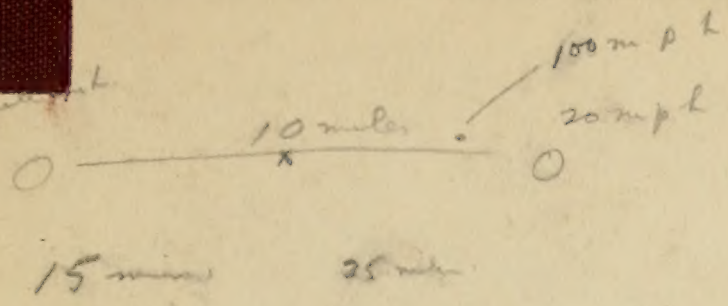

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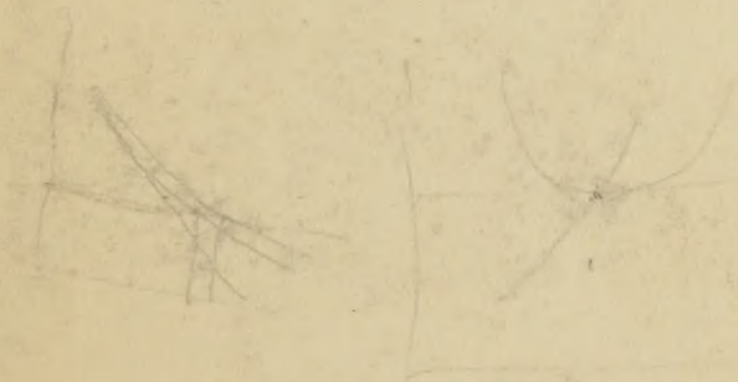

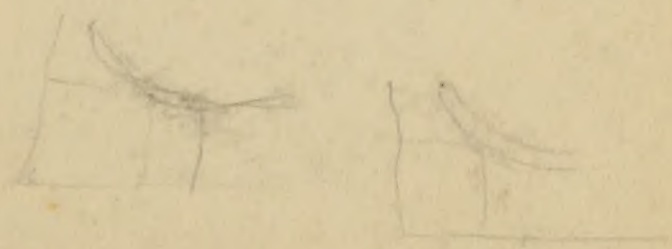

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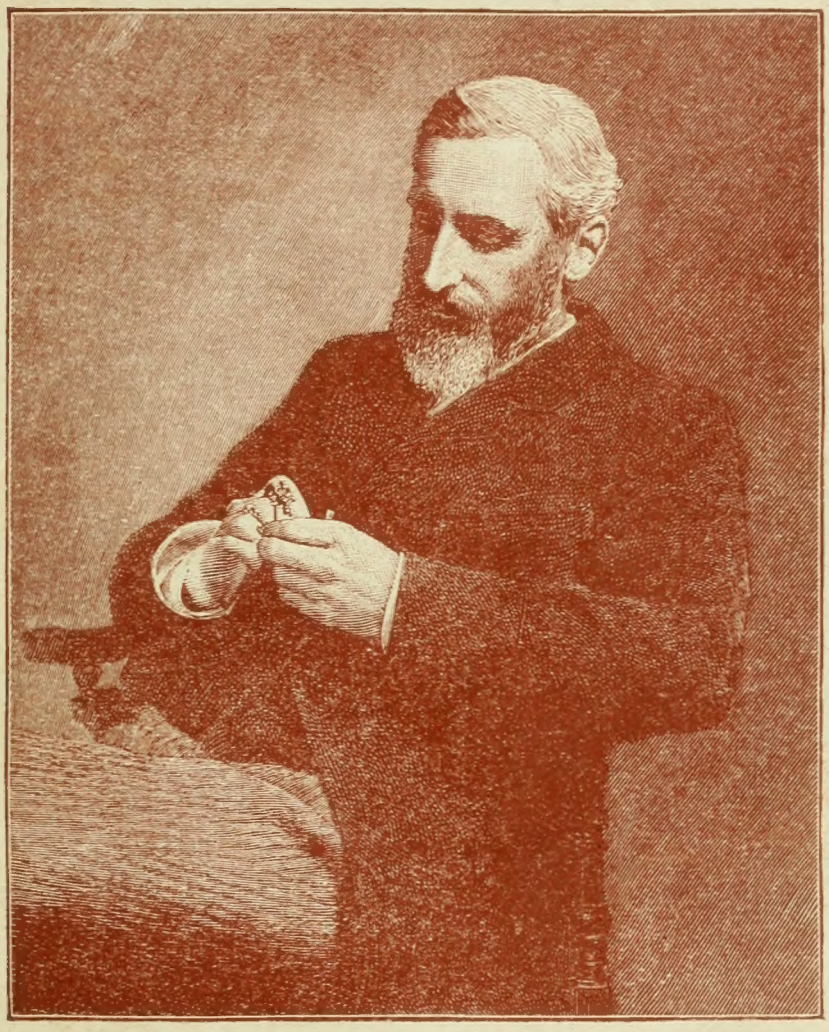
THE HAND OF GOD

AND OTHER POSTHUMOUS ESSAYS



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THE HAND OF GOD

AND OTHER POSTHUMOUS ESSAYS

THE HAND OF GOD

AND OTHER POSTHUMOUS ESSAYS

TOGETHER WITH SOME REPRINTED PAPERS

BY

GRANT ALLEN

[ISSUED FOR THE RATIONALIST PRESS ASSOCIATION, LIMITED.]

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PREFATORY NOTE

THE hitherto unpublished portion of this book, comprising the chapters on "The Hand of God" and "The Worship of Death," was intended by Grant Allen as the opening section of a volume supplemental to, and confirmatory of, the theory advanced in the *Evolution of the Idea of God*, of which a slightly abridged edition is included in the R. P. A. Reprints. Twenty years' study of the subject convinced him that "in its origin the conception of a God is nothing more than that of a dead man regarded as a still surviving ghost or a spirit, and endowed with increased or supernatural powers and qualities" (*Evolution of the Idea of God*, end of Chapter I.); corpse-worship being, as he tersely puts it, "the protoplasm of religion."

Largely influenced at the outset of his inquiry by the examples and arguments marshalled in Herbert Spencer's *Principles of Sociology*, he independently examined a mass of material, the result being to confirm him in the theory summarised in the foregoing quotation. We had many long discussions on the matter; "of course, as usual, we split on the rock of Animism, which, when my long-delayed book on religion comes out, will be ground to powder like the images of Baal," he humorously says in one of his letters to me. I could never understand why he, whose bones and marrow the theory of unbroken continuity in mental development permeated, did not see that the cult and deification of the dead could not be a primary stage in the history of religion. He recognised that religion is a branch of sociology, to be included in what Spencer termed "the super-organic"; yet he would see in ancestor-worship (the importance of which, as a well-nigh universally-diffused cult, cannot be overrated) the one ultimate source of the God-idea. For what is called Animism, or the accrediting of things, both living and non-living, with indwelling spirits, *is itself not primary*. It must have been preceded by a stage when man's impressions of the powers around him, whose influence, for good or evil, was ever being borne in upon him, were vague, indeterminate, and impersonal. Such a pre-animistic stage is represented

to-day by the jungle dwellers of Chutia Nagpur, of whom, in his *People of India*, Sir Henry Risley says: "In most cases the indefinite something which they fear and attempt to propitiate is not a *person* at all in any sense of the word.....All over Chutia Nagpur we find sacred groves, the abode of equally indeterminate things who are represented by no symbols, and of whose form and function no one can give an intelligible account. They have not been clothed with individual attributes; they linger on as survivals of the impersonal stage of religion" (p. 215). This falls into line with all that is to be logically assumed as to the continuity of the animal and the human psychology; hence, there is no point in the process on which we can lay finger and say, Here man began to be religious; because what has become explicit in him is implicit in his nearest congeners.

This admitted, the value of what Grant Allen tells us about the later (in themselves immeasurably early) stages of the development of the world's religions is not to be easily over-estimated. His skill in disentangling a mass of material and presenting it in coherent form; his insight into its significance, and in the resolution of the fundamental elements of which it is composed, are remarkable. What is apparent in his writings was yet more so in his talk, and in this they who were privileged to hear it will testify that it brought them into contact with one of the most fertile and suggestive minds of our time.

A brief outline of his career may conclude this Note. He was born at Alwington, near Kingston, Canada, on February 24th, 1848. On the spear-side he was Irish (his father, who survived him, was a clergyman); on the spindle-side there was a blend of Scotch and French blood. Until he was thirteen his father was his tutor. Never robust, he could find no zest in the games of boyhood; but this left him free for rambles among the Thousand Isles and other happy hunting grounds for flower and bird and insect-rambles, whose outcome was to be manifest in the delightful nature-studies which are the theme of the *Evolutionist at Large*, of *Flowers and their Pedigrees*, and numerous kindred volumes. From school at Dieppe, and afterwards at Birmingham, he passed to Oxford, matriculating in 1867 at Merton College. His university life was hampered by narrow means; adverse turns in the family fortune, never large, threw him on his own efforts, and he took to that usual resource of the impecunious—coaching and private tutorship. He accepted masterships in Brighton College, Cheltenham College, and Reading Grammar School succes-

sively, supplementing a slender income by essays in journalism, using any spare time in pursuit of what to him were one—philosophy and science; reading Spencer, Darwin, and their intellectual kindred, in whose footsteps he learned to tread with the easy grace evidenced by his books. In 1873 he was a successful candidate for the Professorship of Mental and Moral Philosophy in a newly-founded Government College at Spanish Town, Jamaica, the object of which was the education of coloured youth. It was a failure which his succession to the Principalship could not avert; the scheme was too ambitious and academic; the place, he said, "should have been run as a Board school." When I visited the derelict building in 1905, I was shown cases filled with insect-eaten mortar-boards and gowns, while the ordure of birds and bats lined the rickety stairs. In 1876 Allen came back empty in pocket, but rich in garnered facts stored up during his sojourn among "All shades," to cite the title of one of his novels; facts which were to be deftly worked into that and other stories, notably his masterly "Reverend John Creedy." His struggle, aggravated by ill-health, to get bread for himself and his brave helpmeet (their only child, a son, was born 1878), was long and sharp. "There is no money in science," he said in bitterness, and his first book, a remarkable treatise on *Physiological Esthetics*, which won praise from Spencer, left him £50 to the bad.

Work on the *Indian Gazetteer* at Edinburgh, and fitful guineas for scientific "middles" in the *Cornhill* and other serials, helped to keep the "wolf from the door"; but his income remained barely enough for even modest demands until he discovered in himself a certain aptitude for story-telling, drawing, as remarked above, mainly on his tropical experiences for "copy." The result was to give him the means of recruiting health by spending winters abroad—an absolute necessity for him until he found in the upland air of Hind Head a substitute, making hibernation at Antibes no longer necessary. Though he enjoyed novel-writing (he drolly said that he "disapproved of fiction"), his heart was in serious pursuits, and he rejoiced in the stretches of leisure which enabled him to give to the small public avid for such things works of the type of his *Evolution of the Idea of God*. But he was not to live long in the land where, too late, he had come to a goodly heritage. In the spring of 1899, while staying at his beloved Venice, about whose art treasures, as about those of other cities, he has written so illuminatively, he was seized with

illness, which made return to England imperative. In the following October, after weeks of acute suffering, there came "the crowning impotence of death."

Those who knew him in the fire-side intimacy which reveals a man will recognise true assessment of him in this tribute with which his old friend, the late Professor F. York Powell, enriched the *Memoir* published shortly after Allen's death: "He was one of the best and truest friends a man could have—generous, fair-minded, and unforgetful of the old comradeship; so that, though he was always able down to the last to make new friends, I do not think that he ever lost his old friends, save those whom death too soon removed. I do not see how such a straightforward, sympathetic, enthusiastic nature as Allen's could have passed through the world without influencing those with whom he came in contact very definitely for the better. Few men I have known well have cared more for the essentials than Grant Allen. Truth, justice, pity, love, gratitude, and sympathy were to him throughout his life real things to be upheld at all hazards. His faith was always great; his hope was continually and wonderfully sustained; his charity was invincible."

EDWARD CLODD.

August, 1909.

THE HAND OF GOD

AND OTHER POSTHUMOUS ESSAYS; TOGETHER WITH SOME REPRINTED PAPERS

THE HAND OF GOD

POPULAR religion is, to a great extent, a collection of psychological fossils. It enshrines in its midst stratum after stratum of early savage concepts, often concealed under specious names of later Christian, Mahommedan, or Buddhist origin.

Among these curious survivals from barbaric thought which still pass current in Western languages and codes of ideas one of the strangest is the familiar phrase "The Hand of God," which is commonly held sufficient to account for any extraordinary occurrence not otherwise explicable. It is largely employed to gloss over the origin of accidents on the high seas, or inexplicable misfortunes; and it is also a favourite cause of death with coroners' juries, especially in theological and unthinking districts. I propose, therefore, in the present paper to trace this singular conception to its primitive source, and to show by what gradual and successive steps it has reached the form in which we finally know it.

Although there are still, doubtless, some competent thinkers who refuse to admit that religion, as a whole, has developed from ancestor-worship (or rather from corpse-worship), there are probably none who would now deny that such worship forms at least a large and important element in most primitive cults, both ancient and modern. I will not insist, accordingly, on the wider view, which I hold to be indubitable, that ancestor-worship is the fundamental basis of all religion, but will confine myself here to taking it for granted that the worship of the *manes*, of the spirits of the dead, is, at any rate, one great and principal source of religion as we know it. In Egypt and in China, in Rome and in Peru, men propitiated with gifts, and approached with prayers and praises, the tombs or mummies of their friends and ancestors; and although certain other causes may have led to the development of the mythical and mythological element in all religions, there can be little doubt that the cult of the dead alone led to the development of the distinctive elements of worship and sacrifice, of prayer and thanksgiving, of the temple and the altar, of all that is most essential and central in the religious faculty. Granting even that there are, or may be, gods who were never men (which is a doubtful postulate, save in the highest and most recent creeds), it is, at any rate, certain that the distinctive acts of homage now paid to such idealised gods had their indirect origin in the offerings and prayers paid by savages to the deified ancestor.

This being so, it is natural that prayer and praise should first of all have been offered to the actual tomb or mummified

body of the dead parent. And such we find to be really the case. Propitiations of ancestors are made at the grave; and the empty hut where the great chief lived is often the nucleus of the primitive temple. But where the practice of keeping the dead body itself has prevailed, and especially in very dry climates, where mummification is possible, as in Egypt and Peru, it is to the body itself rather than to the soul or spirit that offerings are made and prayers uttered by the surviving relations. I need not labour this point; it is already a familiar one, and it has been fully worked up by Mr. Herbert Spencer in his *Principles of Sociology*. Wherever mummies are made, the mummy itself is the object to which the principal sacrifices are always offered.

Elsewhere, however, it is not usually the whole man that is preserved, but only some important or special part of him. Numerous instances of this sort are everywhere on record. Most often the head is the selected object. The Andamanese widows, for example, carry the skulls of their husbands suspended round their necks as a sort of amulet. In cases of sickness the New Caledonians present offerings of food to the skulls of their departed. The Mandans keep the heads of their dead friends in a circle; and each widow knows her own husband's, visits it, feeds it with choice food, and talks with it affectionately. I need not multiply instances; they have been collected in anthropological works by the thousand. Everybody knows now that most primitive peoples preserve and worship the bodies or relics of their deceased relatives. At this stage of thought the spirits of the dead are the gods of the living. Even in Christian Europe the head of St. Denis was enclosed in a silver casket in his namesake basilica; the head of St. Catherine of Siena is still preserved in a shrine in the Church of San Domenico; and I have collected more than 280 instances of similar holy heads in Italy alone at the present moment.

In the extreme case, as we saw, it is the whole body of the deceased that is preserved; in others, the head, but sometimes lesser parts, such as the hand or arm. Thus the Tasmanians keep "a bone from the skull or the arms" of their dead relations. Even smaller members may be employed for the same purpose, for the Loyalty Islanders "preserve relics of their dead, such as a finger-nail, a tooth, a tuft of hair, and pay divine homage to them." At Rome, when the body was burnt, a single bone was cut out and honorifically buried. Mr. Hartland has noted many similar cases in *The Legend of Perseus*. Any little fragment is often held in savage philosophy to represent the whole; to use the language of modern religious life, a relic answers for the entire body. When men die in war far from home the survivors often carry back with them to the tribal ossuary a single knuckle or joint as a representative of the entire skeleton.

It is not merely for purposes of worship, however, that primitive peoples preserve the dead, or their bones and members By a well-known principle of early witchcraft, possession of a man's body, or any part of it, or even of something that once belonged to him, gives you magical power and command over his spirit. If you hold his bones, you can use him for divination; you can make him your familiar; you can compel and coerce him. Even a man's hair or the cuttings of his nails are quite sufficient to allow you to cast spells over him and bewitch him; and that is why nurses are often careful to burn such things in the case of children, lest any evil-disposed person or persons should get hold of them in order to work mischief. Much more, then, if you hold the dead chief's or dead god's actual body, and worship it and feed it, will you be able to cajole or coerce it into doing what you want.

Hence, too, in later religious survival, the importance attached to the possession of the body of a saint. The Venetians,

as we all know, brought over St. Mark by fraud from Alexandria, and never doubted that ownership of the remains of the Evangelist was of the highest importance to the safety of the State. (A curious picture of Tintoretto's represents the soul of St. Mark flitting in the sky to accompany the body.) Later on, when plague devastated the town, the Venetians further stole the corpse of the great plague-stayer, St. Roch, from its tomb at Montpelier, and erected a church in its honour near the Frari. So the people of Bari held the body of St. Nicholas, before whose shrine countless prayers are still offered to this day by the faithful in Italy. Another body of St. Nicholas lies in the church of San Niccolo di Lido; and in the familiar story of St. Mark and the Fisherman, made famous by the art of Palma and of Paris Bordone, we are told how St. Mark, St. Nicholas, and St. George appeared in person to defend the land which held their bones from the assaults of demons. While I am on this subject I may also mention by anticipation that I saw once at Milan the annual festival of San Carlo Borromeo. The vault where the saint lies in state was opened for the day, and his hand was apparently held out of the sarcophagus to be kissed by the devout. This episode of the hand has a special importance, the meaning of which will be visible later.

In modern Christendom, however, as in early savage religions, where you cannot afford to have a whole saint to yourself, you can do almost equally well with a part or fragment of him. It is lucky for Bologna that it enjoys a complete St. Dominic; lucky for Padua that it possesses an entire St. Antony; but where such good fortune cannot be fully secured, the head or the finger of some holy man is quite sufficient. Innumerable altars in the Catholic world are thus satisfied with the faintest relic of a departed saint; and I believe I am right in saying that no altar can exist or be consecrated without the presence beneath it of a relic of some sort. The altar thus shows its affiliation on the primitive tomb by preserving a last touch with the cult of death in its evanescent condition.

Now among the parts of a dead man's body which are undoubtedly most useful for conjuring and witchcraft are the hand and arm. Everybody knows that a dead man's hand is a common piece of wizard's furniture. There are various reasons for this use. The hand is the part of a man with which he clearly does things. It is also the part with which he beckons and commands, grasps sword or sceptre, makes gifts, and executes vengeance. In the case of weather-doctors, who are always vastly important persons in early communities, and who pass easily after death into gods of the first magnitude, the hand is the part with which the magician waves in rain or fine weather, dispels thunderstorms, and abates tempests. A wave of the hand is a common form of magic; it survives in modern mesmerism and spiritualism. Hence it is natural enough that a hand should often be cut off from the dead, as we know to be the case, and carried about by the living as a charm or talisman. The fingers, that had so much power while their owner lived, must surely be still more efficacious and potent now that their owner is a deified spirit.

The Australians, in particular, attach high importance to the hands of their dead chiefs and ancestors. They keep them and dry them for use in enchantments. Mr. Howitt states that when an *aurora australis* made itself seen one night in his camp all the Kurnai in the neighbourhood began to swing one of these dried hands towards the threatening portent, shouting out, "Send it away! send it away! do not let it burn us!" We have here clear evidence that "the hand of a god" is thought of *per se*, as a detachable element, capable of acting and protecting its votaries.

A dead man's hand was similarly used as a common "property" of witchcraft by medieval magicians, as it is to this day by the "obeah men" of the West

Indies. The witches in *Macbeth* reckon among their charms "a pilot's thumb, wracked as homeward he did come"; and also a "finger of birth-strangled babe," both of them familiar objects of modern Scotch necromancy. The famous "Hand of Glory," employed by English and Continental burglars as a talisman, was the dried or mummied hand of a dead thief, by preference a house-breaker; it was supposed to secure for them luck in house-breaking and practical invisibility. Here the magical intention is clearly visible.

Arms and hands of saints were in like manner preserved as relics, and were often carried in procession for special half-magical purposes. The arm and hand of St. Fergus (whose head was hoarded as a precious deposit at Scone) were enshrined in a jewelled case at St. Machar in Aberdeen, where they saved the city from many misfortunes. The exquisite *chasse* of St. Ursula at Bruges, rendered glorious for us by the delicate miniatures of Hans Memlinck, contains the arm and hand of the martyr of Cologne, and was long the chief possession of the hospital that still harbours it. A beautiful reliquary in the Louvre holds the arm of St. Louis of Toulouse; a similar case contains the arm of Charlemagne; several others equally famous might be noted, save for tediousness, in France or Italy. The traveller, once put upon the track of such jewelled hands, will find them in abundance, and may see for himself how they lead up (as we shall note a little later) to the *Main de Justice* of Continental sovereignty.

Hands or arms severed from the corpse to which they belong are also used to this day for magic or healing. The hand of a dead priest is employed to stroke persons suffering from various diseases; and even within the last three years cases have been mentioned in England where the hand of a corpse has been in request for healing. All priestly or kingly hands, living or dead, possessed in a special degree this power, of which the "touching for king's evil" was a peculiar survival, closely connected with the divinity and sanctity of kingship; it fell into abeyance in England after the legitimist Stuarts, who were kings by divine right, gave way to the purely Parliamentary Hanoverians. In Ireland the left hand of a corpse is dipped into the milk-pails to make the milk stronger and the cream richer. At Oran, in Roscommon, a child was disinterred and its arms cut off to be used in certain mystic rites, as Mr. Gomme has stated. "Touching or stroking with the hand of a corpse," says Mr. Sidney Hartland, "is a remedy known in every part of Europe for superficial growths like wens, tetters, and swollen glands." He goes on to cite a recent case of a fashionable lady in Berlin who begged a physician to give her the opportunity of stroking a bony outgrowth with a dead hand. The negro population of Barbadoes resort to the touch of a corpse's hand for "all swellings and chronic pains"; while in the Abruzzi, "the hand of a dead priest," according to Signor Finamore, "has potency against scrofulous tumours." I might add many other instances, but I refrain. I shall only remark in this connection that as criminals were originally victims offered to a god, and therefore, by a well-known principle, identified with him, the frequent use of the hands of criminals for healing or magic hangs together, odd as it may sound, with that of saints, priests, and sovereigns.

