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ARTICLE I.

THE GENERAL ASSEMBLY OF 1872.

ORGANISATION.

This body held its sessions in Richmond, Va., beginning May 16th, at 11 a. m. Forty-eight ministers and fifty-four ruling elders were in attendance. Two more ministers and six more ruling elders would have made the Assembly completely full. The absentees were nearly all from very remote Presbyteries—one of these Presbyteries being in Brazil. Grace Street church, where the Assembly met, is a spacious and beautiful edifice, and was often filled with attentive and interested crowds of people gathered to witness the proceedings. Old Virginia hospitality was still itself, and was enjoyed as freely as afforded. The Moderator, Dr. Plumer, was assisted in the introductory services by Dr. Van Zandt, of the Reformed Church, a delegate; and by Dr. Porter, of the Presbyterian Church in Ireland, not a delegate, but simply a casual visitor. The text of the opening discourse was from Isaiah liii. 11: "He shall see of the travail of his soul and shall be satisfied." Dr. Armstrong nominated Dr. Welch, of Arkansas, for Moderator; Dr. Hendricks nominated Dr. Samuel R. Wilson; and Dr. Jacobs nominated Dr. Adger, but

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OTHER TOPICS.

There were several other matters of interest before the Assembly, as the Examination Rule, Systematic benevolence, the Narrative, Theological Seminaries, Statistical Tables, Commissioners' Expenses, Evangelistic Labor, Sabbath-schools, which it would be pleasant and profitable to review; but our space is exhausted, and we close with thanks to the Head for another agreeable and useful assembling together of the representatives of our Church.

ARTICLE II.

LOGIC, AND THE LAWS OF THOUGHT.

1. *An Outline of the Necessary Laws of Thought: A Treatise on Pure and Applied Logic.* By WILLIAM THOMSON, D. D., Provost of the Queen's College, Oxford. Fourth Edition. Sheldon & Co., New York.
2. *A Treatise on Logic; or, The Laws of Pure Thought," etc., etc.* By FRANCIS BOWEN, Alford Professor of Moral Philosophy in Harvard College.
3. *The Laws of Discursive Thought: Being a Text Book of Formal Logic.* By JAMES MCCOSH, LL. D., President New Jersey College, Princeton. Formerly Professor of Logic and Metaphysics, Queen's College, Belfast.

Once on a time in the Revolutionary war, between the United Colonies and Great Britain, an American captain, it is said, begged his company just to fire *once* before running away from the enemy. So we pray of the good reader, whose eye lights for a moment on the above ponderous headings—only peruse a page or two of what we have to say, and if you find it dull, retreat to some more Arcadian nook in literature. Most persons regard a work on Logic, very much as a lad of ten summers did a volume of Henry's Life of Calvin. "Isn't that a dreary

book?" said he. Well, no; we had not found it so. Neither have we found the three treatises of Thomson, Bowen and McCosh, dreary; though we must confess that Aristotle is exquisitely dry.

But have we not had enough of Logic? Is it not time to cry, *Jam satis nivis in terris?* What with Aristotle and his Greek commentators, his Arabian commentators, and his scholastic commentators; Kant and Krug and Esser among the Germans; the Renaissance in England under Whately, and Hamilton; and, to crown all, the East Indian Logic as interpreted to us by Max Muller, shall we not cry, "Hold, enough!"

Kind reader, all these things prove that the most intellectual races of the past have solaced themselves with this science, and the likelihood is that the most intellectual races of the future will follow suit. The questions, What good does Logic do? of what use is it? is it, in truth, of any use? may be very pertinent; but they never have stopped thoughtful men from pursuing their researches, and never will. Man always has reasoned, always must do so; and man will always strive to understand the rationale of reasoning. At least some men will; and really they are excusable for this; for if we crave to comprehend the philosophy of the rainbow, how much more shall we long to understand that syllogistic process by which we mount from the earth to the sky of knowledge.

And yet, in one sense, we hold that enough or at all events nearly enough of Logic has been written. One book more is needed. One more thinker, not to discover any new principle, but to recast the principles already ascertained. The gold has been dug from the mine; it has been molten into massy, glittering ingots; and now the time demands some cunning artificer who shall mould them into one august statue for the vestibule of Truth's mystic temple.

