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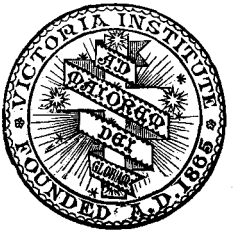

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ORDINARY MEETING, FEBRUARY 15, 1886.

D. HOWARD, ESQ., V.P.C.S., IN THE CHAIR.

The Minutes of the last Meeting were read, and the following Elections were announced :—

ASSOCIATES :—Major-General H. Aylmer, Falmouth ; Rev. S. S. Allnutt, M.A., Dehli ; Rev. T. Dunn, London ; Rev. A. Elwin, China ; G. H. O'Donel, Esq., India ; Rev. F. B. Proctor, M.A., London ; Mrs. H. V. Reed, United States ; Rev. J. Whiteley, Bradford.

Also the presentation to the library of the following :—

Essays by the late Lord O'Neill. *From the Dowager Lady O'Neill.*
Sermons by the same. „ „ „

The following paper was then read by Mr. H. CADMAN JONES, M.A., the author's university duties preventing his attendance.

FINAL CAUSE. By Professor R. L. DABNEY, D.D., LL.D. (Texas University).

OF the four "causes," or necessary conditions of every new effect, taught by Aristotelians, the last was the "Final Cause," τὸ τέλος, or τὸ οὗ ἕνεκα ; "that for the sake of which" this effect was produced. This result, for the sake of which the effect has been produced, is termed "final," because it is of the nature of a designed end ; and "cause," in that it has obviously influenced the form or shape given to the result, and the selection of materials and physical causes employed. Final cause thus always involves a judgment adapting means to an end, and implies the agency of some rational Agent.

2. The question: Do any of the structures of Nature evince final cause ? is the same with the question : Is the "teleological argument" valid to prove the being of a personal and rational Creator ? The essence of that argument is to infer that, wherever Nature presents us with structures, and especially organs adapted to natural ends, there has been contrivance, and also choice of the physical means so adapted. But contrivance and choice are functions of thought and will, such as are performed only by some rational person. And so,

as material Nature is not intelligent or free, such adapted structures as man did not produce must be the work of a supernatural Person. This reasoning has satisfied every sound mind, Pagan and Christian, from Job to Newton. Yet it is now boldly assailed by evolutionists.

3. Some attempt to borrow an objection which Descartes very inconsistently for him, suggested: That "he deems he cannot, without temerity, attempt to investigate God's ends" (*Meditations*, iv. 20). "We ought not to arrogate to ourselves so much as to suppose that we can be sharers of God's counsels" (*Prin. Phil.* i. 28). The argument is, that if there is an intelligent First Cause, He must be of infinite intelligence; whence it is presumptuous in a finite mind to say that, in given effects, He was prompted by such or such designs. We are out of our depth. But the reply is: That this objection misstates the point of our doctrine. We do not presume to say, in advance of the practical disclosure of God's purposes in a given work, what they are, or ought to be; or that we know all of them exactly; but only: That He is prompted in His constructions by some rational purpose. And this is not presumptuous, but profoundly reverential; for it is but concluding that God is too wise to have motiveless volitions! Again, when we see certain structures obviously adapted to certain functions, and regularly performing them, it is not an arrogant, but a supremely reverential inference, that those functions were among God's purposed ends in producing those structures. For this is but concluding that the thing we see Him do is a thing He meant to do!

4. Next, we hear many quoting Lord Bacon against the study of final causes. They would fain represent him as teaching that the assertion of final causes is incompatible with, and exclusive of, the establishment of efficient, physical causes. But, as these latter are the real, proximate producers of all *phenomena*, it is by the study of them men gain all their mastery over Nature, and make all true advances in science. Whence, they argue, all study or assertion of final causes is inimical to true science. Thus, they quote Bacon, as, for instance, in the *Nov. Organum* (lib. i. Apothegm 48): "Yet, the human intellect, not knowing where to pause, still seeks for causes more known. Then, tending after the remoter, it recoils from the nearer; to wit, to final causes, which are plainly rather from the nature of man, than of the Universe; and from this source they have corrupted philosophy in wondrous ways."

5. Now, Lord Bacon's own words prove that he does not condemn, but highly esteems the inquiry after final causes in

its proper place, the higher philosophy and natural theology. He is himself a pronounced Theist, and infers his confident belief in God from the teleological argument. The whole extent of his caution is, that when the matter in hand is physical, and the problem is to discover the true, invariable, physical efficient of a class of *phenomena*, we confuse ourselves by mixing the question of final cause. Thus, in the *Advancement of Learning*, he himself divides true Science into physical and metaphysical; the former teaching the physical efficients of effects; the latter, under two divisions, teaching: 1. The Doctrine of Forms. 2. The Doctrine of Final Causes. And this third, culminating in theology, he deems the splendid apex of the pyramid of human knowledge.

6. In the second book of his work on the *Advancement of Learning*, he says:—"The second part of Metaphysics is the inquiry into final causes; which I am moved to report not as omitted, but as misplaced." (He then gives instances of propositions about final causes improperly thrust into physical inquiries.) "Not because those final causes are not true, and worthy to be inquired, being kept within their own province; but because these excursions into the limits of physical causes have bred a vastness and solitude in that track. For, otherwise, keeping their precincts and borders, men are extremely deceived if they think there is an enmity or repugnancy between them."

