer parallel rays to consider, but *divergent* rays. In addition to this, the colour of the light is different: sun-light is colourless; in artificial light red and yellow are in excess; and hence an effect of illumination is produced similar to that which would be given by passing natural light through a gauze, or thin texture, coloured red or yellow.

The high-light of bodies under an artificial illuminating principle, is commonly more vivid and distinct than when afforded by the light of day; but it is at the same time reduced into narrower spaces, and this as a consequence of the diminution of extent, and thence divergency, of the illuminating principle. Half-tone is of a more equalised value. Shade always commences with a distinctness and decision apparently equal to the effect given by sun-rays; but it is marked by a peculiar feature, it covers a space greater than that which would be defined by either day- or sun-light. For the cause of this increase, we are again to refer to the fact that the rays are not parallel, but divergent. Reflection is generally distinctly evidenced on account of the proximity of light. Cast-shadow is affected by the same circumstance, which goes to extend the space covered by shade; it is enlarged, and made to appear more important: further, through the proximity of the light, it is additionally characterised by strongly defined limits, so as to imitate in a great measure the cast-shadows given by the sun.

The colour of bodies exposed to an artificial illuminating principle is always considerably influenced: we have no longer the series of tints afforded us by day-light, but a distinct set, produced by the mixture of the colour of this artificial light, which is orange, with those specially belonging to the several bodies. Hence, some families of tints are achromatised; others gain in brilliancy.

Whatever may be the class of natural light under which objects appear to us, we require to bear in mind that it is nearly always *one* at any one time. The light strikes from only one quarter at a time, and the tones spread out for us are all strictly relative to the source of illumination. It is a rare exception to the rule to find two lights striking from different parts of the sky, and equal in strength: when they do occur, one is always inferior in power to the other. Had nature not provided against the occurrence of a double light of equal strength, we should have had not an increase, but a destruction of tones; since each light would undo or destroy the tones produced by the other, and we should have had confusion instead of unity of effect, since each source of illumination would possess an equal claim on our notice. In artificial light the case is entirely different. The limited space within which artificial light can exercise its influence, forces us to the use of many at a same time; but the confusion of shape which this expedient would have caused, had it been employed by Nature to illumine a wide expanse, is greatly obviated by a contraction of the sphere within which art introduces it, and by our proximity to the objects intended to be illumined. Still it is an effect not so satisfactory to the eye as the steady calmness of a single light.

The last circumstance we require to notice in following out the history of tone, is the effect produced on modes of illumination by the influence of the atmosphere.

Between the eye and the objects placed around us a perfectly transparent medium does not obtain. The atmosphere, through which the rays that give rise to visive apprehension have to pass to reach the eye, possesses an appreciable amount of density which affects the conditions of the rays, or the values of the tones offered us. The most advantageous distance for the examination of an object is at about twice its diameter, or under an angle of twenty-eight degrees. And at this distance atmospheric influence is unimportant ; but so soon as any amount of distance is allowed to intervene, we become immediately sensible of a change of effect. The imperfect permeability to light of the atmosphere, constitutes it in some measure an object of sight : *its grey hue is seen;* and as this is an effect interposed between the bodies around us and the eye, all tones of illumination appear to us under the modification that the superinduction of greyness impresses on them. The influence of this interposed hue is principally evidenced on the extreme values —it tends to reduce all tones to a common level. Bright light, therefore, and clear shade, suffer most.

If an illumined object be looked at from the distance of, say a few score yards, the following changes will be remarked. We shall find the high-lights are of a reduced value and brilliancy ; some, indeed, will be hardly visible. The half-tones will appear to us to have gained in breadth by the disappearance of the delicate variations that generally characterize this effect. Shade will seem indistinct and pale, and without the decision of limit to which we are accustomed. Reflection will be entirely lost sight of. And cast-shadow will tell as a feebly marked effect.

Extreme distance carries the action of the atmosphere to its highest extent. The result is a nearly total destruction of all tones, save half-tone. In a distant landscape all we see of the horizon is a blue or grey haze spread before us, of a medium value of illumination. Shades, and cast-shadows, are lost in half-tone; and we have only the occasional high-light of some smooth or polished surface glittering in the sun, to vary the soft average of the horizon.

It is a consequence of this disappearance of tone that definition of form is wanting to the eye under distance. Were it not for the density of the atmosphere, we should see distant objects distinctly, only always of miniature size.

Just the same modification of tone that distance produces, is afforded in near objects by an accidental increase in the thickness of the atmosphere—through dust, smoke, or fog. In all these cases there will be the same general tendency to a level of tone, and from a same cause.

The above are the chief considerations presented to us in a review of the history of Tone, and sight can only take place under the conditions detailed. It may be added that the branch of the Fine Arts known as Chiar'oscuro, is founded on a knowledge of the combinations of tone derivable under the laws we have endeavoured to trace. It is for the observer to determine how far the knowledge has been acquired, for it is too true that all but the highest class of art is often extremely defective in the imitation of the natural conditions of light and shade. Designs for manufactures, scene-painting, room-papering, amateur school-drawing, are continually exhibiting the most glaring errors in respect of light and shade. It is common to observe in them that shades are contradicting each other as to their origin—that illumined surfaces are introduced where they could not possibly occur, and are arbitrarily thrown in, or admitted, with a complete disregard of the necessary action of light on solid matter. There is as much pain to the cultivated eye in these productions, as there is to the musician when false notes occur.

COLOUR.

THE object of the preceding sections has been to show, first, the nature of the circumstances set out for the exercise of the sense of sight, or *Form;* and, second, the nature of the means whereby these circumstances are made visible to us, or *Reflection of light.* The present section will be devoted to the history of colour, and to the consideration of the purposes intended to be answered by the introduction of this principle in nature.

Had it pleased the creative Intelligence, externality, so far as the exercise of an organ of sight is concerned, might have been limited to the two circumstances we have hitherto been considering. We might have had a world of *forms,* rendered visible to us by the agency of *light;* and to these effects only we might have been limited. We require to have aggregations—that is to say, separate masses of matter, else space would be continuously and completely filled up; and we require to have a means of sensuously apprehending these masses, or they would be invisible to us. The first implies Form; the second bespeaks the repulsion of light to the eye. With these two only, that which we call sight, would have been essentially attained; we should have as fully possessed the faculty of visive apprehension, as at present.

But this is not the scheme adopted by Nature. A third circumstance has been admitted. We find that not only are we cognizant of Form and Tone, but we are allowed the power of tracing on Form, the peculiar varieties of effect that we call *colour*. It cannot but be a question of interest to us what ends are intended to be answered by the introduction of this circumstance in the scheme of creation; and the inquiry is the more deserving of notice, in that we know Nature is never wasteful in her contrivances, and we have here a machinery whose application does not at first sight appear to be essentially called for.

To conceive what are the objects of this extension of the scheme of visive creation, let us endeavour to suppose the consequences that would have arisen to us, had the faculty of sight been limited to an adaptation only to Form and Tone. Let us conceive that we are placed in the midst of a world of material circumstances, having, as at present, the power of returning light to the eye, but light deprived of hue, and of a white kind only; let us suppose that we know nothing more than gradations of tone, defining change of surface. Under this state of things, though it be certain that *visibility would still continue to exist,* though we should be as capable as ever of knowing by the eye alone—that there obtains outwardly to us a series of phenomena called bodies, to which are attached the several qualities estimated by the four lower senses,—though we should still fully exercise the faculty of sight, yet there would of necessity arise to us a feeling that would be adverse to the ends intended to be answered by the creation of the visual world. The eye would have to wander over effects apprehended in a mode always the same; it would be constantly and universally exposed to appearances as unchanging as those which strike us when we are offered a wide landscape covered with a sheet of snow, or as those we should see if we were placed in the midst of forms made of animated chalk or marble. The sky would be colourless, the vegetable world would cease to present its grateful changes of hue; birds, fishes, animals, man, the earth, everything that is produced, or could be produced, would appear to us under one universal effect of whiteness. Exposed to this appearance whenever and wherever we should use our eyes, there can be no doubt that the feeling of monotony would at once be largely introduced through the sense, which of all others is required to be most in action. This dreary and wearying effect would arise to us through the very channels which our organization and place in creation require to be most in use. The necessity for the constant exercise of the eye would be attended by the inevitable perception of a circumstance which the constitution of the mind renders highly disagreeable to us. It is universally true, that a faculty required to be constantly in action, and necessary to the continuation or preservation of being, is never coupled with disagreeable feelings. Had Nature forgotten this in the case of the eye, had the plan been departed from here, we should have had a glaring exception to a general rule, and that, too, just in the division of our powers where, from the activity required, an observance of the law would have been imperatively demanded.

Colour, therefore, is to be considered as a widely extended means of guarding the eye from the feeling that would be superinduced by uniformity of light; and it is well worth our while to notice the mode in which Nature has attained this desideratum. That which is primarily necessary—*visibility*—is supplied through matter and light. Now, supposing that the question were proposed to us, in what way additional variety could be admitted to the scheme of visive apprehension, in what way we should preserve the eye from the monotony that would arise from the simple action of light on form—how could we ourselves meet the difficulty? Assuming for the moment that we were in a situation to control the arrangements of Nature, what means could we devise to attain the desired end? Form is already varied as much as we can conceive admissible or desirable, and even if we were to contrive other modes of being, we should only be repeating the same action on the eye—that of *shape*, and our object is to introduce a new class of effects. Noting the difficulties, let us now turn to the plan which Nature has adopted, and we shall find in it as remarkable an instance of simplicity, combined with perfect attainment of the end, as it is possible to discover in any of the arrangements submitted to our capacities. There was the choice either of introducing a new principle, or of making those already existing subservient to the required end. It is in accordance with the general plans of Nature that the latter course should be adopted, and we find that while the principle of Form has been left unaffected, and the principle of Light remains unchanged, to each have been additionally accorded such qualities, as that in their *junction* the variety demanded is necessarily produced. To light and to matter have been given certain related properties or qualities. While the essence of light and its action remain the same, it has been so compounded as to give birth, when applied to matter, to a new quality, cognizable to sense, and which is called *hue.* Light is a compound of many colours, but whose natures are such as that in their union they are achromatised On the other hand, while the principle of form has been left entirely unaffected, the substance of which form is composed has had impressed on it capacities corresponding to the modifications afforded to the substance of light. Each aggregation of matter returns not white light, but only the mode of light that its capacity necessitates. One body returns a red light to the eye, and another a yellow, because light is compounded of many hues, and because the surfaces in question have a capacity only for the colours they throw back. This plan appears to be beautifully simple. The most effectual and the most direct mode of preserving the eye from the action of monotony was to variegate the surfaces of the bodies already formed; the most direct means of attaining this was to make the already existing agent—light—subservient to the end. A third and independent principle introduced into the scheme of creation, and made to dispense colour as the sun does light, might have operated to unnecessary complexity. Nature, at the least possible expense of materials, has produced the variety required; and that the end is effectually attained, must be admitted the instant we take the trouble to note the incessant change of hue the eye is accustomed to recognise. Let any one who cannot discern the perfection of this scheme, endeavour to devise a plan that shall replace the existing arrangement, and as fully and as immediately preserve the eye from the monotony required to be avoided.

It is certainly a singular circumstance that this, the origin and end of the introduction of the principle of colour in nature should have been so uniformly overlooked by writers on subjects connected with the sense of sight. It seems to have been the common error—an error derived from and handed down by the sometimes questionable source and channel, *authority*—to refer to the varieties of hue which the eye notes, as circumstances existing solely for themselves, and susceptible of, and demanding, an independent consideration; nay, so far has this view been carried, that many writers have not merely dropped the notice of the other divisions of Nature to which colour is attached, and to which it is a subordinate, but have positively asserted that all the eye as a sense knows, or can take note of, is colour. "Colour," says Lord Monboddo, "is the primary perception of the sense of seeing; the others are only consequential. Figure and magnitude are nothing but colour of a certain extent, and terminated in a certain manner." "If we had had no sensations of colour," says Dugald Stewart, "the organ of sight could give us no information with respect to figure or distance." These are highly incorrect positions, and they are so, in that they select an *accident*, and exclude the *substance*, which would seem to point both to an unphilosophical consideration of the subject, and to an incomplete practical acquaintance with the constitution of visual effects. Colour is not an independent effect; it is a quality of light. Compounded light strikes upon definite masses of matter, and certain portions of this light, *that are coloured*, are returned to the eye; that is to say, we have light rejected, with a visible quality. But colour is not essentially necessary to our perception of figure. There are such things as colourless objects and effects, whose presence the eye yet distinctly recognises. If mere colour be sight, then the eye has never *seen* such a circumstance as an expanse of country covered with a sheet of snow, or a bird with white plumage, or an animal with white fur. The assertion of the sufficiency of colour cannot stand, while any one body can be cited that is at the same time colourless, and yet an object of sight.

It is said that individuals are occasionally found, who are unable to distinguish between certain hues, and who fail to recognise particular tints. This is the affection called colour-blindness. Now, if colour be vision, all bodies tinted wholly of the hue which is not an object of sight, must be strictly non-existent, so far as the eye is concerned. If a power be wanting to recognise, say red, a person suffering under the affection, by the theory that vision is merely the reception of coloured rays, can have no knowledge of the existence of a red cherry, save only on the occasions when it can be touched. Where it is too far removed to be handled, there must be a blank to him. But it may be urged that *a* colour is yet seen, only not the true colour. In lieu of the red, some other hue is supposed to be present, and through this other hue the cherry will still be the object of sight. It may be asked, in reply, would a space of the real or assumed colour, *without any visible limit,* continue to convey the idea of a cherry? If not, it was not colour, but limit, that gave the idea. Define the coloured space, and we get a question of shape. Limit it spherically, and we obtain the idea of a cherry. But here we have departed from the theory of the sufficiency of colour, and have admitted the action of another element—that of form. If the reception of coloured rays constitute vision, then we may fairly require to be shown an instance where coloured rays reach us *without limits,* and yet convey to us the idea of a body. A rainbow is limited, and we get the idea of a coloured arch. A sunset glow is without visible limits, and we do not obtain the idea of any special shape.

It is perfectly true that differences of colour almost universally reach to the visible limits of form, but we are not thence to assume that our perception of body is merely the reception of the coloured rays. The truth really is, that we cannot avoid seeing differences of coloured limit, for to every aggregation of matter has been given a different hue, and which hue extends to the limit of the form. The hue is only consequential, and we could still see the body, even were it absent.

Besides the great object of the introduction of colour in Nature—that of preserving the eye and mind from the monotonousness of a same mode of illumination—we may trace other and subordinate ends, which the presence of hue serves to answer. These will now be referred to.

The first is additional distinctness conferred on individuals in form. There exist a great many cases where we should lose our ability to distinguish immediately the exact shape of the effects before us—that is to say, as regards *parts*—if the appearance of colour were no longer allowed to obtain. We have not single bodies to look at in space, but extensive fields of view made up of many parts. Owing to the invariability of the causes through which tone is made to arise, we are often exposed, under the existence of same conditions and circumstances, to the observation of nearly same degrees of illumination on different objects; and whenever two of these same degrees occurring on different bodies happen to be so placed in space with respect to the eye as to be, or to appear to be, in juxtaposition, the boundary of the forms to which they respectively belong loses its distinctness, so far as they are concerned, and we fail to obtain a precise idea of the shapes before us. Uncertainty is left on the mind as to the exact extent or limits of some portions of the effect we see. It is in these cases that colour is of advantage. That which tone fails to attain, tint performs, and the surfaces are individualised and rendered separate by a difference of hue. One body is perhaps green, and the second against which the first is seen is blue, whereby both are interdistinguished. Persons who have not been accustomed to attend to the composition of natural effects, hardly know how frequently these differences of hue come into use, in defining to the eye *portions* of the effects we are every moment perceiving. Were hue absent, we should at once discover the necessity for some further means of conferring distinctness and individuality on parts. It is to be observed, that were we limited to the observation of single bodies only—that is to say, were space so scantily filled up as that no more than one object at a time ever came before the eye—this mode of producing distinctness of parts would no longer be needed. It is the close approximation of objects to each other in space that renders the introduction of hue important.

It has further to be pointed out, that the benefit thus arising from colour is really greater than at first appears, through the existence of imperfect transparency in the atmosphere, in and through which we have to see objects. The density of the air has a tendency to equalise to the eye the values of the tones that are produced on bodies. Objects seen at some distance do not tell with their own individual values of illumination, but under the effect that the interposition of a medium of some amount of density imposes, so that all the tones occurring are made to tend to a level of value, by their being seen behind and through a certain amount of atmosphere. When the objects we may happen to have offered us are small, the differences of the tones that define the parts of each are very liable to escape the eye, and in these cases the utility of colour as conferring distinctness is greatly increased. While on this subject, it is worth noting, as bearing on the question, that throughout Nature, it is only in *small* objects, or in the *parts* of objects, that we find strong contrasts of colour allowed to appear. It is not the rule that the larger animals or vegetables should exhibit much diversity of hue, while nearly all the smaller animals and vegetable productions are distinguished by continual variation of tint: and there is a reason for this. Wherever space and bulk obtain, colour was not imperatively required for the visual definition of parts, but limitation of space calls for additional distinctions ;

and nearly all the smaller birds, with flowers and mineral forms where parts are minute, offer to us an infinite variety of tint. An arrangement of this kind serves to call the eye to much that would otherwise be likely to escape our attention.