But if any one asks whether logicians have not extolled their special science unduly, we answer, undoubtedly they have. Chalmers says, in the outset of one of his treatises, that the professors in Edinburgh, in their introductory lectures, each spoke in such high terms of the dignity and importance of his own branch

of instruction that the students were quite at a loss as to their respective claims. Your tanner, too, avers that there is nothing like leather. Why should not your logician style his specialty, "*Ars artium, scientia scientiarum, via ad veritatem, cynosura veritatis, Pharos intellectus,*" etc.? All this however has passed or is passing away. In the first place reasoning is an *intellectual* process, and hence is not an end, but only a means. The intellect is the servant, and not the master. The world of feeling is paramount to that of thought. In the second place, even among the intellectual processes, reasoning is dependent upon several other powers. Mr. Locke has shown that, without memory, reasoning is impossible. He says that previous to this reflection, he had been inclined to underrate memory. Certainly, if we have forgotten either that all men are mortal, or that Socrates, Louis Napoleon, and Alex. Stephens are men, we cannot conclude the mortality of either of these individuals. Then if our conceptions are defective, inaccurate, dull, we shall be but sorry reasoners—as is largely shown by Sir William Hamilton. McCosh devotes special attention to the notion, as he styles it. Once more: Logic is a good builder, but does not furnish his own materials; that very essential part of the business being consigned to observation and invention. In the third place, reasoning is but a way of arriving at Truth—the altar-stairs, marble and massive, if you choose, yet only the altar-stairs which Truth's worshippers must first ascend; or to vary the figure slightly, it is the winding staircase by which we climb to the height of some lofty tower in order to view a broad and goodly landscape. We are willing to take the pains for the sake of the view.

This leads to the farther idea, that if we could soar up like a bird to the tower's summit, we should of course disdain the clumsier method of stepping-stones. Reasoning is the badge of our infirmity, the crutch of our lameness, the evidence of our limitation; titles which contrast rather strangely with the high-sounding designations already mentioned. Yet these very limitations must be considered, and profoundly considered, too, by the coming logician. For as the island is not only surrounded,

but is also defined by the ocean; so the finite is both surrounded and defined by the Infinite. The end of our littleness is the margin of his fulness.

Let us briefly note some of these limitations:

1. We know substances only by means of their properties. In material things, the curious and startling inquiry has arisen, whether there are sixty or more kinds of substance on earth, or only one substance in various allotropic conditions.

2. We are limited in time. Here let us be understood. We are far from adopting the scholastic definition of God's eternity as a "*punctum stans*," a duration in which there is no progress, no succession. Such a thing is, as Mansel remarks, unthinkable to us. The present moment the universe shares with God. The past moment is gone forever from him and from us, beyond his power of recall as beyond ours. The future moment comes to both, alike. What we mean, then, is, that we are but of to-day; while his goings forth are of old, even from everlasting. Our opportunities of perception, of observation, of original and intuitive knowledge are of course extremely meagre. They are supplemental in a curious way by the testimony of our Maker and of our fellows, and by the reasoning process as to the past; and as to the future by the announcements of the Omniscient One, and again by reason.

3. We are limited in space. We float about on our atom-planet, and no one of us, not even the most extensive voyager, has ever seen a tithe of its surface. Our most adventurous sense, that of feeling, reaches to our finger ends. Instead of saying that our eyes pierce the celestial depths, let us rather admire the exquisite contrivance by which information is brought to us from systems and nebulae. So also with the other senses.

"The song and oars of Adria's gondolier,
By distance mellowed, o'er the waters sweep."

The perfumes of Araby and the Indies are wafted to the sailor along the coast. But as vision is the most wonderful of all, it shall serve as our example. What can be more interesting and remarkable than the mode in which our extremely narrow spatial limits are compensated by light? The nature and extent of the

knowledge conveyed to us from the other worlds in space would form a fine theme for an article. The certainty of it, as contrasted with the incertitudes of our earthly life, has been handsomely portrayed by McCosh. If it were only not so meagre!

Here on earth, again, how very limited our range of vision. What do I see at the present moment, when I look up from my paper? A library, an oil painting above it, framed photographs, and engravings, a telescope box, the furniture of the room, the walls; or turning to the window, a vista of deciduous trees and evergreens, and a smooth, grassy plot. Even these are seen by aid of diffused rather than direct light.

As to seeing into or through things, the only transparent substance on which my eye falls is glass. Why is nearly everything opaque? Little models of pumps are made of glass that the young may visually learn the action of valves; and if there had been in each generation only one human body constructed of transparent materials, the circulation of the blood would have been discovered long before the days of Dr. Harvey.

Then, so much depends on the agency of particles too small to be seen by the unaided eye. Our senses are not fine enough. Fontenelle has presented this thought so miraculously that Brown has quoted him, and Chalmers has quoted Brown. In short nobody can say it better than Fontenelle, if as well. Too much curiosity to remain in happy ignorance; too much dullness of senses to perceive—this is the foundation of that restless prying about; hence our telescopes and our microscopes, and by-the-by our spectroscopes which Dr. McCosh thinks are going to beat them all.