7. In fact, the two imply each other. If there is a God pursuing His purposed ends, or final causes, He will, of course, pursue these through the efficient, physical causes. It is the very adaptation of these to be right means for bringing God's ends, under the conditions established by His providence, which discloses final causes. It is the physical cause,—gravity,—which adapts the clock-weight to move the wheels and hands of the clock. Shall we, therefore, say it is contradictory to ascribe to the clock, as its final cause, the function of indicating time? Does the fact that the physical cause,—gravity,—produces the motions weaken the inference we draw from the complicated adjustments, that this machine had an intelligent clockmaker? No; the strength of that inference is in this very fact, that here, the blind force of gravity is caused to realise an end so unlike its usual physical effects in the fall of hail-stones and rain-drops, of leaves and decayed branches.

8. The evolutionist says, then, that since the physical cause is efficient of the effect, this is enough to account for all actual results, without assigning any "final cause." The *lens*, for instance, has physical power to refract light. If we find a

natural *lens* in a human eye, we have a sufficient cause to account for the formation of the *spectrum*, the function from which theists infer their final cause; and the logical mind has no need to resort to a theory of "contrivance" and "final cause" for this organ. Function is not the determining cause, but only the physical result of the existence of the organ. Birds did not get wings in order to fly; but they simply fly because they have wings. As to the complex structures called organs, the evolutionist thinks his theory accounts for their existence, without any rational agent pursuing purposed ends. That just this configuration of a universe, with all its complicated structures, is physically possible (*i.e.* possible as the result of physical causes), is sufficiently proved by the fact that it exists as it is. For theists themselves admit that it is the physical causes which contain the efficient causation of it. These are, as interpreted by evolutionists, slight differentiations from the parent types, in natural reproductions (variations which may be either slightly hurtful to the progeny, slightly beneficial, or neutral): the plastic action of environment in developing rudimental organs, and the survival of the fittest. Allow, now, a time sufficiently vast for these causes to have exhibited, countless numbers of times, all possible variations and developments; under the rule of the survival of the fittest; the actual configurations we see may have become permanent, while all the agencies bringing them to pass acted unintelligently and fortuitously.

9. Such, as members of this Institute well know, is the latest position of anti-theistic science, so called. The whole plausibility is involved in a confusion of the notions of fortuity and causation. This we now proceed very simply to unravel. The universal, necessary, and intuitive judgment, that every effect must have an adequate cause, ensures every man's thinking that each event in a series of *phenomena* must have such a cause preceding it, however we may fail in detecting it. In this sense, we cannot believe that any event is fortuitous. But the concurrence or coincidence of two such events, each in its place in its own series caused, may be thought by us as uncaused, the one event by the other or its series, and thus the concurrence, not either event, may be thought as truly fortuitous. Thus, the coincidence of a comet's nearest approach to our planet, with a disastrous conflagration in a capital city, may be believed by us to be, so far as the concurrence in time is concerned, entirely by chance. We no longer believe that comets have any power to "shake war, pestilence or fire from their horrent hair," on our earth. Yet we have no doubt that a physical cause propels that comet in its orbit

every time it approaches the earth; or that some adequate local cause wrought that conflagration in the metropolis. But now, suppose this coincidence of the comet's *perigee* and the conflagration should recur a number of times? The reason would then see, in the frequency and regularity of that recurrence, a *new phenomenon,* additional to the individual ones of comet and fire; a new effect as much requiring its own adequate cause, as each of these demands its physical cause. This regular recurrence of the coincidence is now an additional fact. It cannot be accounted for by fortuity. Its regularity forbids that supposition. The physical cause of each event, comet's approach and conflagration, is adequate, each to the production of its own effect. But the new effect to be accounted for is the concurrence. This is regular; but we know that the sure attribute of the results of blind chance or fortuity is uncertainty, irregularity, confusion. The very first recurrence of such a coincidence begets a faint, probable expectation of a new, connecting cause. All logicians agree that this probability mounts up, as the instances of regular concurrence are multiplied, in a geometric ratio; and when the instances become numerous, the expectation of an additional coördinating cause becomes the highest practical certainty. It becomes rationally impossible to believe that these frequent and regular concurrences of the effects came from the blind, fortuitous coincidence of the physical causes, acting, each, separately from the other.

10. The real case, then, is this. Each physical cause, as such, is only efficient of the immediate, blind result next to it. Grant it the conditions, and it can do this one thing always, and always as blindly as the first time. Gravity will cause the mass thrown into the air to fall back to the earth, to fall anywhere, or on anything, gravity neither knowing nor caring where. But here are several batteries of cannon set in array to break down an enemy's wall. What we observe as fact is, that the guns throw solid shot convergently at every discharge, upon a single fixed spot in the opposing curtain, with the evident design to concentrate their force and break down one chasm in that wall. Now, it is a mere mockery to say that, given the cannon and the balls, the explosive force of gunpowder, and gravity, the fall of these shots is accounted for. These physical causes would account for their random fall, anywhere, uselessly, or as probably upon the heads of the gunners' friends. The thing to be accounted for is their regular convergence. This is an additional fact: the blind physical causes do not and cannot account for it,—it discloses design.