Again, it is a part of primitive philosophy that the image or representation is almost, if not quite, as effective as the original. If you cannot get a man's body, or any part of it, to put him in your power, you can make a small image of wax or clay, call it by his name, and do witchcraft against it. Similarly, it follows that a painted or imitated hand will be almost as good a protection against "the evil eye" or other mischief as the hand of a god in actual reality. Hence the habit of painting a vermilion hand on the outer wall or door of houses, which prevails over so large a part of the

Mediterranean world. In Morocco, Algeria, and other North African countries the red hand meets one everywhere as a divine protector. Islam itself has not succeeded in eradicating it. It is marked on every cottage; it is printed on woven stuffs; it is impressed on pottery; it is fixed on the first and last wall of villages. The red hand, "for luck" and to avert the evil eye, is also common in Asia Minor and Syria; I have seen it occasionally in Egypt, and even once at Brindisi. Talismans of red hands are common in Italy against the *jettatore*. It is worth while noting, too, that "the red right hand" is a literary characteristic of many gods—notably of Jupiter and of Odin. As "the red hand of Ulster" this ubiquitous sign has survived in the West, where it forms a mark of nobility to the present day in the semi-barbaric escutcheon of English baronets.

In the Middle Ages a hand was similarly displayed aloft over the gates of towns, as a symbol of public peace, the idea being evidently that the burgesses lived under the immediate protection of the Hand of God. One still remains over the chief gate of York, in England.

Count Goblet d'Alviella, to whose interesting work on *The Migration of Symbols* I am partly indebted for the groundwork of this paper, points out in particular that the emblem of the open or uplifted hand is common to all branches of the Semitic race from a very early period. "It appears already among the Chaldeans," he says, "for a cylinder, of Babylonian origin, exhibits an uplifted hand, which emerges from a pyramidal base, between persons in an attitude of adoration; this is precisely the type of our *Main de Justice*"—a subject to which I shall recur more fully a little later. Adoration of the sacred hand, as in this typical instance, clearly shows that it is the hand of a god with which we are here dealing. Similar hands appear upon Roman votive tablets.

According to M. François Lenormant, the celebrated pyramid of Borsippa, again, was called "The Temple of the Right Hand," and one of the names of Babylon was "The City of the Hand of Anu," or "of the heavenly Hand." "The Phœnician *cippi* dedicated to Tanith and Baal Hamman," says Robertson Smith, "often have a hand figured on them." An open hand uplifted to the sky, in the same way as the red hands of Morocco at the present day, occurs frequently, indeed, on Carthaginian *ex votos*; it was doubtless intended for a similar purpose—to ward off the evil eye—North African custom in all these matters being peculiarly conservative. From Phœnicia also, as Goblet d'Alviella holds, the symbol travelled to India, where it decorates the pedestal of the holy tree in a bas-relief at Barhut. But direct transmission will not account for the Central American Temple of the Hand, mentioned by Cogolludo, to which the natives took "the dead and the sick, where, they said, they got restored to life and health." For myself, I should rather incline to believe that so universal an emblem, of so obvious an origin from a world-wide superstition, had independently survived, in India as in Ireland, rather than that it had been deliberately carried from country to country. This is the more probable, as skeleton hands are also found as a decoration of American Indian pottery of a date preceding the European immigration. Some of these are admirably figured in De Nadaillac's *Prehistoric America*.

That the Jews shared the common Semitic faith in the Hand of God is sufficiently shown by many striking passages in early Hebrew literature. There "the Hand of Yahweh" is constantly mentioned, sometimes in the clearly magical sense; as, for example, when the Philistines had taken the ark, "the hand of Yahweh was heavy upon them of Ashdod"; "His hand is sore upon us and Dagon, our god"; "There was a deadly destruction throughout all the city; the hand of the god was very heavy there." So, too, in various psalms: "Thy hand

was heavy upon me"; "the right hand of Yahweh is exalted; the right hand of Yahweh doeth valiantly." These are not mere figurative expressions; indeed, considering the disinclination of the Jews to allude to any bodily or anthropomorphic type of their chief deity, such words must be regarded as extremely significant. I could quote many other instances, but those noted will suffice. "The right hand of the Lord" is frequently mentioned throughout the canonical books of the Old Testament.

Another curious embodiment of the same conception is that which meets us in the sceptre and the "Hand of Justice." From very early times a staff or wand has been both the sign of kingship and the mark of the conjurer, wizard, warlock, or magician. Most of such staves or sceptres are nothing more, no doubt, than mere wands of office; in plain words, they represent the rod with which the master strikes and punishes the inferior. But there are a few variants, which bring the thing more into line with our present inquiry, such as the caduceus, the handed sceptre, and the *Main de Justice*. A couple of accidents which happened to myself gave me the clue to these curious embodiments. I have in my own possession a Kaffir magic stick, with two serpents coiling round it in opposite directions, and a hand at one end firmly grasping the head of one of them. I had also formerly a very similar stick from the West Coast of Africa, in which I at once recognised a savage survival from some early prehistoric prototype of the caduceus. This I picked up in Jamaica; and happening to remark on it one day to an old negress, a servant in my house well versed in local magic, she answered at once, "Yes, sah, dat obeah 'tick. I show you Jamaica 'tick make just de same pattern." A few days later she was as good as her word; she brought me a stick on the end of which a small black mummied human hand was firmly fastened with swathes of cotton. It seemed to have belonged to a negro child. Around the stick two dried snakes were twined, caduceus-wise. The whole was an obeah-stick, actually used in witchcraft; but the owner would not part with it for any amount of money, as he had frequently proved its peculiar efficacy. (Obeah being criminal, I may add, such inquiries are carried on with some little difficulty.) It was clear to me that this was a magic hand, employed for incantation, and that the carved wooden obeah-sticks, one of which is still in my possession, were merely artificial substitutes or imitations. The *Main de Justice* is just another such hand in its most finished form of symbolism and of workmanship.

For when opinion about the magic value of the hand in itself has reached this latter point, it is pretty certain that "the hand of a god," as a symbol alone, will be regarded as possessing a certain sanctity and authority of its own. For this reason a hand is often represented on the end of a sceptre, especially on one employed in the essentially divine and kingly office of administering justice. The Achaean king, as we know, holds the sceptre as typifying his divine function, and decides in accordance with "the laws which come from Zeus." To the present day the *Main de Justice* still stands for the divine element which uneducated and superstitious people associate with the idea of law. To us, law is merely the expression of the will of the majority, wise or foolish; but to savages and semi-civilised peoples it is the will of God, or of the gods, or of the divine ancestors. Even among ourselves, "the wisdom of our ancestors" is often appealed to by the ignorant or the uncultured. As a rule, the hand employed as a *Main de Justice* is half closed, having only two fingers extended, as in the attitude of blessing (which is itself another example of the supposed magical efficacy of the divine, kingly, priestly, or papal hand). Christian influence has sometimes substituted the cross and orb for the hand on sceptres; but in its special use as the title to dispense justice, the

sceptre still bears the image of a hand in most civilised countries.

The hand held up in benediction has also its own varieties. It is common to many religions, and may constantly be seen in Buddhist figures. In the Latin Church two fingers only are held out straight, the others being held down; and the Infant Christ is so represented in most early Madonna pictures. In the Greek Church the fingers are curiously twisted, in accordance with some ancient phallic superstition, into a lingam and yoni, now explained away by saying that they form the double initials of the name Iésous Christos.

But we must pass on from these earlier conceptions of "the hand of a god" to the later Christian conception of "The Hand of God" as an independent entity.

This conception itself, like all other religious ideas, goes back directly to a very ancient origin. Count Goblet d'Alviella has shown that one of its earliest known embodiments, in almost the precise shape in which it is now familiar to us, occurs on an Assyrian obelisk, where two hands are seen to issue, armless and bodiless, from a semi-circle, identified with the solar disk, exactly in the same way as in Christian symbolism the Hand of God issues from clouds of glory—only in the Assyrian specimen one hand is open, exhibiting the palm, while the other grasps a bow, which no doubt expresses graphically the rays or arrows of the sun-god. (A figure of this symbol is engraved in Rawlinson.)

M. Gaidoz has further compared the earliest Christian representations of the Hand of God to certain Gaulish amulets, where in like manner a solar wheel is formed of four rays, through the midst of which a hand passes. This solar wheel must in its turn be compared with the cruciform nimbus behind the head of Christ, which persists in various more or less attenuated forms down to the High Renaissance. I am of course aware that the cross in such cases has been directly evolved, as instances from early manuscripts or from the catacombs show, from the letters *chi* and *rho*, or *iota* and *chi*, the initials of the name of Christ in Greek inscribed within a circle. But at a very early period the newer symbolism merged in or adopted the older, and the nimbus of Christ became to all intents and purposes a veritable sun-wheel. Such convergence of symbols is a common phenomenon in religious history.

A figure printed by Didron, from a miniature of the ninth century in the Bibliothèque Nationale at Paris, shows a curious and highly instructive combination of the Assyrian and the Gaulish symbols. Here the Hand of God, this time an indubitable Christian figure, issues, Assyrian-wise, from a semi-circle, representing, no doubt, the glory of heaven. It has, however, only two fingers open, in the ecclesiastical attitude of benediction. But all round the hand is a cruciform nimbus—in other words, a sun-wheel; that is to say, a circle with a cross inscribed in it. Such a cruciform nimbus forms, of course, from an early date the recognised symbol of a person of the Trinity. The figure thus represents God the Father.

It must not be supposed, however, that such a ninth-century type forms the first known appearance of the Hand of God in Christian iconography. A hand emerging from a cloud is a well-known symbol from a very early date in Christian history, and sometimes, says Didron, more pertinently than he knew, the finger-tips emit rays of light, "as if the hand were a living sun." We have here an admirable example of the well-known syncretism of religious symbols; the emblem gathers round it new elements as it grows, and finally combines, in one and the same image, traces of savage magic and of primitive civilised sun-worship, together with metaphors of developed Christianity.

The earliest example of a Christian "Hand of God," distinctly represented in art as a separate entity, which I have

been able to discover is one from a spandril of the famous sarcophagus of Junius Bassus. I do not mean to say that earlier examples may not exist ; I merely mean, this happens to be the first that has come under my notice. On this curious sarcophagus various events in the life of Christ and of the patriarchs are represented, with the personages disguised under the common early Christian symbolism of lambs. In one spandril a lamb, as Moses, is striking the rock in the wilderness for water. In another a lamb, as Christ, is raising Lazarus, or being baptised by another lamb, as John, while a dove descends upon its head from heaven. But the particular figure with which we have here to deal represents a lamb, no doubt again intended for Moses, receiving a missive, which I take to be the table of the ten commandments, from a hand which issues from a cloud in the heavens. This comparatively early specimen clearly shows that we are justified in assuming an unbroken connection between the Christian Hand of God, the Jewish usage, and the Gaulish, Assyrian, and Oriental specimens.

A little later is the mosaic in the Church of St. Cosmo and St. Damian, at Rome, about the year 530. Here, on the roof of the apse, we have a colossal figure of Christ, still classical in type; while above it, extending from golden-edged clouds on a ground of blue, comes forth a single hand, now the recognised emblem of the First Person of the Trinity.

A familiar example of almost the same date is given us in the fine mosaic on the semi-dome of the apse in St. Apollinare in Classe at Ravenna, also assigned to the sixth century. The subject here is the Transfiguration. There is, however, oddly enough, no figure of Christ; the artist, perhaps despairing of his ability to represent adequately the divine vision, has contented himself with symbolising it by means of a jewelled cross inscribed in a circular glory—a clear survival of the pre-Christian sun-wheel. The circle is covered with stars, so as to represent a firmament, but the spokes of the wheel are still distinctly marked by radii at the margin. On either side, amid clouds, stand a most inefficient Moses and Elias ; while below, St. Apollinaris and the conventional sheep do duty on earth for the Church militant. But the point which especially concerns us here is this : above the jewelled cross, which stands for Christ, a hand issues mysteriously from a cloud, and seems to encourage the transfigured Saviour. Similar hands are to be found in several other mosaics in Ravenna, from the time of Honorius and Galla Placidia, through the epoch of the Gothic Theodoric, down to the Byzantine works of the days of Justinian.

From that date forth, the Hand of God becomes a recognised commonplace of Christian iconography. I will mention only a few striking instances. The beautiful mosaic of the ninth century in the Church of San Prassede at Rome represents a very large Christ, this time in human guise, with an oval cruciform nimbus, surrounded by St. Peter and St. Paul, St. Praxedis and St. Pudentiana, St. Zeno and Pope Paschal, the founder of the church — the last figure bearing in his hands a model of the building, and marked as a still living personage by his square nimbus. But above the head of Christ, once more, a hand issues from the clouds, and seems to designate the Son as a divine figure. I cannot avoid mentioning as a curious concomitant circumstance, showing the slow segregation of Christianity from Paganism and Judaism, that a palm hard by overhangs a river inscribed as the Jordan, and that on one of its branches sits perching a phœnix, with a halo of rays like a solar image. In the closely analogous but much earlier mosaics of St. Cosmo and St. Damian a similar phœnix is surrounded with a glory of stars in true solar fashion.

Among works of later Italian art the hand in the clouds often points to the transfigured or risen Christ, who

stands in a mandorla or almond-shaped glory, which is itself, of course, by ultimate origin, a yoni or ancient phallic emblem. (Hence it is mostly confined to ascending saints, who are undergoing, as it were, a new birth to heaven.) In pictures of the Annunciation, again, a single hand often projects from a circular halo or a mist of glory, and sends down the dove upon the expectant Virgin. The beautiful and tender Filippo Lippi, in the National Gallery in London, so represents the subject; here the hand sends forth concentric rings of golden light to accompany the dove, in a fashion which Mr. Sidney Hartland, in his *Legend of Perseus*, has aptly compared with the story of Danaë. I have a large collection of photographs representing Italian Annunciations, in a great number of which both these antique traits are visible. In a few, however, two hands issue from the cloud and launch the dove—a usage which comes somewhat nearer to the Assyrian than to the Gaulish precedent. In another class of pictures, such as those representing the Baptism of Christ, I think the double hands the more usual feature. They are excellently seen in Verrocchio's famous Baptism at the Belle Arti in Florence, with the angel said to have been inserted by the young Leonardo. Here a pair of hands at the top of the picture emerge from the sky in a radiating glory and send down a dove, which itself disperses rays of radiance upon the head of the Saviour. The student should compare the similar figures in the Baptisteries at Ravenna. More than one Nativity of the Della Robbia school shows the same idea as treated in plastic art. Two hands descending from the framework of the relief seem to despatch the holy dove upon the head of the Madonna.

In later work the Hand of God coming forth from the cloud is so common as to be almost universal. In this respect, indeed, we may trace three distinct epochs of Christian feeling. In the first stage the prohibition against images made long before by the priests of that jealous god, the Hebrew Yahweh, was adopted by the half-Judaic, half-Pagan early Christian community. During this period Christ is usually represented by symbols alone, as the lamb, the fish, the true vine, the Good Shepherd; or again by "types," as Moses, Jonah, or some other hero of the Jewish mythology. Towards its close he is also symbolised by the cross, the labarum, the monogram, and the solar wheel, especially after the conversion of Constantine. Throughout this earlier age, and for some time later, it was not usual to represent God the Father directly in art at all; as Kugler rightly says, in speaking of the primitive Christian mosaics, with their colossal central form of Christ in the apse of the basilica: "Above the chief figure appears generally a hand extended from the clouds, and holding a crown—an emblem of the almighty power of the Father, whose representation in human form was then not tolerated." But in the second stage (I think from about the tenth century onward) the First Person of the Trinity was boldly figured as a grave and reverend old man, with a long white beard; we see him so still in the common type of pictures known as the Santissima Trinità, and also in such other works as Raphael's Disputà and his first fresco at Perugia. During the fourteenth and fifteenth centuries, in particular, and the early part of the sixteenth, not the slightest compunction was felt in painting the Eternal Father, for whom indeed a regular type of figure was evolved which is instantly recognisable, like a Christ or a St. Sebastian. Still, during this same period, the Hand of God protruding from the clouds lived on by prescription, and was largely used where the addition of a whole figure in the field above would have destroyed the unity and balance of a composition. Finally, the Protestant "Reformation," with its singular recrudescence of Judaising tendencies, and its reversion from Christianity towards the Old

Testament teaching, put a stop in the North to the painting of God the Father, and made the Hand of God once more the dominant mode of representation. This feeling even reacted upon Catholic countries, where, since the middle of the sixteenth century, somewhat greater reserve has probably been felt in the bodily picturing of the Supreme Father.

I have thus shown, I hope, the direct continuity of this late-lingering phrase and corresponding idea with the earliest savagery. The notion of the separable Hand of a God was first barbaric, then Oriental, and especially Semitic. Being Assyrian, Chaldæan, Phœnician, Carthaginian, it was also almost of necessity Israelitish and Jewish. Being Jewish, it was also inevitably Christian. Directly, it passed into Christendom as the pictured Hand of God; indirectly, it passed in as the hand of Justice. At the present day thousands among us use the phrases that such and such a person has been struck by the Hand of God, or that such and such a notorious criminal, in the Argentine or elsewhere, can never finally escape the Hand of Justice, without ever realising the true origin of the antique expressions they employ so glibly. But language is made up of such psychological fossils; and only by the aid of literature, art, folk-lore, and archæology are we able to understand the real course of its development.

Religion, indeed, from beginning to end, seems to be one and continuous. The great historical cults themselves are mere centos, or survivals with modification, of earlier barbaric or semi-civilised notions. Mr. Frazer has proved this thesis to the hilt in his magnificent work, *The Golden Bough*, for the most central concepts of the Christian faith; I have humbly endeavoured to perform the same office in this fragmentary paper for a very small phrase in our popular religion, and a very minor element in our Christian art. But I may add, in conclusion, that, if the reader keeps his eyes open when on an Italian or Eastern tour, he will be astonished to find how large and unsuspected a part this curious conception of the Hand of God has played from the first in the everyday life and iconography of Christendom.

THE WORSHIP OF DEATH

I.

I REGARD the Papuans of New Guinea as preserving for us in many ways some of the most primitive traits of ancient religion. These people are Negrittos in type—that is to say, they are members of a very early and scattered race of humanity, with woolly hair and a low character of skull; and they have been practically isolated in their own large island for an immense period of time, perhaps to be measured by hundreds of thousands of years. I shall therefore devote some little space at the outset to considering their religion.

The New Guinea folk, as a whole, worship their dead, and seem to know no other gods but corpses and their "spirits." Their most usual method of preserving their friends is to embalm or dry them. In 1876 the Italian traveller D'Albertis saw two native mummies preserved under a shed on the banks of the Fly River. He says:—

> On opening the first, I found the entire body of a woman. The bones were in great part covered with the dried

skin, almost intact. It was of a uniform red colour, which I believe to be artificially produced with the red chalk so much used by the natives. I think—though I am not certain of this—that the flesh had been removed before the body was preserved, leaving only the skin. (D'Albertis, ii., pp. 133, 134.)

Similarly, Mr. Wyatt Gill, the well-known missionary, remarks :—

The Koiari treat their dead after this fashion. A fire is kept burning day and night at the head and feet for months. The entire skin is removed by means of the thumb and forefinger, and the juices plastered all over the face and body of the operator (parent, husband, or wife of the deceased). The fire gradually desiccates the flesh, so that little more than the skeleton is left. (Gill, *Work and Adventure in New Guinea*, p. 307.)

I wish particularly to call attention in this case to the curious destination of the expressed juices, which leads up to the question of ceremonial cannibalism.

I ought to mention, however, that even at this primitive stage burial of a sort also takes place. Thus Mr. Gill says :—

Inquiring the use of several small houses, I learned that it is to cover grave-pits. All the members of a family at death occupy the same grave, the earth that thinly covered the last occupant being scooped out to admit the new-comer. These graves are shallow ; the dead are buried in a sitting posture, hands folded. The earth is thrown in up to the mouth only. An earthen pot covers the head. After a time the pot is taken off, the perfect skull removed and cleansed—eventually to be hung up in a basket or net inside the dwelling of the deceased over the fire, to blacken in the smoke. [Note this point, as leading up to the sanctity of the hearth.] It is easy to understand how this love for the dead should glide into worship. (Gill, as above, p. 333.)

This case, too, is full of implications. We shall see in the sequel that two elements mentioned in it are of fundamental importance. In the first place, it is common at all stages of religious evolution to raise the honoured dead after a time from their graves and preserve their remains in a reliquary or shrine ; this rite of resurrection is ecclesiastically known as Translation of the Relics. In the second place, it is usual to preserve the head or skull, mummied or otherwise, and to inquire of it for oracles. The origin of this oracular idea is clear. It is the head in life that hears and answers ; it is the head after death that receives prayers and gives signs or oracles.

Evidence will accumulate as we proceed which tends to show that both embalming or mummification and burial had begun to be practised at so early a period that they probably antedate the dispersal of man. Both modes of disposing of the dead exist in many scattered groups of the very lowest races, besides surviving into higher levels. Only, at this lowest stage the burial usually takes place in a very shallow grave ; it does not seem to be prompted by terror of the *revenant ;* and it is almost always followed by a Ceremonial Resurrection, when the bones are often washed, anointed, smeared with blood, or painted red, and are also generally worn as mementos or charms by the nearest relatives. The Ceremonial Resurrection takes place for the most part after a stated interval, varying according to the particular race from a few days to a year, three years, or even longer. I must beg the reader to note particularly all such minor details in the examples I shall quote, as I admit nothing except such special points as cast light in the end upon higher religious developments.

Of a New Guinea baby at Boera, Mr. Gill writes :—

The body was besmeared with turmeric, the head with red ochre [the meaning of these red pigments as substitutes for blood will become clear to us later] ; the mother was alone with her dead infant, who died in the morning. I was informed by Piri that at the same hour to-morrow it will be covered with two inches of soil, the friends watching beside the grave ; but eventually the skull and smaller bones will be preserved and worn by the mother. (Gill, as above, p. 306.)

And here is another passage which strikes the keynote of ceremonial or sacramental cannibalism:—

> The corpse was now laid by the side of the grave dug in their islet, and their heathen grief found its vent. First, the women lacerated their faces, and beat their breasts most affectingly, bewailing the untimely death of their young relative; and then, in the madness of their grief, pressed the matter out of the wounded thigh, and smeared it over their faces and persons, and even *licked it up*. (Gill, as above, p. 265. Compare the Christian Pietà and Deposition.)

I may mention that the laceration is undergone in order to draw blood which may be smeared on the corpse, and that the corresponding smearing of dead matter on the face of the survivors makes a mystic community, a sacramental union as it were, between the worshippers and the dead body or "spirit." Blood is often thus smeared on the face of the dead; the turmeric and red ochre mentioned above are convenient substitutes.

