Some Lessons and Landmarks of a Century

Introduction

The terrain of the last hundred years that we are about to re-explore in our minds displays not only a wealth of varied features as broad as could be found in any previous century, but new basic philosophic and religious outlooks, offering an environment as different from the old as that which will greet the first intrepid explorers of the Moon at whose threshold we stand today. We must of necessity only pick out landmarks here and there and draw what lesson we can. We may only cross the country as tourists, not survey it as cartographers; and since you travel today with a physicist as your guide your route will be a physicist’s choice.

Certain it is that the lie of the land is characterized by Science, that magnificent, impressive, almost overwhelming mountain range bordering the full span of the century and stretching into the distance, with its loftier regions lost in impenetrable mist and its foothills deceptive in their stark proximity. It is certain too that whatever these heights may reveal or suggest of the grandeur of Science, they obscure for the majority of plain men any glimpse of the great beyond, about which men who lived in earlier centuries spoke with such confidence.

Unfortunately, the highlanders of Science and the lowlanders with no such aspirations are alike in, all too often, having no real comprehension of the underlying nature and philosophical status of Science. I have quoted elsewhere, and it will bear repetition, a paragraph by Jacques Barzun in his introduction to a book by Stephen Toulmin.

Western society may be said to harbour Science like a foreign god, powerful and mysterious. Our lives are changed by its handiwork, but the population of the West is as far from understanding the nature of this strange power as a remote peasant of the Middle Ages may have been from understanding the theology of Thomas Aquinas. What is worse, the gap is visibly greater now than it was a hundred years ago, when educated men could master the main conclusions and simple principles that governed Physics, Chemistry and Biology. The difficulty today is not that Science has uncovered more facts than one mind can retain, but that Science has ceased to be, even to scientists, a set of principles and an object of contemplation.

It is the task of our Institute to retain that perspective of reality which is so easily lost today in the kaleidoscope of changing viewpoints. Faith is threatened by an easy drifting amid popular philosophies quite as much as by the myopia of the specialist. While each ‘wind of doctrine’ that today threatens the faith of men with shipwreck has a claim to be considered in our councils, we ourselves must see that our moorings are sufficiently firmly anchored not to be parted by changes in the philosophical weather or the fickle climate of opinion.

Amongst the most important principles by which we come to a scientific understanding of the world are the conservation laws—conservation of mass, conservation of charge, conservation of angular momentum and so on. The conserved properties are crucial to the whole structure of our science. Their importance is emphasised by their constancy in the flux of phenomena. Every series of events, every new configuration, every resulting situation restates their relevance. As we take a look at the flow of attitudes and ideas over the period since the inauguration of this Society, let us keep our minds alert for that which is unchanged, for that and maybe that alone is likely to be of abiding significance.

_The Mechanical World_

In the year 1864, one year before the founding of the Victoria Institute, Maxwell, then Professor of Physics at King’s College, London, published his great paper on ‘A Dynamical Theory of the Electromagnetic Field.’\(^1\) This work was the crowning glory of classical physics. Here the predictive quality of science, so enabled by the potency of Newtonian mechanics, reached a climax of achievement with the pre-vision of radio, of those electromagnetic waves which Hertz was to discover twenty-three years later.

In his earlier papers on electromagnetism Maxwell had seen the cause of those phenomena in a vortex sustaining material, containing particles like ball bearings rolling between the vortices. He writes: ‘Magneto-electric phenomena are due to the existence of matter under certain conditions of motion or of pressure in every part of the magnetic field and not to direct action at a distance between magnets and currents’. This way of thinking of the world as a vast piece of engineering machinery was characteristic of the second half of the nineteenth century. Lord Kelvin was perhaps the doyen of it. Crowther\(^2\) tells

\(^1\) Proc. Roy. Soc. 1864.
us that ‘He assumed that the complete description of material phenomena was to be derived from the common objects of experience; atoms must behave according to laws that had been derived from the observation of quantities of matter comparable with the size of the human body’.