4. Another curious limitation is found in our connection with matter. By how circuitous a route must our thought travel to reach your mind and become your thought, kind reader? How disembodied spirits communicate with one another, we know not, but surely the process must be less complex. Then there is the medium of language of whose imperfections Bishop Butler was so fully aware, that it was a matter of wonder with him that such a vehicle of thought should ever have been devised or employed;

language, mark you, in whose intricate labyrinths Whately locates the whole domain of Logic, and about which all logicians say so much, even those who consider Logic the science of "thought as thought."

5th and last, for we are not aiming at an exhaustive account, there is the narrow purview of the intellect. It has been said that the mind can be in only one state, and accordingly can think of only one thing at a time. If this were so, we could not reason at all. We must have *two* propositions in view, or we cannot draw a conclusion. Still, as in literal vision, our mental scope is contracted. We do not hold all our knowledge perpetually before us as the Infinite One does. We *know* what we can *recall* by an indirect effort of the will; what we *can* recall, and not merely what we *do* recall. Methinks this matter of memory should be more fully considered by our logicians, so as to explain how it is that we might oftentimes reach conclusions which we do not reach, and why we are so frequently inconsistent with ourselves.

Under these five heads we merely suggest the need of a pathology, as well as a physiology of our intellectual powers. In this sense let Logic be the medicine of the mind. Let us learn what our limitations are, subjectively, then what our Creator has done toward compensating them; and then what the province of reasoning is. If reasoning does not enlarge our knowledge both positively and negatively, if it does not conduct us to new truth, and preserve us from error; why, we had better find something that will.

Before passing on, we will say just here that the distinction should be drawn and kept in mind, between reasoning and logic; between what we do, and how we do it. This, we think, would clear up a part of the difficulty touching the utility of Logic. Once more. We see no very good ground for the Hamiltonian objection to calling logic the science of reasoning. In Logic, inference is not the only thing, but it is the great thing. Conception and judgment are subsidiary, and it is because they *are* subsidiary to inference, that Logic takes cognizance of them at all.

An Example.—Let us imitate Paley in his natural theology, and begin with a simple, familiar instance.

You wish to remove some heavy article of furniture, say a piano, from one room of your house to another. It will have to pass through several doors on the way, and with regard to one of these doors, you doubt whether it is wide enough to admit of the piano's being taken through it. You take a rod or a bit of cord and measure the width of the piano, then apply it to the doorway and find *its* width equal to the length of the rod. Hence you infer that the width of the doorway is equal to that of the piano. On this lucid transaction several remarks are to be made:

1. It is a case of reasoning. Try it by any or all the tests, propounded by Aristotle or McCosh, and it vindicates its right and title.

2. We cannot see that the above process is one of analysis; certainly not of analysis in extension as it is now called, by which a class is separated into its constituent individuals. All men may be actually or in thought divided into Socrates, Plato, Aristotle, and the rest, and this may be called an analysis. This indeed seems to have been the use of the term in former times. But in the instance given, what class comes under consideration? Pianos? doors? rods? The reasoning would be identically the same, if there neither were, nor in the nature of the case could be more than one of each of these in existence.

But perhaps it is an analysis in comprehension, in which we regard the totality of attributes in an object, or rather in a concept, and eliminate some one of them.

For example: It is said that when we utter the proposition, snow is white, we must have analysed our complex conception of snow, and separated the whiteness of it from its other qualities. But unfortunately the particular width of the piano was not a part of your conception of it. If one should say, the piano has width, we might possibly regard him as analysing his conception of matter, which must have not only one but three dimensions in space. But in place of analysing a conception, you proceeded to ascertain an objective truth. You confined your attention

to one quality of the piano, and the corresponding one of the door. We may call this abstraction, if we like; authors vary in their use of that term. But abstract as we may, analyse as we may, we can never by either of these processes learn what we wish to know about the piano, which is, not whether it has any width at all, but how great that width is in the particular case before us.

What are we to think, then, of Dr. Thos. Brown's theory, viz., that reasoning is essentially analytic, except perhaps in questions appertaining to mathematical *proportions*, not equality as in the example I am using? And what of Haven, who swallows Brown's theory without the exception?

3. There are three propositions in this specimen of reasoning, two premises and a conclusion, and three terms, no more and no less. In other words, it is a syllogism. The reader will now pause, and ask himself whether he could have discovered these momentous truths without aid from some great philosopher of ancient or modern times. If he should vaingloriously imagine that he could, let him ponder this remark of Dr. McCosh, (page 123): "The syllogistic analysis of reasoning, so far as is known, was first unfolded by Aristotle in the *Prior Analytics*, and constitutes the most certain, and altogether the greatest discovery ever made in mental science." Do not unduly exalt yourself, then, so far as to say that, first, the rod must be applied to the piano; secondly, to the door; and, thirdly, the piano and the door may be pronounced equal in width; or, that if two rods had been used, the one in taking one measure, and the other in taking the other, no conclusion could have been drawn; or, that using only the one measure, we could not infer anything about some piano or door other than that which we had measured. Remember Columbus and his egg, that formidable weapon in the hands of modern thinkers, though luckily unknown to the Stagirite.