11. The human eye, for instance, is composed of atoms of oxygen, hydrogen, carbon, nitrogen, with a few others of

phosphorus and lime. Chemical affinity may arrange an ounce or two of these atoms into a compound, which may be, so far as any determination of that blind cause goes, of any shape or amorphous, fluid or solid, useful, useless or hurtful to sensitive beings. But here are countless millions of reptiles, birds, quadrupeds and men, creatures designed to live in the light and air, of whom the men number twelve hundred millions at least, in each individual of whom there is a pair of eyes except in the imperfect births. Numerous and exceedingly delicate adjustments were necessary in each separate eye, to effectuate the end of an eye—vision. The pupil must open on the exterior front, and not somewhere within the socket; the interior of the ball must be a *camera obscura*. There must be refracting, transparent bodies, to bend the rays of light; achromatic refraction must be produced; focal distances must be adjusted aright; there must be a sensitive sheet of nerve to receive the *spectrum;* the sensation of this image must be conveyed by the optic chords to the *sensorium;* the animal's perceptive faculty must be coördinated as a cognitive power to this sensorial feeling; the brow and lids must be contrived to protect the wondrous organ. Here, already, is a number of coincidences, and the failure of one would prevent the end —vision. Let the probability that the unintelligent cause, chemical affinity, would, in its blindness, hit upon one of these requisites of a seeing eye, be expressed by any fraction, we care not how large. Then, according to the established law of logic, the probability that the same cause will produce a coincidence of two requisites is found by multiplying together the two fractions representing the two separate probabilities. Thus, also, the joint concurrence of a third has a probability expressed by the very small fraction produced by multiplying together the three denominators. Before we have done with the coördinations of a single eye, we thus have a probability, almost infinitely great, against its production by physical law alone. But in each head are two eyes, concurring in single vision, which doubles the almost infinite improbability. It is multiplied again by all the millions of the human and animal races. But this is not all. To say nothing of the coincidence of means in inorganic and vegetable nature, there are in animals many other organs besides eyes, which, if not as complicated, yet exhibit their distinct coördinations. These must multiply the improbability that fortuity produced all the former results! Thus the power of numbers and the capacity of human conceptions are exhausted before we approach the absurdity of this theory of the production of ends in nature without final cause.

12. We look, then, at these combinations of means to results or functions, which unintelligent physical causes could not account for; and we perceive this farther fact. Adjustments or coördinations are regularly made, in order to certain ends. The nature of the end proposed has determined the nature of the physical means selected, and the combination thereof. Thus: as the ship is evidently designed and purposed for sailing, so is the ear for hearing, and the eye for seeing. The function of sailing has determined the materials and structure of the ship: the function of hearing those of the ear: the function of seeing those of the eye. But the ship-building must be before the sailing: the ear and eye must exist before the hearing and seeing. The facts which we have, then, are these: Here are ends, coming after their means, which yet have acted causatively on their own precedent means! But every physical cause precedes its own effect. No physical cause can act until it exists. Here, however, are ends, which exercise the influence of causes, and yet, against all physical nature, are causes before they have existence, and act backwards up the stream of time! Here is the function of sailing, which has effectively caused a given structure in a ship-yard, before this function was.

13. To solve this paradox, there is only one way possible for the human mind. There must have been *prescience of that future function*. It is impossible that it can have acted causally, as we see it act in fact, except as it is foreseen. But foresight is cognition; it is a function of intelligence; it cannot be less. A mind has been at work, pre-conceiving that function and the things requisite to it, choosing the appropriate means, purposing the effective coördinations therefor, and thus shaping the work of the physical causes. *This is "final cause."*

14. There is one sphere, within which the mind has intuitive and absolute knowledge of the working of final causes, as every atheist admits. This is the sphere of one's own consciousness and will. The man knows that he himself pursues final causes, when he conceives and elects future ends, selects means, and adapts them to his own purposed results. But is he not equally certain that his fellow-man also pursues final causes? Doubtless. It is instructive to inquire how he comes to that certainty as to his fellow's soul. He has no actual vision of that other's subjective states! Men have no windows in their breasts into which their neighbours peep, and actually see the machinery of mind and will moving. But this man knows that his fellow is pursuing final causes generically like those he consciously pursues himself; because

he observes the other's outward acts, and infers final causes in the other's mind, from the great mental law of "like causes, like effects," by an induction guided by the perfect, visible analogy.

15. But when we observe, in nature, these visible actions exactly analogous to combinations seen in our fellow-man when he pursues his final causes: why do not the same analogy and induction justify us in ascribing the same solution; that there are final causes in nature also? Why is not the one induction as valid as the other? There is no difference. It is vain to object, that whereas we see in our fellow a rational person; we see in nature no personality, but only sets of material bodies and natural causations. For it is not true that we *see* in our neighbour a rational person, competent to deal with final causes. His soul is his personality! And this is no more directly visible to us than God is visible in nature. What we see in our neighbour is a series of bodily actions executed by members and limbs, as material as the physical organs of animals: it is only by an induction from a valid analogy between his acts and our own, that we learn the rational personality behind his material actions. The analogy is no weaker, which shows us God's personality behind the final causes of nature. The question returns: Why is it not as valid?

16. Is a different objection raised: That man's pursuit of his final causes is personal and consciously extra-natural, exercised by personal faculties acting from without upon material nature; while the powers which operate everything in nature are immanent in nature? The replies are two: First, in the sense of this discussion, human nature is not extra-natural, but is one of the ordinary spheres of nature, and is connected with the lower spheres by natural laws as regular as any. When the personal will of a man pursues a final cause, he does it through means purely natural: there is, indeed, a supra-material power at work, coördinating mind; but nothing extra-natural or supra-natural appears. Why, then, may we not press an analogy so purely natural through all the spheres of nature? Second: our opponents [Evolutionists, or Materialists, or Agnostics] refute themselves fatally; for they are the very men who insist on obliterating even that reasonable distinction which we make between the material and mental spheres. They plead for *monism* in some form: they deny that mind and matter are substantively distinct; they insist on including them in one theory of substance and force. They have, then, utterly destroyed their own premise, by denying the very distinction between personal mind and

nature, on which alone their objection rests. On their ground, our analogical induction for final cause in nature is a perfect proof. They admit that our minds consciously pursue final causes. But mind and physical nature, say they, are manifestations of the same substance and force. Hence, when we see the parallel coördinations of physical causes to future ends in nature, just like those we consciously employ; there is no other inference possible, but that nature, like us, pursues final causes.