In his 1864 paper, however, Maxwell, who was so often gifted with prophetic vision, had broken free of his contemporaries’ enslavement to real engineering models and was already placing the emphasis primarily on the equations. However, having been brought to such success by the mechanical models, he allows their continuing validity. Thus he says, ‘For the sake of persons of different types of mind, scientific truth should be presented in different forms and should be regarded as equally scientific whether it appears in the robust form and vivid colouring of a physical illustration or in the tenuity and paleness of a symbolical expression’. He says ‘symbolical’, but the adjective is not sufficiently restrictive, for he is referring of course to mathematical symbolism. Perhaps even Maxwell had not yet reached the point where he was prepared to regard the ‘robust form . . . of a physical illustration’ as equally symbolical, and capable of misleading in just the same way as if the handwriting of the equations were taken to be part of their message.

However that may be, here surely we have already a hint of the idea of complementarity, a hint even broader than those other premonitions of electrons and atomic structure implied by Maxwell’s ‘molecules of electricity’.

It is notorious that in discussing the biological sciences the great majority, whether they accepted or rejected Darwinian evolution, adopted a much less accommodating attitude to ‘persons of different type of mind’ and saw the mechanics of natural selection as a direct challenge to the ascription of creatorial powers to God. For most either God acted and it was all infinitely mysterious and magical, or the great machine of Nature acted and it was all intelligible and therefore not divine.

‘God moved in a mysterious way His wonders to perform’, and if the way was not mysterious then the performing was not God’s. It is true that, even then, a few great minds could see the narrowness of the ‘nothing buttery’ (as MacKay calls it) which incited the head-on conflict that followed the 1866 meeting of the British Association. For the most part, however, these few chose the pleasures of apparent orthodoxy rather than the reproach that would assuredly have fallen on them if they had said then what we all believe today—that to
understand the mechanism of an event in nature is not to remove it one whit from the sphere of God’s activity.

But to say what runs counter to popular theology or philosophy demands care as well as courage, lest the Cromwellian injunction to humility, to ‘consider that ye may be mistaken’, be construed as support for extremists on either side. If a man is to resolve the tensions that his faith encounters, then it is essential on the one hand that his faith be appropriately established; that he can give to himself as well as to others ‘a reason for the hope that is in him’; and on the other hand he must give his reasons ‘with meekness and fear’—meekness lest he judge another to be less honest than himself, fear lest he ‘be found to fight against God’ for a reason for faith that is not from God.

Much of the conflict with which the century opened arose because Christians hurried, either to defend Paley’s ‘Argument from Design’ from the creative randomness of natural selection or to defend the Bible from the suggestion that the Word of God could come in any manner other than the strictly literal. May it be that the fierceness of the strife at that time was a symptom of a faith and hope insecure because anchored elsewhere than in Christ? Whether or not it is too drastic an over-simplification, Butterfield’s dictum had yet to be heard, ‘Hold to Christ, and for the rest be totally uncommitted’. Perhaps here too Maxwell, who was relatively unruffled by the turmoil of those years, had the heart of the matter when he wrote to his wife in 1864: ‘Why should we not have our Lord always before us in our minds? . . . Pray to Him for a constant sight of Him.’

Relativity

If the idea of the Electro-magnetic Aether and the truism of the Survival of the Fittest dominate natural philosophy at the opening of the century, the next landmark that demands our attention is the famous Michelson-Morley experiment in 1887. These workers set out to measure the Earth’s velocity relative to that subtle medium whose supposed mechanical properties had led Maxwell to his famous equations. The negative results did far more than sound the death knell of the aether—a coup de grace administered by Einstein with Occam’s Razor. Einstein’s genius, thus stirred, assisted in the demise of the whole

1 1 Pet. iii. 15. 2 Butterfield, Christianity and History, 1959.
3 The Life of James Clerk Maxwell, Campbell and Garnett, 1882.
4 Morley and Michelson, Phil. Mag. (1887) 24, 449.
of classical Physics and the utter collapse of the view held, according to Richtmyer,\(^1\) by ‘not a few physicists of note . . . that all the important laws of Physics had been discovered and that, henceforth, research would be concerned with clearing up minor problems and, particularly, with improvements of measurement so as “to investigate the next decimal place”.’