A second end which is answered by the introduction of the principle of colour in Nature, is the extension of the scheme of *character*, as applied to visual effects. The sufficient individualization of the arrangements offered to a sense is an essential requisite in creation. Colour serves to further this individualization; it supplies additional resources for the attainment of the end. Not only can we have individuality of shapes, but we may have individuality in the hues these shapes may be made to exhibit; not only can a mass of matter be rendered distinct from all others by its peculiar form, but it may be additionally marked by a peculiarity of hue; and the latter means of individuality may be made to coincide with, to add to, to vary, the distinctness of the effects that are attainable by arrangements of shape.

This form of character is continually available in our rapid appreciation of the effects around us. In cases where familiar objects of similar shapes come before us, hue is a powerful aid to our instantaneous perception of class and kind. When bodies are familiar, we are apt to pass them unnoticed, and when they are similarly formed we are liable to confound one with another. In both circumstances, the utility of colour becomes apparent. We are compelled to take heed of what passes before the eye by a difference of hue in the objects presented to us. Again, when any considerable degree of distance intervenes between the eye and the bodies placed before us,—

and shapes are, from this or other causes, rendered either similarly indistinct or indistinctly similar,—we readily recognise those whose hues are familiar to us, or that are the most marked. Even where rapidity of acceptation is not in question, it will be found that colour is an important ingredient in the recognition of the bodies around us. Individuals of same species frequently owe their acceptation as distinct effects to the colour that has been conferred upon each. If every horse, for instance, were of precisely a same hue, we should lose a powerful auxiliary in the recognition of differences of individuals. This rule will be found operating in a great many cases in the animal, vegetable, and mineral worlds.

These are the immediately evident uses which the introduction of the principle of colour in Nature seems to answer. Its appearance preserves the eye from the monotonousness of a same mode of illumination; it serves to render the parts of bodies more distinct; and it constitutes an additional means for individualization. Recognising these facts, we now pass to the consideration of the modes in which the scheme has been followed out.

Colour has been made to spring from the action of light on material surfaces; and there is a manifest advantage in adopting this plan, rather than that of affixing hue to forms as their natural attribute. Colour could have been given absolutely to matter; or, in other words, the surfaces of bodies could have been permanently tinted by the hand of Nature, independently of light; but then, either all bodies must have been coloured uniformly throughout—that is, every portion of the surface of a given individual must have been of a same hue, which would have been monotony of colour, instead of monotony of light—or they must have been tinted according to set forms; in which case, under the changes of locality allowed to bodies, and to the source of illumination by which they are made objects of sight, there would be the continual risk that the distinctive hues assigned them would occur on portions either removed from sight or removed from the influence of light; under both of which circumstances the gift of colour would have been to no purpose, for we should fail to see it. By the scheme adopted, colour being the product and offspring of light, it can only obtain to us where light exists; that is, on *surfaces that are the objects of sight.* An illumined surface is a visible surface; and illumination means colour. Wherever sight, therefore, can be exercised hue must be seen.

In the admission of a scheme of colour to be applied to form, there were obviously two plans to be followed: either the new effect was to be one for all Nature—that is to say, all bodies were to be similarly coloured—*or* many effects of colour were to be admitted.

The first plan would have done but little for the attainment of the chief end for which colour was required, namely, the diffusion of additional variety over the face of Nature. A number of bodies similarly coloured would have been but one remove from the effect of a number of bodies not coloured at all. At the most, we could only have had changes in degree of the hue adopted; and this would have been but the repetition of an action of a *same kind.* If all bodies had been tinted red, even though we might admit all the changes of which red is susceptible, the action would not differ in kind;

we should have had a monotony of red, instead of a monotony of absence of colour ; the former being only preferable to the latter, in that it admitted of degrees.

If the second plan be selected—that of the admission of many effects of colour—it will follow that the hues must be made to exist either as independent facts or as relative facts.

The objections to the adoption of a scheme of independence are overwhelming. If to each colour be accorded a distinct existence, we shall need the creation of an enormous amount to meet the extent of the scale of variety in form. Each form being different, and colour being needed to vary form, we require as many individualities of colour as there are individualities of shape. In the apprehension, however, there would be this difference. The varieties of form, great though the number may be, imply a conception of one kind : forms are only *modes of limitation in space;* but the varieties of colour having to be distinct existences, would imply the conception of as many distinct ideas. While, therefore, any one form would be accepted as an aggregation of relative facts, there would be made to occur on it an indefinite number of circumstances of hue that would not be known relatively, but as distinct existences ; and every step over creation to fresh forms would bring before us new facts, totally disconnected with anything we had already seen or could see again, and requiring a separate apprehension. To confer upon the mind the power of knowing a series of circumstances of colour as independent effects, is at once to recast the form in which it has been determined our capacities should exist. We are not to know independently and absolutely, but relatively; under our present form of mind, we could not know them at all as connected facts. There exist, therefore, reasons springing from the very nature of our capacities, that exclude the consideration of a scheme of independence as the basis on which colour is to be placed. We cannot know colour independently, for this mode of apprehension is totally unfitted to the human mind. If varieties of colour be admitted, they must obtain as relative circumstances.

Rejecting, therefore, a scheme of independence, we recur to that which would make colours exist as relative facts; and such a basis comes before us with the recommendation that it accords with the former, in which all other information is presented to the mind; and permits the superstructure of the long series of perceptions and ideas that can be made to grow through relation and association. On a reference to the circumstances of colour known to the eye, we find it is actually a relative base that has been adopted by Nature for the application of these effects to form. The system we shall have to trace out will be found to be, like all the other schemes of Nature, characterized by extreme simplicity of origin, great luxuriance of development, and perfect attainment of the ends sought.

A relative origin implies the selection of a certain number of elements or principles, capable of supplying by intercombination the amount or number of circumstances that may be required for individual existences. From one element or principle we can only obtain derivatives exhibiting differences of *degrees;* from the intercombination of many elements or principles we can have, additionally, differences of kind. The latter is the more comprehensive scheme ; but then we have the difficulty of determining how many principles are to be employed. If too many are selected, we may have results extending beyond the power of apprehension given to the mind. If too few, the derivatives producible may become so limited in number, as to be unequal to the purposes for which the combination was intended. The latter defect, however, disappears, in proportion as the elements or principles selected approach the condition of first facts. The intercombination of a few remote relatives would be infinitely less fruitful than the intercombination of a few elementary circumstances.

The plan of Nature in the development of the scheme of colour has been that there shall not be a hundred distinct principles selected, nor only two principles, nor four ; but that *three* shall be the number on which the series of effects required to be produced shall be based.

The investigations that have been directed to the discovery of the nature of light, appear to resolve it into three distinct circumstances, characterized each by the possession of an effect that we call hue. Light is either the achromatised result of the union of three elements of colour, or it conveys these three elements wherever its influence reaches. An analysis of its nature shows us they are always in existence, only not visible to the eye, because not opposed to some form of matter ; which alone has the property of making colour the object of sensuous recognition. The names by which these primary relations of light are known are Red, Yellow, and Blue.

According to the Newtonian theory of colour, the spectrum afforded by a glass prism indicates *seven* as the number of original hues in Nature; and they are described to us under the terms Red, Orange, Yellow, Green, Blue, Indigo, and Violet. This nomenclature was long accepted, but we may reasonably object to it on three grounds. The first is, that blue and indigo only express shades of one hue, proceeding from light to dark ; and if it be correct to distinguish between shades of blue, then we ought to adopt the same course with red and with yellow. The division occupied by blue certainly offers a space of an intense character ; but the darkness may mean no more than that blue at its fullest value is exclusive of *light*. The second source of exception lies in the fact that later experiments have enabled us to infer that three of these hues, namely, orange, green, and violet, are merely the necessary results of the overlapping of the red, yellow, and blue rays, and are not original colours. And lastly, a nomenclature founded on the tints afforded by a glass prism, would be derived from circumstances subject to considerable variation. There are cases where some of the prismatic hues are absent. There are others where two or three are so marked in width and intensity, as wholly to overpower the rest. There are others where the usual order is subject to reversal. It is further worth noting that artificial light has its own special changes, so that the tints afforded by a prism are not finally decisive of the nomenclature we ought to adopt.

What constitutes the effects the eye calls Red, Yellow, and Blue, we are entirely ignorant. Our familiarity with the circumstances to which the names are attached, is apt to lead us to suppose we possess a positive knowledge of the origin of colour ; but this is a misconception. We do not know the ultimate facts on which colour depends. We are ignorant why red is red, or green is green, or what there is in the constitution of the mode of light blue that prevents it assuming the appearance yellow. Our knowledge is confined to the classification of observed phenomena. The first causes of the effects we see are matters of hypothesis. We are sure that the colour of a body is derived originally and primarily from light, for without light hue fails to appear; by a weak light tints are only faintly expressed; and by lights of different colours objects are made to assume varieties of hue differing from their ordinary character. We are sure that there is an inherent capacity or tendency in all bodies to the production of one definite colour, and to the exclusion of the rest; for surfaces of a given hue are only modifiable to a certain extent, and no more by lights of different colours; a red body exposed to a yellow light becomes of an intermediate tint, orange; a green body acted on by a red light is achromatised, or made to appear colourless. And these facts indicate a native capacity in the particles of matter to the production of a given hue. We have reason to believe that the cause of the appearance of any particular tint on a surface or object, is the return to the eye of that portion of the compounded mass of light which the constitution of the surface fits it to reflect; a body is red because it has a susceptibility to that portion only of the stream of light which is expressed by the term red, and returns a red light to the eye. But these and similar facts form the sum of our knowledge. The nature or condition of light whereby it thus transmits colour, or is compounded of colour—the nature or condition of any particle of illumination or of colour—the nature or condition of material surfaces, whereby each has a disposition to some one hue in preference to the rest—

are circumstances concerning which the greatest degree of obscurity exists. The various hypotheses that have been put forth give us no information ; they are no more than an exchange of one kind of ignorance for another, and merely remove the question to other ground. Euler, for instance, supposed hue to arise from the differences of velocity with which the particles of light move, and that the greatest produces red, and the least violet. Newton thought that we are to refer to the differences of magnitude of the particles of light, for the source of colour. Other opinions incline to consider the more or less of removal in space from each other of the colouring particles, as the cause. Goethe imagines colour to spring from the primordial phenomenon of light and darkness, as affected or acted upon by semi-transparent media ; and that various densities produce colour according to their degrees, beginning by yellow, thence proceeding to red, and ending in blue. Modern theories have referred to new considerations ; polarization, for instance. Brewster tells us that the breadth of a wave of red light is the 258-thousandth of an inch ; that of green is the 207-thousandth of an inch ; that of violet is the 157-thousandth of an inch. But granting the entire truth of such of these theories as can be demonstrated, still the difficulty is as great as ever. The high authorities from which they have proceeded, do not pretend to tell us why or how the conditions supposed, necessarily call up in the eye or mind the sensation of hue or any particular hue. A cause is stated, perhaps only some physical character ; but we do not learn why the effect is a necessary sequence, or what is the *modus operandi* of the cause. It is thus all through the history of the senses : our researches at last reach an impassable line where human apprehension fails, and where all the means of analysis we can devise, end arbitrarily in the position—such is the law of Nature.

To us, red, yellow, and blue appear as ultimate facts, because they are the only three effects of colour which art has found to be uncompounded, or which may not be produced by a mixture of other tints. By no combination of blue and yellow can we produce the effect, red; by no combination of blue and red can we make up a yellow; by no mixture of yellow and red, can we produce a blue. Whereas, by the intercombinations of these three primaries, we can produce every other tint known to the eye.

And yet, though we thus assume them to be ultimate facts, there are not wanting indications that we have in them by no means reached the last generalization of which their natures are susceptible; and that they are themselves but the manifestations of some principle placed further back, and, in its turn, destined to bar our further progress. It is well ascertained that these assumed primaries are occasionally *convertible into each other.* A red, a yellow, and a blue, do not in all cases retain the hue which constitutes their individuality: they can at times pass from one state into another. Chemical combination shows us that a red sometimes changes to a blue, sometimes to a yellow; a blue can assume the appearance yellow, or it may become converted into a red; a yellow is convertible to both red and blue. Not only are the primaries thus convertible into each other, but they can each assume the state produced by the combination of the remaining two. Thus a red can be converted into a green, and a green become changed to a red ; and so on of the other primaries. We can readily find instances of these changes. An infusion of turmeric, which is yellow, becomes orange and red by the addition of an alkali. The tincture of kermes, which is red, becomes yellow by exposure to the sun. An infusion of litmus, which is blue, is changed to red by the addition of an acid ; and the saturation of the liquid with an alkali, restores the blue colour. Manganese, dissolved in weak spirit, affords a yellow hue ; but the addition of hot and cold water produces the changes of green, blue, purple, and red. If to concentrated nitrous acid, which is red, one fourth part water be added, the colour will change to a fine green ; if an equal quantity be poured in, we obtain a blue, and if double the quantity be employed, the solution is rendered colourless. Most vegetable hues are convertible into red by the action of acids; and it is somewhat remarkable that, at the same time they are convertible into green, the harmonic to red, by the use of alkalies, the natural antagonists of acids. The existence of a convertibility like this proves the existence of relation among hues, or among their causes, in some remote part of their production, and whose history we have yet to trace. If the primaries were essentially the distinct facts the sense of sight roughly assumes them to be, it would be impossible that they should thus at any time pass to forms not their own, and assume characters opposite to their natures. A convertibility into each other indicates a relative origin, and shows them to be not ultimate facts, but probably the mere necessary results of one common cause, yet to be reached.

As bearing on this question, "What is colour?" we may recur to the affection of the eye known as "colour-blindness." It is stated that certain persons are naturally insensible to certain hues. Colour is seen, but not under the same designation that we affix; red may be mistaken for blue, and so on with other hues. Now what is that element or constituent in red, which may thus escape detection? Why should the special action of the rays whence results the sensation of red, ever be absent, and why, or under what circumstances, can red possibly produce the idea of blue? From the philosophical researches of Sir J. Herschel, directed to the question of colour-blindness, we learn that the source of error is not, as might be supposed, in the mechanism of the eye, but it is the result of an incapacity of the sensorium to distinguish the character of some particular hue. A red ray, for instance, is duly transmitted, but the sensorium is unable to appreciate it, and reports some other hue. Could we determine exactly under what circumstances the error arises, we should be a step nearer to the discovery of that which constitutes colour.

In the case of an asserted inability to distinguish between any two hues, say red and blue, it is not that we are confused as to their separate existence, but that the power to recognise one of them is wanting. We may see red, but we cannot distinguish what others call blue; the privation is really as regards blue. Now the insensibility must either be to a primary, or to one of the binary hues. Should it be to a primary, it would seem reasonable to conclude that all the derivations of this primary must proportionally suffer. Insensibility to one hue can scarcely exist without the insensibility extending more or less to all the related hues. If we obliterate a primary, we wipe away the hues derived from that primary, and dependent on it for their special character. Thus, if red be the colour escaping detection, then the derivatives of red—*purple* and *orange*, must lose their distinctive hues, seeing that the amount of red, which made them purple and orange, is not an object of sight. They must seem to be merely blue and yellow. Should it be a binary, then it will follow that the two primaries, which made it what it is, must be themselves invisible. If green be the deficient hue, then blue and yellow, which afford green, cannot be recognised. But these results do not seem to correspond with the features commonly described as belonging to colour-blindness.

The writer regrets extremely—if it were only for the removal of the doubt remaining on his own mind—that he has never had the good fortune to meet with more than one case of asserted colour-blindness. And in this instance his inquiries into the real nature of the privation were rendered of uncertain value, by the evident existence in the individual of an affectation of singularity, whose extent it was difficult to determine. In matters of sight it is far from infrequent that we meet assertions of qualifications, or of deficiencies, that have only a limited foundation in truth. When a person asserts he cannot distinguish red from green, and chooses to adhere firmly to that assertion, we have only limited means of meeting the difficulty. The inquiry is rendered more intractable by the fact that we should be discussing, not an affirmative, but a negative result. Where an individual asserts he can see the time correctly on a dial out of the range of vision of ordinary eyes, a telescope will decide the truth of the statement. But where he insists that he cannot see blue at all, and backs up his assertion by a steady denial of the presence of blue on all occasions, it needs contrivance and management to entrap him into the admission that he really does occasionally see some kind of blue, though possibly not so distinctly or so vividly as ordinary eyes. There is self-deception to overcome in these cases, as well as insufficient discrimination among feeble sensations belonging to particular hues.