17. The exception of Hume and his followers of our generation is already virtually answered. He cavilled that the inference from our conscious employment of final causes to the same fact in nature is unsound, because of the difference between a person and a natural agency. Mr. Mill has echoed the cavil, while completely refuting it in another place.* Mr. H. Spencer has reproduced it in the charge that the inference labours under the vice of *anthropomorphism;* that it leaps from the conscious experience of our limited minds to an imaginary acting of an infinite mind (if there is any divine mind), about which we can certainly know nothing as to its laws of acting; and it unwarrantably concludes that this absolute Being chooses and thinks as we finite, dependent beings do. The *argumentum ad hominem* just stated would be a sufficient reply. Or we might urge that, if God has made the human mind "after His image, in His likeness," this would effectually guarantee all our legitimately rational processes of thought against vice from *anthropomorphism.* For, in thinking according to the natural laws of our minds, we would be thinking precisely as God bids us think. And, should Mr. Spencer say that we must not "beg the question" by assuming this theistic account of man's origin, we might at least retort, that neither should he beg the question by denying it. We might also urge, that the difference between the normal acting of a finite mind, and of an infinite one, can only be a difference of degree, not of essence; that the thinking of the finite, when done according to its laws of thought, must be good as far as it goes; only, the divine thinking, while just like it within the narrow limits, goes greatly farther. Sir Isaac Newton knew vastly more mathematics than the school-child; yet, when the school-child did its little "sum" in simple addition, "according to rule," Newton would have pronounced it right; nor would he have done that "sum" in any other than the child's method! Once more; the unreasonableness of the demand, that we

* *Theism*, part i., "Marks of Design in Nature."

shall reject any conception of the divine working, though reached by normal (human) inference, merely because it may be anthropomorphic, appears thus. It would equally forbid us to think or learn at all, either concerning God, or any other Being or concept different from man: for, if we are not allowed to think in the forms of thought natural and normal for us, we are forbidden to think at all. All man's cognition must be anthropomorphic, or nothing.

18. But the complete answer to these exceptions is in the facts already insisted on: that, in reasoning from "finality" in nature, to "intentionality," we are but obeying an inevitable necessity; we are not consulting any peculiarity of human laws of thought. In the operations of Nature, just as much as in our own consciousness, we actually see ends which follow after their physical efficients, exerting a causal influence backward, before they come into existence, on the collocations of their own physical means, which precede. There is no way possible in physical nature by which a cause can act before it is. The law of physical causation is absolute; a cause must have existed in order to operate. Hence we are driven out of physical nature to find the explanation of this thing,—driven, not by some merely human law of thought, but by an absolute necessity of thought. The final cause which acted before it existed, must have pre-existed in forethought. Forethought is a function of mind. Therefore, there must be a Mind behind nature, older and greater than all the contrivances of nature. A great amount of thinking has been done in the finalities of nature. Who did that thinking? Not nature. Then God. The only alternative hypothesis is that of chance. We have seen that hypothesis fall into utter ruin and disgrace before the facts.

19. Were all the claims of the Evolutionist granted, this would not extinguish the teleological argument, but only remove its *data* back in time, and simplify them in number. For then, the facts we should have would be these: a few, or possibly one primordial form of animated matter, slowly, but regularly, producing all the orderly wonders of Life, up to man, through the sure action of the simple laws of slight variation, influence of environment, survival of the fittest. Here, again, are wonderful adaptations to ends! And chance would equally be excluded by the numbers, the regularity, the beneficence of the immense results. The problem would recur:—Who adjusted those few but ancient elements so as to evolve all this? Teleology is as apparent as ever. We may even urge, that the distance, the multitude, the complex regularity

of the later effects which we now witness, illustrate the greatness of the thinking but the more. The justice of this point may appear from the fact, that there are Theistic evolutionists who make the very claim just urged. They advance the evolutionist theory, and in the same breath they stoutly assert that in doing so they have not weakened, but improved the grounds of the teleological argument. However, we may judge their concession of this improved theory of evolution to be unwise and weak; this other assertion is solid, that they are no whit inferior in knowledge or logic to their atheistic comrades and co-labourers, who pronounce the teleological argument dead.

20. The attempt to account for structures adapted to functions by evolution, has no pretence, even, of applying, except in organised beings which perpetually reproduce their kinds. For it is the claim of slight variations in generation, and of the fuller development of nascent new organs by the reaction of environment, which form the "working parts" of the theory. But clear instances of finality are not confined to these vegetable and living beings. There are wondrous adaptations in the chemical facts of inorganic nature, in the mechanism of the heavenly bodies, in the facts of meteorology. Here, then, their speculation breaks down hopelessly. Have suns and stars, for instance, attained to their present exquisite adjustments of relation, and perfection of being, by the blind experiments of countless reproductions? Then, the fossil-suns, unfitted to survive, ought to lie about us as thick as fossil polypi and mollusks!