Dr. Brown, however, says that we need only *one* premiss, the minor. Socrates is a man, therefore, analysing of course man into his attributes, or at least knowing that mortality is one element of our conception of man as man, we by one step reach the conclusion that Socrates is mortal. Concerning all which,

we can say only that "*Bonus Homerus dormitat; Anglice* what stupid blunders our great thinkers sometimes make! Dr. Brown was endeavoring to carry out his theory of analysis, otherwise so acute a mind would never have been so misled. The oddity of the mistake is all the greater, when we consider that it is by an *analysis* that he professes to evolve the needed idea of mortality from the conception of "man." But if all, or nearly all reasoning is essentially analytic, why slur over an analytical process necessary to his reaching a conclusion? Coming back to our example, who can suppose that Dr. Brown would not know that he must measure first the piano, and secondly the door? Here then we find the two premises, no more and no less.

4. Do we learn anything new by our reasoning in the illustrative case? To *learn* something *new*, may sound tautological, for it may reasonably be asked, whether we can learn at all, without learning something new, whether the idea of the new is not a part of the signification or connotation of learning.

Our limits forbid us to enter particularly into the discussion of what we mean by knowledge. Whatley treats this subject in a very luminous and sensible way. For the present purpose, it is enough to inquire whether we attain to any previously unacquired truth by the process of measuring and considering as above detailed. If you had known in the outset that the piano would pass through the door, just touching it on both sides, why take any measures? Surely you do learn something in the end which you did not in any sense know in the beginning. If you had been asked, is the width of the one equal to that of the other? you must have answered, I do not know. The inquiry then arises, at what point of the process did you come into the possession of this desired truth. Was it when you had obtained the measure of the piano? No. Was it when you had obtained that of the door? Again we say, no; but it was when you put together these two, and from the two conjoined you necessarily inferred the equality of the piano to the door in that spatial dimension which you were considering. Neither truth alone was sufficient; both might even in some sense have been known to us, that is, have been capable of being recalled by memory, and yet, if the two

had not been brought under the joint purview of the mind at once, you could not have learned any thing from them, *i. e.*, you could not have reached your conclusion. At the same time it is entirely clear that, taking the second measurement placed you in an attitude, or shall we say, gave you an advantage of position which you could not have enjoyed from the first measurement alone. You then needed to take no more measures, and to introduce no more terms, but only to compare those already employed.

All this seems reasonably plain, but as there has been a tremendous battle at this point in the field, and fearful blows have been given and taken by giant combatants, let us timidly survey the scene of action. Let us approach it under the broad ægis of the Stagirite himself. "A syllogism," says Aristotle, (*Prior Analytics* Bk. I., p. 1), "is a sentence in which certain things being laid down, *something else different from the premises necessarily results.*" Again in the *Topics*: "A syllogism is a discourse in which certain things being laid down, something different from the *posita* happens from necessity through the things laid down." Now for the moderns. Bowen speaks (p. 24) of the syllogism as "used for the purpose of investigation and discovery," in the earlier times. "At a later period when instruction, disputation and proof came to be the *chief purposes* for which syllogisms were formally enounced, etc., etc." Thompson, p. 281 of *Outline*: "It is a great misfortune for Logic that the syllogism has been regarded as an instrument for deduction only. . . . We need not wonder that modes only adapted for teaching truth, have been pronounced useless for discovering it, that when deductive arguments are selected, it should be easy to prove that they will not do the work of inductive." And on p. 283, "The syllogism is not confined to deductive arguments."

The amount of which is that only inductive syllogism are useful for discoving truth.

So far, so good. But now a formidable knight comes on the field in the person of Sir Wm. Hamilton. "An extension of any science through Logic is absolutely impossible; for by conforming to logical canons we acquire no knowledge, receive

nothing new, but are only enabled to render what is already obtained more intelligible by analysis and arrangement. Logic is only the negative condition of truth." Again in his Appendix, p. 623: "In the common order the objection of *petitio principii* stands hitherto unrefuted, if not unrefutable against Logic." Bowen seems to play fast and loose, for on p. 364, he says: "If reasoning were an organon of discovery;" p. 365-6: "It does not appear, then, that reasoning as such, or as an act of pure thought, is a means for the advancement of knowledge." He then goes on to cite what we have already quoted from Hamilton. This has been the common objection to Logic, and the mental philosophers have presented it very forcibly.