Considerations of this nature induce the writer to receive with some degree of doubt the descriptions given to the world of cases of colour-blindness. Some species of inability unquestionably exists, but it does not seem clear how far the dispute may be one of words, and not of things. When a person asserts he does not see red, is it a question of kind, or really of degree? Where is the proof he does not see, more or less well, that which we call red, but which he calls by some other name? Through accidental circumstances, he may have failed in early life to affix the word red, to a sensation which he yet recognises. The sensation, more or less, exists to him, but he describes it otherwise than would the majority. The dispute may really mean, in many instances, do we all affix a same name to a same sensation? The evidence in favour of *some* deficiency cannot be waived; but how many eyes may yet be able to see low degrees of red, that could not cope with bright crimson: just as many eyes can bear low degrees of light, that can see nothing in very bright sunshine? Differences of organic capacity are everywhere recognisable.

It so happens that the writer is in a position to speak with certainty, as to the possibility of the existence of *degrees* of power to distinguish given hues. For a long period of time he was engaged on a series of experiments connected with this work, and having the expressions and relations of colour for their object; and during the course of these experiments he was led to remark the occasional intervention of an uncertainty of results for which he could not account, or suppose any sufficient reason. The conclusions at which he had arrived one day did not always appear so clearly justifiable on the next day; and, indeed, much shorter intervals of time occasionally sufficed to throw suspicion on the assumed results. It became necessary before going further, to determine the nature of the disturbing influence; and the main question was therefore laid aside for the time, in order to pursue the collateral inquiry. It is needless to detail the steps taken; but they ended in a very unexpected result. The writer became, for *the first time,* alive to the fact, that the fault was in his own vision. The two eyes had not precisely a same power of perception. Or, rather, to speak correctly, the sensorium was not affected exactly in a same way, under the sensations of colour conveyed by the two eyes severally. The amount of difference was extremely slight, and might never have been detected, but for the accident that the writer had been engaged in weighing, with the utmost possible accuracy, the impressions afforded by colour.

The nature of the difference was, that one eye saw any given series of hues *on a colder scale* than the other; very slightly less, yet still distinctly so. The conclusion, therefore, was that the sensorium, as connected with the left eye, was not so sensitive to the family of red rays as it was in its connection with the right eye; and further experiment soon proved this to be the case. The disturbing influence of which the writer was in search, was now readily traced. Unconsciously, the sensations conveyed through the left eye, had at times been preferentially acted on; while at other times, the right eye had been the accepted channel. Hence, a strict agreement between the conclusions reached was not always possible.

The existence of an inequality of impression on the sensorium, and of an occasional preferential use of one eye over the other, has been referred to by Sir J. Herschel, who arrived at the same conclusion by other means. The habit of alternating the action of the eyes would seem to offer some analogy with the process of changing the weight of the body from one leg to the other, giving the nervous energy the benefit of an intermittent rest. But the existence of an inequality of sensitiveness does not seem necessarily confined to the mere perception of external form,—it may possibly extend to questions of colour more frequently than we ourselves suspect. The possibility is worth keeping in view where questions of extreme delicacy of tint are in dispute.

We need not pursue these speculations, and shall content ourselves with the knowledge that, though the cause may be hidden, the primaries are certainly made known to us by the action of light on material surfaces. Light may not be the result of the junction of the hues, but the latter are certainly the product of some property of light rendered manifest by matter.

In the action upon the optic nerve, the primaries seem to be possessed of unequal degrees of strength. There is more of the colouring principle, whatever it may be, inherent in red, than in yellow or blue. An intense red dazzles the eye more than an intense yellow or blue. We can distinguish the colour red at a distance so far removed as that the others cease to be apparent. It is probable that the second place in the scale of values or of action on the eye, is to be allowed to yellow : a strong yellow would be recognised at a greater distance than a strong blue.

The comparative action of excessive light and weak light, renders evident a relation of difference among the primaries, which we are hardly prepared to expect. Excessive light means always colour at the brightest point ; red, yellow, and blue look more powerful in proportion as the light to which they are exposed is clear. Now we should thence suppose that if we were to diminish the light, the necessary result would be a diminution, *pari passû*, in the value of colour ; but this is only true to a certain extent, it is not the only result observable under a diminution of light. Down to a certain degree of privation of light, the failure in power of hue is gradual and proportionate ; but after this period a new result arises. Colour in one case is changed into light, and in another into darkness ; or rather the latter effects arise on, and supersede, the former. Thus bright red towards the close of evening, instead of gradually sinking in power proportionately with the light, suddenly subsides into darkness. Yellow equally with red, loses its hue by decay of light; but colour in this instance, instead of subsiding into darkness, disappears, while light remains. A yellow fruit, or flower, or dress, looks white, or rather pale, by an evening light. Blue is the only hue whose decay is coincident with that of the illuminating principle —a blue surface gets deeper and deeper as the light of the sun disappears, and darkness and decay of colour seem to reach their maximum at about the same time.

To the eye the primaries are possessed of qualities that appear to warrant a classification in respect of an analogy to heat and cold. By universal consent, reds and yellows are ranked as warm colours, while blue and its derivatives are acknowledged to convey the sensation of coolness and freshness. It is not clear at first if these distinctions are assigned because red and yellow are the hues assumed by flame, or because there is really something in the primaries that affects the optic nerve in a manner analogous to the sensations of heat and cold. But this latter consideration has probably the more influence in the origination of the distinction, for we can acknowledge warm and cold colours irrespective of heat or fire.

The primaries do not appear to be equally produced or exhibited in the material arrangements supplied to us. Two of them are continually the objects of sight, but the third is of comparatively rare occurrence. We find reds and yellows occurring in great confusion, while blues are only occasionally seen. If we endeavour to bring to mind one blue animal, one blue flower, one blue fruit, we shall have hundreds of reds and yellows and browns crowding upon the recollection. It is perhaps an intentional compensation for this deficiency of blue in the material aggregations offered to us, that the colour of the sky against which objects are seen, *is* specifically blue. With a blue sky, and a majority of blue-coloured forms, this hue would have been redundant, and to an excess. By a reduction of the amount of blue allowed to objects, we have a general balance of colour kept up. Whatever the intention, it is certain that in the objects spread over the face of the earth, there is less of blue than of yellow and red.

It would be an inaccurate conception of the nature of the primaries to suppose them to be effects necessarily existing invariably the same with regard to strength or intensity. In speaking of a red, a blue, or a yellow, we are apt to affix the term to some preconceived idea of these hues—some determinate degree of strength—we refer unconsciously to an individual, to some particular red, or blue, or yellow. But this would convey a far too limited acceptation of their natures; they can exist of all degrees of strength. The terms are to be taken as expressive of families or classes of effects, comprising a long series of related instances. Reds, blues, and yellows obtain in natures of all degrees of intensity, from the faintest effect which the eye can recognise, a degree but just removed from perfect whiteness, down to the deepest and fullest amount of hue which the eye can bear to look upon. Each of the primaries has its own stages of intensity.

It is of great importance to our comprehension of the scheme of colour, to determine, if possible, the extent to which the series has been carried in each case. Results will be subsequently found to flow from this source for which we are, at present, unprepared.

In entering upon the question we labour under the difficulty of not being able to define with anything like precision, the amount of difference which may constitute a *stage* in the gradation of intensity belonging to each colour. We are reduced to the comparison of same kinds, when we investigate degrees of expression of any effect, and this of itself supplies us with no measure of difference; we need means which can define the amount of increase or decrease of action on the optic nerve, necessary to constitute the perception of an individual in tint. This is a division of our subject in which as yet little progress has been made. In the case of the *ear*, the amount of difference which may constitute an individual in sound, has long been made the object of investigation; we know the ratios of the vibrations constituting each note of the scale. According to Savart, the ear distinguishes a sound which lasts only the twenty-four thousandth part of a second. But in the case of the eye, we neither know the amount of difference that constitutes individuality in quantity of form nor in gradation of tint. To enter upon the question at all, we are driven to the assumption of certain data, assent to which must depend upon the visive acuteness or sensibility of individuals, and we can offer no proof of our positions, but must refer for their acceptation to the general consent of our perceptions.

All attempts at determining the amount of gradations allowed to each primary must proceed on the arbitrary assumption of some quantity sufficient to constitute to the majority of observers a difference of degree. Suppose we have three glass tubes containing each a liquid intensely coloured red, blue, and yellow respectively, and occupying only a small portion of the tubes. Let us add to the liquids a definite amount of water (volume or weight), sufficient to cause a slight change of hue. Let us then ascertain the quantity required to produce a total extinction of the effects of the primaries. We have here circumstances that will enable us to determine roughly the extent of gradation allowed in each case. The ratio which the first quantity added bears to the last, will point to the number of tones that must exist between the two extremes. Of course the extent of the scale will depend on the exact determination of the quantity first assumed to be sufficient to cause a change of tint to the eye; and further, the experiment will suppose that the stages of gradation are equal throughout, a circumstance about which, however, there is considerable doubt; it is not at all sure that the stages of change are not infinitely more rapid at the commencement of dilution than at the close.

There may be a better mode of conducting this experiment. Let a hollow wedge of glass, of about six inches square and opening at an angle of half a degree, be filled with a red, or blue, or yellow fluid. Let the surface of the wedge be marked into four divisions placed parallel with the angle of the wedge. This is all the contrivance we require. On examining the wedge thus filled we shall find the hue produced by the coloured fluid at any given place, is of an intensity proportioned to the amount or quantity we have to look through. The angle of the wedge admitting but a small amount of liquid will appear the palest, the head of the wedge admitting the most will be the darkest. As the progression of intensity must be gradual (the sides of the wedge being planes), the division of the surface into, say four spaces, will afford a rough mechanical indication of the stages of intensity a hue may exhibit with this angle of increase. Let us now procure wedges of progressively different degrees of opening, and fill them with the same fluids, and we shall end by ascertaining the angle at which colour ceases to gain in intensity : there must be an amount of opening at which transparency ceases, and here will be the maximum point of hue. We are thus supplied with the means of filling up our scale of colour. The first angle having given four tints, we can determine how many must be afforded by the maximum angle. In truth, the last wedge employed will contain the whole scale of tints as exhibited in all the previous wedges, only crowded into a limited space.

This method, however, is, in practice, anything but perfect ; there are allowances to be made for considerable errors that may be involved. First, we have the common difficulty of fixing the exact amount of divisions which we shall allow to the first wedge of glass employed. Four have been assumed, but every eye is not of the same degree of ability in the recognition of differences of tint. It is in the eye, precisely as with the ear, that differences of cultivation confer differences of susceptibility ; and that the practised sense can distinguish individuality and disjunction, where the uncultivated only sees continuity and identity. Hence, the selection of the number must be determined by the consent of the experiments of many persons. Second, there is a difficulty in the determination of the number of tints that can occur ; they appear in the wedge in a continuous order, whereby the limits of differences are melted away. If we cut pieces of paper of a tint and size to match the divisions we have allowed to the wedge, and place them in the order in which the tints themselves occur, we shall find considerably more difficulty in distinguishing the amounts of difference, than when we refer to the same pieces not arranged with any reference to order, but mismatched. In the first case, progression deceives us; in the second, we look at the tints for themselves only, and through disjunction of value recognise individuals. Third, we are liable to be influenced by considerations arising from the nature of the liquid employed, and unconsciously referred to a question of colour; thus the fluid may possess a more or less of intensity, and it besides may be of various degrees of purity. Fourth, the substance—glass—containing the coloured fluid, is not in itself absolutely colourless; we have, therefore, to examine effects of hue modified by the superinduction of an extraneous tint, and which may more or less affect those we have to consider: some families of hues will have their brilliancy impaired by the colour of glass; others will be changed into a new series; others will be partially achromatised; and these extraneous influences materially affect our calculations.

A third mode of testing the range of strength allowed to each primary would be the following. Let us take a perfectly colourless powder, such as prepared chalk, arrow-root, or magnesia, and to a known quantity of this in its dry state, let a certain quantity by weight or measure of any pigment be added that is of a strong red hue, say vermilion, and equally in a dry state; but let only just so much be added as suffices to tinge the white powder sufficiently to constitute a difference. Of course the amount that may be thus necessary will again depend on individual acuteness of sight in the detection of tint, and can thence not be fixed ; still a very small quantity is generally sufficient. Let the additions be continued, preserving for comparison a duplicate of each stage, till at last the white powder becomes converted into apparently a pure vermilion hue. All the quantities known, we shall obtain data that will enable us to calculate roughly the number of tints of red recognisable by the eye, between its most intense expression and perfect whiteness.

It is evident that in founding a calculation on the stages afforded by the above, or other similar means of investigating the extent to which a scale of colour may be carried, great allowances will require to be made. We shall have but approximations to the truth, and the sources of error are such as are probably only to be sufficiently guarded against by persons who are practically conversant with effects of hue, and who have the means of testing in other ways the soundness of the deductions to be made from these sources. It is on the ground of experiments thus admitted to be fallible, but subjected so far as was possible to the examination of practical tests carried on through some considerable period of time, that an assumption will here be offered as to the extent of gradations we may recognise belonging to each primary.

It is probably quite within the mark to say that the eye of a common observer has the power, though generally unconsciously exercised, of readily distinguishing thirty tints, or gradations in strength, of red, thirty of blue, and thirty of yellow. This is but a limited number, and is meant to exclude all delicacies of expression. A cultivated eye knows a far more extensive scale; but it will be safer to build on data afforded by perceptions of only average value, and the calculation we shall presently have to offer becomes formidable enough, even under this careful limitation.

But colours are susceptible of combination under two forms. The first is called *Binary*, and implies a union of the primaries two and two. That is, red with blue, red with yellow, and yellow with blue.

Binary combinations possess a marked characteristic, that of giving birth to a series of hues not less brilliant than the primaries employed. This mode of combination does not injure the principle of colour, and the result is the production of three new families of hues. Red mixed with blue, gives rise to purple; red mixed with yellow, produces orange; yellow mixed with blue, affords green. It is indifferent under what shape, or by what means, we test the correctness of these results, whether by the union of coloured rays of light separated by a prism, or by the mixture of coloured fluids, or of coloured substances,—in all cases the consequences are as here stated. We can give no reason why these consequences follow, for we cannot determine what it is that constitutes the hues of the primaries.

To binary hues we are, of course, to assume the same number of degrees of strength we have supposed to the parent hues or primaries, namely, thirty degrees; proceeding from a full power of colour down to negation, or whiteness.

So much for degrees of strength of the six chief hues; but strength does not express all the characters of colour. In speaking of red, or of any other hue, we are apt to suppose we have sufficiently defined the appearance before us; but a minute's reflection will show us that reds have not one uniform expression: we know many species of this colour. Scarlet and carnation are both reds, yet they are distinct in character. Flowers will show us a wide range of hues, which all belong to the family of reds, yet are dissimilar. The leaves of trees and shrubs are all green, yet a glance at a cultivated garden will discover so many varieties of this hue that we shall be puzzled to name them. So it is with each of the primaries and of their binaries. Red, yellow, blue, green, purple, orange, are merely names for *families* of colour, and each comprises many individual instances.

To understand what is conveyed by the existence of this variety of expression, let us conceive the six chief hues as fusing into each other on each side by intermediate hues. And the manner of this may be shewn by following out the modifications of which any two, say red and blue, are susceptible. Let us suppose we have before us a pure red, at its fullest strength, which we shall express by a value of 100. Let a red be placed next to it which is the result of the mixture of 99 parts red with one of blue, equally pure. Let another follow whose effect is produced by 98 red, mixed with two of blue. Suppose the same process continued, and we shall find the purity of the red giving way to a crimson bloom. At about the 70th stage of red and 30th of blue, we shall perceive the commencement of the red purples. At about the 50th stage, or the mixture of equal amounts of red and blue, we shall get to the pure purples at their fullest power. By continuing the process at about the 30th stage of red, and 70th of blue, we shall reach the family of blue purples; and finally, we shall get to a hue made up of one red to 99 of blue, ending at last in pure blue, expressed as before by a value of 100.

Just in this same way, we can follow out the changes that ensue in the fusion of red and yellow. Allowing a same range, we shall have to proceed through the families of red orange, pure orange, yellow orange, up to pure yellow. Or again, in the fusion of yellow and blue, where we shall successively meet with the families of yellow green, pure green, blue green, ending at last in pure blue.