The refusal of Nature to answer questions about the aether and the emphasis on the primacy of the observer’s own frame of reference has accompanied the introduction at the popular level of a philosophical climate which distrusts all absolutes. Having watched the physicists throw out the concept of absolute velocity, many today seem ready to throw out all but the subjective and the relative. It may be that right and wrong are not absolutes. It may be that Christians have been slow to recognise that He Who is addressed when the humble Christian prays, ‘Our Father, Which art in Heaven’ is also addressed when the humble Muslim prays, ‘King of the Day of Judgement, ’tis Thee we worship and Thee we ask for help’. Yet the physicist has not thrown out all absolutes—absolute angular momentum for example—and we must be careful not to carry relativism and subjectivism in religion to the point where, so far from being the supreme ‘I-Thou’ relationship, it becomes supreme narcissism—a mere symbolism for the relationship between the ego and the super-ego. Either, ‘There is one God and one Mediator between God and Men, the Man Christ Jesus’\(^2\) or the whole force of the kerygma is gone and we can replace ‘one’ by ‘none’ or ‘more than one’. Indeed it is probably true to say that ‘There is no God and may be more than one Mediator’ is the popular, though no doubt erroneous, interpretation of one bishop’s honest opinion. It is true that we have to realise, as St. Peter had to, that ‘God shows no partiality, but in every nation anyone who fears Him and does what is right is acceptable to Him’\(^3\); but that is a very different thing from saying that all religions lead to God. They may lead away from Him. All too often that has happened in the Christian religion, when its dogma has been put before Christ. Neither is it the same as saying,\(^4\) ‘He who knows about depth knows about God’ or that God means ‘What you take seriously without any reservation.’

Relativity has emphasised another fact about the physical world, which has an important bearing on our theological thinking. Long

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2 1 Tim. ii. 5.
3 Acts x. 34 f. (RSV).
ago St. Augustine attributed the existence of the world to God not in tempore but cum tempore. In Relativity the 'Lorentz transformations', for changing measurements relative to one frame of reference to those appropriate to the same event as seen from another frame of reference, demonstrated an interchangeability between space intervals and time intervals. In Einstein's four-dimensional continuum, therefore, time was no more absolute than space. God, whom only the theologically naïve thought of as existing in space, like an Olympian demigod—a mere component of His own world—was now seen more clearly than ever not to be in time either. Once the timeless character of 'He Who is' (Mascall) dawned on men's thinking many an ancient theological crux was resolved.

Quantum Theory

The first decade of the century found Physics in a state of growing confusion, paralleled only by the theological confusion of the extremes of liberalism and fundamentalism. Planck had discovered that energy was radiated in discrete amounts, which we now call quanta, yet these quanta did not all contain the same amount of energy but a quantity proportional to frequency. This dependence of the magnitude of the quanta on frequency showed that they were not just a new kind of atom. The involvement of frequency showed them to be closely related to Maxwell's electromagnetic field. Planck balked at assuming that absorption, the converse of radiation, also occurred discretely, for how could the absorbing atom gather energy discretely from the ever-widening sphere of the wave front? However in the meantime Einstein showed that when absorption led to photo-electric emission that was just what did happen. So radiant energy was like a corpuscle and acted at a point discretely, and it was also like a wave and spread out to be diffracted at a grating or polarised by anisotropic media.

In the years that followed, the way of picturing fundamental particles underwent an even more revolutionary, though reverse, metamorphosis to that experienced by light. Starting with the Bohr-Sommerfeld picture of an atom like a tiny particulate solar system, the imagery passed via De Broglie waves to Schroedinger's wave equation at which point Neils Bohr ¹ came to the rescue by introducing to Physics a principle already recognised in theology—Complementarity. The principle has been so widely discussed that I need not explore it in detail here. As

introduced by Bohr it asserts 'that electrons cannot exhibit both wave and corpuscular properties simultaneously but that these attributes are complementary in their description of electronic behaviour'. The basic problem was the empirical need for more than one set of images, which, though they might be incompatible on the macroscopic scale, would do justice to the known facts about the electron. Another way of dealing with the problem was to say that all descriptions of physical events in which an electron could be shown to have taken part required the electron to be viewed as a corpuscle, while any prediction of the electron's future required it to be viewed as a wave. Whichever way we look at it, the fact of the matter seems to be that the true nature of the electron requires more than one set of mental pictures to present the full range of its (discovered) properties to our minds. It was in this way, too, that the principle was found to be useful in resolving apparent conflicts between faith and science. For example, if the Bible says, 'God said, “Let the earth bring forth living creatures” ' and the biologist can trace an evolutionary history for what it brought forth there is, according to the principle, no necessary conflict, for 'the origin of species' can be seen equally well and equally validly as the operation of biological laws and as due to the volition and action of God. It is important, too, to emphasise what Bohr was saying. Both pictures are valid but only when kept separate. An electron does not at the same time exhibit both wave and particle properties. It may be one of a stream which is diffracted at a crystal and subsequently causes secondary emission at a screen, but if the phenomenon requires that it be viewed as causing secondary emission at the crystal, then it cannot also be viewed as being diffracted there.