Dr. Guillemard supplies some interesting evidence to the same effect. He writes of Jobi in New Guinea:—

> They were drying the corpse of a man over a fire, an operation which took nine days.....The custom is apparently in vogue among several of the Papuan tribes, and in some cases, when the body is sufficiently dried and smoked, it is preserved in the house.....On the tenth day the body in question was rowed across to Kaiari Island and placed upon a platform of sticks among the mangroves. (Guillemard, *Cruise of the Marchesa*, ii., p. 313.)

I think those who have read Mr. Frazer's learned book, *The Golden Bough*, will have no difficulty in perceiving that this common custom of hanging the corpse on an elevated platform, examples of which will meet us frequently, is due to the well-known magical desire to keep it "between heaven and earth"; Mohammed's coffin is the stock example. (See Frazer, *The Golden Bough*, ii., p. 223.)

Dr. Guillemard adds:—

> Mr. Van Hasselt afterwards told us that some of the Arfak tribes also dry the bodies of their dead in the above manner, and that it is the custom that the substance which drips from the corpse in the process should be tasted by the widow, under pain of death.

Here once more we get the foreshadowing of ceremonial cannibalism.

It may seem premature to introduce at this stage any reference to the origin of idols; but, as the whole of worship is so closely bound up together that it is impossible to unravel each part analytically, I will add Dr. Guillemard's evidence on the idols of New Guinea. He says that almost every room contains a *korowaar*—that is to say, a carved wooden image—and these *korowaars*, he observes, are—

> the media by which the living hold communication with and are kept in memory of the dead. If any individual die, a *korowaar* is immediately constructed; for, unprovided with an earthly habitation, his spirit could not rest.....When finished, the image is either placed on the grave or carried to the house of the nearest relation, where it is treated with great respect. On every occasion of importance—on fishing excursions, in sickness, on undertaking a journey, and so forth—it is consulted, and, if nothing takes place, it is considered a sign of the approbation of the deceased. (Guillemard, as above, ii., p. 280.)

In this account it is important to notice that the image may either be placed on the grave or in the house, and that the near relation is the incipient priest; also, that the oracular use of the idol exactly equates with that of the dried head or skull in many other instances.

Mr. Wilfrid Powell, I would mention parenthetically, cites similar images in New Zealand, an island inhabited by a kindred race, and says that they are of chalk and are kept in "mortuary chapels." "The ghost must have some habitation on earth, or it will haunt the survivors of its late family." (Powell, *Wanderings in a Wild Country*, p. 248.)

A few other facts noted by Dr. Guillemard are of first-rate importance. The *korowaars* that are bought for

barter, he says, "have generally belonged to someone who has died, or are old ones whose names have long ago been forgotten." Here we have the individual ghost and the correlated image passing gradually into the generalised god—a god revered for his power by those who never knew him personally as a living ancestor—nay, even by those of an alien family. Moreover, the images are often "grotesque or indecent"—that is to say, phallic. (Guillemard, ii., p. 282.)

The curious duplication of mummy and image which these examples show will meet us at many later stages of our inquiry. I have mentioned already in *The Evolution of the Idea of God* the case of the supplementary images laid in the tomb with the mummy in Egypt, and other instances will occur again at every turn.

I have also noted already in *The Evolution of the Idea of God* that there has never been more than one religion everywhere; it is for the sake of emphasising that fundamental truth that I mention here this early indication of the origin of idol-worship. I may add that other facts which link on the cult of the Papuans to the man-slaying rites and artificial gods of cultivation in more advanced societies will appear at later stages of our inquiry.

I must pass on to other Negritto races.

The Tasmanians were probably among the earliest Negrittos to be separated from the main undifferentiated mass of the Negritto family; certainly they were long and most completely isolated. Unfortunately, owing to their rapid extinction, we possess relatively little authentic information as to their religious ideas. Yet even here various means of disposing of or preserving the body certainly existed. Some tribes placed the corpse in a hollow tree and abandoned it ("between heaven and earth" again); others threw the dead bodies into natural holes and covered them with rubbish; a few were cremationists. (Milligan, *Proc. Roy. Soc. Tasmania*, iii., p. 180; Bonwick, *Daily Life of Tasmanians*, p. 22.) Even the cremationists, however, collected the ashes of their dead and carried them about as talismans. (Bonwick, as above, p. 96.) That is to say, they kept their god or spirit always with them. But in many cases they did more than this. "Often," says Mr. Bonwick, "would the mother bear about with her the bones of her child, and the widow some such memorial of her husband." (As above, p. 97.) In this instance, therefore, though I do not find distinct mention of artificial preservation or mummification, there was at least safe keeping of the actual body. They also tried "to possess themselves of a bone from the skull or the arms of their deceased relatives, which, sewed up in a piece of skin, they wear round their necks, confessedly as a charm against sickness or premature death." (*Tasmanian Journal*, i., p. 253.) As the "spirits" are supposed to cause death, this desire to keep a hold over the dead is only natural. For when a man dies in New Guinea, people ask what taboo he has broken, or why the "spirits" are angry with him. (Chalmers, *Pioneering in New Guinea*, p. 330.) They take it for granted that his ancestors have taken him.

The importance attached to these memorials or divine relics of friends is further and most pathetically shown by the fact that, when the miserable remnants of the Tasmanians were exiled to the Straits, they took with them the skulls and limbs of their dead in great numbers. (Bonwick, p. 10.) Dispirited and decaying, they yet carried their gods as their dearest possession to the land of exile. Such migrations of bodies and bones, or of their equivalents, sacred stones and idols, with the migrating tribe will meet us constantly hereafter; just as the Hebrews in the legend carried the bones of Joseph, as well as their tribal sacred stone, Jahweh, from Egypt to Canaan.

The women, among the Tasmanians as elsewhere, were the chief mourners.

They lacerated their bodies for the dead; they cut off their hair and flung it upon the corpse; they threw flowers on the spot, and twined trees to fence-in their beloved. (Bonwick, p. 97.) As they were unable to dig, save with a short stick, they made no grave of any depth; but they hedged round the body with brushwood (a common feature); and they sometimes erected above it a rude hut, the first beginnings of the temple. (Bonwick, p. 92.) Occasionally they even raised a mound, the foreshadowing of the tumulus.

The Tenimber Islanders are closely allied to the Papuans of New Guinea. They deposit the dead on a raised platform ("between heaven and earth"), and place beside it fruits, cooked yams, fowls, and rice, which are renewed from time to time. (Earl's *Voyages of Domga*, p. 223.) Among the natives of Lette we find the same duplication of idol and body as in New Guinea; for they bury lightly, put dressed food into the open grave, and, when the grave has been filled in, collect round an image and offer it provisions. (Earl's *Moluccan Archipelago*, p. 62.)

The New Caledonians are half-buriers, so to speak, as indeed is usual among Negrittos. They dress the body of the dead with a belt and shell armlets; they cover it lightly with soil, all save the head; and they spread a mat over it. After ten days the friends twist off the head and preserve it for worship. (Turner, *Polynesia*, p. 425.) The people of Tana wrap the body of the dead in a piece of thick native cloth, and paint the face red—a substitute for the blood-offering. (Turner, p. 92.) The wives of a chief are strangled, to accompany him to the other world. (Turner, p. 372.)

Here is an equally illustrative case from among the Fijians. A child of rank died under the queen's care, says Mr. Williams. Its body was placed in a box (a shrine or reliquary) and hung up from a beam of the temple ("between heaven and earth" once more). For some months the best of food was offered to it daily, and the bearers approached it with the utmost respect. If tortoise-shell or mats were divided, the child had its share. Indeed, in Fiji "there appears to be no certain line of demarcation between gods and living men." (Erskine, *Western Pacific*, p. 246.) Tuikilakila, chief of Somo-Somo, said to Mr. Hunt: "If you die first, I shall make you my god." He was a god himself, and he boasted of it.

From the Negrittos I pass to those other scattered races which seem to represent very early types of human culture.

The Fuegians wrapped the dead body in skins, carried it into the woods, and placed it on broken boughs or pieces of wood (the raised platform between heaven and earth); they then piled branches upon it. Dried bodies have also been found on the coast, laid out in caves, the primitive habitation. (Fitzroy, ii., p. 181.)

The Andaman Islanders wrap the corpse in leaves, and bury it in a shallow grave temporarily. Two or three months after burial the near relatives disinter the bones, and each takes one; the nearest kinsman (the primitive priest) takes the skull and lower jaw, which he carries suspended round his neck for months. (Owen, *Trans. Eth. Soc.*, New Ser., ii., p. 37.) Sometimes, however, they place the body on a platform in a tree. (St. John, *Trans. Eth. Soc.*, as above, ii., p. 42.) The skulls when clean are painted red. The small bones are made into waistbelts. Tree-burial occurs more abundantly in America. I will call attention presently to some of its implications.

The Veddahs of Ceylon simply cover their dead with leaves; they put a stone on the chest, apparently to prevent the body from rising, and seek a new cave, leaving the one in which the man died to be occupied by him or his spirit. (Bailey, *Trans. Eth. Soc.*, N.S., ii., p. 296.)

The Australian blackfellows have all

the principal modes of disposing of the dead already developed—one of the numerous facts which show the great and almost primitive antiquity of funeral practices. They expose on platforms, they expose on trees, they bury lightly, and they occasionally burn. (Eyre, *Australia*, ii., p. 343, *seqq.*) Here, too, however, mothers carry on their backs for weeks the dead bodies of their children. (Angas, *Australia*, i., p. 75.) The women bury and perform the funeral rites. Huts or little temples are erected over the grave, and in them is placed the property of the deceased.

Few of these earliest races show any traces of deities of a higher or generalised character. Sacred stones, indeed (sometimes demonstrably monumental), exist among them, both in New Guinea, in Fiji, and elsewhere; and to these sacred stones Seemann (p. 89) attributes a phallic significance. But for the most part the only gods known among them are the bodies, bones, or skulls of the dead, or the images into which their "breath" or spirit has been conjured. And I notice that the missionaries who, like Mr. Chalmers, know the race most intimately, speak habitually of the worship of spirits, but seldom or never of deities. Mr. Turner, again, says of the Tanese:—

> Their general name for gods seems to be *aremha:* that means *a dead man*, and hints alike at the origin and nature of their religious worship. The spirits of their ancestors are their gods. Chiefs who reach an advanced age are after death deified, addressed by name, and prayed to on various occasions. They are supposed especially to preside over the growth of the yams and the different fruit-trees. (*Polynesia*, p. 88.)

The more we know about the rudest races, the clearer does it become that all their gods are dead fellow-tribesmen.

One curious little side-issue I will mention now for its subsequent importance. The New Caledonians have a rain-making class of priests or magicians. They "make rain" by pouring water over a skeleton they have exhumed—clearly a mode of sympathetic magic, which also lets the spirit or dead man know precisely what is wanted of him. (Turner, *Polynesia*, p. 426.) Now, I need hardly remind the reader that St. Swithin is the great rain-saint in England, because it is believed that on the day set apart for his Translation at Winchester rain fell and continued for forty days consecutively. If rain falls on that date (July 15th), it is still believed that forty wet days will follow. Other watery saints exist elsewhere; in France, St. Médard and Saints Gervais and Protais; in Flanders, St. Godeliève; in Germany, the Seven Sleepers of Ephesus. Here is a still more analogous instance. The year 1896 was a year of serious drought in Spain, and on May 3rd the body of San Isidro the Ploughman was carried in solemn procession through the streets of Madrid, in order to obtain rain.

> Encased in a magnificent silver filigree urn of the sixteenth century, it was carried by priests in a portable altar. The streets were crowded with people, who knelt as the body of the saint passed along. The procession was organised on the initiative of the Queen Regent for the purpose of making divine intercession for a termination of the terrible drought. (Telegram from Madrid, *Daily Mail*, May 5th, 1896.)

Now, San Isidro is essentially a water-saint, whose chief miracle is that he struck a rock, when there gushed forth at once a fountain of pure water. (Mrs. Jameson, *Sacred and Legendary Art*, ii., p. 778.) He is also the patron saint of Madrid. I learnt by inquiry from an eye-witness in this instance that, previously to setting forth from the sanctuary, the reliquary was sprinkled with holy water. I mention this curious survival here to show by anticipation how closely similar are the rites of corpse-worship in all races and ages. We do not know that the New Caledonian skeleton is that of a rain-doctor, but on this analogy I incline to suspect it.

I will add that similar usages extend in many places to the later sacred objects, such as sacred stones, idols,

and sacred trees. In a Samoan village a stone was housed as a representative of a similar rain-making god (or dead chief; perhaps a rain doctor); in times of drought his "priests" carried the stone in procession and dipped it in a stream. (Turner, *Samoa*, p. 145.) Near Dorpat in Russia, when rain was needed, rain-makers climbed up the fir-trees of an old sacred grove, and one of them sprinkled it with water from a bunch of twigs. (Mannhardt, *Wald- und Feld-kulte*, p. 342.) In Mingrelia, to get rain, they dip a holy image in water daily till the desired effect is produced. In Navarre the image of St. Peter was taken to a river and apparently dipped, while prayers were offered for rain. (Frazer, *The Golden Bough*, i., p. 15.) Even sacred wells have water thrown into them for the same purpose; corpse, stone, tree, image, and well being all alike, as we saw in *The Evolution of the Idea of God*, dwelling-places of the "spirit."

Another implication of importance I would like to suggest before we go further. In the chapter dealing with tree-worship in *The Evolution of the Idea of God* I gave reasons for believing that the sanctity of trees was in large part due to their being planted on the graves of the dead, and of this I have now collected a vast mass of proof, which I shall publish hereafter. But the instances accumulated in the present chapter may suggest the further idea that tree-worship in part possibly antedated the practice of burial. It will be noticed that in several of these instances the bodies of the dead were kept "between heaven and earth" by being exposed in hollow trees or on branches. Now, to these trees offerings of food and other gifts would almost certainly be made; indeed, I have noted a few instances where it is distinctly mentioned that food and drink are laid at the foot of the grave-tree. In process of time, however, the body would disappear; but, in some instances at least, the tree would doubtless continue to receive its accustomed worship. To this origin I am inclined in part to attribute the general sanctity of woods and groves, and the common idea that they are the residence of ancestral spirits.

I will not push further these suggestions as to the corpse-worship of the most primitive races. I have said enough, I trust, to show that it gives us pregnant hints in every direction of the lines which religious evolution was certain to follow in higher races.

II.

The very low and apparently primitive races with which we dealt in the previous chapter are scattered in space, and belong to at least two diverse types of humanity; all that we can predicate of them in common is that they probably represent more nearly than any others the earlier ideas and practices of the species. I have therefore dealt with their peculiar forms of corpse-worship ethnographically, giving the habits of each race in a separate paragraph. In America, on the other hand, the type of mankind as a whole is so much more constant that I do not think such ethnographical treatment necessary. On the contrary, I incline to believe that usage all over America (up to the epoch of Columbus) was in most ways extremely similar, and that when a fact of importtance is noted of one tribe rather than another, the notice often depends more upon the individual observer than upon the nature of the tribe. As far as I can judge, a great similarity prevails over the continent. I will, therefore, give the evidence in this instance in a different order.

I proceed first to America, again, not to Africa or Polynesia, because I believe the American tribes come nearest in many of their practices to those already considered, and also because the similarity of many rites and practices with some which we have already considered will help to bring out that striking identity of religion, all the world over, which I am anxious to illustrate. If

certain rites are found to be common to Americans with Papuans and Andamanese, I think we can hardly escape the suggested inference that they antedate the dispersion of the human family.

The Mandans give us an excellent example of that form of corpse-worship in which the body is preserved in rolls of clothing, and exposed on a platform "between heaven and earth." I slightly condense the following account from Catlin. "These people," says that conscientious observer,

> never bury the dead, but place the bodies on slight scaffolds just above the reach of human hands, and out of the way of wolves and dogs; and they are there left to moulder and decay. This cemetery, or place of deposit for the dead, is just back of the village, on a level prairie; and with all its appearances, history, forms, ceremonies, etc., is one of the strangest and most interesting objects to be described in the vicinity of this peculiar race. Whenever a person dies in the Mandan village, the customary honours and condolence are paid to his remains, and the body dressed in its best attire, *painted*, *oiled*, *feasted*, and supplied with bow and quiver, shield, pipe and tobacco—knife, flint and steel, and provisions;.....a fresh buffalo's skin, just taken from the animal's back, is wrapped around the body, and tightly bound and wound with thongs of raw hide from head to foot. Then other robes are.....also bandaged around the body in the same manner, and tied fast with thongs, which are wound with great care and exactness, so as to exclude the action of the air from all parts of the body. There is then a separate scaffold erected for it, constructed of four upright posts,.....across which are a number of willow-rods, just strong enough to support the body, which is laid upon them on its back, with its feet carefully presented towards the rising sun. There are a great number of these bodies resting exactly in a similar way; excepting in some instances, where a chief or medicine-man may be seen with a few yards of scarlet or blue cloth spread over his remains, as a mark of public respect and esteem. Some hundreds of these bodies may be seen reposing in this manner in this curious place, which the Indians call "the village of the dead." (Catlin, *Indians*, i., p. 89.)

I wish to call special attention here in passing to the feasting, painting, and oiling of the dead, such anointment, as well as the tight winding of the robes, being full of suggestions, not merely for mummies, but also for higher levels of religion. It is important to observe that these ritual elements of painting and oiling first appear in connection with corpses. Note also the similarity to Egyptian practice, in another hemisphere.

Even more interesting is the destination of the Oracular Skull, of which we have here one of the fullest and best accounts:—

> When the scaffolds on which the bodies rest decay and fall to the ground [says Catlin again] the nearest relations [incipient priests, as usual] having buried the rest of the bones, take the skulls, which are perfectly bleached or purified, and place them in circles of a hundred or more on the prairie—placed at equal distances apart, with the faces all looking to the centre; where they are religiously protected and preserved in their precise positions from year to year, as objects of religious and affectionate veneration. Every one of these skulls is placed upon a bunch of wild sage, which has been pulled and placed under it. The wife knows (by some mark or resemblance) the skull of her husband or her child which lies in this group; and there seldom passes a day that she does not visit it, with a dish of the best cooked food that her wigwam affords, which she sets before the skull at night, and returns for the dish in the morning.

The women also visit the spot often—

> from inclination, and linger upon it to hold converse and company with the dead. There is scarcely an hour in a pleasant day but more or less of these women may be seen sitting or lying by the skull of their child or husband—talking to it in the most pleasant and endearing language that they can use, and seemingly getting an answer back. (Catlin, i., p. 90.)

The point about the answer is very

illuminating. Sometimes a woman will bring her needlework and chat by the side of her dead child while she embroiders moccasins.

Women in mourning in this tribe, I will observe parenthetically, are obliged to cut all their hair off as a duty to the deceased. (Catlin, i., p. 95.) The same thing is done in many other instances.

Somewhat similar was the ancient mode of disposing of the dead among the Iroquois :—

> The body of the deceased was exposed upon a bark scaffolding, erected upon poles, or secured upon the limbs of trees, where it was left to waste to a skeleton. After this had been effected by the process of decomposition in the open air, the bones were removed either to the former house of the deceased or to a small bark house by its side, prepared for their reception. In this manner the skeletons of the whole family were preserved from generation to generation, by the filial or parental affection of the living. After the lapse of a number of years, or in a season of public insecurity, or on the eve of abandoning a settlement, it was customary to collect these skeletons from the whole community around, and consign them to a common resting-place. (Morgan, *League of the Iroquois*, p. 172.)

This is perhaps the best place to interpose the remark that similar habits of Ceremonial Resurrection and of collecting the bones, especially the skulls, in charnel-houses or chapels, continue all through the various stages of culture up to the very highest. A familiar example is that of the bone-house attached to the monastery of the Cappuccini at Rome, which is one of the sights of the Eternal City. It consists of four chambers, set round with rows of skulls upon skulls, interspersed with mummified bodies. The earth of the cemetery was brought from Jerusalem. "As it is too small for the convent, when any monk dies, the one who has been longest buried is ejected to make room for him." (Hare, *Walks in Rome*, ii., p. 2.) Several such charnel-houses, however, exist in connection with other monasteries, where the cemetery is larger.

To return to our American Indians. Customs of much the same sort must have been common elsewhere in America, for Buchanan speaks of "the solemn ceremony which the Hurons and the Iroquois observe every ten years, and other nations every eight, of depositing all who have died during that period in a common place of sepulture." (Buchanan, *North American Indians*, p. 238.) Among the Chippewas, Schoolcraft notices the common habit of exposure on scaffolds. "The corpse," he says, "is carefully wrapped in bark, and then elevated on a platform made by placing transverse pieces in forks of trees or on posts firmly set in the ground." Sometimes, however, the Chippewas bury, in which case a roof of bark is set over the corpse; "this enclosure has an aperture cut in it, through which a dish of food is set for the dead. Oblations of liquor are also sometimes made." (Schoolcraft, *Mississippi*, p. 122.) The same writer notes that posts inscribed with the totem of the deceased are placed at the head of the grave. We have here no doubt one origin of totem-worship, though not, I believe, the main one.

Sir Richard Burton gives a good account of the practice among the Sioux :—

> The Sioux expose their dead, wrapped in blankets or buffalo robes, upon tall poles—a custom that reminds us of the Parsee's "Tower of Silence." After deaths the "Keening" is long, loud, and lasting; the women, and often the men, cut their hair close, not allowing it to fall below the shoulders, and not unfrequently gash themselves and amputate one or more fingers. The dead man, especially a chief, is in almost all tribes provided with a viaticum, dead or alive, of squaws and boys—generally those taken from another tribe—horses and dogs; his lodge is burned, his arms, cooking utensils, saddles, and other accoutrements are buried with him, and a goodly store of buffalo meat or other provision is placed by his side, that his

ghost may want nothing which it enjoyed in the flesh. (Burton, *The City of the Saints*, p. 149.)

Schoolcraft further mentions that "they gather the bones about one year after they have been up in a scaffold, and mourn over them for the last time." (Schoolcraft, iv., p. 66.) He notices that they put up grave-posts and paint characters upon them, denoting the number of enemies killed and prisoners taken by the dead man.

I might continue with several other examples of the practice of exposure, which, indeed, is common all over America, but I prefer to go on to some other points of greater interest.

Several Indian tribes bury, though most often in shallow trenches. The Dakotas make no mounds at all; the Chippewas do. Formerly, these people laid their dead on the bare rock, covering them with a loose cairn of stones to protect them from wild animals. After a certain number of years the tribe gathered their dead, and bore the bones to a suitable place, where they raised a great tumulus over them. (Hind, *Red River Expedition*, i., p. 90.) This mode of "sleeping with one's fathers," already noted in previous cases, suggests the first hint of the conception of a "city of the dead," and of an organised life below ground under kings or chieftains.