After all that we have read on the subject, we take the side of Aristotle. For, let us revert to the example of which so much use has been made. Do you not learn something; do you not discover something by the process indicated? Manifestly you do; and something which you could not learn by intuition; something also to which every part of the process is necessary, and which is not reached except at the end of the whole process.

Suppose we wish to reach the oil painting that hangs suspended over the library. We take a chair to stand on; that proving insufficient, we place a stool on top of it, and our own height suffices for the rest of the journey. The chair and the stool fulfil their function, and we do our part. Just as you obtained the measure of the piano, then that of the door, and by a mental operation accomplished the remainder, viz., drawing an inference from the two measurements or premises. Three things are indispensable, two premises and the conclusion.

The same point is proven by the whole science of mathematics. Countless illustrations could be given. Who knew or could have known, except by reasoning, that the volume of the sphere is two-thirds that of the circumscribing cylinder? Is not this truth arrived at by a series of syllogisms? And is it not a new truth to every learner? The immense majority of men never do know it; the proposition has never been presented to their thoughts; it is a truth lying in the vast domain of the unknown and cannot be perceived intuitively.

We do not know how this reasoning will strike the reader. To our own mind it appears conclusive, at least with regard to syllogisms like those which we have brought forward, while it may leave some riddles involved, or some puzzling questions unanswered. Such questions emerge in every department of thought, but they ought not to shake our faith in ascertained truth.

But at the risk of anticipating what we design to consider under another head, I will take up John Stuart Mills' view and briefly discuss it. In Bk. 2, p. 3, he takes hold of this knotty question: "It must be granted that in every syllogism considered as an argument to prove the conclusion, there is a *petitio principii*. When we say, all men are mortals, Socrates is a man; therefore Socrates is a mortal; it is unanswerably urged by the adversaries of the syllogistic theory, that the proposition, Socrates is a mortal, is presupposed in the more general assumption, all men are mortal. . . . In short, no reasoning from generals to particulars can, as such, prove anything. . . . This doctrine is irrefragable," etc.

The reader will at once observe that the syllogism adduced by Mr. Mill differs from the one which we have dwelt upon. In ours the reasoning is from particulars to particulars. We selected it for that very reason. But it may be thought that our foregoing argument applies only to reasoning from particulars and not to reasoning from generals. Hence it devolves on us to show that in this well-known and threadbare Aristotelian syllogism in Barbara, there is a progression from the known to the unknown.

When we say that all men are mortal; do we admit, do we know that Socrates is a mortal? Not at all. In place of Socrates, substitute Gabriel. Because all men are mortal, is Gabriel mortal? No, for he is an angel. Undoubtedly so. Then how can the mortality of Socrates be presupposed in that of all men? The prompt answer will be, because Socrates is a man. Yes, but that is introducing a new premiss. Of course the possession of two premises, like the chair and the stool, delivers us from the need of any more *extraneous* aid, we can now reach

the conclusion, if we but will, by the laws of our own intelligence. If the principle of reason and consequent were not imbedded in our nature, we might have the two premises laid down side by side, and the conclusion need not occur to us as a conception, much less as a truth. The conclusion has not yet been stated. We are just authorised to infer it, if we can and will. The summit of the stool is high enough to enable *us* to reach the desired point.

To make our meaning still plainer, let us advert to the distinction between immediate and mediate inference. The universal proposition, all men are mortal designated by the letter A, being allowed, the particular proposition, designated by I, that some men are mortal, is implied in it, or derivable from it without introducing any middle term. This is called immediate inference. The general proposition is the sum of all the individual truths. But the mortality of Socrates was not one of those individual truths; we mean the specific truth that the Athenian philosopher, the teacher of Plato, etc., etc., was mortal. This specific truth, I say, had never been cognised by us, when we said unhesitatingly, all men are mortal. It is doubtless otherwise with the Infinite One. Our limitations have prevented us from doing what he has done; and they impose on us the necessity of doing what he has no need to do.

We deny, then, that the truth of Socrates' mortality is presupposed in the mortality of all men. In thought, it is not included in it. It is attainable by means of the two truths, the mortality of all men, and the manhood of Socrates.