21. The claim, that a blind *conatus* towards higher action felt in the animal may have assisted the plastic influence of environment from without in developing rudimental organs, cannot assist the evolutionists. They differ among themselves as to the mode of such influence; they contradict each other. Natural history fatally discredits the claim by saying, that the organ must be possessed by the species of animals, before any of them could feel any *conatus* towards its use. Can seeing be before eyes, even in conception? No. How, then, could eyeless animals feel any *conatus* to see? Let no one be deluded by the statement that a blind boy among us may feel a yearning to see. He is a defective exception in a seeing species, who do crave to see because they already have eyes; and who suggest to their blind fellow the share in this desire by the other faculty of speech. It still remains true, that the species must have eyes beforehand, in order that individuals

may experience a *conatus* for seeing. But the case to be accounted for would be the beginning of such *conatus* in some individual of a species, none of which had the organ for the function, and in which, consequently, none had even the idea of the function or its pleasures as the objective of such desire. If they resort to the assertion that this *conatus* towards a function may be instinctive and unintelligent, the fatal answers are:—That their own sciences of zoology and physiology assure us that instincts are not found in cases where the organs for their exercise do not exist: And that an instinctive *conatus*, being blind and fortuitous, would never produce results of such regularity and completeness, and those, exactly alike in each of the multitudes of a species.

22. But the most utter collapse of the attempt to explain the finalities of Nature by the laws of a supposed evolution, occurs when we approach those classes of organs, which complete their development while the influences of environment and function are entirely excluded; and these are exceedingly numerous. The fowl in the shell has already developed wings to fly with, in a marble case which excluded every atom of air, the *medium* for flying. So, this animal has perfected a pair of lungs for breathing, where there has never been any air to inhale. It has matured a pair of perfect eyes to see with, in a prison where there has never entered a ray of light. It has an *apparatus* of nutrition in complete working order, including the interadjustments of beak, tongue, swallow, craw, gizzard, digestive stomach, and intestine, although hitherto its only nutrition has been from the egg which enclosed it; and this has been introduced into its circulation in a different manner. This instance of the fowl has been stated in detail, that it may suggest to the hearer a multitude of like ones. The argument is, that physical causes can only act when in juxtaposition, both as to time and place, with the bodies which receive their efficiency. But here, environment and function were wholly absent until the results,—wings, eyes, ears, lungs, alimentary canal, were completed. Therefore, they had no causal connection whatever as physical causes. Their influence could only have been as final causes.

23. Perhaps the deepest mysteries and wonders of Nature are those presented in the functions of reproduction. And to these Nature attaches her greatest importance, as she shows by many signs, seeing the very existence of the *genera* and *species* depend on this. The organs of reproduction present instances most fatal to our opponents, in all those cases where the male organs are in one individual, and the female in a

different one of the same species; and where their development is complete before they either can or do react upon each other in any manner. These instances not only include the great majority of the animal species, but many kinds of plants and trees; or, at least, different flowers of the same tree. The organs are exceedingly unlike each other, yet exactly adapted for future co-operation. This fitness is constituted not only by structure of masses, but by the most refined and minute molecular arrangements. If either of these delicate provisions is out of place, Nature's end is disappointed. Must not these organs be constructed for each other? Yet the reaction of environment had no influence on their development; for all interaction has been excluded until the maturity of the structures. Final cause is here too clear to admit of doubt when the cases are duly considered.

24. The argument will close with these general assertions. Our conclusion has in its favour the decided assent of the common sense of nearly all mankind, and of nearly all schools of philosophy. All common men of good sense have believed they saw, in the adjustments of the parts of nature to intended functions, final causes and the presence of a supernatural mind. The only exceptions have been savages like the African Bushmen, so degraded as to have attained to few processes of inferential thought on any subject. All speculative philosophers have been fully convinced of the same conclusion, from Job to Hamilton and Janet, except those who have displayed eccentricity in their philosophy, either by materialism, ultra-idealism, or pantheism. This *consensus* of both the unlearned and the learned will weigh much with the healthy and modest reason.

25. The postulate that each organ is designed for an appropriate function is the very pole-star of all inductive reasoning and experiment in the study of organized nature. At least, every naturalist proceeds on this maxim as his general principle; and if he meets instances which do not seem to conform to it, he at once discounts them as *lusus naturæ*, or reserves them for closer inquiry. When the botanist, the zoologist, the student of human physiology, detects a new organ, not described before in his science, he at once assumes that it has a function. To the ascertainment of this function he now directs all his observations and experiments; until he demonstrates what it is, he feels that the novelty he has discovered is unexplained; when he has ascertained the function, he deems that he has reduced the new discovery into its scientific place. Without the guidance of this postulate of adapted function for each organ, science would be paralysed, and its order would become

anarchy. The instances are so illustrious, from Harvey's inference by the valvular membranes in the arteries to a circulation of the blood, down to the last researches of zoology and botany, that citation is needless for the learned. But this postulate is precisely the doctrine of final cause.