The question now arises, how many degrees of expression shall we assign to each family? This question, like that of the perception of degrees of strength, is one that can only receive an arbitrary decision; we must proceed on the assumption that eyes of ordinary power possess some fixed range, and we must leave out of the calculation the wider range attained by cultivation of the perceptive power. We might, perhaps, fairly ask whether all the hues can legitimately claim a same extent of expression; but for the sake of clearness we will pass over this possible doubt, and assume a same number of stages for all. It is probably a perfectly safe conclusion if we determine that eyes of average power can readily recognise fifty degrees of expression as to purity of each primary, and of each binary. If there be error in this amount it is on the side of an under-statement. We shall therefore obtain 300 modes of expression of primary and binary hues.

Every one of the reds, yellows, blues, oranges, purples, and greens we can detect in nature must belong to one or other part of this scale of colour. Yellows may be pure, or may betray a tendency to orange on one side, or to green on the other. Greens may be pure, or may be connected with yellow on one side or with blue on the other. Blues may be pure, or may be combined with green on one side or with purple on the other. Purples may be pure, or be connected with blue on one hand or with red on the other. Red may be pure, or may melt into purple on one side, or into orange on the other. Orange may be pure, or may tend to red on one side and to yellow on the other. And it does not necessarily follow that the species of admixture shall be instantly detected : the modes of expression of many are so delicate that it will often need a practised eye to detect them.

It will be remembered that to each of the primaries and binaries, we assumed the existence of a range of degrees of *strength* extending to thirty tints, and ending in pure negation, or whiteness. Now to each and all of the 300 varieties of hue producible by the primaries and their admixture, and whose history we have just traced, must be allowed the same range. Each of the 300 degrees of purity we have established has thirty degrees of strength, and each terminating in privation of colour. We thus obtain 9000 modes of expression of the chief hues.

We have hitherto only examined the results afforded by the primaries and binaries in degrees of strength and of purity. But this will give a very limited view of the combinative properties of colours. We have above only the elements with which Nature begins the series of changes required for an unceasing variety on the face of the objects presented to us. *Binary* combination expresses but one of the forms possible. That which Nature seems universally to prefer is designated *Ternary* combination, and which may be explained as afforded by a union of the three primaries in ever-varying proportions.

While binary combination produces hues equal in brilliancy to the parent hues, ternary combination evidences a singular result ; it is that of destruction of colour. The result of the mixture of the three primaries at equal intensities, and in equal purity, is complete achromatism. It is certainly strange that the union of effects possessing a common property—colour—should be productive of a loss of this property. The fact is so, however, and we have here a phenomenon which might be found of value in the determination of the difficult question, what is the nature of colour, or by what is it constituted ?

The composition of light affords us a distinct example of achromatism. A ray or stream of light consists of variously coloured pencils. In their union, all hue disappears, and we have a result produced, which is absence of colour. Newton has shown that if the three primaries into which a prism divides light be recombined, or be made to strike on a same spot, the consequence is a colourless point of illumination, while, if only two of the primaries be employed, we gain a tint which it is the nature of the primaries selected to produce by combination. We may arrive at this same conclusion by other means. If a ray of sunshine be made to pass through a piece of glass stained red, so as to strike on a piece of white paper placed beyond, we shall have a red effect produced on the paper. If between the paper and the red glass a second glass be interposed, coloured blue, the illumination becomes converted into a purple tint. If a third glass be interposed, coloured yellow, the purple is destroyed, and only a colourless grey can be observed. The greyness, or partial obscuration, is due to the incomplete permeability to the rays of light of the three pieces of glass. It will be quite indifferent in what order of succession we place the glasses. Any series may be adopted, and so long as the glasses are stained of a same degree of intensity, the final consequence will always be achromatism. Again, if we take three glass jars containing severally a liquid strongly tinted red, blue, and yellow, we shall find that by mixing any two we obtain the colour that naturally results from the union, and that the addition of the third destroys the colour, and produces a muddy or dirty grey. Again, the grey is the result of the presence of colouring particles of matter impervious to light. This last mode of examining the consequence of ternary combination is the more interesting and instructive, in that we may trace the growth of the result in the *gradual* addition of the deficient primary. A slight portion added begins by tarnishing the binary hue, and the deterioration is distinctly consequent on the quantity we proceed to pour in.

Ternary combinations, more especially of the class which implies a mixture of the primaries of unequal strengths and purities, in truth express an effect of colour so extensively spread over nature, as that it becomes more easy to say where it is, than where it is not. It is more than doubtful if in any part of Nature we really know what colour can be in all its power. We have probably nothing more than forms of individuality, and thence intentional deteriorations of possible perfection.

Dyes, pigments, and chemical mixtures offer us many forms of expression of reds, and blues, and yellows, each claiming to be a brilliant hue ; but the existence of a difference among those of a same class is proof of the presence of some mode of deterioration by admixture. The red, or blue, or yellow is tinged, or changed, or tarnished in its expression by the addition of some slight proportion of one or more of the many shades of the other primaries. This, which is true of the primaries, is equally true with the series of their derivatives, or subordinate gradations of strength.

Assuming that ternary combinations were only to take place with exact equalities of strength and purity, the result would always be achromatism everywhere ; no colour could be seen. But it suffices to employ constituents, one of which betrays some slight excess or deficiency, to produce a new series of hues distinctly recognisable, and almost infinitely variable. The range of combination here opened is so very extensive that we are tempted to disbelieve its existence when it is detailed to us.

A German writer—Meyer—endeavoured to ascertain the number of combinations derivable from the three primaries, modified more or less with black and white. The result of his experiments appears to have been the recognition of only 819 different tints. This amount is so far under the amount attained by others, that there seems a great probability either that the means employed by Meyer were insufficient, or that the visive acuteness of the individual making the experiments was much below the common level. The validity of the conclusions is, besides, open to objection, from the fact that the premisses refer to a circumstance wrongly admitted in a scheme of colour. Black should have been excluded. In the definition of tones of light, black is correctly referred to as an element, for it expresses privation of illumination, but it has nothing to do with combinations of tints. It may be mentioned parenthetically, that in popular conversation black and blackness are commonly assumed to be the opposites to white and whiteness. This is an erroneous classification. White is negation of colour; black is privation of light.

It is said by Goethe, in his "Winkleman und sein Jahrhundert," that the mosaic workers in Italy, whose business it is to compound in particles of coloured stone, placed on a flat surface, correct imitations of the works of both nature and art, are accustomed to employ a number of tints nearly one thousand times greater than that which has just been given on the authority of Meyer. They are said to be in the habitual use of fifteen thousand varieties of hues, each variety comprising fifty tints; and this is a gross sum of seven hundred and fifty thousand changes of colour. It is of little consequence whether or not these tints are all wanted on one occasion, or for one piece of workmanship; the existence of an ability to recognise the differences is all that need be contended for. Perhaps mosaic working is not a bad mode of testing the amount of tints that can obtain—at least, it may be depended on to a certain extent. The hues of nature in nearly every case gradate by insensible degrees, and the attempt to imitate these hues by particles of coloured stone, is an artificial mode of superinducing disjunction or stage, on insensible gradation. By the admission of separation among the tints, we are led to the knowledge of how many are required to imitate any particular effect, and how many are called for in the general representation of Nature. Its defect, however, is the following : that while in Nature the portion of tint which each stone represents gradates on each side into its neighbour's, in mosaic imitations this tint does not gradate, but is throughout of the same strength ; whence, by the practice of mosaic working we shall not obtain the number of tints really existing in Nature, till we can find and employ portions of coloured stone no greater in extent than a particle of gradating colour. This we cannot do. Mosaic working, therefore, only gives us a *minimum*. We have, of necessity, less tints than actually obtain in Nature.

We have assumed fifty varieties of each family of hues, and to each variety thirty degrees of strength, which will give us 1500 tints. Now, supposing we have yellow before us, we can combine the 1500 tints with any of the whole series of hues placed between red and blue, being 100 varieties, each of which affords thirty degrees of strength. The result is 4,500,000 changes.

Let us now take fifty varieties of blue, each having thirty degrees of strength, and we get 1500 tints. These we may combine with any or all of the family of hues contained between red and yellow, being 100 varieties, each having thirty degrees of strength. The result of the combination will be a second amount of 4,500,000 varieties.

Let us, lastly, take fifty varieties of red, each having thirty degrees of strength, making up 1500 tints. These we may combine with the family of hues contained between blue and yellow, being 100 varieties, each having thirty degrees of strength. We gain a further amount of 4,500,000 varieties of expression.

The sum of these three forms of ternary combination is 13,500,000 ! ! But from this vast amount should in strictness be deducted all the instances of pure achromatism resulting from the mixture of the primaries, or their several degrees, at an exact equality of strength, say 4500 instances. The number left is still so enormous, that it is difficult to admit its accuracy. But the opinion already given is here repeated, that the error is far more likely to be on the side of an under-statement than on that of exaggeration. The power to recognise a still more extensive range is certainly obtainable by cultivation of the organ of sight. Sensitiveness to colour can be developed just as can sensibility to sound.

We must not, however, understand that ability to recognise this large army of tints means that we are able to point out each singly and seriatim. We acknowledge very many, merely by reason of their occurrence in succession to, or in the midst of, other tints of a different family. We should be unable to select any one, blue-grey among others nearly like it; but we could readily refer to it, were it placed among faint pinks or yellows.

From the preceding sketch of possible combinations of colour, it will be seen that precision of language in this division of our subject is an impossibility. How can we treat clearly of that for which we possess no names ? We can speak roughly of a yellow-green, a blue-green, but where are the terms that indicate the several stages lying between the extremes? It is the same all through the scale of colour, though clearly the object of sight-language fails to point them out. It would be very desirable that some scientific nomenclature should be devised to replace such arbitrary terms as Waterloo blue, cherry red, Isabeau yellow, puce, Bismark yellow, which tell nothing of origin, or mode of formation, of the tints implied.

Of course, it is not meant to be asserted that the whole of this number of tints can be in view at any one time, or on any one series of objects. The calculation is of value only as serving to determine the number Nature has to work with, in ornamenting the objects spread over the surface of the globe, or constituting the visible world. The probability is, that at any one given time we see but a limited amount, and the number seems roughly determinable by class in creation, and by period in time. To take note of the whole series, we may require to use our eyes for months in succession, and experience the changes of seasons and places in addition.

We have now gone over the machinery devised by Nature to preserve the surfaces of objects from the monotonousness of a colourless illumination. Three roots of colour, under the distinctions of kind and degree, are found to be amply sufficient for the variety required. But there is yet a further inquiry before us.

In describing the characters of the primaries, the notice of a marked law of their co-existence has been purposely deferred, in order that the extent of its application might be better seen, through the knowledge of the amount of combination allowed to the sources of colour. This law peculiarly deserves our attention, in that it seems by no means a *necessary* condition of the co-existence of the primaries, but appears to exemplify a purely benevolent intent, allowed to operate in the creation of the world of sight, and superadded to the wonders spread out for us.

In calling colour into being as a means of diversifying the face of creation, of more distinctly defining separate masses of matter, and of affixing additional individuality on form, it must be obvious that there would have been a contradiction admitted to the scheme, and that it would have worked against the primary law of the senses, had the effect thus created, and thus applied to Form, been of a nature to act *offensively* on the organ to which it was addressed. Supposing that the perception of the effect of colour were naturally productive of a feeling of pain, it would become a consequence that all the advantages pointed out as attained by its introduction would be more than lost in the grand defect ; that through colour, we should be impelled to turn away dissatisfied from the very wonders we had before been accustomed to contemplate with gratification, and whose influence colour was intended to heighten. It would be a consequence that the exercise of the sight would no longer imply an undivided sensation, but would have to be founded on two antagonistic principles, namely, the pleasure arising from the perception of Form, and the displeasure consequent on the perception of the hue attached to it. We cannot suppose that faculties to be constantly exercised can have been conferred on us with the penalty affixed to them of calling up perceptions of pain as often as they are in use. We must, therefore, conclude that it is not a part of the scheme of creation that colour should possess an offensive action on the eye.

But even excluding pain from the scheme of colour, there yet seems no reason why hue should not have been left in itself a *negative* circumstance—that is to say, a circumstance without action over us ; and that for the purposes of gratification we should have been limited to the pleasure we derive from the perception of the admirable attainment of the ends the creation of colour was intended to answer. Utility was fully provided for directly the scheme was found equal to the superinduction of variety, distinctness, and character in the effects of shape offered us ; or, at most, if pleasure were to be afforded, we might have been confined to the gratification which colours, taken by themselves and *separately*, could be made to produce. It is true that under this last scheme, as all colours would be equal in their production of gratification, the eye would have been exposed to a monotony of pleasure ; and this is a result which would soon cause the effect of colour to be lost to us in wearisomeness or forgetfulness.

Nature, however, has not stopped at these plans. More than mere utility has been attained; and a more perfect scheme than gratification consequent on the perception of *individual* colour has been followed. The selection of the scheme adopted can only be taken as evidence of the existence of a purely benevolent aim in the Intelligence that has planned the visual world, since it oversteps mere utility, and superadds gratification.

It is a condition of the existence of the primaries, and at the same time a co-ordered condition of the mind which is to accept them, that the perception of the co-existence of the three roots of colour is productive of pleasure. When red, blue, and yellow are seen in conjunction without any exercise of reason, and instantaneously, a sensation of gratification is conveyed through the eye. It is a necessary result of their co-existence, that this pleasure is experienced. The term commonly applied to the relation we then form is that of *harmony*.

This relation of the primaries is exemplifiable in two forms. We may have the three primaries existing singly, whereby the eye would have to gather in the three constituents successively, to form the relation on which the pleasurable perception is founded ; or two of the primaries, in a state of combination, may be accepted in conjunction with the third in a pure state, whereby we should only need to refer to two circumstances for the formation of the relation. The result is the same in both cases. Red, blue, and yellow accepted in any given order is, of course, the first case. Red seen with green, blue with orange, and yellow with purple, exemplify the second. Of the two modes, the latter is the more forcible and popular exemplification of the law. It is very commonly known that yellow harmonises well with purple, blue with orange, and red with green.

Colour being subject to deteriorations in respect of intensity and purity, this relation is necessarily open to imperfect forms of expression. The maximum, or standard, is given when the three primaries at high degrees of intensity, are exactly balanced in strength. The continued observance of this exact balance, while colour declines in strength, affords the first class, assumed by variations of forms of harmony. We have to admit the existence of as many modes of observance of the law as there obtain gradations of strength. So long as equality of intensity is kept up, it matters not what place in the scale of values the derivatives of the primaries may occupy. The law will be equally observed, whether we take the primaries at their first, or twentieth, or last degree, the pleasurable action only decaying coincidently with decay of strength. The scale of values thus given may be accepted in contradistinction to the next class, as the pure series. The second class is essentially an imperfect exemplification of the law of harmony. There is no express regulation of Nature whereby the primaries or their derivatives shall only obtain in juxtaposition at a perfect equality of strength. Bodies are so variously coloured—the causes which control their localities are so many and so variable—that we are continually open to the perception of arrangements of hue, departing in various amounts from the perfect equality of value just referred to. One or more of the primaries, or of the shade employed, may be above or below the degree of intensity required for the production of perfect harmony. In these cases the pleasurable sensation is diminished by an amount proportionate to the degree of departure from the standard equality. We have no new sensation to notice ; we merely fail to experience the full amount of gratification of which we might be susceptible. We have here an impure series, and which may extend to the extremes of dislocation of value.

These two classes of harmonic combination extend throughout the scale, and embrace every effect of colour known to the eye. It follows, therefore, that we cannot point to a single hue, however near to or remote from a primary, which has not its corresponding harmonic tint ; and not only does there exist the tint which exactly harmonizes with it, but there obtains a long series, evidencing more or less of departures in point of strength and purity from the greatest degree of harmony which the place in the scale of intensity of the original tint would afford. Every hue has its own natural harmonic in respect of intensity, and in respect of purity; and further, each may be connected with a long series which only imperfectly approach the exact condition required to constitute harmony. If, as has been supposed, we have above thirteen million of tints to distinguish, we can readily conceive how nice must be the visive capability which can recognise harmony all through the remote relatives of this wide field of subordinate effects; and yet there is little doubt that we do daily exercise the capacity, though unconsciously, the only difference among individuals being in the extent to which the perception is developed.

The faculty which, in the technical language of the fine arts, is called skill in colouring, is the result of a perception of this harmony carried to an extent of accuracy very far above that of the common level. The finished colorist can not only exclude absolute discords, but he can exert a power beyond this; he endeavours to reject all the effects evidencing *imperfect* harmony, and to take up only that relation which exactly obeys the law. The faintness of expression of the tints he is regulating should be no obstacle to him. That, however, the attainment of this perfection of colouring is really difficult, is proved by the annals of the fine arts, which show but few perfect colorists.