As I understand the use of the principle in theology, however, it forbids, not simultaneous display of complementary features, but simultaneous employment of features from complementary accounts in a single causal matrix of events. Thus, for example, if the principle of complementarity is to hold, the origin of life may be seen both as part of the divine activity and plan, which should ultimately introduce the ‘imago dei’, and also as arising from a ‘concourse of atoms’, but it is inconsistent with the principle to attribute that particular ‘concourse of atoms’ to God’s arranging in a sense different to that in which any other concourse of atoms is due to Him.

The popularisation of the idea of complementarity is just one aspect of the epoch-making impact of the Quantum Theory on human

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1 Shankland, Atomic and Nuclear Physics, 2nd ed. (1960), p. 48. 2 Gen. i. 24.
thought. If the classical imagining of space and time collapsed with the Theory of Relativity, the classical concept of matter as of the most concrete, immutable and permanent aspect of reality could not ultimately survive the Quantum Theory. Instead of thinking of atoms and electrons as really like little hard spheres, scientists found it useful sometimes to think of them as like that, providing one remembered that they were not really like it.

We hear a good deal about ‘images old and new’ in theological discussion today. It may be that there is a paradigm here in natural philosophy for theological thought. Images may be either superfluous or inadequate. That which is imaged may prove to be purely imaginary—to be zero—or it may be far greater—infinite. Maxwell’s insights into the electro-magnetic field were achieved by means of physical models of the aether which have not merely turned out to be inadequate and to require complementary accounts to do justice to the phenomena; they were not inadequate but superfluous. They and the aether they symbolised have simply vanished from our thinking. On the other hand no practising physicist has ceased to believe in electrons because they are not really like billiard balls or waves. Rather we have come to realise that the familiar world, which we take so much for granted, has depths which we can explore but cannot ultimately comprehend. The mystery of being, which was always there but is so often taken for granted, has forced itself again upon our thinking. This very inadequacy of our conceptual machinery is reflected in the use of such a term as ‘strangeness’ for one of the properties of the so-called fundamental particles. Now it seems to me, as a physicist, looking at what has been going on in theology, that it has important parallels with the events in Physics over the last fifty years. The outstanding theological landmark of the period which saw the birth of the new Physics is Karl Barth’s recall to know God neither as in the old orthodoxy—a proposition by which to explain the world—nor, as in liberal theology, a mere projection of the divinity of Man, but in an encounter, mediated by the Bible, and demanding response. This was a rejection of experiment in favour of experience, of ‘savoir’ in favour of ‘connaître’, as the language of theology. But for Barth’s theological revolution, T. H. Huxley’s agnosticism would no doubt have been even more prevalent today than it is, for God as a link in a physical chain of events is superfluous. He is no more necessary than Maxwell’s aether. Indeed the introduction of ‘acts of God’ for the otherwise inexplicable is positively deleterious to Science.
However, the situation was not in fact parallel to the aether hypothesis. God, as a ‘cosmic clockmaker’, could very well be dispensed with, but God was still there. (I do not say ‘out there’.) In the Bible and in life God continues to address men in the depths of their mysterious moral being. The Phenomenon of Christ continues to tower above all searches for the historical Jesus. To do justice both to the data of spiritual experience and that of history requires not only a recognition that God is—'He that cometh to God must believe that He is'—but it requires far more. It requires, demands may be a better word, response. The parallel is much closer to that of the Quantum Theory than of the Aether Theory. It is a case of inadequate pictures, not of unnecessary ones. Instead of God being the hypothesis we can do without, He is the one supreme fact of experience and of history, and the problem of theology is one of language, that is to say, of imagery. We need thought models, to do justice to that Fact in our own minds, and to enable us to communicate with other minds concerning It.