If any doubt lingers in the mind of the reader, we think it will be dispelled by another illustration. Travelling along a highway in Bengal at nightfall, you descry at the edge of a contiguous jungle a motionless object. The distance and the gathering twilight so disguise it that you cannot decide whether it is the stump of a tree, a rock, or an animal. But presently the fearful roar of a tiger dissipates all doubt, and you flee in terror, or hastily catch up your fire-arms for defence. Now you had known from childhood that all tigers are ferocious, carnivorous animals, but never before that that particular object was a for-

midable enemy to man, because you were not aware that the aforesaid object was a tiger. The general truth left the conclusion unattainable, the second truth, added to the first, rendered the conclusion attainable; and the principle of reason and consequent attained the result: unattainable, attainable, attained—these three words signalise the three steps in the syllogistic discovery of truth.

Mr. Mill, however, thinks that he meets the question in the only possible way. "From this difficulty there appears to be but one issue. The proposition that the Duke of Wellington" (then living) "is mortal is evidently an inference; it is got at as a conclusion from something else; but do we in reality conclude it from the proposition, all men are mortal? I answer, no!" This is very curious. Let us read a little farther on. "The inference is finished when we have asserted that all men are mortal. What remains to be performed afterwards is merely deciphering our own notes. . . . The mortality of John, Thomas, and company, is after all the whole evidence that we have for the mortality of the Duke of Wellington."

His theory, then, is, in one of its aspects, that the observed cases of mortality warrant us to infer the mortality of the whole human race, and when we learn that the Duke of Wellington is a man, we learn that he is one of the beings regarding whom the inference has before been made. This is very plausible. But there are several weak points in it. First, let us suppose that our major premiss, the mortality of all men, were derived from the Scriptures, and not gained by observing individual cases. Then we could never *infer* the mortality of any individual man. We might believe it, but could not infer it from the general proposition. But when Revelation tells us that it is appointed unto all men once to die, it does not tell us that the Duke of Wellington will die. This particular truth we do not get from intuition, nor from belief in testimony. It is arrived at by a process which all the world, except Mr. Mill, call inference. Mr. Mill says: "No supernatural aid being supposed, we derive our knowledge of the general truth from observation." Secondly, we have stated only a part of Mr. Mill's theory. In its totality

it is this: we reason from particulars to particulars, and from particulars to generals, but never from generals to particulars; reasoning from generals to particulars would involve a *petitio principii*, hence although we do proceed from generals to particulars, the process is not reasoning. We think we have proved that this process is reasoning, is inferential. Let us now examine his doctrine of reasoning from particulars to particulars. We selected the example of the piano and the door, because of its being an extremely simple instance of reasoning from one particular to another without "interpolating a general proposition." So that we have no doubt that in a multitude of cases we do thus reason. But does not the sophistical charge of *petitio principii* lie against this instance as really as against any case of reasoning from a universal to a particular proposition? We maintain that it does, and that Mr. Mill has failed to clear up the difficulty. If $2 \times 6 = 12$, and $3 \times 4 = 12$, it follows that $2 \times 6 = 3 \times 4$. Objectors say that the conclusion is involved in the premises, and that we do not advance in our knowledge of truth when we add that $2 \times 6 = 3 \times 4$. Mr. Mill does not meet this case at all.

But the most adroit part of Mr. Mill's argument still remains to be considered, viz., that which relates to our reasoning from particulars to generals. "From the mortality of John, Thomas, etc., we are entitled," he says, "to conclude that all human beings are mortal. Again he says: "The mortality of John, Thomas, and company, is after all the whole evidence we have for the mortality of the Duke of Wellington." At this we open our eyes a little in wonder whether Mr. Mill has gone over to Dr. Brown's one-premiss theory. We should really think he had, but for his express rejection of that theory elsewhere. One of the commonest forms of sophism is that in which one of the premises is kept out of sight. "From instances which we have observed we feel warranted in concluding" general propositions.

Now if we had seen only black-haired men, could we legitimately infer that all men must have black hair? Evidently not. Then there must be some other truth before the mind beside that

of John, Thomas, etc., having black hair. If that is, "after all the whole evidence" we have from the crinal nigritude of the human race, we shall not be able to reach that desirable conclusion. There is a suppressed premiss here to the effect, that all men resemble John, Thomas & Co.; that the individuals who have come under our observation are a fair sample of the race. How we come by this belief is a question in induction, yet unless we do have the premiss by some means or other, we can never get to the conclusion. But this premiss is a universal proposition; hence an essential part in reasoning from particulars to generals, is a general proposition. Mr. Mill, it is true, maintains that *this* general proposition is itself an induction from particulars. I admit it in the case of "simple enumeration," in which every instance comes under our observation. But in the vast majority of cases it is impossible to observe every individual. What naturalist has ever observed a thousand or a millionth part of the horned and cloven-footed animals in the world? Yet he believes them all to be ruminant. The "simplex enumeratio" then hardly constitutes an exception. In all other cases it is impossible to reach a general proposition as an induction from particulars. Hence Mr. Mill is at last self-contradictory. His inference of a general conclusion from particulars necessarily involves the employment of a general proposition as one premiss along with the particular or particulars as the other premiss.