The perception of these relations of colour is variously evidenced in different individuals, and even in different nations. Some persons have a quick and keen perception of harmony of hue; others show only an obscure feeling. In some persons the faculty is of easy development; in others, cultivation appears to be of no great avail. Indeed, individuals exist who have probably never known the pleasure consequent on the perception of harmony of colour; in the same way that there are persons who are unconscious of the gratification that results from the sound of a perfect chord in music. Even nations and races of people differ among themselves in the possession of the capacity: the English school of Art is said to evidence the existence of a vivid perception of harmony of colour.

A marked class of proofs of our recognition of the law of relation we have been tracing, is afforded in the effects which have been called spectral colours. It appears that when the eye has for any length of time considered a particular hue, subject to a strong illuminating power, on closing the eye, or even on directing it to some other object, a peculiar sensation in the optic nerve can be distinguished; namely, the perception of a colour, and which is not that of the object first seen, but always the *natural harmonic to it.* Thus, if a piece of bright scarlet paper be placed on a ground of pure white exposed to the sun, and be considered for some time, we shall see on removal of the scarlet paper from the white ground, a green spectrum of the same size and shape. The same effect will be produced by writing with common ink on a sheet of bright red paper; the ink will lose its character of blackness, and will seem of a green hue: it is even difficult to believe that the writing is not green. There are various other modes of producing these spectra; and in all cases it will be found that it is by no means any hue indifferently, but only that naturally related to the colour actually before the eyes, which is produced. Sir David

Brewster, in his second letter to Sir Walter Scott, gives the following table of spectral hues. He says that—

Red . .	suggests	Bluish green.
Orange . .	,,	Blue.
Yellow . .	,,	Indigo.
Green . .	,,	Reddish violet.
Blue . .	,,	Orange red.
Indigo . .	,,	Orange yellow.
Violet . .	,,	Yellow.
White . .	,,	Black.
Black . .	,,	White.

There is probably some little inaccuracy in this list, through the difficulty of conveying particular sensations by means of written language. Reddish violet, for instance, is not the exact harmonic to *pure* green, though it is to a blue green. The exact hue of the colour employed, requires to be taken into the account: and in describing the results, we must bear in mind the difficulty of defining individual perceptions of particular hues, and our want of a sufficient nomenclature of perceived tints. A corrected scale would be afforded in the following table :—

Red . . .	suggests	Green.
Orange red .	,,	Blue green.
Orange . .	,,	Blue.
Yellow orange	,,	Blue purple.
Yellow . .	,,	Purple.
Yellow green .	,,	Purple red.
Green . .	,,	Red.
Blue green .	,,	Orange red.
Blue . . .	,,	Orange.
Red blue .	,,	Orange yellow.
Purple . .	,,	Yellow.
Red purple .	,,	Yellow green.

Such is the scheme of colour which it has pleased Nature to call into existence for the use and gratification of the eye—such is the system which the consent of the perceptions of all those who have investigated this division of creation, warrants us in admitting. It is a waste of time to inquire how it is that the circumstances we have been reviewing are enabled to act upon us as has been described. The attempt to enter upon the question of the mode in which the human eye, or rather mind, knows or is conscious that harmony of colour is or is not present, is unavailing; for the investigation must of necessity be stopped at a certain point. Whatever hypothesis we may think fit to put forward as a solution, will eventually be found to rest on an ultimate fact, totally unexplainable save by the broad reason,—such has been the will of the Creator. When Newton supposed that the gratification we derive from the perception of colour arises from the proportions of the vibrations excited in the optic nerve, we were not finally informed of the reason of our experiencing certain sensations. Let us admit this view, and we have still to fall back upon the question of how it is that "proportion" thus affects us; we only shift the difficulty from one word to another; we refer to an equally mysterious agent. Any theory we may adopt will labour under this same defect; we can only name a cause, and not show how this cause comes to act. In all matters of sensation, the connection between the outward fact and the inward perception, is totally hidden from us: we must at last fall back upon the argument that the sequence is a part of the scheme of creation. Every hypothesis we may take up involves this position, and must conclude as arbitrarily.

The amount of influence over the mind exerted by colour, is by no means a settled question among theorists: its merits have been at times unduly exalted, and at times its fair claims have been denied. One set of persons are agreed in ascribing to colour joined to light and shade, all that portion of our perception of the beautiful which comes under the head of organic pleasure; while others appear to deny to colour any further influence than that which may spring from the growth of accidental associations. Payne Knight is a representative of the first class of opinions. We are told by this writer that "the beauties of light and shade, and colour, are all that affect the eye, or make any impression on organic sense and perception;" and that "Beauty consists in harmonious, but yet brilliant and contrasted combinations of light and shade and colour; blended, but not confused; and broken, but not cut into masses." Opposed to this theory, and representing the second class, is the opinion of Alison. The "Essay on Taste" of this author, gravely informs us that "it is the colours only of the dress of the great, of the opulent, or of distinguished professions, which are ever considered beautiful: white expresses or brings to mind cheerfulness; black, gloom; blue, serenity; purple and ermine, dignity; scarlet, martial qualities. Wherever colours are felt as producing the emotion of beauty, it is by means of this their expression, and not from any fitness in the colours themselves to produce the effect." Here are two opinions in direct opposition: Payne Knight asserts the existence of a system of combination of hue, affecting us organically: Alison refers to colours singly and individually, and denies their influence over us except through the channel of association.

It may be worth while to notice as a contrast to the non-practical positions of the latter writer, the attempt of le Père Castel to construct a "Clavecin Oculaire," or visual harpsichord, on the belief of the existence of the very organic action ignored by Alison. Castel supposed it possible to construct a machine which should interest the eye through hue, as a harpsichord does the ear by sound. The attempt was made. Instead of keys striking notes, a machine was exhibited in which keys being pressed in a certain order, thrust out from cavities different colours, or differently coloured surfaces, in modes of succession accordant with the system believed to exist in nature. The contrivance was ingenious, and excited considerable attention among the *savans* of the day: but that it soon fell into disrepute is not surprising, when we recollect that colour is only one of the constituents of the effects prepared for the eye; and one, moreover, that occupies no higher rank than an ornament. To act upon the eye with a meaning, we require to take *Form;* the selection merely of one of its *qualities* is a manifest error.

Truly to understand the station that colour occupies in the scheme of visual effects, we must begin by discarding every perception of association, and every idea which may spring from this source. We require to perceive that the ideas arising to us through the channels of association, constitute a distinct inquiry from the feelings with which these associations are originally connected, and on which they are founded. If in our attempt to ascertain the claims of colour, we detect ourselves to be engaged in the investigation of the kinds of ideas which given effects of hue may *suggest,* we have quitted the true question before us. We require to ascertain the conditions implied in our perception of external effects ; if we pass the bounds of this inquiry, and glide off to the myriads of associations that are built upon the perception, we get upon a subject which is as little capable of leading us to a knowledge of the conditions belonging to hue, as would be the investigation of the associations we build on perceptions of sound, to make us acquainted with the conditions of the harmony known to the ear. The associations that arise to us through perceptions of colour are innumerably extensive ; and it is often extremely difficult to avoid being led away into questions foreign to that which ought to occupy us. To take a particular instance, in a human countenance before us, we perceive an effect of colour which we may be induced to describe by the terms, glow of health, blush of modesty, pallor of feebleness ; but the real question is, not what idea the effect perceived *suggests*—health, modesty, feebleness, are mere associations—but what are the conditions under which the tints observed co-exist, so as to produce these or any other effects. To know that the hues before us are like those which usually accompany health and modesty, implies our capability of accepting previously certain combined effects of colour : and it is strictly to the conditions of this previous perception, that we are to confine our attention.

It is a fundamental error to consider colour as of *itself*, capable of suggesting any one idea to the mind : it has not this property. Hue is but a quality of light. If we attach any definite meaning to perceptions of colour, it is not that colour is of itself capable of calling up these ideas; but because colour only obtains in connection with the circumstance which light serves to exhibit, namely, Form; and on which our ideas *are* founded: without the connection, colour would lose its power. To perceive the inadequacy of hue to act upon the mind alone, let us suppose ourselves in possession of the principles it implies, in any form or under any shape we please. Let us suppose that we have the means of wielding at will the elements that constitute colour, and that it is in our power to separate and combine them in unlimited perfection. Having this ability, exerting it to its fullest extent, and assuming that nothing but colour is before us, let us ask what effect of totality we shall be able to produce, and what will be its action over the mind. We may set out combinations of hues *ad infinitum*, but what shall we obtain?—mere effects of colour. It is clear we may not assume to the hues we employ, nor to the combination made up, any conception of limitation in space, for this is an idea of Form. We must not suppose these colours attached to any definite surface, or occurring on any particular objects, for this is no longer an unmixed consideration of colour, but is the examination of coloured Form; that is to say, Form with a quality, whereby colour is rendered subordinate to another effect. If we are not to suppose shape or body to the combinations of colour produced, we are driven back to the bare conception of a system of harmonic ornamentation, as the utmost hues can effect.

It will be found that we really cannot adduce a single instance of an effect known to the eye, and possessed of a definite meaning, which consists of colour alone and without Form: some of the modes of occupation of space by matter must be present, if there be a meaning attached. We cannot escape this conclusion. All effects of colour must, as objects of sight, have bounds; they cannot extend *ad infinitum*, and be at the same time known to an organ which is not all-pervading, but is essentially limited in the sphere of its action. Non-infinite extension, even taking it in its most simple sense, a mere plane surface, is *limitation of extent*, and limitation of extent is a consideration of Form,—is that which constitutes Form to the eye. Whenever we see colour, we see an extent of space which is coloured: we see a mass of something—that is to say, a something having shape—which offers to the eye the effect we call colour. That the mode of the limitation in space is really the base to which all our ideas are attached, is seen by the fact that if we take away the idea of Form from the effect of colour perceived, all meaning at once falls to the ground.

However we may magnify colour in importance, it is really no more than a mere quality of Form. Our conceptions of beauty, therefore—if beauty imply definite existence—cannot arise primarily from colour, for by colour alone no idea can be suggested to the mind. If beauty be organic at all, it must be organic in other modes, through other channels, than colour; for colour of itself has no definite meaning. The share of colour in the production of the beautiful is, in truth, no more than that which has been already detailed: it is but the sensuously pleasurable shape in which variety is thrown over the elements that really constitute the beautiful. Matter offered to the eye or created for the organ of sight, must be limited in space; hence Form: these limits must differ among themselves, else all would be alike; hence kinds of Form. Form is that to which the visual ideas of an external world have been attached; and a portion of these ideas have been made pleasurable; hence our perception of the beautiful. Form might have been made monotonously of one hue; but it has been judged preferable to vary the effects of the surfaces created, by the addition of tints which are thrown back to the eye with the light that renders Form sensuously known to us; hence colour. It has been a last step to make colour itself the means of producing gratification in the organ to which it is offered; but this gratification implies no change in the subordinate station colour occupies: pleasurable colour may, or may not, accompany our perceptions of beautiful objects: the beauty is in the Form; the colour is an accompaniment: and the harmony may, or may not be, wanting. An ugly Form may be beautifully coloured; and a beautiful Form may be colourless, or even discordantly tinted.

It only remains to complete our history of colour, that we should review the modes in which hue has been applied by Nature, to diversify the effects presented to us.

The appearance of colour is manifestly subject to control. The universality of light would result in the production of hue in every place open to illumination, and to an equal amount; were it not for some provision in the substance that constitutes Forms, whereby this hue becomes restricted in respect of time and place. We do not find that colour is the common property of all objects of sight; nor do we find any hue equally bright at all times, nor appearing in all places equally. There would seem to be a more or less of capacity bestowed on bodies, subjecting the appearance of colour to restriction. Light is at all times ready to shed its colouring influence ; but matter is unequally prepared or fitted to render this influence sensuously manifest. We will endeavour to follow out some of the forms of restriction observed in the material circumstances around us.

Colour does not appear necessarily to accompany density of matter, for we find hues equally bright on the earth and in the air : but bright hues are more common on the earth. We have occasionally such an effect as a brilliant sunset, a rainbow, a gorgeously coloured cloud ; but we have *constantly* the circumstances of bright-coloured mineral, vegetable, and animal Forms. Further, colour does not appear necessarily to be present with opacity, for we have strong effects of hue accompanying transparency ; but commonly more bright hues are found in dense collections of matter than in the opposite condition of being.

Smoothness of surface is not necessarily accompanied by brightness of colour : but smoothness is the condition most favourable to the exhibition of tint. Even where bright colour does not exist, the occurrence of smoothness of surface operates to the production of a clear expression of the tints that are admitted. On the other hand, porosity of surface does not necessarily mean absence of colour, for we have instances of porous surfaces presenting strong hues ; but commonly porosity is the condition most unfavourable to the appearance of colour : its presence is even indicated by a low power of hue. On smooth surfaces, colours are always distinctly marked and intelligible : on porous surfaces they are found to be diffused and broken down.

Effects of colour seem to have been especially reserved for the exterior of bodies—at least, this rule holds good with a large majority of the circumstances offered to the eye: and there is fitness in the restriction, considering that colour was not so imperatively required for the portions of Forms that are out of the range of vision. The interiors of bodies fail to present us with the richness and brilliancy of hue assigned to the exteriors. The plumage of birds, the fur of animals, the tints on the wings and coats of insects and on the petals of flowers, are all external effects; and sections of the interiors offer us a far less attractive display of colour. The exceptions to the rule obtain principally in the lowest division of creation—the mineral world: here, fracture is often needed to exhibit colour to the full amount. It is, perhaps, an instance of a same intention to assign colour to visible surfaces only, that the hues spread over the face of the earth are far more numerous and vivid than those hidden from sight in the sea. Fishes fail to exhibit the general brilliancy of hue that we discover in birds, or insects, or flowers.

The brightest hues that belong to bodies will commonly be found to occur on some of the *convex*, and not on the concave, surfaces. It is usually on the prominences of Forms, and not in the hollows separating these prominences, that we are to look for vividity or distinctness of colour. This rule is often very plainly evidenced.

Very few Forms possess only one hue throughout: and in the application of the colours that are admitted, there is always a more or less of fusion—that is to say, we have not sharp edges, and defined limits, among the tints;

but a carefully softened amalgamation. No tint stops suddenly; but each flows into its neighbours by a succession of intermediate stages. This fusion is always in strict accordance with the laws of colour already detailed: the hue that connects any two others, is invariably the natural compound of these two, both in kind and in degree: a discordant intermediary is not to be found.

The scale of colour allowed to any one Form, commonly embraces a very wide range in power, but a very limited one in kind; or, in other words, though an extensive number of tints may occur on a Form, yet these tints are frequently but degrees of expression of a same primary; or, at the most, of two; and the second, often but very faintly expressed. Thus, in a body before us, we may have very many degrees of expression of a red, or of a yellow, but the prevailing and predominating effect would be that of a red, or a yellow, and the tints of the second primary admitted, would occupy but a subordinate rank: though not necessarily found in a subordinate position.

The arrangements which are perhaps the least seldom observed, are those of the co-existence of the three primaries, and at a same strength. Very few examples can be adduced: and they are perhaps beneficially limited; for being, in truth, the mode of combination which affords the fullest expression of harmony of colour, their too frequent repetition would tend to superinduce indifference; we might come to look upon harmony of hue as an everyday effect, scarcely worth notice.

Colours, in the modes of their application to Forms, assume a variety of appearances. Sometimes a few tints of low power, are widely spread over the body: sometimes a few distinct and bright hues are to be observed, concentrated in a particular portion of the object—the wings of birds, and the petals or stamens of flowers for instances: sometimes two separate colours are found on different sides of the form: sometimes the colours assigned are distributed in patches; sometimes in streaks, sometimes in spots, sometimes in regular figures. But whatever may be the arrangement adopted, colour always occupies spaces of irregular and unequal extents.

Whatever colours may be bestowed on Forms, there will always *appear* to be some modifications created, through the existence of the very conditions by which objects are made visible circumstances. An illuminating principle must be unequal in its action on the parts of the same body, since not planes are offered us, but solid figures: and solidity, as has already been shown in the section on Tone, means variation in the repulsion of light to the eye, or differences in the characters of the illumined surfaces: the very same circumstances that cause this difference of tone, act upon and modify the effects of tint belonging to the body, and influence the visual appreciation. We can perhaps make this more clear by means of an illustration. We will suppose there is before us any form of a simple kind, offering an equally simple effect of colour—say a sphere uniformly coloured red. In this case, though an equal amount of hue exists throughout, yet it is certain that to the eye an inequality of value will be apparent: thus, one portion being in shade, that portion must appear of a duller hue; for as colour owes its being to light, the interruption of light must mean reduction of value to the red: again, a second portion returning high-light to the eye, must present an effect of hue different from that of the rest of the body: high-light is a representation more or less perfect, of the form, power, and colour of the illuminating principle: hence this portion under sunlight or daylight, will offer a hue tending to pale orange. The only portion of the form that will really exhibit the hue naturally belonging to the body, is that occupied by half-tone. But here again some little correction must be made: the portion that immediately precedes or prepares shade, will be found to be of a much cooler or greyer red than the portion occupied by the rest of the half-tone. These same modifications of the hues belonging to the forms we see, are continually and necessarily taking place, however complex may be the shape or the arrangement of the colours admitted. The rule simply stated, is that shade lowers colour: high-light modifies it: the only portion of objects where distinctive hues are really seen, is that occupied by half-tone, subject, however, to the law that a cool hue always appears to precede and prepare the portion occupied by shade.