In many cases, the wives and slaves of the rich are killed, to accompany them to the lower world, both in North and South America. Among the Comanches, "when a man dies his horses are generally killed and buried, and all his principal effects burnt." (Schoolcraft, ii., p. 33.) Formerly, his favourite wife was also killed, but this practice has been discontinued. Among the Chinooks, Schoolcraft mentions a horrible modification of this ancient custom. A chief lost a daughter. She was wrapped up in a rush mat and placed in a canoe. Her father had a slave bound hand and foot and fastened to the corpse. He then enclosed the two in another mat, and left the head of the slave out. The canoe was carried to a high rock, and left there. The custom was, in such cases, to let the slave live for three days and then strangle him. They also kill the favourite horse of the deceased. (Schoolcraft, ii., p. 71.) Among the Guaranis of South America, when the chief died his faithful followers used to immolate themselves on his grave. The survivors erected a cairn, and surrounded it with a palisade. (Waitz, iii., p. 419.) The Abipones used to slay at the grave the best horses. (Dobrizhoffer, *Paraguay*, ii., p. 267.)

Varieties of method occur, many of them interesting. The Guaranis enclose their dead in large clay vessels—a habit which recalls the keeping of the skulls in clay pots in New Guinea, and other eastern customs. (Dobrizhoffer, i., p. 63.) The South American Manpes bury the dead in the houses, with all their ornaments. Some large houses "have more than a hundred graves in them." (Wallace, *Amazon*, p. 498.) The Ceremonial Resurrection, in this case, is sometimes accompanied by Sacramental Cannibalism. The Tarianas and Tucanos, "about a month after the funeral, disinter the corpse, which is then much decomposed, and put it in a great pan, or oven, over the fire, till all the volatile parts are driven off with a most horrible odour, leaving only a black carbonaceous mass, which is pounded to a fine powder," mixed with a native liquor, "and drunk by the assembled company till all is finished. They believe that thus the virtues"—say, rather, the spirit—"of the deceased will be transmitted to the drinkers." (Wallace, p. 498.)

Among the Carriers of North America a still more hateful variant on the same Sacramental Eating of the Dead God took place. The bodies were burned in the presence of the families of the deceased and of his wife. A funeral pile was erected, and the body placed upon it. The widow then set fire to the pile, and was compelled to stand by it, "anointing her breast with the fat that oozed from the body." No matter how

insupportable the heat, if she tried to move away she was thrust forward by her husband's relatives with the points of their spears. (McLean, i., p. 255.) Compare Mr. Wyatt Gill's account of the Koiari, in New Guinea, and Dr. Guillemand's notice of the Arfak tribes, where the widow "tastes the substance which drips from the corpse" under pain of death. Similar god-eating customs occur elsewhere. The Arawaks of South America formerly dried the bones of their chieftains and drank them in powder. (Waitz, iii., p. 388; Schomburgk, *Raleigh's Guiana*, p. 109.) Like traits are recorded of many other tribes.

House-burial, already noticed, takes place in many instances, with interesting variations. The Caribs, when they buried the master of the house, quitted it for ever, leaving it as the dead man's temple. (Edwards, *West Indies*, i., p. 60.) In other instances they suspended the corpse in a hammock, between heaven and earth, after the women had washed it, and then watched it till decomposition set in. At the proper point of this process the women cleaned the bones, painted them (note this touch), and put them in baskets, where they were carefully preserved. When the natives left the place the bones were taken with them. (Schomburgk, ii., p. 432.) Compare once more the case of Joseph.

The Warans usually bury the dead in the ground under the hut which they inhabited; if the deceased be a great man, the hut is burnt down over the grave. (Schomburgk, p. 52.) Among the Tupis, a somewhat peculiar race, we get a trace of the terror of the *revenant:* "The corpse had all its limbs tied fast, that the dead man might not be able to get up and infest his friends with his visits." But the burial took place within the hut, under the very bed occupied by the deceased. There was also a curious form of anointment; the corpse of a chief was smeared with honey, and then coated with feathers. Food, water, and weapons were placed by the dead man's side. The vault was finally roofed and covered up, and the family lived upon the grave as before. The women cut off their hair in mourning. (Southey, i., pp. 248–49.)

A point to which I attach great importance is this: the dead are not merely exposed or buried and then forgotten; they are remembered always, but more especially at certain times of year and at certain commemorative festivals. Among the Patagonians, for example, the dead are buried in pits, "clothed with the best robes they can get, adorned with beads, plumes, etc., which they change once a year." And again: "They every year pour upon these graves some bowls of their first-made chica, and drink some of it themselves to the good health of the dead." (Falkner, *Patagonia*, p. 119.) This is a very early form of the Feast of First Fruits, which, as I have pointed out in *The Evolution of the Idea of God*, apparently depends upon the belief that ancestors or the dead cause fruits and foodstuffs to grow. An old woman, the primitive priestess, is chosen out of each tribe to take care of the graves, and is held in great veneration. Her office is "to open every year these dreary habitations, and to clothe and clean the skeletons." (Falkner, p. 120.) Widows also mourn for a year—a period which thus has a sacred significance. But this feast belongs to the stage where preservation or mummification is common, because other Patagonians carry the bones to a distance—a "Land of the Dead"—and, after dressing and adorning them, set them above ground, under a hut or tent, with the skeletons of their dead horses around them. (Falkner, p. 119.) I may add that when a Patagonian dies, "one of the most distinguished women is immediately chosen to make a skeleton of the body." She removes the flesh as cleanly as possible—a rite which again reminds us of the New Guinea practice, and which is doubtless a relic of Ceremonial Cannibalism, if that form of disposal be not indeed still recognised among them.

Similarly, the Dakotas mourn their

dead for one year, visiting the City of the Dead, and carrying food for a feast, to feed the spirits of the departed (Schoolcraft, ii., p. 99), while with the Comanches the ceremony lasts a month. The Crees wear bags which contain some of the bones or hair of their dead relations, which they regard with the greatest veneration. They are said to carry them for three years. (Kane, *Wanderings of an Artist*, p. 127.)

I could easily give numerous references to annual commemorations of the dead; but so many of these will crop up hereafter, in Egypt, Etruria, and elsewhere, down to the Christian *Jour des Morts*, that I refrain. It is more important here to notice that other annual festivals also existed in America, among the more savage tribes (for I reserve the civilised Peruvians and Mexicans for a separate chapter). The following quotation from Morgan will give some idea of the nature of these, which I take to be unconnected directly with the cult of the family dead, but to be in all probability (as I judge from their nomenclature) the feasts of slain and manufactured corn-gods or tree-gods.

> Six regular festivals, or thanksgivings, were observed by the Iroquois. The first, in the order of time, was the Maple festival. This was a return of thanks to the maple itself for yielding its sweet waters. Next was the Planting festival, designed, chiefly, as an invocation of the Great Spirit to bless the seed. Third came the Strawberry festival, instituted as a thanksgiving for the first fruits of the earth. The fourth was the Green Corn festival, designed as a thanksgiving acknowledgment for the ripening of the corn, beans, and squashes. Next was celebrated the Harvest festival, instituted as a general thanksgiving to "Our Supporters," after the gathering of the harvest. Last in the enumeration is placed the New Year's festival, the great jubilee of the Iroquois, at which the White Dog was sacrificed. (Morgan, p. 183.)

I shall also bring forward evidence at a later stage to show that among these early mummifying or half-burying savages the doctrine of the Manufactured God, who was sacramentally eaten, was already developed. The following instances must suffice for the present. Among the Tupis of Brazil a prisoner was taken; he was given the sister or daughter of his captor for wife, and was treated like a god in the fashion with which Mr. Frazer has made us familiar. If he had children, those children themselves (like the offspring of the Khond Meriahs) were regarded from birth as sacred victims. When the feast was made the prisoner was tortured, killed, and eaten. "Every part of his body was devoured; the arm and thigh bones were reserved to be made into flutes; the teeth strung as necklaces; the skull set up at the entrance of the town, or sometimes used for a drinking-cup." (Southey, i., pp. 218, 222.) I have introduced this case at this point partly for the sake of the use it notices for the oracular skull of the human god; it is clearly set up at the gate of the town as a protective deity against enemies, a usage of which we shall find numerous examples hereafter. I need hardly say that almost all the early narrators entirely miss the meaning of the whole proceeding.

The Guaranis also eat human victims, each of whom "was treated well; the time appointed for his death was kept secret from him, and women were given him whose exclusive business it was to attend to his comfort." In other words, he was treated like a chief or god. When he was slaughtered, the whole tribe partook of the broth made of his body, even children at the breast being made to taste it. (Southey, ii., p. 369.) This is clearly a god-making rite, followed by a solemn sacramental eating of the god's body.

If we put together all the evidence here loosely collected—and it is only a very small part of that which might be adduced—I think it will be clear that these customs of very primitive peoples, so closely resembling one another among the Negrittos, the American Indians,

and the scattered members of the race in remote islands, like the Andamanese and the Fuegians, suffice to prove that almost all the practices connected with Corpse-Worship had been already developed while the human family was still a single horde. The coincidences are too numerous to be accidental. Every point recurs again and again. I think we may conclude with some probability that the following is, roughly, the basis of this early universal human religion.

Primitive men kept and reverenced the bodies of their dead. They washed and cared for them. They also usually dried and preserved them. The drying was accompanied by removal of the flesh —which the survivors reverently ate, to keep it in the family. They ate it sacramentally. The women performed the funeral rites. They cut off their hair and threw it on the scaffold or in the grave. The bones and skin were usually placed between heaven and earth, on a platform or in trees. Food and drink were offered to the dead. They were supposed to send, in return, the food of the tribe. They were clad and adorned. The remains were often smeared with blood or painted red. They were also anointed. Annual feasts were held in their honour, and at these feasts they themselves participated. A Ceremonial Resurrection took place later. Burial in shallow graves, and the raising of cairns, are also world-wide customs of this early stage. So are the immolation of wives, slaves, or friends to accompany the dead to the other world, conceived of as near and material. Hedges or palisades surround the grave. Idols are made of the dead, and head-stones erected. Equally primitive, apparently (because found in all parts of the world and among the lowest or most isolated savages), are the other main elements surviving in advanced religions. The dead were regarded to some extent as gods, more or less powerful. Artificial gods were manufactured and slain. Such gods were sacramentally eaten. In New Guinea and elsewhere (as I shall show later) we get sacred animal similarly sacrificed and sacramentally eaten; therefore, the anthropic victim the animal treated as the equivalent of a man and a god, exists already at this first stage. I shall also bring forward evidence hereafter tending to prove that the Manufactured God is sacrificed all over the world with a five-day feast, and that this five-day feast is, therefore, of very early origin.

In short, there is only one religion in the world, and every leading element of that religion is common, in embryo at least, to the lowest savages in every region. This central underlying religion is, therefore, probably of immemorial antiquity—perhaps of Pliocene origin.

The head, in particular, is preserved throughout the world with special care, and is regarded as oracular. It is painted red: it is hung up in houses or at the gate of villages. I will give in a later chapter a fuller account of it.

III.

One of the principal objects I have in view in this essay is to bring forward evidence that all the main elements of sacred ritual take their rise in the worship of the corpse, and that almost all such elements already appear in that early stage of religious evolution where corpse-worship is the sole known form of adoration, as the corpse itself is almost or quite the sole sacred object. I also desire to give proof that most of these ritual practices have an obvious and unmistakable meaning when applied to a corpse, believed to be still more or less conscious, but that they are comparatively meaningless when applied to the other objects of worship which later supplement or supersede the corpse —meaningless, that is to say, *unless* we understand their derivative character in the latter instances; unless we recognise that the idol, the sacred stone, the sacred tree, or the sacred well (as already suggested in *The Evolution of the Idea of God*) are surrogates and representatives

of the corpse or ghost, which is the primitive deity. The inference will be clear, that we cannot regard such stones or trees as primitive objects of worship: we must look upon the cult in which ritual acts have a distinct meaning as original, while we consider the cult in which they are meaningless as posterior and substitutive.

I will, therefore, give here a few selected instances of special acts of worship offered to corpses in the early stage, and correlate them with similar acts of worship offered to stones, idols, trees, or wells in later stages. These instances will be merely suggestive and cursory, in order to point out the goal towards which we are tending.

We have seen abundantly in the instances already quoted that *food and drink* are supplied to the corpse among primitive corpse-worshippers. Such offerings of food and drink are of course quite natural where survivors believe in the continued sentient existence of the dead. Till a very late stage in religious evolution we shall find that offerings to ancestors and departed friends persist as a common element of ritual; they will occur so abundantly in the sequel that I need not now insist upon their frequency; it will suffice to instance the annual feasts and continual offerings to the family mummies in Egypt, and the similar offerings in the tombs of Etruria. But such offerings of food and drink, quite natural when made to a corpse, a mummy, or even a grave, become meaningless when made to a stone, a stake, a tree, a log, and, above all, to a sacred well or spring, *unless* we regard these various objects as the dwelling-place or representative of the dead man's spirit. I will therefore proceed to give a brief list of examples where food and drink are offered to each one of these sacred substitutes.

That food is offered to sacred stones hardly needs proof. For form's sake I give a little. The Fijian gods were often represented by "smooth, round milestones" (very like gravestones), to which food was regularly given. (Williams, *Fiji*, i., p. 220.) The Bulloms of the West Coast of Africa make "offerings of rice to the stones which are preserved in memory of the dead." (Winterbottom, *Native Africans*, i., p. 240.) Blood is habitually offered to sacred stones all over the world; so are rice and ghee in India. The sacred stones of the Norwegian peasants were given beer to drink. As a rule, liquids are offered to stones more often than solids: I believe because the ground sops up the liquid. Here is a curious intermediate case from Africa. In Bonny each house has its place for the Penates, beneath which ancestors are buried. A tube-like opening leads down to the corpse; and the negro never leaves his house without pouring down a libation. (Bastian, *Mensch*, ii., p. 377.)

That food is offered to idols I do not think requires any example; the cases are too numerous to require exemplification.

Food is also offered to sacred trees. On the Guinea Coast every village has its sacred tree, and in some places palm wine and grain are laid before it. The negroes of the Congo plant a sacred tree before their houses, and set jars of palm wine under it for the tree-spirit. (Frazer, *The Golden Bough*, i., p. 60.) In the Nyassa country (where, as Mr. Duff Macdonald tells us, the spirits of the dead are the only gods) the ritual ceremonies are conducted and offerings placed, not at the dead man's grave, but at the foot of the tree which grows before his house, or, if that be unsuitable, beneath some especially beautiful tree selected for the purpose. (Duff Macdonald, *Africana*, i., p. 60.) Here the true derivation of tree-worship seems to me most forcibly suggested. The sycamores of Egypt, once more, were regarded as the seats of "spirits," and were, therefore, habitually honoured with fruit offerings; water-jars were also placed beneath them, but these were charitably left for the use of the passer-by, just as to this day in Cairo the free distribution of water is an act of virtue. Those who used the

water gave thanks by a prayer to the deity in the tree. (Maspero, *Dawn of Civilisation*, p. 122.) The most famous of these sycamores, the Sycamore of the South, was regarded as the living body of Hathor upon earth. (Maspero, *ubi supra.*) The Tree of the Virgin, at Metairieh, now very ancient, is such a sycamore, christianised by the legend that Our Lady (the heiress-general of Hathor and Isis, as of Venus, Aphrodite, and Artemis) reposed under its branches after the flight into Egypt. It was probably the old sacred tree of Heliopolis—perhaps the tree of the foundation victim—and it has outlived two successive dominant religions into the days of Islam. Similar trees, says Mrs. Philpot, are worshipped at the present day by both Christian and Mussulman Fellahin. (Mrs. Philpot, *The Sacred Tree*, p. 11.) Many other examples are quoted in this useful little book, to which I owe several of the instances here given. On a mountain in Travancore there existed, till recently, an ancient tree, regarded by the natives as the residence of a powerful deity; sacrifices were offered to it. (Mrs. Philpot, p. 13.) The Siamese have such a veneration for the takhien-tree that they offer it cakes and rice before venturing to fell it. (Tylor, *Primitive Culture*, ii., p. 196.)

Food is also offered to sacred wells; libations of wine and offerings of cakes were thrown into the well of Abraham at Mamre. (Sozomen, *Hist. Ecc.*, ii., p. 4.) At Mecca, and at the Stygian Waters in the Syrian Desert, gifts were thrown into the holy source. (Robertson Smith, *Religion of the Semites*, p. 177.) At the sacred waters of Karwa, and elsewhere, on the other hand, offerings of bread, fruit, and other food, were not thrown in, but deposited beside the fountain. (Robertson Smith, p. 177.) Carver mentions that the Indians on the Mississippi made offerings to the river; and Franklin saw an Indian, whose wife had been afflicted with illness, propitiate the water-spirits by throwing a knife and some tobacco into the rapids. (Tylor, *Primitive Culture*, ii., p. 210.) In South Africa the dwellers by a stream will sacrifice a beast to it in time of drought, or, warned by illness that the river is angry, will cast into it a few handfuls of millet and the entrails of a slaughtered ox. Some of these cases are, no doubt, complicated with the idea of the manufactured water-god, already shadowed forth in *The Evolution of the Idea of God;* but I give them at this point for what they are worth, leaving the reader to unravel for himself the various ritual or mystical implications. Thus the Ostyaks sacrifice a reindeer to the River Ob; and the Buraets, at the mountain lake of Ikeougoun, offer gifts of milk, butter, and the fat of animals, which they burn on the altar. In Bohemia, during the half-pagan period, Duke Bretislav forbade libations and the sacrifice of victims at springs; and even to this day the Christian Bohemians go to pray on the bank of a river where a man has been drowned—an illuminating detail—and cast in an offering of a loaf of new bread and a pair of wax candles. (All these cases are from Tylor, ii., pp. 210, 213.) Horace's fountain of Bandusia will occur at once to every classical scholar. I could multiply instances, but these will suffice for our present purpose.

Again, we have seen that in almost all cases the corpse, when finally laid out as a mummy, is dressed in all the *clothes and ornaments* it possessed when living. Often, indeed, in the desire to do it honour, the whole wardrobe of the deceased is piled recklessly upon it. Thus the Indians of Panama, when a chief died, "adorned his body with gold, and wrapped it in the richest cloths." They then dried it by exposure to fire and hung it up in the new chief's house. (Andagoya, Markham's translation, p. 15.) In Vera Paz, when a "lord" died, his people "clothed the body with precious garments, which, according to his riches, he had been collecting since he began to grow old, that he might be buried in them." They also "put jewels

on the corpse, and covered it with many mantles." (Ximenes, p. 211.) The Mexicans (who, however, had just reached the stage of cremation) used to "clothe the corpse in fifteen or more very fine habits of cotton of various colours." (Clavigero, book vi., chap. 39.) Among the Tepeacans the cazique's corpse "was shrouded in several mantles." (Herrera, iii., p. 264.) Even among the lowest races these traits have already appeared as far as their opportunities permitted; for the Fuegians "wrap the body in skins" (Fitzroy, ii., p. 181), the only clothing they know; the Tahitians, "after embalming the body, clothed it" (Ellis, *Polynesian Researches*, vol. i.. p. 159), and in wild New Guinea "the desiccated body is well wrapped up and fixed in a lofty tree." (Chalmers and Gill, *Work and Adventure in New Guinea*, p. 308.) I need not recall at higher stages the magnificent cloaks of Peruvian mummies, on which Prescott dwells, or the wrappings and scarabs of the Egyptian dead in their artificial caverns.

Similarly, we shall note as we proceed the silken robes and cloth of gold tissue in which Christian martyrs and modern European kings are often alike found to be swathed. I will ask the reader to watch for these on his own account in subsequent chapters. It is tedious always to call attention afresh to such significant details.

Now, just as food is offered to the other sacred objects which are substitutes for the corpse, so are these objects clothed and wrapped up with the same care and particularity as the mummied body. The Caribs, to cite an intermediate case, took a bone of a dead friend from the grave, wrapped it up in cotton, and inquired of it for oracles. (Note that last important detail.) Sacred stones, once more, are similarly clothed. In the travelling sledge-ark of the Samoyedes were two holy stones, both smeared with sacrificial blood, and "both dressed in green robes with red lappets." (Tylor, *Primitive Culture*, ii., p. 163.) The great god of Bowditch Island was a stone "carefully wrapped up in fine mats," which were offered so often that it was "busked up to a prodigious size." As late as 1851 the islanders of Inniskea, off the coast of Mayo, had a venerated stone "resembling in appearance a thick roll of homespun flannel," which they brought out and worshipped at intervals, and to which they prayed during storms for a wreck to be cast on their coast. They "dedicate a dress to it whenever its aid is sought; this is sown on by an old woman, its priestess." (Earl of Roden, *Progress of the Reformation in Ireland*, p. 51.) It was named Neevongi, and kept in the house of a man named Monigan; I will refer to it hereafter as "Monigan's idol."

Similar facts exist as to logs or stakes, which we saw, in *The Evolution of the Idea of God*, to be in all probability originally grave-marks. The Tahitians worshipped "rough unpolished logs of the casuarina tree, wrapped in numerous folds of sacred cloth." (Ellis, *Polynesian Researches*, ii., p. 203.) Elsewhere these holy stakes are described as "shapeless logs of wood, covered with finely braided and curiously wrought cinet of cocoanut fibres, and ornamented with red feathers." (Ellis, *Polynesia*, i., p. 211.) Mr. Chalmers speaks in New Guinea of "a banana stump, dressed to represent the dead, with all his dress and ornaments on" (Chalmers, *Pioneering in New Guinea*, p. 240); it stood beside the grave. So, in Judæa, the sacred *ashera* or shaped log that did duty as the mark of a god was clothed, for we learn from a famous passage in Second Kings that the women "wove hangings for the *ashera*." (2 Kings xxiii. 7.) Similarly the sacred *erica* at Byblus, identified with Osiris in later times, "was a mere dead stump" (Robertson Smith, *Religion of the Semites*, p. 191), for it was cut down by Isis and presented to the Byblians wrapped in a linen cloth and anointed with myrrh like a corpse. (Plutarch, *De Iside et Osiride*, pp. 15, 16.) "It therefore represents the dead god,"

says Professor Robertson Smith, with more truth than he knew.

That idols, which are the sacred stone or the sacred stake carved into human shape, at least in the upper portion of the body, are similarly wrapped in garments, hardly needs illustration. I will only mention here as illustrative examples that the Tahitians clothed their shaped idols in just the same robes and feathers as their rude logs. (Ellis, *locc. citt.*) The New Zealanders "set up memorial idols of deceased persons near the burial-place, talking to them affectionately as if still alive, and casting garments to them when they passed by." (Tylor, *Primitive Culture*, ii., p. 174.) Castrèn tells us that the gods of the Ostyaks are sometimes rude logs, clad in scarlet cloth and costly furs, and sometimes shaped idols (that is to say, logs to which a human form has been given), similarly clad in the richest native dresses. To these idols are made rich offerings of clothes, food, pipes, and kettles. (Castrèn, *Finn. Myth.*, p. 193.) The Teng-ger tribes of Java, says Mr. Hartland, dress up a mannikin about a foot and a half high, made of leaves, in the clothes of the dead man, and ornament it with flowers. "The practice of making images of the dead and conjuring the spirit into them," he adds, "is not an uncommon one." (Hartland, *Perseus*, ii., p. 310; Featherman, *Papuo-Mel.*, p. 399.) Cases like the offering of the robe by the Trojans to Athene will be familiar to everyone. The Bambino of the church of Ara Cœli at Rome is tightly swathed in a rich gilt garment, thick with jewels. In the sequel other instances will occur of such offerings of clothing to idols of wood or marble.