*Proposition and Operation*

The United Church of Christ, formed in America in 1959 by a merger of the Congregational-Christian Churches and the Evangelical and Reformed Church, has adopted an interesting statement of Faith. Its opening clause runs, ‘We believe in God, the Eternal Spirit, Father of our Lord Jesus Christ and our Father, and to His deeds we testify’. There follow seven clauses concerning those deeds, starting 'He calls...', 'He seeks...', 'He judges...', 'In Christ Jesus... He has come...', 'He bestows...', 'He calls...', 'He promises...'. The outstanding feature of this statement is its emphasis on God’s operations to the almost total exclusion of propositions about His being. Surprisingly enough (in view of the readiness Christians have so often shown to argue about the being of God) the great historic creeds traditionally attributed to the Apostles and to the Council of Nicea show a similar emphasis (apart from the famous Christological passage in the Nicene creed, ending ‘consubstantial with the Father’ which was, of course, specifically occasioned by the Arian controversy). The emphasis on operation rather than essence, on activity rather than actuality, is closely paralleled in the approach of modern Physics where the behaviour of Nature and its fundamental components is all-important and its being

1 Heb. xi. 6.
is irrelevant. But philosophically attractive as this approach is, it has its dangers. It is an essentially pragmatic approach and as such can become doctrinaire. As far as human society goes, what is relevant is what God does and how Nature works. But human society is composed of individuals, and for the individual response, involvement, personal relationship requires more than an operational approach. An operational attitude to human relationships may be appropriate to the psychiatrist, but it is inadequate to establish friendship. To enjoy, indeed even to build, a friendship, especially for example the deep, rich friendship of marriage, requires that I represent my friend to myself by a mental imagery adequate to his or her being as well as to his or her functions. Every human relationship requires for its fulfilment this recognition of an autonomous other.

Now in view of the rapidity with which concepts and language change or lose their power, it seems to me entirely correct that creeds, especially contemporary expressions of belief, should emphasise the activity rather than the essence of God, but I think that we must recognise a danger here. Experience can be variously understood and may be wrongly interpreted. I said earlier that God is the one supreme Fact of experience and of history, but that is very different from claiming that all recognise their experience or history as such. This is the peril of that very relativism in religion to which I referred before—the relativism behind the frequent use of such expressions as 'what is true for me or for him' as though truth itself were wholly relative. The humanist agnostic has an 'ultimate concern' (Tillich), and surely that is of God, but it is a thousand pities that he does not recognise it as of God. The Muslim kneels to Allah even as Cornelius prayed to God, and his humility and charity may be no less, but he needs to hear the 'good news' just as much as did Cornelius; and we need to hear it too, for it is 'the gospel concerning His Son, Who was descended from David according to the flesh and was designated Son of God in power . . . by His resurrection from the dead . . . to bring about obedience to the faith . . . among all nations'. ¹ 'Such is the unique “humanity of God”' (Barth). Here, too, is the apostolic reaffirmation of Christ's great commission and here, to one physicist at least, is the crux of that discussion which has become known in this country as the 'Honest to God Controversy'. To quote, this time with an emphatic 'Amen', Dr Robinson's own words, 'Christianity stands or falls by revelation, by Christ as the disclosure of the final truth . . .'. ² As St John says, 'The Son of God has

¹ Rom. i. 3 ff.
² 'Honest to God', 196.
come and has given us an understanding to know Him Who is true. . . . This is the true God and eternal life'.

Both the guarantee of a communicable Faith (in the sense of the content, not the act of confident belief) and the safeguard against a purely subjective deity is the realisation that God is the supreme Fact not only of experience but of history. It is this which, while giving philosophy, psychology, theology and science their proper place in these councils, enables us still individually to present to our generation, not that philosophy, psychology, theology or science but 'Christ the power of God and the wisdom of God'.

The Final Authority

Running like an ever-widening stream through the terrain we have traversed is that rejection of human authority which had its source in the sixteenth century and which has characterised and promoted the progress of science ever since.

The authority of the Bible, which had dwindled almost to zero in liberal theology, was restored by Barth so that Dillenberger can write, 'In contemporary theology, there is considerable unanimity concerning the nature of its subject matter and its central concerns. Its one concern is the proper understanding and articulation of the Biblical message...'.