The appearance of colour is subject to a restriction consequent on place in creation. The eye is so accustomed to effects of colour, that we are apt to overlook a universal connection between sets of Forms and sets of hues—namely, that same families of objects are always similarly coloured. The petals of the rose, the plumage of the eagle, keep to their distinctive hues. The fur of the tiger does not assume the colour blue, or scarlet, but remains brown. A leaf is not pink or purple, but green. We shall find that this relation of colour to Form obtains all through the scale; each family of objects has a distinctive set of hues assigned to it; and the natural limits are never passed. It would appear, however, that in some divisions of creation, these limits are far more extensive than in others; thus certain species of flowers admit of a great variety of colours; dahlias, tulips, are instances; while certain others, such as the sunflower, have only one unvarying hue. In animal forms we shall find this same inequality of limitation: one species keeps invariably to a given hue, another comprises a fluctuating range of tints. But in all cases, there is yet a limit in respect of species to be recognized: a blue rose, a scarlet horse, a blue lion, a purple swan, a green man, are imaginary effects.

The appearance of colour is controlled by the influence of locality. It is not indifferently on all spots of the globe that we are to look for colour, for it varies with place; but same modes of colour are commonly found in same places. The tropics are said to be rich in the variety of tints offered to the eye; northern climates, on the other hand, only exhibit colour sparingly. A hot situation generally implies gay-coloured birds, insects, shrubs, and flowers; cold regions bespeak a limited supply of duller hues. A dry climate implies in the vegetable world a predominance of yellows and reds; a damp climate, the predominance of greens. Again, the upper ranges of territory on the globe, such as the Arctic circle, and high mountains, have a very restricted supply of colour; while below this line, and in valleys and on plains, we have a profusion of brilliant tints provided for us.

The distribution of colour is subject to a widely-spread generalization in respect of rank in creation. In carrying the eye over the series of effects constituting the visible world, there would seem ground for the deduction of the general law, that power of hue obtains inversely to position in the scale of being. It is certain that the higher examples of Form display but little colour; while the lower examples exhibit a great diversity. In the animal world we have hues of inferior brilliancy to those we find in the vegetable and mineral kingdoms. That which is true of the three great divisions of creation, appears equally true when referred to the effects comprised in each: thus in the mineral kingdom such forms as rocks, strata of earth, have only low degrees of colour; while the smaller bodies, ores, precious stones, have powerful hues assigned them: again, in the vegetable kingdom, the oak, elm, cedar, have little colour; while flowers and shrubs exhibit every variety: and lastly, in the animal kingdom, man, the whale, the elephant, appear with sober hues; but the families of birds and insects, glitter with myriads of dazzling tints. So general seems to be this exclusion of brightness and gaiety of colour from the higher classes of Form, that we might almost be led to the assumption of a general law, that the presence of colour argues inferiority in the scale of being.

We must not omit from the list of restrictions to which the appearance of colour is subjected, the influences resulting from the operations of Time. Organised bodies that have to go through the periods of youth and growth, maturity, age and decay, present effects of colour that are distinct for each case. To youth and growth belong low and imperfect effects; maturity is distinguished by decided and clear hues; age and decay present us with tarnished, subdued, and negative tints. The young of animals, of birds, of insects, of plants, are rarely brightly coloured; it is only when growth has been attained, that the Form puts on the distinctive hues assigned to it; but these fade at the approach of old age or decay, and give place to effects of a dull and subdued character. Bodies that are coloured yellow, appear to suffer least from the influences of time; all other hues are distinctly affected: reds, greens, and purples, change into browns and greys.

The alternations of the seasons likewise exercise an influence over the effects of colour exhibited in nature: at least in some of the forms of animal life; and distinctly so in the wide series of vegetable productions. In some animals the winter clothing is different in hue to that assumed at the period of summer; there are birds that have a spring plumage and a winter dress. But it is principally in vegetable life that we see the operation of the seasons as influencing colour. Spring universally affects green hues in foliage; and in this climate, there is at that period, a preponderance of yellow hues in flowers. Summer developes the gayest and brightest tints that the scale of colour can furnish. Autumn changes yellows, greens, and reds, into orange and brown hues. Winter throws off all colour, and the eye is allowed to repose from the glitter of the past seasons. A period of rest like this, is to be valued: it preserves us from too long an exposure to a same series of exciting effects; and which, under the limitation of sensuous power allowed to the eye, would infallibly end in indifference or wearisomeness; and it enables us at the return of spring to recur to the developments of hue with renewed acuteness of perception.

There is yet one more circumstance to be noted in our review of the changes to which colour is subject through time; namely, the common and therefore unappreciated alternations of night and day. During a considerable portion of a period of twenty-four hours, the effect of colour is non-existent. Form may be known to us by the touch, in the absence of light; but colour then is not. With day, colour rises; the vigour of sunshine gives it its maximum of intensity; as light fades, the hues of nature disappear.

SUMMARY.

The separate histories of the three circumstances making up visual effects,—namely Form, Tone, and Colour,—have now been traced. It will remain that we should see what additional results they offer under their combination.

An examination of natural effects, even carefully carried on, would scarcely convey to us the influence each element exercises in combination; for the reason that we should be considering *completed* results; and no evidence remains to us of the several stages of growth of the end attained. To ascertain the operation of the means employed, we require to recur to a synthetical process, and build up the effect by its separate stages: an employment of the same means adopted by nature, would teach us how any given effect becomes produced. For a synthetical examination, we require to take Form separately, and note the consequences of the addition to it first of Tone, and then of Colour.

Let us suppose we have before us a Form of any kind, deprived of Tone, and Colour. We can obtain this abstraction by means of what is called a cast in plaster. Let it be, say, a beautiful female face and head. We have here Form, without colour. Let us now suppose light to be admitted, so as to develope Tone; and under the action of varying light, varying effects will be produced, which may be thus described.

If the illuminating power be of a subdued character, and further be so arranged as to fall full on the face, but at an angle of 45 with the plane of the earth, we shall obtain the most favourable conditions for the exhibition of the perfection supposed to belong to the surfaces. The low power of light will obviate glare, and its position will reduce the shaded portions in amount, and afford opportunities for the display of softened half-tones. The result to the eye will be the impression of youthful roundness. Let the light be now suddenly increased to a direct sun effect, and the features will immediately become defined by sharper lines; every little irregularity of surface will be evidenced with unsparing distinctness: and edgy shadows will destroy the idea of rounded softness previously ascribed to the surfaces. Let the face be now so turned away from the light as that the rays strike no longer on the full face, but on the side, though with a same angle to the earth. We shall have here the relation of light to surface which betrays most forcibly, irregularity of shape: just as the sun which at mid-day shining perpendicularly on a mountain, leaves its sides unmarked by inflections and apparently smooth; at evening time casts long and marked shadows, defining the undulations which characterize the mass: or, just as the moon which at the full, and with a direct light, appears even to the telescope tolerably smooth, at the wane, when its mass has to us only a side light, exhibits all the hills and valleys which make up its surface. Much of the beauty of the face will now disappear: irregularities of feature and surface will become evidenced on the light side: and the presence of a great extent of shade, will call up an idea of squareness and comparative age, rather than that of youthful softness. We often see this same effect, and from a same cause, in Photographed portraits. In photographs, hue being excluded, definition of surface has to depend solely on Tone: and to evidence Tone and surface more distinctly, side lights are often (and injudiciously) employed. The necessary consequence is a blackened and edgy definition of all the wrinkles and errors of surface which can be called up in the face: and we have a result which is either considered unlike, or much older than the living original. It is strictly justice, *without mercy,* in more senses than one.

We will now trace the modifications producible by the addition of colour. Let the face be favourably placed as regards the light, and then carefully tinged of a clear flesh hue; let a healthy glow be diffused over the cheeks, and a rich lustrous pink be added to the lips. A marked change of effect will be at once observed, and the value of colour in the ornamentation of surface, will be apparent. The former tones still remain, but they will be everywhere *softened* by the addition of tint: their points of commencement will be rendered indistinct, and their opaque darkness will give way to warmth and apparent transparency; monotony of tone in the lightened surfaces will be enriched by variety of tint; the youthful appearance we had formerly remarked, will assume the softness of girlhood; the beauty we had traced, will be shown to us through a medium in itself attractive: for Tint invariably softens Tone, and this circumstance shows us why it is that female marble busts are so liable to offer an unsatisfactory effect: we are, in a bust, reduced to Form and Tone; and where it is not demonstrable that the *form* is itself perfect, the exclusion of colour leaves the defective surfaces in full evidence: hence only features that are well-shaped should be represented through this channel: where beauty is entirely the result of *complexion*—and this is the case in a majority of instances—a marble bust, though a good likeness, will certainly offer an unsatisfactory result.

We will now suppose that instead of the addition of healthy hues, we take those which mark disease. Let the complexion be painted of a sallow hue; let a dull leaden tinge be passed over the cheeks; a livid circle be painted round the eyes; and the lips be left colourless. The form, it will be remembered, still retains its previous shape, without addition or subtraction; but the effect will be no longer the same: independent of the idea of the absence of health, there will be a destruction of the ornamentation of surface the eye has been accustomed to appreciate, and a diminution of the amount of pleasure derived from its contemplation. Let the face be now painted parti-coloured, with streaks and patches of red and yellow and blue, according to the customs of savage nations: we shall find that we are no longer able to follow out the gradations of tones which defined the surfaces, and that therefore our perception of its form is *confused and disturbed:* we shall see streaks of colour, not delicacy of tone or shape; and hence the beauty of the form will be subdued or lost. All bright parti-coloured objects in nature come before us under this necessity, that our perception of their Form, or surfaces, is never clear. The statue of the Apollo painted so as to offer the dress worn by Harlequin, would fail to evidence the perfection of surface we know it to possess. But this influence may be a gain or loss, according to circumstances.

We will now assume that instead of a beautiful face, it is one that would be considered plain or even ugly.

The preceding observations will render it apparent that the addition of any light which serves to convey distinctness of surface, can only evidence more forcibly the offensive construction before us. Such would be a full light, and a direct light; both of which define surface with precision. But an opposite result would follow were we to admit only a subdued light, or such a mode of light as should hide or confuse surface. By a subdued light, surfaces are only indistinctly defined; and ugliness then loses its more prominent characters. By a light which should throw a large proportion of the visible surface into shade, the same end would be produced, the source, however, here being really absence of evidence. Much the same loss of character follows when, instead of one subdued light, many and powerful sources of illumination are employed, such as we find in theatres, or well-lighted rooms; for in this case, the evidence as to surface afforded by the tones of one light, is nullified by the action of other lights; no tone can then begin or end in the mode that would follow from only one light; and the eye ceasing to be advised of the exact nature of the surface, ugliness loses some of its force.

If to this ugly face, colour be now added, a great portion of the offensive effect is at once covered up; and this, partly because tone is now subdued by, and lost in hue; and partly because colour is naturally a powerful means in the ornamentation of surface. An ugly or deformed feature will have a shade of a certain character, beginning and ending at a certain point, and which conditions define the deformity; but colour diffused over the space, serves to soften or confuse these characters.

The conditions of tone of a better formed surface may become simulated, and the eye accepts the effect for more than it is worth. It is on these principles, whether known scientifically or not, that actors and actresses use rouge: the vivid colour lightens up and diffuses the tones which would define wrinkles, depressions, and furrows; and there is an apparent gain in youth and beauty.

For the illustration of the influences of the three elements on each other in combination, we have assumed a female face, and further have made it a question of beauty and ugliness; because the first is a portion of nature with whose expression we are familiar, and because beauty and ugliness are qualities patent to all. But there is not a single effect of form, or of character, known to the eye, that cannot be examined in the same way, and be shown to illustrate the same facts. The extremes of size or of compression of bulk, of simplicity or complexity of form, have no power to destroy these results. The modifications we have traced will always remain, whether we take a microscopic or a magnified view of nature; whether we examine a blade of grass or a mountain.

Our ability to detect the conditions we have been describing, all through the series of effects actually offered to the eye, is in truth simply a question of more or less of familiarity with the portion of nature before us. Everywhere these conditions exist, and every effect we know is thus compounded and thus modified. We cannot see any one of the elements unaffected by the others. Each, in each case, undergoes some change through its union with the rest. We shall now endeavour to point out the chief modes of these changes.

They fall under one or other of the following heads. Form modified by Tone, or by Colour. Tone modified by Form, or by Colour. Colour modified by Form, or by Tone.

The occasions when *Form is modified by Tone* constitute a large proportion of the effects offered us. The light which calls up Tone, may be of various powers; and hence arise three distinct classes of effects. At its *highest* force, shape becomes lost in glare, and the mind retains no clear idea of the relations of part to part. Witness the facets of gems and of cut-glass—white surfaces in bright sunshine—sudden bursts of illumination—the play of flame—objects passing in the midst of a conflagration—in all which cases, though shape of some kind must be present, we are unable to determine its conditions. At the *medium* power of light, the limits of bodies are evidenced with clearness and decision, and shape is readily recognised. The same landscape which, under a glaring sun, was lost in dazzling brightness, becomes full of detail under a calm light. Trees and hills and valleys rise up into sight, and their constituent portions can be followed out. A chalky cliff which under a mid-day sun the eye could not rest upon, offers by a clouded light an extensive series of jagged fractures, all readily traced out. A medium power of light is that which everywhere evidences Form at its fullest power of expression: the tones it affords being such as the eye can accept without a strain on the nervous capacity. A *low* power of light gives rise to important modifications of Form. The limits and configurations of bodies fail to be clearly exhibited; and their contained parts are less strongly marked, under a low power of illumination. Our judgment of the effects before us is not so much an apprehension of outline, or of the exact mode of limitation of space assigned by nature, as an acceptation of the shapes of the surfaces *left visible;* and these by a low light are liable to be pieced together in the mind of the observer, subject to the dictation of fancy, and to the production of an impression sometimes importantly modifying, and sometimes totally at variance with, the characters naturally belonging to the effects before us. A succession of beautifully formed arches enriched with Gothic tracery, that by daylight would interest us through the taste displayed in its choice of ornament, would be very differently viewed by a gloomy light: its deepened shade and vague recesses, would suggest ideas of grandeur, repose, sublimity, awe, danger; according to the frame of mind, or mood, of the observer. A sombre avenue of trees in the dusk of the evening—a series of darkened rooms—a vaulted cloister by faint moonlight—are effects where the power of determining limitation is absent, and where our conception of form is merely that of the sum of the surfaces left visible.

It is always useful to bear in mind that under a low power of light, the eye receives *incomplete* information: surfaces are insufficiently distinguished from each other, and limits are indistinct: hence, parts seem to flow into parts, affording unexpected and untrue results: so that we determine much less by what really *is*, than by what the effect at the instant is *most like.* The eye is not an infallible guide; and there is often fair reason to doubt if we actually see what we think we see. "*I saw it with my own eyes*" is an unassailable argument to the ignorant or the unlearned; but the assertion will be received *cum grano* by those who have investigated the nature of visual information; for it really means no more than what was seen, seemed at the moment *to be like* this or that circumstance. If we reflect that any ten people witnessing by broad daylight a given circumstance or series of actions, will each afford a description varying in some small particulars from the rest, we shall understand that the sources of variation must be greatly increased under a low power of light, where surface and limit are obscure. The overwhelming majority of assumed ghostly visitations, are never in broad sunshine, but by a low power of moon, or night-light; and the assertion that some supernatural appearance was observed, may be quite truthfully made, without in the smallest degree proving that the reality occurred. The fact means nothing more than that by some defective information, the eye accepted an effect that seemed *like* something it was not.