It might seem absurd to suppose that we could adduce examples where the sacred tree and the sacred well (whose connection with graves and burials was already suggested in *The Evolution of the Idea of God*) are clothed after the fashion of the corpse and the mummy. Yet such cases occur abundantly. The sacred date-palm at Nejran in Arabia was adored at an annual feast (a very funereal trait) when it was "all hung with fine clothes and women's ornaments" (Robertson Smith, *Religion of the Semites*, p. 185)—presumably because it represented a goddess; that is to say, a dead woman. To another tree the people of Mecca resorted annually, and hung upon it garments, weapons, ostrich-eggs, and other gifts, which are precisely the things I myself have seen them hang round the graves and bodies of Mahommedan saints in Algeria. In later dwarfed developments of this cult mere rags or clouts are used instead of entire articles of clothing. This is the case with an ancient tamarisk, known as "the Mother of Clouts," near Suez. In the Mahommedan districts of North Africa, such trees are known as Marabout trees, and are covered with rags. (Andrée, i., *Ethnog. Par.*, pp. 60 and 61.) Mr. Sidney Hartland, in his admirable chapter on the subject in *The Legend of Perseus*, collects a number of apposite instances, a few of which I venture to borrow. Sacred trees, covered with clouts, are to be seen everywhere in Corea. Darwin found a great tree in South America, not far from the town of Patagones, worshipped as a god, under the name of Walleechu (therefore presumably growing from a grave), and covered with pieces of cloth, cigars, bread, meat, and ornaments. (Darwin, *Voyage of the Beagle*, p. 68.) In the Baltic provinces of Russia a sacred aspen stands near the village of Roiks, and up to 1845 was hung with wreaths and many-coloured ribbons. Near Pallifer stood two holy elms, hung and bound with ribbons, and on an old lime-tree near the chapel of Keppo passers-by hang fragments torn from their own clothing. (Hartland, *Legend of Perseus*, ii., p. 191, where references are given to the original authorities.)

In order to understand the true meaning of all these cases, we must correlate them with other facts not quite of the same order. Thus, the similar

sacred lime-tree of Evessen actually stands on a prehistoric barrow, in which a golden coffin is said to have been buried—in other words, on the tumulus of an ancient chief. (Grabowsky, *Globus*, lxvii., p. 1.) While Arabs and Africans tear pieces off their clothes to hang on the sacred trees, in other cases they do the same in the Egyptian desert to "an old tree-trunk or a stake propped upright with stones" (Hartland, *Legend of Perseus*, ii., p. 198)—an obvious cairn or grave mark—both of which are "adorned with shreds and tatters of clothing, for every pilgrim as he passes adds a rag." So, too, the Turks tear off strips of their own clothes, and tie them to the railing surrounding a saint's tomb. (Featherman, *Turanians*, p. 398.) The graves of the Hottentot ancestor-gods are marked by cairns, on which every passer-by casts a stone and a piece of his clothing. (Hahn, pp. 45–69.) The Cornish and Bretons tie similar rags on sacred bushes. The exact equivalence of these various acts, paid primarily to the corpse, then to the tomb or stone, finally to the tree or stump which grows beside it, is very striking; I have seen in the *koubbas*, or shrines of historical Algerian saints, every object which is mentioned as being offered to trees throughout the Mohammedan area.

Last of all, we come to the extreme case of sacred wells or springs. That these should be clothed seems at first an almost incredible transference of feeling; but if we remember the proof, provisionally given in *The Evolution of the Idea of God*, of their connection with tombs, and of the annual renewal of their divine life by immolation of a divine-human victim, even this curious identification and extension of cult will become explicable. Of its reality, at least, there can be no doubt. The pilgrims at the shrine of Aphaca, by the source of the holy river Adonis, "cast into the pool jewels of gold and silver, webs of linen and byssus, and other precious stuffs." (Robertson Smith, *Religion of the Semites*, p. 177.) At all the sacred wells of Wales and Ireland, clothing, now generally reduced to rags and clouts, is cast into the water, or still oftener hung upon the neighbouring trees. Here, again, Mr. Hartland has collected a number of apposite instances. The articles thrown into the well are generally pins; but in the significant case of a well at Finmagh in Roscommon a "Druid" was said to be buried in the spring, and the offerings were pieces of gold or silver. (So they were at Mamre and at Aphaca.) Professor Haddon and Dr. Browne found in the Arran Isles, off Galway, rags attached to the sprays of bramble or ivy at most of the holy wells. (Hartland, *Perseus*, ii., p. 178.) I do not deny that all these instances are complicated by the question of transference of evil, in connection with which, indeed, Mr. Hartland cites them; but their direct value to our argument is not affected by that secondary implication. Professor Rhys speaks of a stunted tree near the sacred well of Cae Moch as "simply covered with rags"; and elsewhere he has seen the rags laid underneath stones in the water or thrust into holes in the walls. I admit they were put there by persons who desired to get rid of illnesses, or even of warts; but in their origin, I think, they were the offerings of votaries who came to pray at the shrines of long-forgotten gods—that is to say, of ancient dead bodies.

An instance of this equivalence is given us half unconsciously by Mr. Hartland himself; for he mentions as a case of the offering of hair (to be considered shortly) the worship of the Kirghiz Tartars, who "have shrines at the graves of sundry holy men, to whom they offer prayer and sacrifice, and fasten not only ribbons and strips of cloth, but also hair, to the bushes, reeds, and tall grasses growing around." (Hartland, *Legend of Perseus*, ii., p. 220, quoting Featherman, *Turanians*, p. 269.)

I think, then, we are provisionally justified in supposing that the offering of clothes to sacred objects takes its rise

with the habit of offering them to the corpse or mummy; and of this practical identity of stone or tree with corpse or grave we shall find many more examples as we continue our inquiry.

The *anointment* of the corpse or mummy, and its preparation with myrrh and spices, is a common feature of primitive and developed corpse-worship. It is also a derivative feature of later cults, in which sacred stones, sacred logs, sacred trees, and other objects, have partially superseded, and even obscured, the cult of the dead body.

I will mention a few characteristic instances only. Sacred stones are everywhere anointed. Pausanias describes a rude stone monument as having oil poured upon it daily and being wrapped in wool at every festival. (*Pausanias*, x., pp. 24, 6.) Jacob anointed the sacred stone at Bethel; and Robertson Smith believes the custom of so anointing it survived at Bethel in later ages. The Norwegians, up to the last century, used to keep domestic sacred stones (like Monigan's idol), which they smeared with butter and steeped in ale. (Tylor, *Primitive Culture*, ii., p. 167.) At Medina, in the last days of heathendom, an Arab writer notes that a man washed his domestic idol, which had been defiled by Moslems, and then anointed it. (*Ibn Hisham*, p. 203.) The same writer tells us that in swearing a solemn oath the parties dip their hands in unguent, and then wipe them on the Caaba. The Society Islanders kept rude logs or bits of basalt, clothed in native cloth and anointed with oil, which they regarded as the seat of the spirits. (Ellis, *Pol. Res.*, i., p. 337.) Trees were also anointed; the sacred *erica* at Byblus, we saw, was smeared with myrrh "like a corpse." Even sacred wells receive like treatment, strange as it may seem; for at the annual fair and feast of the tree and well of Abraham, at Mamre, visitors not only offered sacrifices beside the sacred terebinth, but cast into the well libations of wine, cakes, coins, myrrh, and incense. (Sozoman, *Hist. Ecc.*, ii., p. 4.) Other examples will be brought forward at later stages.

Closely connected with anointing, and also with the offerings of food, is the practice of painting sacred objects *red*. This is, undoubtedly, as Mr. Herbert Spencer surmises, a survival from the habit of offering blood to the mouth of the dead chief. Thus, the Tanese, in the New Hebrides, wrap the body of the dead in a piece of thick native cloth—dress it—and then paint the face red. (Turner, *Polynesia*, p. 92.) Similarly, the Andaman Islanders paint the skulls of their friends red, and wear them round their necks. (St. John, *Trans. Eth. Soc.*, New Series, v., p. 43.) In America the Dakotas would pick up a round boulder, paint it red, address it as grandfather—*i.e.*, identify it with the dwelling-place of an ancestral spirit—and then pray to it for succour. (Schoolcraft, *Indian Tribes*, ii., p. 196; iii., p. 229.) The faces of Hindoo idols are habitually painted red; so were the features of the Corinthian Dionysi. "Mr. Hislop remarks that in every part of Southern India four or five stones may often be seen in the ryot's field, placed in a row, and daubed with red paint.....In the Indian groups it is a usual practice to daub each stone with red paint, forming, as it were, a great blood-spot where the face would be if it were a shaped idol." (Tylor, *Primitive Culture*, ii., p. 164.) The Priapus-like images of ancient Italy were similarly daubed with minium. Readers of *The Evolution of the Idea of God* will recall the bloodstained mouths of the Siberian grave-stake idols. Sacred trees in India are often daubed with red on the trunk at about the height from the ground of a human face.

When a man's body is exposed as a dried mummy, or is taken to be buried, it will be noted, in many cases, that his wives, if permitted to survive him, or his friends and kinsmen where the wives are slaughtered, cut off or tear their *hair*, and lay it upon the corpse, or fling it into the open grave. Sometimes they even cut off a finger, or some other member, and similarly offer it. In this case Mr.

Sidney Hartland is probably right in supposing that the object in view is to effect a close, sympathetic, magical union between the living and the dead—between the new god, or spirit, and his future worshippers. It binds the two together, and gives the worshipper a share, as it were, in the god's divinity. It also acts as a proof of fidelity; for if you have a fragment of a man's body, such as hair or nails, you can use it to work witchcraft against him; it gives you a hold upon him. Thus, in the case of a corpse, the cutting off the hair has an obvious meaning—you put yourself in the hands of your god. In later instances it becomes a mere ritual element, the purpose of which is probably unknown to the worshipper.

A few instances may be cited. The Australian natives, at a burial feast, tear out part of their beards and throw them on the corpse. Sioux mourners snip locks of their hair and fling them on the dead body. (*Report of the Bureau of Ethnography*, i., p. 159.) In many instances widows are required to sacrifice their hair to their dead husbands. Conversely, the natives of Tana, in the New Hebrides, wear locks of the hair of dead relations suspended round their necks—a form of communion analogous to that of wearing the skull or small bones, as is done by the Andamanese and others. (Cook, *Voyage*, ii., p. 68.)

Mr. Hartland has collected numerous instances of parallel uses of hair in connection with other sacred objects. I shall avail myself of some of them. Here is a good intermediate usage. Mr. Ainsworth relates that he saw in an Arab cemetery on the Euphrates tresses of hair attached to sticks over the graves of women. (Ainsworth, i., p. 260). When King Ummeda, of Bundi, in India, abdicated, an image was made of him as if it had been his corpse, and this effigy was burnt on a pyre; his successor cut off his own hair and whiskers, and offered them to the late king's imaginary *manes*. (Crooke, p. 231.) About Lake Nyassa, in East Central Africa, at a funeral the heads of the deceased man's relatives are shaved; the hair is buried on the site of his house, which sometimes remains as his temple if he is buried in it, but otherwise is taken down. Two or three months later they are shaved again, and the hair is buried at the grave or in the bush. (Macdonald, *Africana*, i., pp. 109, 111.) Cases occur in Europe. Mourning women at Lecce, in Apulia, pluck out their hair and strew it on the corpse. (Andree, *Ethnog. Par.*, i., p. 150.)

In later religions hair is offered to the god, often a great and evolved god. In other words, it is offered to the image. In Greece, as is well known, the hair was frequently cut at the first indication of manhood and dedicated on the altar. Sometimes it was also offered in redemption of a special vow; Pausanias mentions a statue of Hygeia almost hidden by the locks cut off by women who had recovered from illnesses. (Pausanias, ii., p. 11.) At the conclusion of the mysteries of Cybele the votaries dedicated locks of their hair to the temple. And the meaning of this rite is all the clearer when we remember that even in Greece, when a loved one died, the survivor frequently placed a lock of his hair in the corpse's hand, as Achilles did with Patroclus.

But sacred stones, sacred trees, and even sacred wells, receive the self-same mark of affection and confidence. The Bacchic votaries, when their mysteries were over, dedicated their locks to sacred pine-trees; the reason for the difference between this rite and the rite of Cybele is obvious when we remember that Cybele was a sacred stone, while Dionysis was an annual corn and vine victim. Beneath the sacred olive which grew upon the tumulus of Hyperoche and Laodice (note that point), at the entrance of the sanctuary of Artemis at Delos, ephebi laid the first-fruits of their beards, and bridal pairs their hair. At Megara, on the grave of the virgin Iphinoe, brides cut off their hair before the wedding ceremony. The Roman

vestals consecrated their locks to Juno Lucina, and hung them on her sacred tree. (For all these classical instances, which, with many others, I borrow from Mr. Hartland, see Bötticher, p. 92.) In our own day, at the sacred well of Tubber Quan, near Carrick-on-Suir (Ireland), dedicated to Saints Quan and Brogawn, pilgrims go thrice round a tree on their bare knees (a sun-wise charm, of the sort with which William Simpson made us familiar in *The Buddhist Praying Wheel*), and then cut off locks of their hair, which they tie on to the branches. (Pettigrew, p.40.) At the junction of the Ganges and the Jumna, and at other Hindoo places of pilgrimage, women cause their hair to be cut by the priest with golden shears (a solar point again), and then thrown with certain ceremonies into the river. (Sir Monier Williams, *Religious Life and Thought in India*, p. 375.) So, in Turkey, Greek Christians cut three tiny locks from a baby's head at christening, if any can be found, and throw them into the font in the name of the Trinity. (Miss Garnett, *Women of Turkey*, i., p. 73.)

I need hardly call attention to the fact that in Catholic Christendom the men specially dedicated to the service of God—the priests, monks, and friars—and also the brides of Christ, the nuns, either wear the tonsure or else cut off a part of or all their hair.

"These practices," says Mr. Hartland, "all explain themselves in the same way. The dedication of the hair at a temple, or the placing of it in the hand of a corpse, or on the grave, effects union with the divinity, or with the departed friend. The tress is more than a symbol of devotion; it is more than a gage of fidelity. The holder of the head whence it has been taken and the holder of the severed lock are in actual, though invisible, union. This accounts for the efficacy of the practice in healing disease; this accounts for its value as a guard of fidelity to an oath." I heartily agree with this explanation; I only regret that Mr. Hartland has not seen how the rite has its origin in funeral ceremonies.

Thus, in all these cases, we see reason to believe that a piece of ritual observance which persists to the end in the most advanced religions took its rise in the earliest savage corpse-worship; that it is explicable, in the first instance, by corpse-worship alone; and that it survives through insensible transferences of feeling into later cults only because there was never a marked point of time when men definitely left off worshipping the dead man and consciously took to worshipping some more ethereal ideal. The habits and concepts formed at the earliest savage level persist into the most civilised and sublimated religions.

IMMORTALITY AND RESURRECTION

THEY are not at all the same, but few people are aware of it. Nothing is more common than to find, even among educated orthodox thinkers, a complete confusion of idea between the two totally distinct and almost contradictory notions of the resurrection of the body and the immortality of the soul. I find this confusion so widespread and so injurious to the interests of the truth that I propose to combat it here by examining the roots of these two contrary forms of superstition, not, of course, from the point of view of religion—orthodox or otherwise—but from the point of view of sociology and the history of institutions. Here are a couple of unlike and irreconcilable beliefs as to the supposed future of man after death. How did each arise? which preceded the other? why was one of them preferred by ancient philosophy? why has the other been adopted as a component dogma of modern Christianity?

And as it is often best to let the reader know beforehand, for clearness sake, the general trend of the discourse, the final goal towards which the argument is tending, I will begin by saying without further ado that the conclusions I wish to establish are these: The earliest form of the superstitious notion of a continuance of life after death is the belief in the resurrection of the body; a later form is the belief in the immortality of the soul. The idea of resurrection arose from, and is closely bound up with, the practice of burial, the earliest and simplest mode of disposing of the remains of the dead. The idea of immortality arose from, and is closely bound up with, the practice of burning—a later and better innovation, invented at a higher stage of human culture. During the early historical period all the most advanced and cultivated nations burnt their dead, and, in consequence, accepted the more ideal and refined notion of immortality. But modern European nations bury their dead, and, in consequence, accept, nominally at least, the cruder and grosser notion of resurrection. Nominally, I say, because, in spite of creeds and formularies, the influence of Plato and other ancient thinkers, as well as of surviving ancestral ideas, has made most educated Europeans believe really in immortality, even when they imagine themselves to be believing in resurrection. Nevertheless, the belief in resurrection is the avowed and authoritative belief of the Christian world, which thus proclaims itself as on a lower level in this respect than the civilised peoples of antiquity. And the reason why European nations after Constantine thus went back from the higher practice of cremation to the lower practice of burial, and from the higher idea of immortality to the lower idea of resurrection, is because they then adopted the Christian religion, an offshoot and sect of Judaism. In other words, a religion of a lower type, which surged up from the depths, taking its rise among a race in an inferior stage of culture, and carrying up with it into higher races all sorts of ideas belonging to the barbaric grade of humanity among which it originated.

We have thus, in our modern world, the singular phenomenon of races at a high state of culture, who have, nevertheless, received from races at a lower stage certain ideas and practices long since outgrown by their own ancestors—races who have gone back from the wholesome practice of cremation to the barbarous one of burial; from the beautiful and ideal Hellenic deities to the "ghastly glories of saints, dead limbs of gibbeted gods," which, as we shall see hereafter, belong to a very low and almost savage level; from the spiritual and sublimated belief in immortality to

the coarse and material belief in resurrection of the body. I say nothing here about the morality of Christianity, which may be as high and pure as its paid apologists assert, or may be otherwise; but, so far as regards the level of its philosophical ideas, Christianity must be considered by the impartial student of human progress as a retrogressive movement from Hellenism towards barbarism.

The earliest way of disposing of the bodies of the dead is certainly by burial. In point of time burial goes back with certainty to the neolithic age, and with some probability to the palæolithic. Several interments in caves have been attributed by competent archæologists to the earlier of these two periods, the first for which we have any sure warranty of man's existence on earth. But, as I do not desire to introduce controversial matter of any sort into this simple exposition, I will waive the evidence for burial in the palæolithic age as doubtful, and will merely mention that in the Mentone caves, according to Mr. Arthur Evans, a most competent authority, we have a case of true burial, accompanied by neolithic remains, of a grade of culture earlier and simpler than any known to us elsewhere. In other words, from the very earliest beginning of the neolithic age men buried their dead; and they continued to bury them, in caves or tumuli, down to the end of neolithic culture. They buried them in the Long Barrows in England; they buried them in the Ohio mounds; they buried them in the eucalyptus forests of New Zealand; they buried them in the heart of darkest Africa. I know of no case of burning or any means of disposal of the dead otherwise than by burial or its equivalent, mummification, among people in the stone age of culture. It is only when bronze and other metals are introduced that races advance to the stage of cremation.

The wide diffusal of burial over the globe is also a strong argument for its primitive origin. In all parts of the world men now bury their dead, or did once bury them. From the tombs of the kings at Pekin to the pyramids of Memphis; from the Peruvian caves to the Samoyede graveyards, we find most early peoples, most savage peoples, most primitive peoples, once or still engaged in burying. Burial is the common and universal mode; burning, exposure, throwing into a sacred river, and so forth, are sporadic and exceptional, and in many cases, as among the Hindoos and Parsees, are demonstrably of late origin, and connected with certain relatively modern refinements of religion. Burying is the true Catholic Church of humanity.

Once more, in many or most cases, we have positive evidence that, where a race now burns its dead, it used once to bury them. Burial preceded burning in pre-heroic Greece, as it also did in Etruria, and in early Latium. The people of the Long Barrows, in Western Europe generally, buried their dead; the people of the Round Barrows, who succeeded them, and who possessed a far higher grade of culture, almost always cremated. It has been assumed that burning is primordial in India; but Mr. William Simpson, of the *Illustrated London News*, called my attention to the fact that the Vedas speak with great clearness of burial as the usual mode of disposing of the corpse, and even allude to the tumulus, the circle of stones around it, and the sacred *temenos* which they inclose. According to Rajendralala Mitra, whose high authority on the subject is universally acknowledged, burial was the rule in India till about the thirteenth or fourteenth century before the Christian era; then came in cremation, with burial of the ashes, and this continued till about the time of Christ, when burial was dispensed with, and the ashes were thrown into some sacred river. I think, therefore, until some more positive evidence is adduced on the other side, we may rest content with our general conclusion that burial is the oldest, most universal, and most savage mode of disposing of the remains

of the dead among humanity. It probably took its rise in the tertiary period, while mankind was still one homogeneous species; and it has been dispersed accordingly over the whole world, even to the most remote oceanic islands.

What is the origin of this barbaric and disgusting custom, so repugnant to all the more delicate sentiments of human nature? I think Mr. Frazer is right in attributing it to the terror felt by the living for the ghosts (or, rather, the corpses) of the dead, and the fear that they may return to plague or alarm their surviving fellow-tribesmen.

In his admirable paper on "Certain Burial Customs as Illustrative of the Primitive Theory of the Soul," Mr. Frazer points out that early men pay great attention to the dead, not so much from affection as from selfish terror. Ghosts of the dead haunt the earth everywhere unless artificially confined to bounds, and make themselves exceedingly disagreeable to their surviving relatives. To prevent this, simple primitive philosophy has hit upon many devices. The most universal is to bury the dead—that is to say, to put them in a deep dug hole, and to cover them with a mighty mound of earth, which has now sadly degenerated in civilised countries into a mere formal heap, but which had originally the size and dignity of a tumulus. The object of piling up this great heap of earth was to confine the ghost (or corpse), who could not easily move so large a superincumbent mass of matter. In point of fact, men buried their dead in order to get well rid of them, and to effectually prevent their return to light to disturb the survivors.

For the same reason heavy stones were often piled on the top of the dead. In one form these became at last the cairn; and, as the ghost of murderers and their victims tend to be especially restless, everybody who passes their graves in Arabia, Germany, and Spain is bound to add a stone to the growing pile in order to confine them. In another form, that of the single big stone rolled just on top of the body to keep it down by its mass, the makeweight, has developed into the modern tombstone. In our own times, indeed, the tombstone has grown into a mere posthumous politeness, and is generally made to do duty as a record of the name and incomparable virtues of the deceased (concerning whom, *nil nisi bonum*); but in origin it was nothing more than the big, heavy boulder, meant to confine the ghost, and was anything but honorific in intention and function.