26. Belief in final cause is the essential counterpart to, and immediate inference from, the belief in causation. But this is the very foundation of inductive logic. There is no physicist who does not concur with us in saying, that all induction from instances observed to laws of nature is grounded in the "uniformity of nature." But has this nature any stable uniformity? Is not her attribute variation and fickleness? The first aspect of her realm is mutation, boundless mutation. Or, if she is found to have, in another aspect, that stability of causation necessary to found all induction; how comes she, amidst her mutabilities, to have this uniformity? Her own attributes are endless change, *and blindness*. Her forces are absolutely unintelligent and unremembering. No one of them is able to know for itself whether it is conforming to any previous uniformity or not: no one is competent to remember any rule to which it ought to conform. Plainly, then, were material nature left to the control of physical laws alone, she must exhibit either a chaotic anarchy or the rigidity of a mechanical fate. Either condition, if dominant in nature, would equally unfit her to be the home of rational free agents, and the subject of inductive science. Let the hearer think and see. Nature is uniform, neither chaotic nor fatalistic, because she is directed by a Mind, because intelligence directs her unintelligent physical causes to preconceived, rational purposes. Her uniformities are but the expressions of these purposes, which are stable, because they are the volitions of an infinite, immutable Mind, "whose purposes shall stand, and who doeth all His good pleasure," because all His volitions are guided, from the first, by absolute knowledge and wisdom, perfect rectitude, and full benevolence. Nature is stable, only because the counsels of the God, who uses her for His ends, are stable.

None but theists can consistently use induction.

The CHAIRMAN (D. HOWARD, Esq., Vice-President Chemical Society).—We have to thank the author, and also the reader of this paper: we would gladly have welcomed Dr. Dabney among us, had he been able to leave his distant home. Having been a quarter of a century ago a very distinguished soldier, he has since added to that distinction the further claim upon our recognition which belongs to his position as a professor and deep thinker. It may seem strange that after all these years of discussion we should still have to

go back to so elementary a matter as the causes which Aristotle classed as first causes. And yet there are few things which create so much discussion as the question of first cause. I once heard a distinguished lawyer ask a distinguished physician, in cross-examination, what was the cause of a man's illness, and the physician replied, "If you will tell me what you mean by 'cause,' I will answer the question." The lawyer, however, thought better of it, and the question was not answered; and we were consequently cheated out of a very important discussion. Doubtless, the barrister was astute enough to know that most men would have fallen into the trap he had laid, and, in describing the cause of the man's illness, have afforded a chance for a clever rejoinder. And so it is in the matter before us. We see men entirely ignoring the very ancient distinction between the different causes by confusing, under the common term "causes," all those which Aristotle, if not the first to draw attention to, was undoubtedly the first to classify. The more we pursue the question the more evident it is that, take what view we may of creation, whether we consider the present state of things to have been brought about by evolution, or by a mere single act of creation, we are just as much unable to escape from the argument of final cause in the one case as in the other. We are, in fact, unable to free our minds from the belief that there has been a distinct purpose in nature. It is, I believe, perfectly true that there is nothing in the belief in evolution to prevent a full and complete belief in a final power and creative cause, though I quite share the author's view of the very incomplete proof of the universality of evolution. Therefore, this question of final cause is by no means one which it is needless to discuss in these days. It is not one, I think, which has been so thoroughly thrashed out that there is no necessity to say any more upon it. There are, however, many here who I believe are well able to discuss the subject, and I hope they will give us the benefit of their thoughts upon it.

Mr. HASTINGS C. DENT, C.E., F.L.S.—In offering a few remarks on this subject, I would first of all say that there have been few papers read in this room to which I have listened with deeper interest; and I cannot but regard it as a most important contribution to the transactions of this Society. I propose to confine my remarks to a few criticisms, and I may say that there are many points in the paper which are so very clear and plain that I might almost call them axioms. I will draw attention to some half dozen of these, and the first to which I would refer relates to contrivance and choice. In section 2, the author says, "Wherever nature presents us with structures, and especially organs, adapted to natural ends, there has been contrivance, and also choice of the physical means so adapted. But contrivance and choice are functions of thought and will, such as are performed only by some rational persons." There is a very admirable illustration of this given in section 7. It is not the old idea of Paley about the watch, but rather an enlargement of that idea. The author says, "Here the blind force of gravity is caused to realise an end so unlike its usual physical effects in the fall of hail-stones and rain-drops, of leaves and decayed branches."

Then I come to axiom No. 2, which is to be found in section 8. The author says, "Function is not the determining cause, but only the physical result, of the existence of the organ. Birds did not get wings in order to fly; but they simply fly because they have wings." In the same way, we are told in paragraph 12, "Adjustments, or coördinations, are regularly made in order to certain ends;" and again, on the same page, "As the ship is evidently designed and purposed for sailing, so is the ear for hearing and the eye for seeing." Axiom No. 3 is given in section 9, where the author says, "We know that the sure attribute of the results of blind chance or fortuity, is uncertainty, irregularity, confusion;" and then we have axiom No. 4, a little further down, "It becomes rationally impossible to believe that these frequent and regular concurrences of the effects came from the blind, fortuitous coincidence of the physical causes, acting each separately from the other." Again, in the concluding part of section 17, we are told, "The difference between the normal acting of a finite mind and of an infinite one can only be a difference of degree, not of essence;" and then we have an analogy between the child's sums and those of Sir Isaac Newton. The fifth axiom is to be found at the end of paragraph 20, where the author confutes the theory of gradual evolution, or the doctrine of organisms obtaining perfection. Here the author gives us a splendid specimen of analytical reasoning, by citing the case of the sun and the stars, as to which he says, "Have suns and stars, for instance, attained to their present exquisite adjustments of relation and perfection of being by the blind experiments of countless reproductions? Then, the fossil suns, unfitted to survive, ought to lie about us as thick as fossil polypi and mollusks." There is one more axiom. It appears at the end of section 21:—"Their own sciences of zoology and physiology assure us that instincts are not found in cases where the organs for their exercise do not exist." May I be allowed, very humbly, to take exception to one item in section 22? I would venture to suggest that the argument there employed is weak, because it can be so easily controverted or answered by the evolutionists. The author says, "The most utter collapse of the attempts to explain the finalities of nature by the laws of a supposed evolution occurs when we approach those classes of organs which complete their development while the influences of environment and function are entirely excluded, and these are exceedingly numerous." He then refers to the fowl in the egg, as obtaining all its different organs necessary for the consumption of food, and the other needs of its being. Now, the evolutionist would say the fowl has merely inherited organs which are transmitted in the egg, and that, consequently, improvement or degeneration takes place after the animal has emerged from the egg-shell; every creature becoming more complex as the embryonic stage becomes more complicated. I do not know any creature that emerges from an egg without possessing some organs which it could not use while in the egg.