It often occurs that lighted surfaces become grouped together by an apparent absence of separation, so as to produce effects of a very deceptive character, and which the eye is quite unable to unravel. We may see a portion of one lighted surface flowing into other surfaces really distinct, but apparently continuous. The result is further liable to mislead the eye, in that it is in the nature of a low power of light to evidence *curvature* imperfectly, and to reduce this character to the state of a plane; so that all surfaces have a tendency to appear of a same nature; and thus additional vagueness is produced. Some years back, the writer, whose sleep one night had been accidentally disturbed, saw at the further end of his room—only partially lighted by a half-opened shutter, through which a faint moonlight was streaming—the figure of a man, apparantly about to move along the floor in a crouching position. The appearance was so truthful, that the first impulse was to spring on the figure; but an instant's reflection showed that the effect must be somehow a mere deception. For several minutes, the writer continued gazing on the appearance, and patiently endeavouring to separate the lightened masses into their several portions, so as to understand how the effect had been so deceptively made up. But, to his delight, he found himself unable to trace the true shapes of the surfaces, or their several limits. It was only by going close to the figure that he could make out how a heap of clothes, and other articles, thrown carelessly on the back of a chair, and partly fallen on the ground, had come, by the light of the moon, to make up the effect of a midnight disturber. On moving back a few feet, the figure of a man became again distinctly visible; and so excellent was the imitation, that even with a knowledge of the real shapes of the several portions, the eye could not be disabused. The clothing was allowed to remain undisturbed till morning, to see if daylight would continue the effect; but it was found that a greater power of light exhibited separation of parts too clearly to allow of the continuance of the deception. Many a story of ghost and phantom has probably had its origin in this same accidental aggregation of imperfectly illumined surfaces, in the midst of a mass of darkness; affording the appearance of that which did not actually exist. Sight is simply the perception of *visible* or *lightened* surface, not of all which may be actually present: and imagination often assumes results wide of the truth where weak light fails to evidence individuality.

Form is modifiable by colour under the following circumstances. We have already referred to the influence colour possesses in the ornamentation of surface: and this power is extended over every form the eye recognises. Between same forms, the eye will prefer that which offers the attraction of hue at its greatest perfection. Disagreeable forms to which colour has been added, cease to offend the eye, and may even become sources of gratification. An unsightly landscape, for instance, which by mid-day displeased us, may, when tinged by the glowing hues of a rich sunset, appear actually attractive: the forms must be the same, but the eye loses sight of them under the gay tints thrown over all. Besides this—the mere ornamentation of surface—colour will often be found to constitute a portion of the character presented by bodies. A ripe apple or cherry becomes a different effect to the same form in an unripe state; and that, solely through tint. A grey horse immediately strikes the eye among others that are brown. Very many objects are known at a glance by their colour—a pink rose, a white lily, a green leaf; and among objects of same form, but of different colour, it is to the hue that the eye turns for the means of detecting individuals. Witness dogs, oxen, fruit. And lastly, colour influences Form, in that it adds to, or destroys, our power of recognising limitation of space; whereby we may more or less perfectly apprehend what is before us. An involved surface coloured red, seen against a further surface similarly coloured, loses its distinctness of shape; but seen against a surface painted green or blue, the eye takes in at once all the subordinate parts and developments. A distant mass of trees in spring appears of a same unbroken green tint: in autumn, differences of colour betray differences of species; and we recognise changes of shape, and distinct individuals, in the mass.

We now pass to the second head, *Tone modified by Form or by Colour.* Tone is modifiable by Form through the contraction or extension, simplification or enrichment, of the surface on which it occurs. Assuming any given Tone as essential to, or indicative of, an effect, say a lustrous tone on a polished surface, or a subdued tone in a covered locality, it is evident that if the surfaces or space on which this tone should occur, be unduly contracted by accidental circumstances, the eye has so much less evidence offered it as to the precise shape of the Form or Forms: if the surfaces on the contrary be unduly extended, the eye receives increased evidence of the shape; and that sometimes to a degree which goes to convey even a different impression. A sheet of metal or paper nearly bent in two, will only show half-tone on the narrow edge exposed to the light: but the curvature may be gradually lessened till a complete plane is attained; when the half-tone will grow in extent, till it covers the whole of the surface; and the evidence of curvature consequently ceases. But the influence of Form is more distinctly exhibited under the conditions of simplification, and its opposite, enrichment, of shape. A polished surface, say a marble column, will offer a beautifully graduated half-tone; but if the column be cut up by subordinate surfaces, or rusticated, the liquid half-tone disappears, and a complex series of harsh and sudden changes of light takes its place. The breadth of tone which the pavement of a church would of itself offer, may be cut up by the accidental introduction of benches, or moving objects. A polished gem may have its lucidity of Tone destroyed by engraving. The complexity of light and shade exhibited on a richly developed or intricate Form, may be removed by smoothing down the surfaces to a level. We may never determine positively as to any effect of Tone traced by the eye, till we have thoroughly understood the nature of the surfaces on which it occurs: a Tone of a given intensity may be afforded by surfaces of same, or of different kinds, similarly placed; but substitute other arrangements under the same light, and a different Tone may follow. The Tone which would be natural to a given situation, or to a given Form, may be displaced, or heightened, or destroyed, by the intrusion of surfaces accidental to the situation or Form. Tone is modifiable by colour, through the superior effectiveness of the latter. A half-tone occurring on a surface is lost, if that surface happen to be bright coloured: strongly tinted bodies show only faint traces of tone: parti-coloured bodies show still less: the Tones exist, but an unprepared eye fails to trace them distinctly. An ivory ball would offer an exquisite gradation of Tones; but paint it with streaks of red and black and yellow, and the previous Tones sink out of sight to the superficial observer, though necessarily still present.

We now turn to the third head, *Colour modified by Form, and by Tone.* Colour is modifiable by Form principally through restriction and extension of the space on which it should occur. Wherever space is limited, Colour can only be thrown off from a diminished field; and where space is extended, Colour must spring from an increased surface. A space may be virtually diminished not merely by contraction, but by the introduction of development of parts; and it may be virtually increased where those developments are removed. For in the first case, even allowing to the developments the same hue precisely that belongs to the surface to which they are attached; they will not to the eye make up a similar value, since a part of the original surface is lost in the interstices between the developments; so that the sum total of Colour is *less.* And in the second case, the removal of the developments restores the original space over which the hue is spread. Colour is further modified through the variation of shape belonging to bodies. A surface coloured red equally throughout, will not if it be curved *appear* equally coloured. As has already been pointed out in the section of Light and Shade, it is only on the portions exhibiting half-tone, that colour is shown at its full power; and curve surfaces must further offer high-light, which is an extraneous hue; and shade, which is hue imperfectly illuminated; so that the field for Colour is limited to the space of half-tone. All coloured surfaces that are not planes, are subject to a more or less of this modification: we find only certain portions exhibiting the distinctive colour at a full amount. It is thus that bodies offering many angles are always imperfect exhibitors of Colour; for only the surfaces which are so placed as to supply half-tone, can appear tinted at the full power; and these are but a portion of the Form: all the others must either afford high-light, or shade; and thence show hue of a low amount. The exceptions to this rule, are found in the case of semi-transparent bodies, whose parts are permeable to light; and in the case of bodies with parts in close approximation, whence powerful reflections ensue: in both instances, shade loses its darkness and becomes warmed up nearly—though still not quite—to the level of the brightest half-tone; and the general effect, as in flowers, is a mass of equalised hue. Colour is modifiable by Tone in two cases: first, where light is so thrown back to the eye, as to give rise to a glare; and second, where it is only of an insufficient power. In the first case, glitter, as seen on all polished surfaces, is an imperfect display of colour; or rather it is a display of the hue of the source of illumination absorbing and covering that of the body itself, and modifying it in accordance with the laws of Colour. In the second case, where light is reduced in power, and low Tones are thence present, it is evident that Colour must be importantly affected, since hue is the result of the action of light; and weak light must mean faint hue. A bright coloured body taken into a sombre situation, will lose in brilliancy; and it will gain, by having the benefit of a powerful light. Bright blue seen in the sun, tells to the eye with a vivid effect; but seen in a gloomy place, or in the dusk of the evening, it appears merely as a dull grey. To give bodies seen under low illumination an equal value of hue with those seen in a clear light, their tints must be made stronger. The gift to a body of a capacity to exhibit bright hue, does not ensure that it shall always be so accepted by the eye: it will be so accepted when sufficient light is present: but it will not be so when a low power of illumination is thrown over it. Colour, as the result of light, is always in proportion to the power of that light: but some hues decay more quickly than others by decay of light, and consequent supervention of Tone. This same result is obtainable under another form. The interposition of media of various degrees of density between the eye and the objects viewed, is to all effects the superinduction of Tone, and a same action on Colour thence follows. Coloured objects seen through mist or through a dusty atmosphere, appear fainter in hue; and some tints will be found to suffer much more than others. The laws of Colour come here into operation. A red body seen through mist or smoke, will appear a pale red; through dust, it will appear tarnished: a blue seen through a yellow fog, will seem a dingy green; by the orange rays of the setting sun, it will tell as a bright grey. To determine correctly as to Colour, we must first determine the power of light present; and further, its purity. A same object seen by mid-day or the evening, in a pure or an impure atmosphere, is liable to be variously accepted by different persons, or even by the same person. A brilliant purple satin seen in the sun, is a very different effect to the same substance seen in the dusk of the evening, or by candle-light. A first visit to a town or to a country district, under a July sun, or a November haze, conveys a different impression to the eye; and that, mainly through the influence of Tone on the Colours of the objects before us

From the preceding observations it will be apparent that the effects offered to the eye, are not the simple addition of hue and light to Form; but a result liable to extensive variation through the power possessed by each element to modify the appearances of the others. The series of changes does not however end here. The scheme is further widened through the admission of differences of condition to the elements themselves, whereby each example is made to interest us in continually varying amounts. Form, Colour, and Tone imply, not fixed values; but a long series of circumstances in themselves unequal, and affecting us unequally. Were all of a like attraction to us, the interest we require to take in objects of sight would be lost in satiety. But no two Forms, or Tones, or Hues, possess that condition of constituents which would lead us to assign to each a same value. And these various stages of interest attached to each element, become afterwards combined, not according to equality of value, but with all the disproportion that a necessity for the production of unceasing variety demands. Form of a high value, or a low value, or of any value, may combine with Colour, and with Tone, of an equally varying and totally different value; and one element may thus improve, or deteriorate, or nullify, the effect belonging to the other two. Hence in the circumstances nature has grouped for the eye, the determination of the value of any one element, at no time gives an assured clue to the value of the others. Beautiful form may have defective arrangements of light, and show offensive hues; or these relations may be reversed or changed or modified to any extent; so that the value of each element must be considered strictly for itself in every case where sight is exercised.

Additional complexity is again thrown over this scheme, by its application to *parts* of bodies, as well as to wholes. It does not follow that any one relation of Tone and Colour to Form, shall be invariable for the *whole* of any one body. In the various portions of an effect, we may have dissimilar arrangements of the elements: one part may be well formed, with defective Tone and Colour; while the next or some other portion, may have good Colour, with bad Form and Tone. Any relative values may obtain: and hence, the knowledge of the dominant feature of one portion of a body gives no certain clue to the condition of the relations of the other parts.

We infer from these considerations that to apprehend rightly any external effect, we must raise the questions —What is the amount of power given to each element? How far do they modify each other in any given effect? Does the eye see in this effect only Form, good, bad, or indifferent? Or is it that we are struck by Colour, or by Tone, for the time being? If either of the three are satisfactory or unsatisfactory, which is it? and in what degree are they so? Is our approbation or disapproval confined to a part, or does it extend to the whole? Are fault and beauty mixed up in the effect? and if so, where? and to what amount of each? To take no note in our judgments of these considerations, is not to understand what we see, but merely to receive sensation while the mind sleeps: it is not to read nature, but merely to accept impressions which fade without instructing.

It is probable that among the effects supplied to the eye, some sets are more readily apprehensible by certain minds than by others. To every individual belongs a peculiar frame of mind, part the gift of nature, and part the result of imperfect or of exclusive education; and the bias that results leads him to accept more or less readily certain facts and certain forms of thought, while he rejects others: this selection and rejection being independent of the aggregations and combinations adopted by nature. Hence, in looking at natural effects, we are far from all seeing alike; and even, strange as it may appear, we are far from all seeing a same thing in the same way. One man looks at circumstances connected with shape, bulk, class, character and its numerous ramifications; another has preferably taken up hues; a third has been struck with the peculiarity of light: and each on comparing notes, will be led to express surprise that so different a judgment from his own should have been formed on same facts: the truth being that each observer referred to different portions, or to different conditions, of the constituents. It is only a further exemplification of this same individuality of perception, that we ourselves see the same fact differently, at different periods of life, or at different times. What we once enthusiastically admired, we now only coldly praise, or turn from with indifference; and what once failed to move us, is now the object of our warmest approval.

In some cases, the source of attraction is mainly a question of Form. The eye, perhaps unknowingly to ourselves, has remarked peculiar arrangements of shape that are satisfactory to us. Other persons may, or may not, have seen these arrangements; and, even if remarked, may or may not approve of them. The arrangements may comprise the whole extent of the effect, or they may only relate to a part. Instances are not wanting where our approval of a part is so decided, as to lead us to overlook marked defects in other portions. Sometimes it occurs that our approval is dependent on accidental position; thus, the situation we may chance to occupy, may be such as to afford the clearest view of the portions conferring pleasure; while other persons not so placed, and seeing other sides, may only find defective arrangements. The most beautiful series of shapes or forms we can see in the world, are intentionally imperfect; and this should never be forgotten. Hence, all present defective results on one side or other; and which results other persons may see, though we do not. Besides this, there are many moral qualities whose presence or absence may be impressed on the eye through Form; and these may lead us to be lenient or enthusiastic towards defect or perfection, in the arrangements before us. We see; but unconsciously forgive, or exalt.

In some cases, it may be that questions of shape have scarcely, or only momentarily, attracted the attention; and that we are influenced by considerations of colour, either general or local, either harmonious or discordant, either appropriate or obtrusive. While in other cases, neither Form nor Colour may have caught our eye so strongly, as some effect of illumination: we have perhaps dwelt on a gleam of sunshine, a depth of shade, a glitter of light, a repose, a gloom, which has happened to accord with our natural feeling, or frame of mind, at the time.

These considerations show us that it is by no means an easy thing to see "at sight." A long series of connected facts are implied in every material circumstance offered to the eye. We accept not simple facts existing independently, but complex phenomena, susceptible of infinitely delicate expressions, continuously related, and beautifully adjusted to produce an unceasing variety. A tree, a cloud, an animal, a flower, a leaf, contain a whole history. A blade of grass is crowded with phenomena of interest to those who seek to be conversant with the constructive processes of nature. An every-day observer is content to pass by the myriads of circumstances around him with the uninquiring facility of apprehension that a long use of the eye confers. Rarely do the questions arise—How were these facts compounded? Why are they as they are? On what does their distinctive character depend? What influence does each of the constituents possess? In what are they related to other facts? To such eyes, a cloud is an unimportant something passing through the sky: a tree is one of many every-day effects. Cause of effect, differences, history of production, relation of constituent, are inquiries quite unthought of; and *seeing* becomes a mere mechanical process, separated from perception, unsuggestive of reflection, and barren in the supply of knowledge. An educated eye, though far more keenly alive to defect, even at times to the point of discomfort, yet has its gratifications largely increased. A cloud ceases to be a mere passing nothing: its forms and masses and convolutions, rolling one into the other, all different, yet all beautiful, are followed out and appreciated: its soft gradations of tone, its silvery hills of light, its delicate and evanescent hues, fall soothingly on the sense. A tree ceases to be a mere vegetable production, one of so very many, that neither deserve noting: the exquisite tracery of branches and ramifications, spreading in endless variety of lines, no two alike and all harmonising—the carefully disguised art which has disposed the masses of foliage so as that all combine to balance and make up a pleasing whole—the glittering sun streaming here and there through gaps in the net-work of leaves, turning the spaces in its course into glowing emeralds, and skirting the branches and stems with vivid lines of golden light —the deep shades teeming with indistinct shapes, and half-revealed information, liquid with richness of hue—all these are seen, and drank in, and dwelt upon. Beautiful, most beautiful, is many a shady nook, and clump, and grassy bank, and weedy pool, and tangled lane; luxuriant in thousands of varied shapes, and sparkles of light, and glittering tint; all witnessing to a systematic construction of visible aggregations, traceable equally throughout nature, animate and inanimate; and placed infinitely beyond the utmost exertion of human skill. Wonderful is the system which confers pleasure on the eye, as well through the form, and tone, and hue, of an animal, of a vapour, a stone, a shrub, a forest, a flower, a mountain, a sea-shore; as through the human form or countenance, a Greek hero, a graceful female, or a dimpled child; and which has produced this gratification by the employment of general laws, sufficient for every case; and apprehensible in their results by even a moderate application of industry and intelligence.