Again, certain nations go further still in their endeavours to keep the ghost (or corpse) from roaming. You may divert a river from its course, as Mr. Frazer notes, bury your dead man securely in its bed, and then allow the stream to return to its channel. It was thus that Alaric was kept in his grave from further plaguing humanity; and thus Captain Cameron found a tribe of Central Africans compelled their deceased chiefs to "cease from troubling." Sometimes, again, the grave is enclosed by a fence too high for the dead man to clear even with a running jump; and sometimes the survivors take the prudent precaution of nailing the body securely to the coffin, or of tying their friend's feet, or of breaking his spine, or even—but this is an extreme case—of hacking him in pieces. In Christian England the poor wretch whom misery had driven to suicide was prevented from roaming about to the discomfort of the lieges by being buried with a stake driven barbarously through him. The Australians, in like manner, used to cut off the thumb of a slain enemy that he might be unable to draw the bow; and the Greeks were wont to hack off the extremities of their victims in order to incapacitate them for further fighting. These cases will be seen to be very luminiferous when we come to examine the origin and meaning of cremation.

Burial then, I take it, is simply by origin a means adopted by the living to protect themselves against the vagrant tendencies of the dead. For some

occult and inexplicable reason, the vast majority of men in all ages have been foolishly afraid of meeting with the spirits of the departed. Of course, if a ghost were really to appear to one, the phenomenon would be most interesting to examine and report upon; but mankind generally have been otherwise minded. Their great desire has been, not to see, but to avoid seeing, these singular visitants; and for that purpose they invented, first of all, burial, and afterwards cremation.

Now, how did this odd and baseless idea of a surviving ghost or spirit after death arise at all? Clearly, it is a result of the crude and unscientific nature of early psychology. Unaware of the true relation of subject and object, and of the true theory of cerebral action, primitive men were of opinion that each of us possesses inside himself, in addition to the outer and visible man, another and smaller man, called the *soul* or *spirit*. I will not attempt here to decide at full by what reasoning this curious blunder in psychology first arose. The subject has already been fully treated by Mr. Herbert Spencer, and it is, besides, somewhat too large for such cursory examination as would be here afforded it. It must suffice to say that a number of facts, such as the existence of the breath, the phenomena of dreams, the peculiar conditions of fainting, sleep, epilepsy, and catalepsy, and other similar observations, suggested inevitably to the minds of early men the quaint notion that the human being was of a dual nature, consisting of two parts—one material and physical, the other immaterial and "spiritual"; that is to say, partaking of the character of breath or wind. This latter or inner man is supposed to leave the body during sleep or the fainting condition, and to return to it again with waking or the revival of consciousness. It is also popularly conceived, even among educated and civilised people, to depart from the body at the moment of death, and to lead thenceforth a somewhat separate existence as a ghost or spirit. This primitive and long-lasting misconception, the parent of all the delusions known as religions, is due to ignorance of the physiological facts that the act of breathing is merely a function of the lungs, and the act of thinking merely a function of the brain and nervous system. Misapprehension of these points has led to the curious notion that the ghost, spirit, breath, or soul can exist apart from the body to which it belongs, and can even survive it.

The common modern conception of the ghost is certainly that of an immaterial or shadowy form, which can be seen but not touched, and which preserves an outer semblance of the human figure. But that idea itself, which has been imported into all our descriptions and reasonings about the ghost-beliefs of primitive man, is, I incline to think, very far from primitive, and has been largely influenced by quite late conceptions derived from the cremational rather than the burial level of religious philosophy. In other words, though, in accordance with the universal usage and Mr. Frazer's precedent, I have used the word "ghost" above in referring to these superstitious terrors of early man, I believe it is far less the spirit than the actual corpse itself that early men were really afraid of. It is the corpse that may come back and do harm to survivors. It is the corpse that must be kept down by physical means, that must be covered with earth, pressed flat beneath a big and ponderous stone, deprived of its thumbs, its hands, its eyes, its members. True, I believe the savage also thinks of the ghost or double as returning to earth; but his psychology, I fancy, is not so definite as to distinguish very accurately between corpse and spirit. The accurate differentiation of the two belongs rather, it seems to me, to the post-cremational and more spiritual philosophy than to the primary and inhumational. Anybody who looks at the evidence collected by Mr. Frazer will see for himself that precautions are taken rather against the return of the

actual physical body than against the return of the ghost or spirit. Or, perhaps, to be more precise, the two are hardly thought of at this early stage in separation or antithesis.

If we look at the means taken to preserve the body after death among primitive peoples, this truth of the corpse being itself immortal becomes clearer and clearer. We are still, in fact, at a level where ghost and dead man are insufficiently differentiated. Many savage races seem not to be aware when a man is really and indubitably dead. They keep his body for a long time in the hut among the living, and expect it to revive sooner or later. Mr. Herbert Spencer has collected ample examples of this curious practice from many savage races. Mummification, as carried on in Egypt, Peru, and sundry other countries, is the developed form of this early practice. Burial in stone chambers is also a form of it. In all these cases it is believed that the dead body continues to live in the grave the same sort of life that it led above ground; and for this purpose it is provided with weapons, implements, utensils, food, vessels, and all the necessaries of life for its new mansion. Continued sentient existence of the body after death is the keynote of the earliest level of psychical philosophy.

But, side by side with this naïve belief in the continued existence of the body after death, which is peculiar to the inhumational stage of evolution, goes another and apparently irreconcilable belief in a future resurrection. Strictly speaking, of course, if the body is still alive there is no need for any such special revivification. But religious thought, as we all know, seldom prides itself upon the temporal virtues of logic or consistency; and the savage in particular is not in the least staggered at being asked to conceive of one and the same subject in two opposite and contradictory manners. He does not bring the two incongruities into thought together; he thinks them alternately, sometimes one, sometimes the other. Even Christian systematists are quite accustomed to combine the incongruous beliefs in a future resurrection and in the continued existence of the soul after death, by supposing that the soul remains meanwhile in some nondescript limbo, apart from its body—some uncertain Sheol, some hades or purgatory or "place of departed spirits." The savage is scarcely likely to be more exacting in this matter than our doctors of divinity.

It is the common belief of the inhumational stage, then, that there will be at some time or other a "general resurrection." No doubt this general resurrection has been slowly developed out of the belief in and expectation of many partial resurrections. It is understood that each individual corpse will, or may, resurge at some time; therefore it is believed that all corpses together will resurge at a single particular moment. So long as burial persists, the belief in the resurrection persists beside it, and forms the main feature in the current conception of the future life among the people who practise it.

How, then, do we progress from this first inhumational stage to the second stage of the practice of burning, with its correlated dogma of the immortality of the soul? In this way, as it seems to me. Besides keeping down the ghost (or corpse) with clods and stones, it was usual in many cases to adopt other still stronger persuasives and dissuasives in the same direction. Sometimes the persuasives were of the gentlest type; for example, the dead man was often politely requested and adjured to remain quiet in the grave and to give no trouble. But sometimes they were less bland; the corpse was often pelted with sticks, stones, and hot coals, in order to show him that his visits at home would not in future be appreciated. The ordinary stake and mutilation treatment goes, it is clear, upon the same principle; if the man has no feet or legs of his own, he cannot very well walk back again. But further developments of the like crude idea are to cut off the head, to

tear out the heart, to hack the body in pieces, to pour boiling water and vinegar over the dangerous place where the corpse lies buried. Now burning, I take it, belonged originally to the same category of strong measures against refractory ghosts or corpses; and this is the more probable owing to the fact that it is mentioned by Mr. Frazer among the remedies recommended for use in the extreme case of vampires. Its original object was, no doubt, to prevent the corpse from returning in any way to the homes of the living.

Once any people adopted burning as a regular custom, however, the chances are that, *ceteris paribus*, it would continue and spread. For the practice of cremation is so much more wholesome and sanitary than the practice of burial that it would give a double advantage in the struggle for existence to any race that adopted it in peace and in war. Hence it is quite natural that, when at a certain grade of culture, certain races happened to light upon it in this superstitious way, those races would be likely to thrive and to take the lead in culture as long as no adverse circumstances counteracted the advantage.

But the superstitions and the false psychology which gave rise at first to the grotesque notion of a life after death would not, of course, disappear with the introduction of burning. The primitive cremationists may have hoped, by reducing to ashes the bodies of their dead, to prevent the recurrence of the corpse to the presence of the living; but they could not prevent the recurrence of the ghost in the dreams of the survivors; they could not prevent the wind that sighed about the dead man's grave, the bats that flitted, the vague noises that terrified, the abiding sense of the corpse's presence. All the factors that go to make up the ghost or the *revenant* (to use a safe word less liable to misinterpretation) still remained as active as ever. Hence, I believe, with the introduction of cremation the conception of the ghost merely suffered an airy change. He grew more shadowy, more immaterial, more light, more spiritual. In one word, he became, strictly speaking, a ghost as we now understand the word, not a returning dead man. This conception of the ghost as essentially a shade or shadow belongs peculiarly, it seems to me, to the cremating peoples. I can answer for it that among negroes, for example, the "duppy" is conceived as quite a material object. It is classical literature, the literature of the cremating Greeks and Romans, that has familiarised us most with the idea of the ghost as shadowy and intangible. Burying races have more solid doubles. When Peter escaped from prison in Jerusalem, the assembled brethren were of opinion that it must be "his angel." The white woman who lived for years in a native Australian tribe was always spoken of by her hosts as a ghost. In one word, at a low stage of culture the *revenant* is conceived of as material and earthly; at a higher stage he is conceived of as immaterial and shadowy.

Now, when people take to burning their dead, it is clear they will no longer be able to believe in the resurrection of the body. Indeed, if I am right in the theory here set forth, it is just in order to prevent the resurrection of the body at inconvenient moments that they take to burning. To be sure, civilised nations, with their developed power of believing in miracles, are capable of supposing, not only that the sea will yield up its dead, but also that burnt, mangled, or dispersed bodies will be collected from all parts to be put together again at the resurrection. This, however, is not the naïve belief of simple and natural men. To them, when you have burnt a body you have utterly destroyed it here and hereafter; and we know that mutilation and burning were employed for this very purpose in the case of vampires and other corpses whose total suppression was desirable. Sepoys were blown from the guns in the Indian mutiny for the express reason that, according to the Hindoo belief, that method of disposing

of them destroyed not only the body, but the soul as well—got rid of them entirely. The ordinary human idea is that when you burn a body you simply annihilate it; and on that very account early Christians preferred burial to cremation, because they thought they stood thereby a better chance at the resurrection. It is true they allowed that the divine omnipotence could make new bodies for the martyrs who were burnt; but for themselves they seem to have preferred, on the average, to go on afresh upon their old familiar ones.

Naturally, therefore, among cremating peoples, the doctrine of the resurrection of the body tended to go out, and what replaced it was the doctrine of the immortality of the soul. You may burn the body, but the spirit still survives; and its survival gives origin to a new philosophy of ghosts and *revenants*, a new idea of the inner nature of ghosthood. Gradually the spirit gets to be conceived as a diviner essence, entangled and imprisoned, as it were, in the meshes of the flesh, and only to be set free by means of fire, which thus becomes envisaged at last as friendly rather than destructive in its action on the dead body. What was at first a precaution against the return of the corpse becomes in the end a pious duty; just as burial itself, originally a selfish precaution against the pranks and tricks of returning corpses, becomes in the end so sacred and imperative that unburied ghosts are conceived as wandering about, Archytas-wise, begging for the favour of a handful of sand to prevent them from homeless vagabondage for ever. Nations who burn come to regard the act of burning as the appointed means for freeing the ghost from the confining meshes of the body, and regard it rather as a solemn duty to the dead than as a personal precaution.

Not only so, but there arises among them a vague and fanciful conception of the world of shades very different indeed from the definite and material conception of the burying resurrectionist. The mummy was looked upon as inhabiting the tomb, which was furnished and decorated for its reception like a house; and it was provided with every needful article for use and comfort. The necessities of the ghost are quite different and more shadowy. He has no need of earthly tools or implements. The objects found in the Long Barrows of the burying folk and the Round Barrows of the cremationists well illustrate this primordial and far-reaching difference. The Long Barrows of the Stone Age people are piled above an interment; they contain a chambered tomb, which is really the subterranean home or palace of the body buried in it. The wives and slaves of the deceased were killed and interred with him to keep him company in his new life in the grave; and implements, weapons, drinking-cups, games, trinkets, and ornaments were buried with their owners. The life in the grave was all as material and real as this one; the same objects that served the warrior in this world would equally serve him in the same form in the next. It is quite different with the Round Barrows of the Bronze Age cremationists. These barrows are piled round an urn, which determines the shape of the tumulus as the chambered tomb and the corpse determine the shape of the earlier Stone Age interments. They contain ashes alone; and the implements and weapons placed in them are all broken or charred with fire. Why? Because the ghost, immaterial as he has now become, can no longer make use of solid earthly weapons or utensils. It is only their ghosts or shadows that can be of any use to the ghostly possessor in the land of shades Hence everything he needs is burnt or broken, in order that its ghost may be released and liberated; and all material objects are now conceived as possessing such ghosts, which can be utilised accordingly in the world of spirits.

Note also that, with this advance from the surviving or revivable corpse to the immortal soul or spirit, there goes almost naturally and necessarily a correlative

advance from continued but solitary life in the tomb to a freer and wider life in an underground world of shades and spirits. The ghost gets greatly liberated and emancipated. He has more freedom of movement, and becomes a citizen of an organised community, often envisaged as ruled over by a King of the Dead, and as divided into places of reward and punishment. Now, while we modern Europeans pretend to be resurrectionists, it is a fact that our current ghostly and eschatological conceptions (I speak of the world at large, not of mere scholastic theologians) have been largely influenced by ideas derived from this opposite doctrine—a doctrine once held by many or most of our own ancestors, and familiarised to us from childhood in classical literature. In fact, while most Englishmen of the present day believe they believe in the resurrection of the body, what they really believe in is the immortality of the soul.

It will be clear from what has gone before that the idea of immortality is a later and more developed idea than the idea of resurrection. The Stone Age savages had reached the one; the Bronze Age barbarians got as far as the other. How does it come, then, that modern European nations, in their authorised formularies at least, have gone back from the more advanced to the less advanced conception? The relapse is entirely due to the influence of Christianity. The civilised peoples of antiquity were cremationists. Their religion was a religion of the ghosts and spirit order. Their ideas on these subjects were vague, poetical, and gracefully tinged with philosophic thinking. But Christianity came upon them as a sudden and crude reversion to a lower order. It was a Semitic religion, the religion of a burying people in the resurrectionist stage of thought. It surged up from below, from the dregs of the world; it arose among an obscure sect of local fanatics even in its own narrow provincial birthplace; and it brought with it to cultivated Rome and Hellas the common ideas and practices of the less civilised medium in which it had its origin.

Readers of Mr. Frazer's wonderful work, *The Golden Bough*, will all have drawn for themselves the obvious inference which Mr. Frazer everywhere prudently refrains from drawing, that early Christianity was in all its essentials a special development of the common religious ideas of Asia Minor and Syria. It was the creed of Adonis, the creed of Attis, dressed up afresh and applied with minor differences to a certain historical or mythical personage, said to have lived in Galilee about the beginning of the Christian era. Of this personage himself we know really nothing but the name or names; every supposed fact or incident related of him is merely one of the common and universal incidents related of all the other gods of vegetation, each of whom is represented as being a man as he was; each of whom is slain by a violent death; each of whom undergoes resurrection, as a rule on the third day; each of whom is identified with corn and the vine; each of whom is sacramentally eaten under the guise of bread and wine by his worshippers. It is now abundantly clear that the Christian religion was one among a number of competing religions of the East, which became popular among the slaves and lower classes of the Mediterranean world towards the decline of the Roman Empire; and Christianity was the winner in the race for the mastery of the world, just because it embraced and synthesised in itself so many separate elements of many other popular creeds and superstitions. But in displacing the civilised religions of Greece and Rome it brought with it into Europe various ideas properly belonging to a lower and Asiatic stage of culture. It brought with it the nasty practice of burial, in place of the sane and wholesome practice of cremation. It brought with it the vulgar Jewish conception of resurrection, in place of the elevated though erroneous Platonic idea of immortality. It brought with it the hateful oriental notions of asceticism and repression, in place of the

graceful and artistic Greek ideals of happiness, beauty, and equal development. By means of these false notions it has retarded the progress of the world for at least half-a-dozen centuries; and it is still doing its best to retard the progress of the world in future. But the forces which tend towards civilisation are growing at last too strong for it, and reason and common sense are beginning to overthrow the domination of the ascetic oriental creed of unwholesome restraint and unnatural repression.

INSECT GODS

THE domestic cat is well known to be a most sacred and reverend animal. Its mummied remains are offered for sale to the intelligent traveller by ninety-nine per cent. of the available small boys in Upper Egypt. The common cow is also a particularly divine beast; it was Hathor on the Nile, and Herè in Hellas, while everybody knows how the Hindoo who has lost caste has to recover his position by being "born again" of a golden heifer. The streets of Benares, said Macaulay, in his vivid way, are crowded "with holy Brahmans and no less holy bulls." Certain Indian monkeys, once more, are almost as sacred as the Egyptian cynocephali, the calf Apis, or the crocodiles of the Nile. But of all the divine beasts on earth the strangest and most paradoxical as an object of human adoration is surely the scarab, or sacred beetle, of Egypt. I have caught one today, here *in propria persona*, in a garden near Cannes, and got his godship well under observation, and, since it is not every morning that one can watch divinity at work with a platyscopic lens, I propose to record in fitting numbers what impression the coleopterous and shard-borne god produces upon the profane modern observer.

In outer show the scarab is quite an ordinary-looking dusky beetle, no more superficially holy to an untrained eye than the British cockroach or any other miscellaneous insect. It is recorded that the envious stranger saw "no p'ints" about the celebrated Jumping Frog of Calaveras County "more nor about any other frog," and it is the same with the scarab; he bears no peculiar outward and visible marks of his inner sanctity. You would not guess he was a god, to look at him. He is not peculiar to Egypt either; on the contrary, he exists abundantly in many other countries where his divine nature was never so much as for a moment suspected. He pervades Provence, and is a familiar beast to man both in the neighbourhood of Marseilles and along the Riviera. In fact, like Cook's tourist, he goes all round the Mediterranean. Yet so local and variable is fashion in matters of religion that the Provençal peasant kills with one blow of his spade the great god of immortality; and even the Coptic Christian or the Moslem fellah crushes under his heel without a passing qualm the chief deity of his ancestors for forty centuries.

Most gods, when you trace them to their source, have the humblest origins. Half of them appear to have been savage chiefs, and the other half big stones or dangerous wild animals. Truth must out: the holy scarab is in real life nothing more exalted than a common dung-beetle. It is the habit of the race to lay its eggs in a ball of manure, which it rolls about to gather more, on the principle of the big snowball, and finally buries. Its grubs hatch out underground in the middle of the ball, and live during their larval stage on the unsavoury food-

stuff thus provided for them. Poor raw material, this, you would say, for a deity. As a rule, moreover, unscientific man does not much concern himself about the ways of insects; he merely kills them. But the sacred scarab is an insect with a difference. He is so very conspicuous an animal in the lands he inhabits that even the unobservant southern cultivator is compelled against his will, as it were, to notice him. On hot and sunny days, when the warmth excites them, the beetles develop a most extraordinary energy, and work in squadrons with superhuman activity. I have seen them as busy as ants or bees at swarming time. They choose, as a rule, some sloping bank of earth to bury their ball in. In Europe they frequent the blown sand-dunes of the coast or dry sea-beaches; in Egypt, where sand is provided wholesale, they have the entire expanse of the desert in the neighbourhood of the inundated soil to choose from. Here they dig the hole in which the eggs are to be buried with their broad fore-feet, which are specialised into ready-made spades or hoes, while their heads are flattened and provided with prongs like a garden fork, so that they may use them as scoops or animated shovels to remove the rubbish loosened by digging.

As soon as the hole is completed, I observe, in the sand-dunes close by, that the pious and affectionate parent proceeds at her leisure to deposit her ball of eggs and manure in it. But as her front legs and forehead have been necessarily specialised as picks and mattocks, they form very bad pushing instruments; so it is with her hind legs that she has to roll the precious ball into position for burying. Now, she would not be strong enough to drag it bodily after her; for to pull is much more arduous work than to push; so to meet the difficulty she has developed a most singular and odd-looking instinct. She clutches the ball firmly between her two hind legs, which are long and bowed, and provided with spines for that very purpose; then she walks backward on her four other paws, pushing the ball before her as she marches in this retrograde fashion. When she arrives at the open trench she has prepared for its reception, in she tumbles it with a rush. Then she buries it in the earth, and leaves it to its fate with a clear conscience. The young grubs hatch out in due time within the buried balls, eat the manure of which their nursery is composed, and become chrysalids on the same spot in a cocoon of mud and other promiscuous rubbish. Hence they emerge in time as full grown burying beetles.

It may seem surprising at first sight that any early people—even the mystical Egyptians—should have noticed such small animals sufficiently closely to have been induced to make them into gods for their parental piety. But if you have ever been in Egypt (and who has not nowadays?) you will know the reason why. It becomes obvious when you get there. The man who looks at the monuments in the British Museum, away from their point of origin, is tempted to wonder to himself at what seems the singularly arbitrary choice of the objects adopted for hieroglyphics. Why this curious poverty of ideas in the selection of symbols and divine objects? Why these perpetually recurring hands and reeds and lotuses and jackals and papyri and ibises? Why these hawk-headed Horuses and these cat-faced Pashts? Why these few dozen bare pictures? But when once you know the country the answer is plain enough. The number of creatures the Egyptian could choose for pictorial representation or sacred use was strictly limited. There are the desert, the river, some few beasts or birds, and that's all, in Egypt. Indeed, so much is this the case that almost everything in the land was more or less sacred. Gods abounded everywhere. The country has a surprisingly small fauna and flora of its own, and the objects so familiar to us in the hieroglyphics and in the Pantheon well-nigh exhaust them. When once you have represented the human body and its

component members, the ox, the papyrus, the lotus, the jackal, the goose, the hawk, the ibis, the cat, and half a dozen more, you have pretty nearly got to the end of the picturable objects of the Nile valley. The Egyptian, in short, pictured and deified the things he knew—he could not very well picture or deify the things he knew not.