We have been tediously minute in this discussion, because we are satisfied that Mr. Mill is in error, and yet he is so extremely ingenious that nothing short of an ultimate analysis of his theory will suffice for the detection of his fallacies. Those fallacies radicate in his empiricism, and to a certain extent vitiate his entire system of logic, able as it is in other respects.

Middle Terms.—Men may be masters of all the rules and principles of the logical science, and yet be poor reasoners in one sense of the word. The two things concerning which a conclusion is desired, must be compared together by means of some third thing, and what that "*tertium quid*" shall be is the question. Logic tells us that we must have it, but not where or

whence it may be obtained. Just here is the field for knowledge and for ingenuity. Let us suppose that in the room where the piano stands, there is no measuring rod. You take a piece of cord; if there is no cord, you take your pocket handkerchief; or laying one palm alternately by the other you adopt the primitive measure of "hands," in which the height of horses is still estimated. In mathematics, how important is what an eminent French writer calls the felicitous selection of the unknown term! In astronomy the spectral analysis has already given some very interesting results. We have learned that the sun's atmosphere contains twelve of our earthly metals; Aldebaran has nine. The spectroscope seems to have settled a mooted point respecting the constitution of some of the nebulae. Are they composed of solid worlds whose light comes to us so blended as to look like a haze? Or are they luminous vapors? The former conclusion was established in some of the cases by the very high magnifying power of Lord Rosse's telescope, which resolved a number of previously irresolvable nebulae into separate stars. The likelihood then seemed to be that a sufficiently high power would resolve the most untractable. But the spectroscope teaches another lesson. "In 1864, Mr. Huggins analysed the light from a nebula in Draco, and found that it is not compound like sunlight, but that the rays come from a glowing gaseous substance devoid of any atmosphere. The lines in the spectrum indicate the existence of hydrogen, nitrogen, and a third substance not recognised." (Rays Elements of Astron.)

The spectral lines were observed by Fraunhofer long ago, but it is only of late that they have been used as a middle term.

A dexterous use of middle terms was made by Marlborough when he ferreted out of Charles XII., of Sweden, his purpose of attacking Russia. How very wily and skilful a diplomat did Marlborough prove himself to be! He was a good manager of middle terms, though it is questionable whether he could have stated in full any one of his syllogisms.

The Dictum de Omni et Nullo.—What is predicated of a class can be predicated of every individual of the class. Predication,

here, is to be understood as including both affirmation and negation. This is the famous Aristotelian canon which was supposed to govern all reasoning processes. But if we may and often do reason without the intervention of a class concept, we may and do reason without Aristotle's dictum. This is Dr. McCosh's view, and is doubtless correct.

Reasoning from Particulars to Particulars.—How far has this been recognised by logicians? Mill is a sturdy advocate of it. "We perpetually do so reason. All our earliest inferences are of this nature. . . . In the same way also brutes reason. . . . The syllogistic form is an indispensable collateral security. . . . The syllogism is not a correct analysis of the process of reasoning."

The matter seems to have stood at about this point until Hamilton and his coadjutors appeared. Mr. Mill's illustration of the village matron and the illness of her Lucy was an unfortunate selection. The vague unscientific diagnosis of such a woman is too unreliable. The causes and the effects which are in their turn causes, involved in that totality which we call health or disease, are far too numerous and too inaccessible for so incapable an observer, while she might be trusted to measure her cot or table to see whether it would pass through the door. A step in the right direction was taken when convertible terms were considered, as that common salt is chloride of sodium, to designate which proposition the vowel U was employed, A, E, I and O, having been "pre-empted." Hamilton's unfigured syllogism comes next; A and B are equal, B and C are equal, hence A and C are equal. The important point of this is not its being unfigured; it is true that A and B are both on the same side of the copula, both being on the grammatical subject, but this is merely a rhetorical and not a logical consideration, for the expression A and B are equal is plainly elliptical, and means equal to each other, *i. e.*, at last $A = B$ and $B = A$. The real importance lies in this, that it is a return toward simplicity, toward the historical as well as logical commencement of reasoning. We are getting back rapidly to the piano and the door, of which A and

C are the generalised symbols. It makes no difference whether we say $A=B$ or $B=A$, $B=C$ or $C=B$, $A=C$ or $C=A$, just as it is unimportant whether we begin with the door or the piano.

Therefore we have arrived at the Ultima Thule in Logic. We have begun, *i. e.*, Aristotle began at the end of the science; Hamilton ends at the beginning, Aristotle chiselled out the bust of the statue; Hamilton has carried the work on down to the feet resting on the pedestal.