Midway between the class that sees nothing of the facts we have been endeavouring to trace, and is content to live through life without inquiring; and the further extreme, the class whose object it is to seek out the cause of every visible fact, encountering willingly difficulty and disappointment; lies the class whose perceptions are just sufficiently developed to know that something exists, but are not sufficiently educated to discover what that something is: and this class will deserve a special notice, not from its own merits, but from the fact that its opinions have chanced to occupy a larger share of the attention of the world than its amount of practical knowledge would warrant. The semi-enlightenment we are referring to is that of the majority; and constitutes the specious and incorrigible authority known by the term "*Taste*," a term which seems to have been devised to signify a species of knowledge beyond definition and rule; and so to mislead mankind.

Where the laws of nature have been traced out, we speak of science; but where we only vaguely feel, and obscurely guess, then in objects of sense we fall back on the word Taste. Its dicta claim to be infallible, by assuming to be founded on a faculty superior to reason. People of "taste" are rarely to be convinced; for not clearly knowing the sources of their own preferences and dislikes, yet still perceiving that these feelings do exist, they cling to them as proofs of a delicacy of discernment not possessed by the majority, and not understood by any one but themselves. "Taste," says Payne Knight, "is a sentiment, hardly definable; but yet sufficient for the guidance of its possessor." Opinions of this kind are common in a certain stage of the progress of science, or of the progress of acquirement by any individual, of a given branch of knowledge; and they are fitted to meet with a ready admission, from their seeming to obviate the necessity for investigation and research. "Genius and taste," rightly observes Sir Joshua Reynolds, "both, in the popular opinion, pretend to an entire exemption from the restraint of rules. It is supposed that their powers are intuitive: that under the name of taste an exact judgment is given, without our knowing why; and without our being under the least obligation to reason, precept, or experience. But everything that is wrought with certainty, is wrought upon some principle. If it be not upon some rule, it could not be repeated. Every object which pleases, must give us pleasure upon some certain principles. There are certain and regular causes by which the imagination and passions of men are affected; and the knowledge of these causes is acquired by a laborious and diligent investigation of nature; and by the same slow progress as wisdom or knowledge of every kind, however instantaneous its operations may be when thus acquired." "If the judgments of Taste," says Dr. Brown, "had been as clearly distinguished from the emotions which it measures, in their relations to the objects that are likely or unlikely to produce them, we should as little have thought of ranking it as a peculiar power, as we think at present of inventing new names of faculties corresponding with all the variety of events corporeal or mental, in which we are capable of inferring the future from the past, by our knowledge of the reciprocal tendencies of objects. Chemistry, Mechanics, Politics, Taste (that is to say, the critical part of Taste), imply previous observation of the succession of those different phenomena, material and mental, which are the subject of these respective sciences: an experience of the past that is different in each particular case; but when the succession of the different phenomena have been observed, it is the same faculty which, in all these sciences alike, predicting the future from the past, feels the relation of antecedence of each phenomenon to its successive phenomena; distinguishing the particular antecedents that are more or less likely to be followed by particular consequents."

Taste is really nothing more than a refinement of our judgment, a cultivation conferred by the repeated perception of the relations that obtain in visible nature: a refinement open to all, but more or less perfectly acquired, according to the examples that have come before us, the opportunities we have enjoyed of investigating these examples, and the practical information we may have acquired.

Unfortunately, it is commonly assumed that wherever a susceptibility to the perfection of nature exists, there is likewise necessarily present a power of explaining why this perfection obtains: and that thus the opinions of "Taste" require to pass unquestioned. This assumption overleaps the important distinction that the susceptibility to the presence of perfection is not the capacity of perceiving the conditions of the phenomena on which its existence depends. In investigating the history of sight, we are often required to bear in mind that sensation does not mean perception. There exist myriads of circumstances that may tell upon the sense, but not attract or receive the attention of the mind. The eye may acquire a vague susceptibility to right and wrong, without a knowledge being gained, of the constitution of the principles which define this right and wrong. "To feel the emotion of beauty," says, very truly, Dr. Brown, "is one state of the mind: to know the relations which other previous feelings bear to it; what forms, or sounds, or colours, separately or together, have a fitness of producing the emotion; is another state of mind." In the popular acceptation of Taste, these two are confounded.

True Taste can only be acquired by a course of practical study of the constructive processes employed by nature. The whole mass of information which comes to us through the eye, is founded on relation. Every object or effect we see, is made up of components which tell upon the eye not independently, but through the relations they afford or supply. No component is ever judged separately; it only has an action over us through its connection with other components. We do not know positively, any one single material circumstance; we must accept it through its relativeness to some other circumstance. Now if this be the case, it is only a practical analysis and synthesis that can give us the measure of these relations. In investigating the properties of a body or substance, the Chemist does not consider himself warranted to decide on its constitution, till he have tested his opinions by recombining the supposed constituents in the proportions and under the conditions he considers actually obtain in nature—at least, chemical knowledge is founded on this reconstruction; for though the process be only possible in certain classes of bodies, yet it supplies the authority for decision in all. In the same way, the man of taste, to be really assured as to the laws which govern the constructive processes of visible phenomena, must have gathered the materials supposed to be present; and have combined them with each other, in various modes and quantities, till he have discovered the conditions which actually obtain for given ends. The mere susceptibility to natural effects is not enough; the inter-relations of constituents must be practically followed out, and be imprinted on the mind.

It is not a little strange that the large majority of works we possess, treating of the qualities of an external world, should have proceeded from persons who belong to the class of supposed possessors of "Taste," as contradistinguished from practicians. We have theories in plenty, from Speculative writers, metaphysicians, and philosophers; and very few from those whose business it may be supposed to be, to know and understand what is daily before us, namely, Artists. It would seem as though the Artist, lost in *particulars*, is not equal to the stretch of mind which can *systematise;* or, in other words, that the analytical form of mind can only be attained at the expense of the synthetical power. There are few works like Hogarth's, while there are scores like Alison's. We require to bear in mind the absence of practical knowledge in the latter class, renders them very unsafe guides; and the more so, that command of language and polished phrase are often substituted for knowledge of things, and the inquirer is thus led on, without dreaming of the gaps he is striding over, into errors that amount to impossibilities.

An examination of works of "Taste" will show that the question of the constitution of visible circumstances is invariably passed over. The laws of material construction find no place in the inquiry. We have, instead, vague generalities, gratuitous assumptions, and a series of metaphysical inquiries as to certain operations of mind, *supposed* and assumed to be sufficient to account for all we know of an external world.

To give instances, is really to quote the entire works of nearly all the authorities in "Taste" that we possess. Still, as evidencing the faulty mode of examination adopted, we may refer to a few passages in different writers. Payne Knight asserts that "beauty consists in harmonious but yet brilliant and contrasted combinations of light and shade and colour, blended, but not confused, and broken, but not cut into masses; and it is not peculiarly in straight or curve, taper or spiral, long or short, little or great objects, that we are to seek for these; but in such as display to the eye intricacy of parts, and variety of tints and surfaces." Now it is to be observed that the work we are quoting contents itself with the assumptions as here given; and nowhere explains to us how it is that the circumstances referred to, constitute beauty. The description given, seemingly so full and accurate, leaves us just where we were. What, may we ask, are the laws which regulate the relations that obtain among, and the appearances assumed by, these harmonious but yet brilliant combinations, broken, but not cut into masses? What are the conditions of the harmony and the contrast, the intricacy and the variety referred to? We are nowhere told. So that the explanation reduces itself to the form, beauty is beauty because it is harmonious, which is only an exchange of one kind of ignorance for another. Again, Jeffrey tells us that "beauty is made up entirely of certain little portions of love, pity, and affection, which in times past have been connected with external objects, and which still adhere, as it were, to them." The paper of which this passage is an extract, repudiates absolutely the existence of such things as material causes for the pleasure experienced by the eye; so that it contains not a word of reference to the laws of visible nature we have been following out; and it adopts the theory of association without one attempt at explanation as to the nature of these "certain little portions," or how they become sufficient to excite in us the idea of the beautiful. Again, Alison tells us that "the beauty or sublimity of forms arises altogether from the associations we connect with them: and that it is only the colours of the dress of the great, of the opulent, or of distinguished professions, that are ever considered beautiful." So that in truth, it is accident induces a preference between the form of a Hottentot and that of the Apollo: while the colour red is beautiful when worn as a military dress; and it is not beautiful when worn in the shape of plush by domestic servants. Again, Lord Monboddo asserts that "Colour is the primary perception of the sense of seeing: the others are only consequential. Figure and magnitude are nothing but colour of a certain extent, and terminated in a certain manner." The same view is repeated by Dugald Stewart, who says, "If there had been no variety in our sensations of colour, and still more if we had had no sensations of colour whatever, the organ of sight could give no information with respect to figure or distance." And Fearns adds, "Figure is merely the perceived local arrangement of two or more apparitions of colour." To these assertions we may reply,—If colour be sight, how is it we know of such a thing as colourless form? A white bird, or flower, a mass of snow, must in strictness be invisible circumstances if colour only, constitute perception: while, if differences of Colour be sight, then, were all objects painted green, we should not see at all; differences being thereby excluded. Writers of the above class fail to perceive that the real origin of sight, is not colour: it is the return of light from matter, to the optic nerve—light sometimes with a quality, colour, and sometimes without.

Besides the "Taste" that is supplied to us in books, we meet with a tolerably free exhibition of it in the daily world around us. But how often, may we ask, has this pseudo Taste been based on actual study of the visible facts spread out for us by nature? All kinds of likings and dislikings find cover under it. Of popular "Taste" it will nearly always be found true, that its possessors are obstinate in defence of their opinions, just where they can give the least reason for their preferences. Like sectarians, they cling with the utmost tenacity to the ideas they have created to themselves; and hold objectors as of vastly inferior discernment. Semi-enlightened, or one-sided, or biassed, or partially-instructed judgments, tolerate no opposition. The peculiarities of their preferences are clear to themselves; and their own inability to clothe their views in words, is taken by them in secret, as only another proof of their possession of a delicacy of perception beyond language, which other persons are unable to appreciate; and therefore are not entitled to oppose. It is additionally unfortunate that, besides imperfect cultivation of the power of the eye, we have so often to allow for the multitude of likings and dislikings, that individual bias of mind, peculiarities of education, habits of seeing, and absence of opportunity for correction of error, are sure to originate. The dicta of the "Taste" we meet with in the world, often amount to no more than this—"Such and such facts please *me;* this preference constitutes me a person of 'Taste.' If you don't see the justice of the conclusion, it is because you have less 'Taste' than myself." House building, furniture, dress, decoration, afford an extensive range of opportunities for the indulgence of ideas and preferences which have not been regulated by a knowledge of the laws of visible nature, and which are clung to with tenacity, though in themselves often indefensible.

The assertion by any man that he is in the possession of some "Taste" in any one department of Art or Nature, affords *primâ facie* grounds for doubt as to its presence at all. The man of true taste is too conscious of how much is required to make up even the glimmering perception on which our judgments are commonly founded, ever to parade his supposed acquirements. The more he knows, the more he doubts if he knows enough to estimate correctly, all the circumstances before him, with their endless intricacies of inter-dependence. While, on the other hand, the man who confounds individual liking with the dicta of taste, is always forward in self-assertion, and generally dogged and unyielding in argument. What he likes, must be right; and those who do not see he is right, have not so much taste as himself. He is ignorant of the existence of the many sources of disturbance of ordinary results, that render a final judgment hazardous; and he decides authoritatively on all things. It is unfortunate for our progress, that in all conditions of semi-enlightenment, it suffices for some individual to put himself forward as infallible, to be readily accepted as a guide by the public. It is thus that we often see national works controlled by persons who have everything to acquire, except self-esteem. Argument with such persons is utterly useless: they cannot see the facts which condemn them: to their minds such facts are really non-existent; and therefore merit no consideration.

It may be conceded, however, that persons of "Taste" have sometimes just this amount of justification for the extraordinary opinions they hold: That though they are unable to adduce reasons for their approvals and dislikes, yet that their ideas have really some foundation in nature. Could the preferences and dislikes be traced to their source, they would prove to be the results of the observation of some facts actually occurring, and not merely assumed; the error only being in rating them as leading facts, and hence making deductions that are unwarranted. Because a certain set of circumstances have been found satisfactory at one time, it by no means follows that altered conditions will tolerate the repetition of the facts. It does not follow that a small result will afford ground for the deduction of a widely controlling principle. Beauty has not one mode of manifestation; it admits of myriads of forms. The man who likes this fact, and the man who prefers the other effect, are equally justifiable, in so far as both sets of opinions have a foundation in nature. But it does not follow that either observer has done more than stumble on some subordinate or accidental effect, and which has an existence subject to the control of principles quite beyond a superficial recognition. Any liking may have some justification; but it may, nevertheless, be quite out of place where a person of "Taste" would insist on its exercise as a governing principle. To take an enlarged instance, Gothic architecture may be very beautiful in itself; but there are many cases where its introduction would argue an acquaintance with only one of the forms of the beautiful; and a want of knowledge of many others better suited to the conditions of the surrounding circumstances.

We must not omit to take note of the class of opinions that form the negative extreme of the scale of "Taste," and which solve all difficulty as to the admission of degrees of capability to understand the constructive laws of visual nature, by denying the existence of cause for preference anywhere, and by reducing perfection to a mere question of individual and accidental liking. There are persons who see in nature nothing more than a series of variable circumstances, fortuitously constructed and arranged, who ignore entirely the existence of laws controlling visible phenomena, to whom the face of nature is an unmeaning blank, and who consider it an idle waste of time to ask why the facts they see, are as they are, and how they have been made up. To these minds, Taste is non-existent: anything is perfect which they prefer, and every man is justified in his own preferences. Their great argument against the existence of laws regulating visible appearances, is the extreme diversity of likings and preferences which it is undeniable are to be found in the world. There can be no fixed origin, they say, for that which is not universally recognised. A European likes one set of objects, and an African another: therefore the idea of a system of laws addressed to the eye, is the assumption of an unnecessary machinery. But this argument takes for granted the existence of an exact equality of judgment. We see, only in proportion as our faculties have been cultivated: and many of our preferences amount to no more than that we have not been accustomed to anything else. The African likes a black, and is disgusted at a white skin, on just the same principle that a European prefers a white, and would shudder at a green complexion; namely, that the last in both cases appears to the respective individuals, *unnatural*, or contrary to the nature they have been accustomed to see. The negro in his likings, is perfectly justified; for he judges from the nature he has had before him; and the most cultivated mind in Europe can do no more. If we once so confound the existence of degrees of capability to see rightly, as to put the tastes and ideas of uncultivated people in opposition to those of cultivated minds, we open the door to the admission of the most preposterous opinions. The visual perfection of thrusting rings through the nose, of knocking out the front teeth, of smearing the face with red ochre and tallow, become as unquestionable, as that of the form of a Greek statue, or a Gothic cathedral.

There is, perhaps, no illiberality in asserting that persons who degrade the laws of visible nature to a question of individual and accidental preferences, furnish the best proof of their incompetency to offer any opinion at all on the subject. If the world of forms be so unexciting to them, as that they really can see no positive and material reasons for choice anywhere, they are by that very fact disqualified from entering upon the discussion. Their own non-susceptibility is no argument against the susceptibility of others. Those whose perceptions have been more or less developed, will ever be loth to believe that nature has left the immense supply of information which the sight conveys, to the disordered arrangements of chance; and will rather doubt the competency of some few persons to see rightly, than conclude that a creative power just in the most active and most important sense —that which comes earliest into action, and that which is made the most use of through life—has departed from the rule observed with the rest; and has left it without the organic susceptibility to pain and pleasure, and thence systematic control, found in the other senses, and bestowed on them as a stimulus to their action.

The preceding pages afford some few of the considerations arising under a study of the three divisions of natural effects.

They are not offered as conveying more than a rude sketch of the ground to be gone over. To pretend to give a completed map, is to assume that we know all the mysteries of construction making up the visible works of nature—an assumption which even the continuous labour of many lives would still leave as a glaring absurdity. To no human skill is it given to fathom the extent of the wonders spread out for the eye. The endeavour, pursue it as laboriously as we may, will at the best, be literally and truly, picking up single pebbles by an exhaustless sea-shore.

But though entire success be absolutely hopeless, the slow and piecemeal unravelment of the problem, is a source of some of the most elevating and purest enjoyments that a study of creation opens to us. Everywhere *order* is manifest—hence there must be *design*. If contrivance become, as it does, apparent at every step, the idea of a Contriver necessarily follows. In heartfelt humility to the Giver of all good, the writer of these pages asserts that no man ever studied closely the world of sight, who has not in the end become impressed with the deepest reverence for the power and skill and bounty, of the great Creator; and a humbled sense of the utter incompetency of all human effort that could be applied in imitation. To us, have been only given to seek out within a narrow limit, and feebly imitate.

Nature crowds before us works that are quite beyond our skill, rich in results, passing our comprehension; never erring but with forethought and intention; never failing in the end but for a purpose; never ceasing in the production of beauty over the whole face of the earth and wide beyond it! To Him, be all the glory!

THE END.

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