It is true that the Bible is the primary material of theology. It is not the Bible, however, that is the central fact in the Christian message. While it is possible to argue with some validity that the Bible is self-authenticating, it is a fact of experience well known to evangelists that Christ's authority is mediated through the Bible rather than discovered by analysis of it. The analytical approach to the Bible is truly of great importance, but it may also be spiritually arid. Yet if a man will listen to the Bible he will hear 'The Word of God'. However, although Holy Scripture uses the term 'Word of God' for God's revelation in general given through 'holy men of old', it reserves the title par excellence for Christ. Ultimately 'self-authentication' belongs to Christ. He is the final datum, the final authority, and what characterised the 'Word of God' of old were 'things concerning Himself'.

I said at the start that in our hundred years' journey we should keep our minds alert for that which is conserved. It is no surprise, yet it is

1 1 John v. 20.  
2 1 Cor. i. 24.  
3 Dillenberger, Protestant Thought and Natural Science, 1961, p. 286.  
4 Luke xxiv. 27.
of the deepest significance, that that which has been conserved in the theological history of the last hundred years, in the history of this Institute, is the Fact of Christ. Whatever may have been the perplexities, the agonising reappraisals, even the 'Shaking of the Foundations' (Tillich), the central conviction of Christians has remained that 'He that hath seen Me hath seen the Father'. Such is the self-authenticating character of the Christ.

Now this recognition of Christ as the ultimate datum, the final authority for faith, is no deviation from the anti-authoritarian stream characterising our epoch, but an appeal to the primary datum 'from all His interpreters,' and that of course is just what the scientist does. There is a close parallel between the appeal to Christ as the truth about God and the appeal to the physical world as the truth about Nature. At present, however, the disciplines of theology and science are not only autonomous, they are almost unrelated. Maybe the more parallel the approach is the less likely is a meeting point.

The theological problem of our generation concerns the understanding of God's relationship to the world. This is where we stand at the end of our journey. As I see it, it is partly a question of what thought model to employ to portray this relationship to ourselves and our contemporaries and partly a question of grasping the truth we want to portray. A hundred years ago the thesis was almost entirely the transcendence of God. Now, in spite of protestations to the contrary by exponents of the new theology, their emphasis is almost entirely on the antithesis—God's immanence. This emphasis was needed I am sure, but now a synthesis is necessary to do full justice to the truth. And that is just the point. It is the truth 'as it is in Jesus' to which we must do justice. If Jesus 'lifted up His eyes to Heaven and said, “Father”', then our concept of God's transcendence must do justice to His attitude. If Jesus 'arose a great while before it was day and departed into a desert place to pray', then my encounter with the sacred in the secular can hardly demand less of me. If Christ's answer to the Sadducees—the religious sceptics of His day—on the matter of resurrection was, 'Ye know neither the Scriptures nor the power of God' it is at least plausible that He would say the same today to those whose theological thinking no longer contains the concept of a life to come. We must not deny the power of God because 'Christ has been evidently set forth crucified'. Whatever we are to understand by the suffering of God or,

1 John xiv. 9.  
2 Eph. iv. 21.  
3 Mark xii. 24.  
4 Gal. iii. 1.
in St Paul's phrase, 'the weakness of God', it must surely be a voluntary suffering and weakness—witness our Lord's remark about the 'twelve legions of angels'. It must be a submission to His creation and to His creature, Man, which are nevertheless eternally and utterly contingent on His willing for their being.

It may be that the outstanding lesson of the century now past is enshrined in the statement, 'It is more blessed to affirm than to deny'. It was right to affirm that 'God created Man in His Own image' but wrong to deny evolution as a possible method. It is right to affirm that 'The wind bloweth where it listeth... so is every one that is born of the Spirit', but wrong to deny the complementary account of religious conversion given by the psychologist. It is right to affirm the full humanity of Christ, but wrong to deny His full deity. It is right to affirm that God is within, but would be wrong to deny that He is without, right to encounter Him here, but wrong to deny He is out there or even up there. In short a positive approach is what is needed, and for this we must be so 'strengthened with might through His Spirit in the inner man, that Christ may dwell in our hearts through faith, that... being rooted and grounded in love (we) may have power to comprehend... the breadth and length and height... (as well as) the depth, ... that we may be filled with all the fulness of God.'

1 Cor. i. 25.  
2 Matt. xxvi. 53.  
3 Gen. i. 27.  
4 John iii. 8.