Among so small a collection of beasts, birds, and fishes, the sacred beetle was sure to attract attention. For, indeed, in Egypt he is everywhere in evidence. He and his works are sufficiently obtrusive and conspicuous. For one thing, the mere numbers of the dung-beetles are immense. They cannot help being noticed. Then their habit of walking backward as they roll their ball between their paws was certain to catch the eye of a humorous and laughter-loving people. Furthermore, being unable to see their way as they march backward, they are always getting ugly tumbles *en route*, from which they recover with much awkward difficulty; for it is the habit of beetles, when knocked over on their backs, to lie there sprawling, like Mr. Gilbert's fat sugar-broker, and kick their legs in the air in the most undignified attitudes till they can recover equilibrium. But these little difficulties do not damp the zeal of the industrious insects. If one beetle gets knocked over on a rough bit of ground, the next scarab who comes along piously takes charge of the motherless ball and continues to roll it on, regardless of the sacred rights of property, to the nearest burying-hole. The original owner, meanwhile, picks herself up after much sprawling, and proceeds in like manner to possess herself calmly of the first unclaimed ball that rolls her way from a similar accident; or, should none turn up, begins at once to pile up a new one. It really almost seems as if the beetles were aware that the whole object of the process is merely to keep up the numbers of the species from generation to generation, and were ready, like good communists, to attain that end quite apart from any petty personal considerations of *meum* and *tuum*. Every beetle appears to act as a common orphan asylum.

Now, the pious Egyptian who saw all this could hardly fail to be impressed by the actions of the insects. For your ancient Egyptian was, in his way, a deeply religious being: he worshipped almost everything. His creed, indeed, reposed upon two great bases, and the scarab appealed to him almost equally in virtue of both of them. The first was the belief in the resurrection of the body, which led him to mummify the remains of his dead lest any part should be wanting at the final moment. The second was totemism—the belief in the sanctity of certain plants and animals, which led him to deify the bull, the hawk, the cat, the ibis, and the jackal. But if any animal was worthy of deification (he might think to himself), surely it was this pious and industrious beetle, which buried its balls of dung—pure corruption and foulness—in the graves it dug for itself, in the sure and certain hope of a speedy resurrection. Of course, primitive observers never suspected anything so commonplace as the presence of eggs in the middle of the ball; that sort of explanation belongs only to the age of science. The Egyptians saw the beetle bury the pellet, and they saw a new beetle emerge from it in due time; and they leapt straight to the not unnatural conclusion that here was a case of spontaneous generation. The pious scarab, they imagined, buried the balls of dirt as they themselves buried their mummied dead; and new scarabs sprang from it under the vivifying rays of the supreme Sun-god, as the glorified body would spring in the end from the dried and withered dust of the human mummy.

It was as an emblem of the resurrection, then, that the scarab attained such immense vogue in the Nile valley. Nothing could be more natural than that a mummy-making race should see in its proceedings an undoubted argument

for the immortality of the soul, and a proof of the continued existence of the spirit after death. Everything conspired to produce this impression. The earnest way in which the good beetles devoted their lives to the pious task of rolling their balls of manure to the chosen burying-place was a lesson, as it were, to careless humanity to look to the end, a perpetual coleopterous *memento mori.* All sorts of strange fables rose up accordingly about the sacred insect. It seems that for twenty-eight days the balls remained under ground, through a whole lunar revolution. During that mystic time the beetles grew within by spontaneous generation. On the twenty-ninth day, which the insect knew as the moment of the conjunction of the sun with the moon, the ball opened of itself, and forth sallied in full divinity a new-born scarab. Later on, when the cult of Ra, the Sun-god, became the chief element in the worship of Egypt, eclipsing and absorbing into itself the earlier ancestral worship of Osiris, yet another point of sanctity was discovered in the scarab. The balls he rolled behind him so assiduously, being round and revivified, were considered as emblematical of the sun's disc; and the beetle himself was almost regarded as an avatar of the solar deity. To such a pitch of dignity may honest industry and sterling earnestness of purpose lead in the end even a despised carrion-beetle!

As a natural consequence, the scarab very early found his way into the hieroglyphic system. His figure appears over and over again on all the monuments, and his name forms part of the titles of some of the mightiest Pharaohs. You may see him chiselled in gigantic proportions on the side of granite obelisks, like Cleopatra's Needle. You may remark him, as large as life, or a great deal larger, on the mouldering walls of sandstone temples. You may note him engraved on precious stones, or forming a letter in the names on seals, or entering into the cartouches of royal conquerors. With his wings full-spread, he generally stands over the propylæa of Karnak and Luxor. As the symbol of eternity, immortality, and resurrection, in one form or the other he pervades all Egypt.

But that is not all. In a country where everything was sacred, and where religion entered into every moment of life, a still further use for the holy scarab soon sprang up—the one which has made him most familiar of all to modern tourists and antiquity collectors. For buttons were made in the image of the divine beetle; and these buttons were held to be very fitting objects to bury with the mummy. They were placed in the tomb as charms or tutelary gods. Sometimes, indeed, the actual beetle himself was so buried with the dead; and, though few of these perishable creatures have remained to our own day, yet instances of them survive; and we may conjecture that their rarity is due rather to the decay of animal tissues than to original infrequency. But more often it was usual to lay in the sarcophagus little images of scarabs in precious stones or earthenware, engraved with suitable hieroglyphic inscriptions; and it is these that are so well known at the present day, and so much sought after by collectors. They occur in a great variety of materials, from the coarsest and commonest pottery to the rarest and most expensive jade or jasper. Blue porcelain is, however, the most frequent material. They are sometimes hung, like necklets, round the necks of mummies, sometimes wound about them in long rows or strings, and sometimes sewn in profusion on to the wrappings or grave-clothes. At times they are clasped in the closed hands of the dead. The inscriptions they bear are always full of some sacred meaning, and have contributed not a little to our knowledge of Egyptian history and religion. "As many as three thousand scarabs," says Mr. Loftie, "have been found in one tomb"; so that the number in existence in museums and in private collections is past all counting.

In order to understand their importance as historical documents we must remember, as Mr. Loftie has well pointed out, that there are no early Egyptian coins. Money did not exist in the days of the Pharaohs. But, then, the Pharaoh was himself a god; and to put his name upon an onyx or agate scarab was therefore to bestow upon an object already sacred a still higher and deeper sanctity. In this way most of the scarabs found in tombs bear the name of a Pharaoh; and thus a collection of these curious emblems holds somewhat the same relation to Egyptian history that a collection of coins would hold to the history of any other country. Thousands of scarabs exist in the Louvre, the British Museum, and private cabinets; and from them an immense amount of information may be derived about Egyptian history, of the same indirect and confirmatory sort as that derived from the evidence of coins in later civilisations. "The Giver of Life," "The Living Divinity," "The Gracious Lord," "The King's Son"—these, with the names of Rameses, or Sethi, or Amenhotep, are the sort of inscriptions one reads on the lower surface. The earliest scarabs of whose date Mr. Loftie—the great authority on the subject—feels certain belong to a king who rejoiced in the melodious name of Neb-ka, and who seems to have been an ornament of the Third Dynasty. Heaven forbid that I should dogmatise on the shifting quicksands of early Egyptian chronology; but if I ventured to have an opinion on the subject at all (which I certainly do not) it would be that Neb-ka most probably lived somewhere about the year before Christ 4000. The latest scarabs, on the other hand, appear to be some time subsequent to the Christian era. A scarab in the Louvre has the cartouche or name-oval of Antoninus Pius engraved on its wings; and others seem even to belong, as I shall hereafter point out, to the purely Christian period.

In order to understand the sanctity of the Pharaoh names thus engraved on the scarabs, we must further recollect that the early kings of Egypt were descendants of the great god Horus, or Hor; and that Horus himself was in all probability a deified king of immemorial antiquity. At any rate, every legitimate ruler of Egypt traced his descent from Osiris and Horus; and Mr. Loftie acutely notes that it is only such divinely-descended native kings for the most part whose names occur on scarabs. Now, "the great Persian conqueror Cambyses," and the Greek Ptolemies could not really claim to be of the stock of Osiris. The Ptolemies, indeed, pretended to claim it; but nobody believed them, a point which is shown by the curious fact that their names are never found inscribed on the holy beetles. Egyptian orthodoxy declined to hold that a Cleopatra or a Euergetes was a fitting object of divine worship. The Roman emperor, on the other hand, was at least a Divus Cæsar, and most of his subjects did really accept his divinity as genuine, and offer sacrifice in the most serious spirit at his altar. Hence it is not surprising that the names of Cæsars should sometimes, though very rarely, be engraved on scarabs; it marks the prevailing sense of the reality of the emperor's godhead. Still, the vastly greater number of scarabs bear the names of the native kings; during the earlier period, very often that of the reigning Pharaoh; in later times, and especially after the Macedonian conquest, those of early historical native princes. Thus one of Mr. Loftie's scarabs, probably executed under the Twenty-sixth Dynasty (say 600 B.C.), bears the figure of Horus, crowned as king of Upper and Lower Egypt; while in another case, on a specimen which must have been produced under the rule of the Ptolemies, a winged sphinx of the most advanced Greek type is represented bearing up the cartouche of a pyramid-building king of the Fourth Dynasty. For even down to the latest period before the introduction of Christianity,

the religious Egyptians, most conservative of mankind, went on worshipping the Pharaohs of three or four thousand years earlier. It was exactly as if we, at the present time, in Britain were to keep up the cult of ancient British kings as old again as Caractacus and Cunobelin.

One of the most interesting exhibits in the museum at Ghizeh is the jewellery of Queen Ahotpou, of the Seventeenth Dynasty (say about 1750 B.C.), taken from her majesty's person when her mummy-case was opened by Mariette Bey. Among the most beautiful objects in this very ancient collection is a gold chain or necklet, with a scarab pendant as its central ornament.

On the other hand, if the kings had their names engraved on sacred beetles, the sacred beetles, in return, gave their names to mighty kings. The very word for beetle was so holy that it enters into the composition of many royal titles. Just as elsewhere great princes described themselves as lions, or wolves, or bulls, or deer-hounds, so in Egypt they described themselves as beetles of the Sun-god.

Strange to say, some of the latest scarabs bear Christian emblems. Several of them are inscribed with the cross, and one, in Mr. Loftie's collection, is adorned with a well-marked crucifix. This queer jumbling up of Christian and heathen symbolism may seem incredible to those who do not know Egypt or early Christian art; but to students of the first few centuries of Christendom it is no isolated example. In the Ghizeh museum there are many other works of the transitional period quite as strangely mixed as these—paintings with the *ankh* or *crux ansata*, the symbol of immortality, combined with the veritable Christian cross; emblems of which it is hard to tell at first sight which are heathen and which Christian; Madonnas that can hardly be discriminated from Isis with the infant Horus; and Isises that fade off by imperceptible stages into Madonnas and Bambinos. The fact is, scarabs had been buried with corpses in Egypt for centuries till they had become, as it were, part of the recognised ceremonial of burial; people no more liked to dispense with them as marks of respect to the dead than our own people would like to dispense with plumes and mutes and all the other wonted accompaniments of Christian burial. So, when the Egyptians felt they must adopt the new creed in place of the old, they endeavoured to Christianise and convert the scarab by inscribing him with a figure of the crucifixion, just as the priests in Brittany have Christianised and converted the old heathen standing stones by putting a cross on top, to which the modern worshipper now nominally at least directs his prayers. There is more of this substitution everywhere in Europe than most people suspect; a large part of what passes as modern Christianity is nothing more than very slightly veneered antique paganism.

A few comparatively big scarabs are found in mummies in the place of the heart. A portion of the Egyptian Bible or "Book of the Dead" is written upon them in very tiny hieroglyphs. These extremely big amulets usually bear parts of certain chapters relating to the human heart; so that the place they occupy in the mummy is by no means accidental. They all belong to a particular period.

It is strange, however, to notice how hard all superstitions die. For example, the stone axes and arrowheads of primitive peoples were regarded from a very early time as lucky, because they gave you a certain hold over the ghosts of the people who originally formed them, and who might be summoned to your aid by rubbing or anointing them. Among modern Europeans, stone arrowheads are looked upon as fairy darts or elf bolts, and are similarly valued as charms or amulets. They usually formed for this reason the central object in the beautiful antique Etruscan necklets; and in a degraded imitation, commonly known as "cornelian hearts," they are still worn by our nominally Christian

English young ladies as charms on their watch-chains. Well, it is just the same with scarabs. These old Egyptian insect gods are now being worn once more by English ladies, who have picked them up for a few piastres in Egypt, "to bring them good luck"; and I know one matron of mature years, who has long ago discarded most orthodox religious beliefs, but who solemnly assures me she would feel very uncomfortable indeed if she were accidentally to lose her sacred beetle, which she wears as a brooch and regards with no little superstitious veneration. The custom has spread so much that scarabs will perhaps soon become the fashion; and as genuine ones are common enough, while imitations are offered by the thousand to every traveller at all the stations on the Nile, the supply will probably create a demand for lucky talismans among the travelling public. Already there are several large scarab factories at Luxor, and the trade has become one of the staple industries of the Thebaid.

How odd that people in the nineteenth century should still be influenced by conceptions as to the godhead of a particular dung-beetle originally formed by the half-savage Africans of ten thousand years ago!

One point more before I close my sermon. On many monuments the scarab, when he appears as a hieroglyph or an ornament, seems once to have been gilded. He is also occasionally represented dispersing rays on every side like a star or a firefly. Now, it is true that in these cases the gilding and the rays may have been merely intended to show his identification with Ra, the Sun-god. But another ingenious explanation of these points has been offered which is worthy of mention before we relegate the scarab to his native obscurity. The common Egyptian burying-beetle with whom we have dealt all along is black and inconspicuous; but up country in Nubia another allied species occurs, in lesser numbers, which is conspicuous in that peculiar sort of bronze-like or half-golden metallic sheen not unfrequently seen in tropical beetles. Now, it has been suggested that the Egyptian people may have been originally a more southern race, who entered the Nile valley from the Abyssinian highlands, and who had been accustomed in their old home to worship this gilded beetle both on account of its pious habits, which resemble those of the common scarab, and because its colour seemed to mark it out at once as a representative of the Sun-god. And in this connection we may recollect that even to the present day in France the little red-and-black ladybird is commonly known as the *bête du bon Dieu*. In that case it is possible that the original scarab of religion was the brilliant Nubian and far southern species; and that the Egyptians, when they moved north beyond the range of the gilded scarab, took to worshipping instead its dingier and less beautiful northern representative. But in art they may have continued to represent him as golden. In all this, however, I must honestly admit, the proportion of solid fact to pure conjecture somewhat resembles the proportion of bread to Sherris sack in Sir John Falstaff's famous tavern bill.

And now I think I have almost finished with my scarab, so I will take him out gingerly between finger and thumb—for he is an unsavoury god—and restore him to the calm of his original sand-pit, by the side of the two carefully-clipped garden date-palms.

GENESIS

A STONE lying on the beach does not show any tendency to grow bigger, or to divide up into two smaller pebbles, each of which, after growing up to the size of the original stone, again subdivides into similar pairs *ad infinitum*. A piece of dead matter of any sort does not exhibit any predilection for the production of other like bits of matter out of its own inert substance. But a living plant or animal does tend to reproduce its like, either by actual fission of its own body, or by production of smaller bodies (call them germs if you will), which unite with like germs produced by kindred organisms, to form a new and distinct individual—a seed or egg. This peculiarity of living beings is perhaps at bottom the most striking characteristic of all life; and it is therefore well to ask ourselves definitely the essential question, "Why do plants and animals reproduce at all?"

Put in this form, the problem is to some extent a new one. Already Mr. Herbert Spencer has asked and answered the questions, "When does gamogenesis occur?" and "Why does gamogenesis occur?"—in other words, why does there exist such a thing as the distinction of sexes? But perhaps nobody has ever yet definitely posited the prior question, "Why does genesis itself in any form occur?"—in other words, why is there such a thing as reproduction at all? Quite recently, however, a minute and rigorous critic, Mr. Malcolm Guthrie, has called upon evolutionary biologists to begin their exposition by dealing with this preliminary difficulty. It may seem to many evolutionists that such a demand is a fair and reasonable one; and some attempt to answer the question at issue ought surely by this time to be made. An answer, indeed, is all the more desirable because the matter is fundamental; upon the right comprehension of the physical necessity or *a priori* certitude of genesis in its simplest form hang all the later and dependent propositions of biological science.

The answer to be tentatively given here is simply this: genesis is a necessary result of the physical and chemical properties of chlorophyll. Now chlorophyll, as everybody knows, and as its name proclaims, is merely the green colouring matter of leaves; and it may seem strange to many, even among those familiar with scientific modes of thought, to be told that genesis, a feature common to animal and vegetal life alike, is the result of a purely vegetal principle.[1] But it will be seen in the sequel that this vegetal principle really lies at the very foundation of all life, and that without it life in any form would be simply impossible. It is unfortunate that the majority of progressive scientific biologists have interested themselves rather in zoology than in botany, and that the fundamental importance of the plant in the biological scheme has thus been often overlooked, or at least only grudgingly and implicitly acknowledged. It might fairly be said, however, that the true "physical basis of life" is not, strictly speaking, protoplasm in general (as Professor Huxley has put it), but is rather that particular modification of protoplasm which we know as chlorophyll.

In order thoroughly to comprehend the nature of chlorophyll, and its relation to the general phenomena of plant and animal life, let us begin by considering briefly wherein organisms generally differ most from the inorganic bodies about them. It has often been said that organic chemistry is the chemistry of the carbon-compounds: it would perhaps be

[1] To appease the exacting scientific critic, it may be added that chlorophyll is found in a very few small animals.

truer, cosmically speaking, to say that it is the chemistry of energetic compounds. The mass of the materials forming the earth's surface—rocks, clays, water, and so forth—are in a state of chemical stability: for the most part, their chemical affinities are fully saturated; they are combinations of elements in the firmest and closest union; they possess little or no potential energy; to use the somewhat crude but unavoidable slang of modern physics, no "work" can be got out of them. In contradistinction to these inert and generally motionless bodies, organic beings have this point in common, that they are all highly energetic: they contain large quantities of energy, sometimes potential or latent, sometimes kinetic or active. Many of them, which we call animals, may be seen as visibly moving masses on the earth's surface; and these possess also internal organic movements, such as circulation, respiration, and so forth, besides being storehouses of molecular motion or heat to a marked degree. Others, known for the most part as plants, do not usually move in the mass; but they likewise possess internal organic movements of growth and circulation, and they sometimes even display considerable visible activity, as in the sensitive plant, or in the opening and shutting of flowers. All organisms alike, however, can be *burnt*, and thus exhibit their possession of potential energy to a very high extent; for combustion really means combination with oxygen, accompanied by the liberation of previously potential energy in an active form as heat and light. Almost all the fuels employed by man for heating and lighting are of organic origin; either animal, as tallow, whale-oil, lard; or vegetal, as wood, coal, wax, petroleum.

If the surface of the earth were left wholly to itself, without receiving light and heat from the sun, it would consist entirely of the stable chemical compounds —water (in the form of ice), stone, clay, and so forth. There would be no life, no movement, no change, or wind, or current upon its face. Its chemistry and its physics would all, so to speak, be statical. But the rays of the sun, falling on these inert and compound bodies, set up in them certain visible and invisible movements. The sunlight makes the ice for the most part into water; it causes the winds which agitate the sea; it produces the evaporation that results in rain, and consequently in the motion of brooks and rivers. But, besides these larger and purely physical effects, it produces certain more intimate and chemical effects, which we know as the phenomena of vegetal and animal life. The raw material of its operations consists of the water on the surface and the carbonic acid (let us retain familiar names) in the air. These are both tolerably stable and fully saturated compounds. But the rays of the sun, falling upon them, in the presence of the green parts of plants, dissociate to some extent the hydrogen and the carbon from the oxygen with which they were combined, and store them up in relatively free and energetic forms. The bodies which result from these operations are no longer stable and inert; they have imbibed the kinetic energy of the sunlight, and have made it potential; they have stored it up, so to speak, in their own substance. Instead of free working energy on the one hand, and a compound whose elements are locked up in the closest embrace on the other, we have now two sets of free elements, the hydrogen or the carbon on the one hand, and the oxygen on the other, whose freedom or separation represents the energy that was absorbed in the act of dissociation. A piece of wood, a lump of coal, an oily nut or seed, each consists in the main of a visible mass of such hydro-carbons, possessing potential energy in virtue of their separation from the oxygen around them, and ready to yield it up again in the kinetic form, as heat and light, whenever we induce their reunion with oxygen by simply applying a match or a piece of tinder.

Familiar as these facts sound to the scientific ear, it is yet necessary to

recapitulate them here from this special point of view, in order to place the reader at the requisite standpoint for understanding the theory of genesis about to be propounded. Regarded in this light, then, a plant is essentially an accumulator and storer of energy—that is to say, a plant which is functionally a plant is such; for we shall see hereafter that some few plants are, from the practical or physical point of view, functionally animals. The business of the plant in the cosmical economy is to receive the rays of the sun in its green portions; to let them dissolve for it the union subsisting between oxygen and carbon in the carbonic acid of the air; to turn loose the liberated oxygen into the atmosphere; and to store up the free carbon and hydrogen in relatively loose unions as hydro-carbons (or rather carbo-hydrates) in its own tissues. These hydro-carbons are then visible masses of matter possessing potential energy, which they may yield up in performing other functions of the plant itself; or in feeding an animal; or as being burnt as fuel in a human stove. In any case, they will combine at last with the oxygen they once cast off, and in so doing will yield up just as much kinetic energy as they absorbed from the sunlight in their first production.

The function of an animal, on the other hand (as well as of quasi-animal plants like the fungi), is exactly the reverse. The animal is an expender, not an accumulator, of energy. It takes the potentially energetic materials laid by in the tissues of the plant, either directly if it is a herbivore, or indirectly if it is a carnivore devouring herbivores; and it recombines these materials with oxygen in its own body, thereby obtaining warmth and motion. It is, if we may be metaphorical, a sort of natural steam-engine, slowly burning up vegetable products within its living furnace, and getting out of them the kinetic energy which it expends in the movements of its parts or of its limbs. It is clear, therefore, that plants are prior to animals in the order of nature. Given a world of solid rock, water, and carbonic acid, beaten upon by solar rays, and an animal if placed there would die out; put a plant there, and it would live and propagate. The world must be peopled with plants before animals can begin to exist. And from this we can readily see the primordial importance of chlorophyll.

For without chlorophyll there would be no life. The solar rays, falling upon carbonic acid and water alone, do not set up any chemical action at all in them. On the other hand, falling upon these bodies in the presence of chlorophyll, they set up the chemical dissociations which result in the production of more relatively free hydro-carbons, which are the raw materials of all other organic compounds. Chlorophyll, it is true, is not in itself a simple hydro-carbon; it is a protoplasmic body of highly complex structure, whose chemistry, even as now imperfectly understood, is too complicated to be gone into here. But it differs from all other organic bodies in this, that it, and it alone, can, under the influence of sunlight, produce new organisable matter. It is a physical property of chlorophyll, when sunlight falls upon it, that it dissociates carbon from oxygen, and builds it up with the hydrogen of water into hydro-carbons. These hydro-carbons can again be employed to manufacture fresh chlorophyll and other protoplasmic bodies, by the addition of nitrogen and some other elements. We may therefore say that chlorophyll possesses the unique power, under the influence of sunlight, of laying by fresh material which is capable of being transformed into itself. In other words, it *assimilates*. This power makes it really the fundamental basis of all life, and gives it its essential importance in the biological theory of genesis.