But at what an infinite cost of labor and talents! Whereas if the beginning had been made at the right place, the progress, it seems to us, must have been far easier and surer. If a man wishes to qualify himself to be a guide in some vast cavern, let him by all means begin at the mouth and investigate every passage-way as he goes onward. If he should first be carried blind-fold to the innermost end, and then have his eyes uncovered, and a lamp put in his hands, and be required to grope his way out, he will do well if, like Aristotle, he gets half-way to daylight, and well again, if like Sir William Hamilton, with a thousand old guides discouraging him, he pushes his way to the mouth of the cave.

The same blunder has often been made by writers on mathematics. In presenting Taylor's Theorem, for instance, they begin with an equation of this sort:

$$f(x+y) = A + By^a + Cy^b + Dy^c + \text{etc.}$$

"in which the terms are arranged according to the ascending powers of y , and in which A, B, C, D , etc., are independent of y , but functions of x , and dependent on all the constants which enter the primitive function." All of which is intelligible to the man who has mastered the differential calculus! But to require a learner to apprehend it, almost necessarily leads to the result that not one pupil in five ever does thoroughly understand Taylor's Theorem. Nor is it credible that Dr. Goode Taylor made his beautiful discovery in any such inverted manner.

What an immense pity, then, that Hamilton had not systematised and completed his New Analytic! Brief schemes, fragmentary thoughts, and acute criticisms on isolated passages, all

huddled together into an Appendix, furnish the hints for the coveted system of Logic which shall begin at the foundation and end with the dome of the science. Professor Bowen has accomplished something, and deserves the thanks of the scientific world for what he has accomplished toward superinducing order into the chaos of valuable materials. President McCosh says, (Preface, p. v.): "The clearest account of the new Logic is to be found, not in Hamilton's own lectures which were left in a crude state, but in the *Logic* of Professor Bowen of Harvard College."

The most direct and satisfactory method that occurs to our own mind is, to divide ratiocination into three parts: 1st. From particulars to particulars. 2d. From particulars to generals, or induction. 3d. From generals to particulars, or deduction. It is the first of these three that has been so much overlooked; and yet it will throw a flood of light upon the other two, if it be but rightly handled. The relation which I have considered is that of equality. "An affirmative proposition is simply the declaration of an equation, a negative proposition is simply the declaration of a non-equation of its terms." "A proposition is simply an equation." Hamilton's Appendix, 515, 525.

This would need some amplification. The door may be wider or narrower than the piano. All differences in degree need not be treated as negatives. The countless relations of individual objects seldom exhibit an absolute equality. One piece of cloth is finer or coarser than another; the blue of the sky overhead is more intense than that of the horizon; Demosthenes was more impassioned; Cicero, more copious; Raphael was more graceful in his forms; Titian more exquisite in his coloring. We cannot enter into this, as we are writing only an article, and not a treatise.

As soon as we introduced general propositions, the "quantification of the predicate" would require consideration, in connection with the limitations of human thought. Also the *vezata questio* relative to the origin and limits of our belief in the uniformity of the laws of nature.

Under the third division, the Aristotelian logic, purged of

any imperfections, and connected with the former departments of the science.

We leave this task to abler pens. Meanwhile the logician will readily excuse a little badinage in this article, if it shall have cajoled into reading it, those who deem Logic so very dry and unentertaining a subject.

ARTICLE III.

ROMANS VI. 4, AND COLOSSIANS II. 12, AND THE BAPTIST CONTROVERSY.

It is proposed to consider the only Scripture texts upon which the Immersionists found their doctrine, that baptism is commemorative of Christ's burial, and that in the "Katadusis" and "Anadusis" of Immersion, his descent into and ascent out of the grave are signified. As an *à priori* argument against this view of baptism, it shall be first shown that, according to the words of Christ himself, and the understanding of the same by his apostles, baptism signified the "washing of regeneration and the renewing of the Holy Ghost;" and that baptize and baptism are essentially "ethical" terms, having no reference to any particular mode, but denoting that the subjects are brought into a certain moral (or spiritual) state as respects that thing (as "repentance" or "death," Rom. vi. 4,) or that person (as Christ, or Paul, or Moses,) into which they were baptized. For this will show that the sacrament is *prospective*, and not retrospective as the immersionists maintain.

I. Our Lord assembled the disciples together just before his departure, and commanded them, (Acts i. 4, 5)—"To wait for the promise of the Father, which ye have heard of me; for John truly baptized with water, but ye shall be baptized with the Holy Ghost." It is evident what *the promise* is—*baptism with*, (or *in*, for such is the Greek preposition,) *the Holy Ghost*. It is also