Rev. J. WHITE, M.A.—May I take the liberty of offering a few remarks?

I think that, even if we admit all the evolutionists lay claim to, nevertheless, the teleological argument—that of a final cause for the existence of a rational and intelligent Creator—still remains unanswered. Evolution only accounts for the existence of the universe as a going machine, successive generations and variations being continually produced, and those generations being perpetuated in a manner beneficial to the creatures generated. I say, admitting all this as an explanation of the natural history of the universe, it still fails to exclude the teleological argument that the creatures which exist must have had the power of variation bestowed upon them. The creature is put into an environment which enables it to fulfil its functions and to bring about the results we witness; but all this implies design and purpose. It is what could not have occurred by chance or accident. Therefore, I think, material evolution does not militate against the belief we entertain, and that it is rational to entertain, as to the universe having been created by a God who had in view the perfection of the creatures by which it is inhabited. Evolution is to be regarded simply as one of the means by which this perfection and improvement have been brought about. In point of fact, the whole argument brought by the evolutionists against theism, seems to me very like the old illustration which, in accounting for the movement of a watch, went back to the spring and left the origin of that part of the machinery unexplained. These scientific theorists attempt to explain the existence of the universe without a Creator. They merely explain some of the processes, but fail altogether to touch their origin. It is a very remarkable thing how completely all the efforts of human science have failed to explain the origin of anything. Professor Max Müller has pointed out that all the attempts to explain the beginning of any language have utterly failed, and that there is not the slightest prospect of our obtaining such knowledge. He adds the remark, that the human intellect seems equally to fail in ascertaining the beginning of everything else. Therefore, I cannot think that the argument for evolution—although I admit evolution to be true as far as it accounts for a considerable number of steps in the process by which the creatures of the universe have been improved—does dispose of the teleological argument for a final cause, which the author of this paper has put before us in so admirable a manner.

Mr. Dent.—I should like to ask the last speaker whether he accounts for the appearance of man by evolution?

Rev. J. White.—I fear I am misunderstood. I only say, *supposing* the case of the evolutionist to be admitted, still it does not militate against, nor upset, the argument advanced in the paper.

Captain Francis Petrie (Hon. Sec.).—I have received the following communication from Surgeon-General C. A. Gordon, M.D., C.B., who is unavoidably prevented from being present.

Physical causes are the real proximate producers of all phenomena, sec. 4.

But the fact that they are so leaves the *ultimate cause* of those phenomena unexplained. For example, a match applied to gunpowder is the *immediate*

cause of an explosion. But the *why* of this result is not explained by the occurrence of the explosion.

In physiology we know that each organ in the body performs its own definite function, and none other; also, that the several functions of organs are influenced by immaterial causes, as the emotions, &c. The fact we know; the why remains mysterious and unknown.

And so with particular causes of diseases, and action of drugs employed in treatment. The fact that definite effects follow the causes and the drugs is matter of actual experience. The why,—that is, the ultimate cause, in the one case as in the other,—is unrevealed.

Materialists assert that the phenomena of mind differ rather in degree than in kind from the phenomena of matter.

As a matter of fact, as little is known of the ultimate and occult properties of matter as there is known of the corresponding properties and faculties of mind. As expressed by Baxter—"Men who believe that dead matter can produce the effects of life and reason, are a hundred times more credulous than the most thorough-paced believer that ever existed."

The CHAIRMAN.—I wish the author had been here to have answered the friendly criticisms that have been made upon his paper. The point to which our attention has been called in regard to the answer of the evolutionist as to the formation and growth of the fowl in the egg, points to one of those curious things that have always passed my comprehension. It is assumed, undoubtedly for a very good reason, as we see that such is the case in nature, that the influence of heredity is an immense power; but what right have we, from the theory of pure natural selection, to assume anything of the kind? What right have we to assume that extraordinary persistency of type which is one of the most remarkable characteristics of all animals? Granting, for the sake of argument, that the peculiar transformations undergone by the embryo are a proof of the past history of the race, how can we, from the characteristics before us, form a conclusion as to the cause of this? But there is, of course, the other possible explanation, that those singular points which are appealed to as evidences of past history, are evidences, not of past history, but of the present position of the animal in the scheme of creation. This is as much in favour of the teleological point of view as it is in favour of the evolutionist. We have to thank the author for a most interesting paper.

Mr. D. M'LAREN.—In section 20 of the paper, the author speaks of the "wondrous adaptations in the chemical facts of inorganic nature, in the mechanism of the heavenly bodies, in the facts of meteorology," the slightest derangement of which would be fatal to the whole of the existing animal creation. Have the evolutionists attempted to notice or explain the adjustment of the masses, and forces, and distances of the heavenly bodies, as bearing on the argument in favour of teleology?

The CHAIRMAN.—As far as my reading goes, there is absolutely no modern argument in that direction. Undoubtedly, a few centuries back the alche-

mists gave us a most interesting history of the evolution of matter, and Paracelsus gave us certain speculations which are not looked upon with respect by modern scientists, but form a curious parody of some forms of modern thought.

Mr. G. WISE.—We find in the amœba that which corresponds to digestion, reproduction, and many of the functions of highly organised creatures like ourselves. I have been reading the introductory chapter to Foster's *Physiology*, and he there very beautifully shows that function precedes organisation, while a great German physiologist says that organs are simply the localisation of functions. I should like to know whether that is true or not?

The CHAIRMAN.—I wish some able physiologist were here to answer that question. For my part I think there is a good deal more of organisation in the amœba than the microscope will show. The differentiation of protoplasm is not to be measured by our powers of perception.

Mr. WISE.—It is said that they are jellies which are purely transparent. Can we in that case discern anything corresponding to organisation?

The CHAIRMAN.—If an apparently perfectly structureless piece of jelly performs functions, is not that a proof of organisation? *

The meeting was then adjourned.

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* Professor Lionel Beale, M.B., F.R.S., has kindly added a paper entitled "Notes on Structure and Structureless" (see page 276.)

REMARKS ON THE FOREGOING PAPER, BY THE REV. R. COLLINS, M.A.

I am much indebted to the honorary secretary for sending me a proof of Dr. Dabney's paper. It seems to me to be the most lucid and closely reasoned essay upon the subject that I have read.

It is instructive to observe how difficult it is for the evolutionists, though they discard the doctrine of final causes, to escape its practical dominancy over their reasonings and methods. In their search after modifications in the structure and functions of plants and animals, they are guided, equally with Harvey, by the idea of some *object* to be accomplished. The evolutionist writes as though Nature were always working up to *quasi*-final causes, though his theory is that no such direct cause exists, there being no intelligence to plan such intention. Nature accomplishes what would be accomplished by an intelligence having an intention in view, and on the same lines, only by a different method, namely, that wherever Nature by any adventitious accidental change hits upon that which will give a plant or animal a better chance in the struggle for existence, that better chance, to be followed by an infinite number of better chances (though why so followed we are not clearly told), establishes a new dynasty. The result in the new dynasty is such as would be obtained by intelligent design. Thus the language of design is continually used. For instance (to take up the first evolution article that comes to hand, Mr. Grant Allen's *Dispersion of Seeds*, in *Knowledge*, November, 1885), we read, "This very sedentary nature of the plant kind renders necessary all sorts of curious devices and plans, on the part of parents, to secure the proper start in life for their young seedlings. Or rather, to put it with stricter biological correctness, it gives an extra chance in the struggle for existence to all those accidental variations which happen to tell at all in the direction of better and more perfect dispersion." Now here the first intuition of the mind is towards "devices and plans," which then is immediately corrected by the superior "accident" theory. If "*accidental* variations, which *happen* to tell" in the direction of more perfect establishment, really produce what would be produced by a wise design, why should we refuse to believe the design, and choose the incomparably more difficult theory that "accidental variations" alone, "that happen to tell," have accomplished precisely what design would accomplish? What scientific advantage has the "accidental variations" theory over the final cause, which is, after all, practically admitted? How design has worked is another matter. Its method may be a perfectly legitimate subject of inquiry. It may have worked, perhaps, in part by variations in plants and animals. But when I speak of variations as "accidental," what do I really

mean by "accidental"? Have I any proof that what seems to me to be accidental is not the result of some law or some intention? Professor Huxley seems to imply such a law or laws, and to deny anything actually accidental, when he says, "The whole world, living and not living, is the result of the mutual interaction, according to definite laws, of the forces possessed by the molecules of which the primitive nebulosity of the universe was composed." "If this be true," he goes on to say, "it is no less certain that the existing world lay, potentially, in the cosmic vapour, and that a sufficient intelligence could, from a knowledge of the properties of the molecules of that vapour, have predicted, say the fauna of Britain in 1869, with as much certainty as one can say what will happen to the vapour of the breath on a cold winter's day." These laws, then, govern what the evolutionists elsewhere call "accidents." Whether Mr. Herbert Spencer's "Energy" would eliminate "accident," strictly speaking, from the universe, or not, I cannot tell. But if so, it explodes the whole of Mr. Darwin's theory based on the "Survival of the fittest,"—at least, as it is used by the evolutionists. The only value of Mr. Spencer's "Energy," however, to many of us, is to cover an infinity of nebulous thought; for the idea conveyed by the word is simply "power for work," wherever found. And it is difficult to see what we can really establish upon the endeavour to unify in speech or theory the power for work of some kind or other that exists all over the universe. But if there be one such "Energy" behind its manifold ramifications, and if it be working out such harmonies and adaptations in Nature as would be worked out in obedience to final causes existing in some intelligent intention, is that "Energy" blindly-intelligent or *quasi*-intelligent? or how am I to understand it? Does it only prompt "accidental variations"? or does it work on definite lines? If the latter, where is the "accident"? And if the "Energy" develope final causes, how are we to eliminate from it the attribute of Mind?

Surely in eliminating the doctrine of final causes from the Universe, the evolutionists destroy the only real guide we can take for unravelling, so far as we can unravel, the functions of Nature. Moreover, they thus deny that which they themselves practically follow throughout their investigations.

"Accident" *versus* "Certainty," as a guide to the explanation of the harmonies and adaptations of the Universe, seems to be the greatest philosophical paradox conceivable.