For, given a stone or a drop of water, that stone or that drop does not tend to make new stones or new drops develop around it. True, it may become the nucleus for crystallisation in the one case, or the centre of condensation in the other, as actually happens with growing

crystals or with gathering clouds; but these instances are not really analogous, as they seem fallaciously to be, to that of the chlorophyll grain. For, in the one set of phenomena, the crystal and the water really pre-exist as such in the surrounding medium; they are only deposited anew in a fresh situation; but in the other set of phenomena the new material exists at first as carbonic acid and water; its oxygen is rejected; its carbon and hydrogen are separated; and it is then worked up with other elements from elsewhere into the form of more protoplasm, which in the sunlight once more develops more chlorophyll. In short, it is the peculiar property of chlorophyll, under sunlight, ultimately to develop more of itself. And it develops more of itself essentially by absorbing the kinetic energy of the sunlight and rendering it potential in the resulting chemical bodies.

Here, then, we have the property which forms the basis or radical idea of genesis; here we have a body which does not remain stationary in quantity, but which increases by assimilating fresh material to itself from without. Given this physical property, and the rudest type of genesis by fission is already practically attained. For you start, to put it roughly, with a drop of protoplasm containing chlorophyll-bodies. These chlorophyll-bodies, under the influence of sunlight, produce hydro-carbons, which again are worked up within the drop into more protoplasm and more chlorophyll-bodies. When the drop is twice as big as it was originally its cohesion is overcome, and it separates into two drops. Each such drop then goes on assimilating more material, and again subdividing into two more drops. And so you have set up a continuous dichotomous type of genesis by fission, which is actually realised almost in this form among the very lowest order of plants (Thallophytes), such as the Chroococcaceæ, whose mode of reproduction will be found fully described in any work on physiological botany. Of course, this rough sketch is strictly diagrammatic in character; it omits all details and fixes itself only on the central facts of the process; and it assumes that fission will take place in the mass when it attains a certain size; but it will serve at least to show that genesis in its simplest and most fundamental form contains no mysteries or hyper-physical element—that it is strictly analogous to all other ordinary physical phenomena elsewhere. The only new factor really imported into the complex chemistry of life, in this its most primitive form, is the factor of absorbed potential energy (which, of course, is common enough in many artificial chemical products).

Where the first grain of chlorophyll came from we do not know. How it was originally produced we cannot tell. Perhaps some combination of circumstances in the crust of a cooling planet, now unattainable, may somehow have given it birth. Perhaps, if we wish to call in the supernatural (and we have a good opportunity for doing so, here on the unknown borderland), it may have been specially endowed with its existing properties by the fiat of a Creator; though, to be sure, the fiat does not seem one whit more necessary or less necessary for those particular properties than for all the other properties of matter in general. Perhaps—and for aught we know to the contrary this is as good a guess as the others—it may have dropped down upon us, as Lord Kelvin suggested, from a prior world; though how it got there would be just an equal mystery, itself demanding a similar solution. Perhaps even, it may go on being spontaneously produced by the action of sunlight on inorganic matter at the present day. But, however this may be—and the question is really no more important than the question as to the origin of any other chemical compound whatsoever—we do know now that the real original living thing must have been a mass of protoplasm containing chlorophyll. It could not have been an animal, for an animal means a destroyer

or user-up of materials already produced by the chlorophyll of plants. It could not have been a fungus of any sort, or a saprophyte, for those are plants, indeed, in structural relationship, but essentially animals in actual function; their life, like the life of the animal, consists entirely in using up the energetic materials already stored up by other plants. One might as well suppose that the earliest living creature was a lion, which lives by eating pre-existing herbivorous animals, which again live by eating pre-existent green plants. All animals and all fungi or quasi-fungi presuppose the existence of vegetal life, and especially of chlorophyll. It was chlorophyll that laid up the energetic materials on which they subsist. Carbonic acid and water will not do this by themselves; they are the waste products. Sunlight falling upon these will not do by itself; it is the instrument merely. But these three, together with chlorophyll, will produce the raw material of life; and the vegetal cell will work it up into protoplasmic bodies within its own substance. And herein lies the fatal flaw of all such investigations into "spontaneous generation" as Dr. Bastian's. Even if it could be shown that living organisms sprang up spontaneously at the present day in decoctions of turnip or in beef-tea (which has never been shown), we should be no nearer the beginnings of life than ever. For the organisms said to be so produced are all such as bacteria, small rod-like creatures of the fungous sort, containing no chlorophyll, and living on the turnip-soup or the beef-tea exactly as we do. If in a world containing oceans of ready-made beef-tea a number of bacteria were produced, they would promptly begin to swim about in it, reproduce their kind in enormous quantities, eat it all up, and then die out for ever. But what we want is an organism which, set down in a world containing no beef-tea, but filled in its stead with water and carbonic acid, will increase and multiply and replenish the earth. And no organism that we know of could do this, unless it contained chlorophyll; whereas, if it contained chlorophyll, it must, by virtue of its physical properties, continue to do so as long as sunlight, water, and carbonic acid (with a little nitrogen, etc.) were duly supplied to it.

Waiving the question, then, as to how the earliest grain of chlorophyll began to be, we see that if one such chlorophyll grain be once granted, with its physical properties such as they are known to be, genesis in its most primitive form follows as a matter of course. Now, the very simplest type of Thallophytes are known as the Protophytes (it is unfortunate that our inquiry leads us mostly into the very dregs of vegetal life, whose mere names nobody knows; but it cannot be helped), and these Protophytes, or some of them, exhibit to us a system of genesis almost in this ideally simple form. In the very earliest of these tiny organisms, such as some Chroococcaceæ, Oscillatorieæ, and others, each plant consists of a single cell—that is to say, of a small mass of protoplasm, containing chlorophyll-bodies, and surrounded by a more or less jelly-like wall. This wall is "secreted" by the protoplasm from its own substance; in other words, each cell is first produced as a mass of protoplasm only, and then proceeds to cover itself with an outside film, much as porridge does in a basin as it grows cold. Not, of course, that the one action is exactly equivalent to the other; but both are presumably due alike to simply physical causes. At a certain point of growth, when the cell or plant has stored up a given quantity of material like itself, under the influence of sunlight, it divides in two, each part being, naturally, exactly similar. The two halves of the divided mother-cell next increase until they attain its size, and then they divide again. And so on *ad infinitum*. Here it is clear that genesis really consists in the production by one cell of two cells exactly like itself; and the principle of heredity is thus seen in its origin to be simply identity of substance and structure.

If the new cells float freely about in

their medium, each one may be regarded as a separate organism; but if they cling together in rows, like beads in a necklace, they form the first sort of compound organism, such as some waving hair-like algæ; and if they cling together on all sides, they form a primitive leaf or frond.

Many plants which rise higher in the scale than these nevertheless often recur to the same primitive form of genesis by simple fission of a single cell. For example, the well-known red snow plant is now considered to be, most probably, a mere abortive stage in the development of some higher alga; but it very well illustrates the nature of this primitive genetic type. A single small mass of protoplasm, containing chlorophyll-bodies, falls on the surface of newly fallen snow, under the sunlight. The bit of protoplasm is itself, in all probability, derived from a higher plant, with a different mode of reproduction; but here it has none of the favourable conditions for its own normal development, while it has all those required for this simplest plane of vegetal life. It has water, carbonic acid, sunlight. Accordingly, it begins at once to integrate fresh matter from without under the solar influence; and, as it does so, it breaks up again and again into small bodies, each of which in turn becomes the mother of others, until the whole surface of the snow is covered with a perfect sheet of tiny red plantlets.

We thus see the *a priori* necessity for the existence of reproduction in all bodies containing chlorophyll. But we do not yet see the necessity for reproduction in bodies which do not contain it. In order to do so, we must have recourse to the principle of natural selection.

Clearly, this principle follows of necessity from the general properties of chlorophyll. For, given chlorophyll, and therefore given reproduction in its simplest form, variation and survival of the fittest are necessary consequences. Unless we suppose all the chlorophyll containing organisms to be circumstanced exactly alike (which is practically impossible), we must allow that greater or less differences will arise between them, through the action of their unlike environment, exactly as happens with stones or other inorganic bodies. But since chlorophyll tends to build up more chlorophyll like itself, and to split up into new bodies, it must also happen that such slightly differentiated bodies will also tend to split up into similarly differentiated bodies—in other words, to reproduce their like. Heredity of acquired traits, in its simplest form, thus amounts to no more than identity of constitution between the two parts of a divided and altered whole. Again, those masses of chlorophyll which are best conditioned for receiving and assimilating sunlight will reproduce the most, while those which are worst conditioned will reproduce the least or not at all. Every variation which tends towards better adaptation to the environment will thus be favoured, and will become hereditary; every adverse variation will be weeded out. It is only possible here to state this connection very briefly; but whoever takes the trouble to work it out in his own mind will easily see that all Mr. Darwin's theory of natural selection flows necessarily from the fundamental attributes of chlorophyll, *plus* the existence of variety or diversity in the inorganic environment.

This being so, it becomes clear that higher developments of heredity will soon be rendered possible. For if any chlorophyll-containing organism is so situated that it happens to split up, say, into several small spores or eggs, instead of into two similar bodies, and if these spores or eggs happen to show any slight betterness of adaptation in any way, it is obvious that they will reproduce more often and more securely than other organisms, or, to use the familiar phrase, they will survive in the struggle for existence. As a matter of fact, we know that we can trace many such higher developments. Starting from organisms which merely split up into two, we go

on to organisms in which a single mother-cell divides into several cells, and to others in which the cells so produced possess certain definite organs, enabling them the more easily to fix themselves in suitable situations. In fact, among the bodies containing chlorophyll we can pass upward from the very simplest types, in which reproduction is performed by mere division, to those very developed types in which reproduction takes place by means of a highly complex seed, such as that of a pea or a hazel-nut.

Most of these gradations can be sufficiently accounted for by the principle of natural selection alone—that is to say, by the reproduction of the most adapted variations; but there is one other principle, or rather one variety of this principle, which must be briefly touched upon here, in order to render comprehensible its application to the case of the more familiar animals. This is the origin of sex — a question which I cannot wholly pass over, though it can only now be treated in the briefest manner. It is certain that all organisms and all cells tend, after a longer or shorter period, to lose their plastic or reproductive power. They seem to settle down into a less active and more quiescent state, after which they do not so readily undergo any change or produce any fresh units. But some organic cells, when they have reached this state, pass through a process known as rejuvenescence, which enables them to begin over again their cycle of existence. For example, in certain algæ reproduction takes place in the following manner: After the plant has produced a number of cells, arranged one after another in long hair-like rows, its growing power or vigour seems to be used up, and it reaches a period of considerable quiescence. Then, in some of these cells, the protoplasm and chlorophyll-bodies at last contract, and protrude through an opening in the cell-wall. Next, they pass the opening and quit the cell altogether, forming what is known as a swarm-cell, without any cell-wall, which floats freely in the water. After a short time, this swarm-cell fixes itself at rest, what was before its side now becoming its root (to use a popular term); and it then begins to grow vigorously into a fresh plant, first secreting a fresh cell-wall, and then producing new cells under the influence of sunlight acting on its chlorophyll. In this case we have a very advanced type of asexual reproduction, almost foreshadowing sexuality; for here the change of attitude, and the casting-off of the slough or cell-wall, seems to give the protoplasm and chlorophyll new life, by permitting them to assume a plasticity which they had temporarily lost in the act of definite organisation.

True sexuality essentially differs from this in one fact: the organism has here acquired so fixed and statical a habit that plasticity can only be restored (as Mr. Herbert Spencer points out) by interaction with another organism. For example, certain algæ reproduce by what is known as conjugation—that is to say, when the long hair-like filaments which form the plant have reached their period of maturity they happen to approach one another in the water, and a union takes place by the outgrowth of a passage between two of their opposite cells. The protoplasm and chlorophyll of one cell collect, and pass over through the passage thus formed in the cell-wall into the other. Then a sort of stir or ferment is set up by this infusion of fresh blood, and the previously quiescent cell-contents break up into a number of small spores, from each of which a new individual is produced.

Such a case shows us sexuality in its very simplest mode, for here the two cells which unite to form the spores do not visibly differ from one another—there is no differentiation of reproductive cells into male and female. In certain higher algæ, however, we get such a bisexual differentiation. Smaller cells, known as antheridia, inject their contents into larger cells known as

oogonia, and set up in them the reproductive process. The pollen-grains and ovules of flowering plants show us the differentiation in its highest vegetal form. Infinite as are the gradations by which we reach these upper levels of plant life, it will yet be obvious to anyone familiar with evolutionary modes of thought that they can all be logically deduced from the known primitive properties of chlorophyll *plus* natural selection acting upon varieties produced by differences of environment.

But how are we to account for genesis and heredity in animals, where chlorophyll is not present? To answer this final question we must consider in what manner the first animal probably came to exist. In many cases the reproductive spores cast off by plants possess organs of motion. They swim about freely in water by means of little vibratile hairs, which they have, of course, acquired by the natural selection of favourable variations. In some instances such spores come to rest finally, and grow out, by multiplication of cells, into fixed and sessile plants; in other instances they continue motile throughout their whole existence, but show their essentially vegetal nature by their possession of active chlorophyll. In their young state, however, these plants do not fundamentally differ from animals. They possess a certain fixed store of potential energy, which they use up in the movements of their vibratile hairs; and so long as they continue in this state they inhale oxygen from the water, give out carbonic acid, and are in fact, functionally, animals. But sooner or later they take to a truly vegetal life, by assimilating hydro-carbons from the surrounding medium, under the influence of sunlight; and, so doing, they prove their right to be considered as genuine plants.

Now, suppose some such locomotive spores, freely floating about in the water, happen by some chance (such as being cast in a dark place) not to use their chlorophyll or to develop fresh chlorophyll, what will occur? Under certain circumstances, under most circumstances indeed, they will simply die. But if one of them happens to come into contact with another, the two might conceivably coalesce. This coalescence would increase the total quantity of energy-yielding material possessed by the joint body, and the length of time for which it could go on moving without the necessity for fresh sunlight would be correspondingly increased. If, again, it came into contact with still other similar germs, or with germs of a different description, the movement might continue indefinitely. We have only to suppose this coalescence rendered habitual, and we have at once the simplest type of animal.

At first, the coalescence thus postulated might almost be mutual; just as in the earliest form of reproduction by splitting it is impossible to say which is parent and which is offspring, because both are halves of a similar whole, so in the earliest form of feeding it is almost impossible to say which is devourer and which devoured, because both combine to form a single whole. In time, however, variation, aided by natural selection, produces distinct types, of which some clearly feed upon others. In the simplest forms the feeding takes the shape of a mere enveloping of the food-morsel by the protoplasm of the devourer; digestion and assimilation are carried on by all parts of the homogeneous jelly-like primitive animal. With higher animals, however, under stress of natural selection, there arises a differentiation of parts: there are integuments, and these integuments assume the character of outer and inner; there is a digestive sac or cavity, there is a mouth, there is a vent, there are subsidiary organs of secretion, assimilation, and circulation, there is a complex locomotive apparatus. But, in every case, all the energy expended by the animal comes directly or indirectly from the starches and other fuels or food-stuffs laid up beforehand by the chlorophyll of the plant.

That such is actually the origin of animal organisms we do not, of course, know with certainty. But that they may most probably have arisen in some such way is rendered highly credible by the analogous case of fungi. It is now certain that fungi are not a separate class of plants, but that they are members of very distinct classes and families, resembling one another only in their quasi-animal mode of life. In fact, there is no group of the lowest order of plants—the Thallophytes—among which fungi do not occur. Now, these fungi are really plants which have lost the habit of producing chlorophyll, and have acquired instead the habit of assimilating and using up energetic materials laid up by other (chlorophyll-containing) plants. It is obvious that life may be carried on by such means; and, however life may be carried on, something is sure to carry it on, because variation is sure to hit sooner or later in its blind groping upon some accident which tells in that (as in every) direction. The occurrence of fungi in every group of Thallophytes clearly shows that the habit of living by expending energy acquired elsewhere, instead of by accumulating energy at first hand, has been assumed by certain plant germs, not once only, but many thousand times over. Parasitism is a trick that occurs again and again in the history of evolution. Moreover, what has thus happened often to fungi may have happened often to the germs or spores which developed ultimately into animals as well; for there is really no valid line to be drawn between a floating fungus and an animal. A mushroom, indeed, and most moulds, are immediately judged to be vegetal by their fixed and rooted position (though many animals are equally rooted); but the distinction between such small locomotive or floating fungi as Bacterium, Vibrio, or yeast, and the simpler animals is a very artificial one.

Why, then, does genesis occur in such animal or quasi-animal forms? Take a yeast cell, placed in a proper solution—that is to say, in a solution full of energy-yielding materials laid up directly or indirectly by true green plants—and the answer is obvious. The cell of which the very simple organism is composed drinks in organisable material from the surrounding liquid. As it does so, it begins to bud out by a small protuberance, which increases rapidly to the size of the mother-cell. The narrow point of union then gives way, and instead of one we have two cells. Each of these, once more, forthwith repeats the process, until the whole solution is one mass of yeast cells. As each is necessarily precisely similar in constitution to its predecessors, they must all resemble their common ancestor, the first yeast cell, except in so far as they may happen to be modified by special circumstances. The cells presumably split up because they have grown by feeding beyond the size at which stability is possible for them. In short, the root principle of heredity is given by the fact that reproduction in its essence is division of a single body into two equal and similar halves whenever it reaches a certain size. The offspring resembles the parent, because the offspring is a bit of the parent, broken off from it to lead a separate life. Where genesis becomes sexual, the offspring resembles both parents, because it is a mixture of parts derived from two organisms, and necessarily developing afterwards as they developed.

Higher animals, starting with this common self-dividing habit of all protoplasm, have gone on developing under stress of natural selection, just as higher plants have done. They have hit out (independently, it would seem) the device of sexual reproduction; they have acquired advanced organs of locomotion, and they have grown into a vast variety of specialised forms. But to the last, the essence of reproduction remains in them the same as in the yeast cell, and differs insomuch from that of the true green plants. Denuded of accessories, the two types are these: plants accumulate material for fresh protoplasm by means of their

chlorophyll, under the influence of sunlight; and this manufactured protoplasm becomes the germ of new plant organisms. Animals accumulate material for fresh protoplasm by integrating into themselves the stores laid up by plants; and this stolen protoplasm becomes the germ of new animal organisms. Variation under the influence of the environment (in accordance with what Mr. Herbert Spencer calls "the instability of the homogeneous"), aided by natural selection, does all the rest.

In this necessarily brief sketch I have intentionally confined myself to what is most fundamental and essential in the nature of genesis, omitting all details of mere secondary importance. Especially have I touched very lightly on those later stages in the process of reproductive evolution whose philosophy has already been fully worked out by Mr. Darwin and Mr. Herbert Spencer My object has been simply to answer the question, "Why should there be such a thing as reproduction in plants and animals at all?"—not to answer the question, "Why should it assume such and such forms in such and such particular definite instances?" I have tried to fill up what seems to me a lacuna in the evolutionary system, and to show that if once we recognise the physical property of chlorophyll, whereby it lays up materials for its own renewal under the influence of solar energy, all the rest follows with deductive certainty as a matter of course. Given a grain of chlorophyll in a planet containing water and carbon dioxide, and supplied with radiant energy, and a world of plants and animals is a necessary result. The chlorophyll so circumstanced must of its own nature be fruitful and multiply, and replenish the earth. Differentiations must needs arise between its parts from time to time under stress of divergent circumstances. Natural selection must weed out the worse of these, and spare the better. And among the better must almost certainly be some which have acquired the fungoid habit, out of which the animal world is a natural evolutionary product.

THE MYSTERY OF BIRTH

I PROPOSE to investigate the central miracle of heredity. And, in doing so, I am going to try a flank movement against Weismann.

"But what can such light cavalry effect," you may ask, "against the embattled force of the mightiest biological general in Germany?" Well, I tremble indeed at my own audacity. I admit the improbability of any serious success. I feel at best like David, with three stones from the brook, coming forth to single combat with Goliath of Gath in all his panoply. And our modern Goliaths are armour-plated.

Yet it may sometimes happen that even the lightest cavalry, if it does nothing else, can effect a diversion. It can manage to draw off the opposing forces in a new direction. Or, to vary the metaphor, it may sometimes turn out that altering the venue a very little sets the facts in a new light before an unprejudiced jury. This is just what Weismann himself did in this very controversy on the nature of heredity. Before he intervened we were all of us asking, "*How* is transmission of acquired characters possible?" Weismann broke in with the prior question, "*Is* transmission of acquired characters possible?" He omitted the πῶς, and insisted on our

arguing first the ὅτι. We had all been inquiring what made this deep miracle of nature take place. Weismann nonplussed us by inquiring instead whether the miracle really took place at all. We said, "How strange that a single cell should be able to transmit, not merely all that the parental organism began by being, but also—so marvellous is its delicate receptivity—all that it learnt or became in the course of its history!" Weismann interposed with a sceptical "But does it?" That was a pertinent inquiry, which, sooner or later, had to be made; and he deserves our thanks, whatever becomes, in the end, of his continuity of germ-plasm, for having compelled us, once for all, to face it.

The side issue on which I wish now to concentrate attention is briefly this: Is not the real miracle the miracle of assimilation? Does not the plant or animal take up from the outer world unlike material, inorganic or organised, and manufacture it within itself into—what?—why, its own substance, its very self, generically, specifically, individually, and personally. And is not this essentially the very same wonder which the continuity of the germ-plasm was invented to obviate? If it can be shown that the individual organism makes, rebuilds, repairs, and renews *itself*, with all its acquired and adventitious characters, from external matter; if it can be shown that it tends to assume spontaneously by inner affinities, polarities—what metaphor you will (in other words, by complex physical and chemical actions)—its own individual and personal form, entire, with all its accidents and improvements, its memories and habits—is it not, then, a minor matter that certain detached fragments of it (call them buds or eggs, germ-cells or sperm-cells) should also possess the same power as the whole and all its component parts, of rebuilding its like, with all its acquired characters and properties? Is not Weismann in that case attempting to multiply entities *præter necessitatem* in introducing the idea of the continuity of the germ-plasm, in order to account for that which needs no more accounting for than the ordinary phenomena of growth and repair? Is he not treating as special and exceptional an act which goes really on all fours with every other act that happens in an organised body? Is he not inventing a particular theory to explain one single and unimportant manifestation of a universal tendency? These are the questions I desire, in all humility, to raise; and I shall endeavour to illustrate them rather by logical process than by any display of fresh or original biological knowledge.

In one word, I propose to throw back upon assimilation, in its widest sense, the burden of the mystery hitherto attached to the reproductive function. I do not pretend in any way to have solved that mystery; at best, I desire, by more clearly defining it, and fixing attention on the real central problem (as it seems to me), to bring it one step nearer the hope of a solution.

I fear I must begin with all the familiar old stock cases, in order to place them, as I trust, in a somewhat new light to the biological reader.

Vöchting, we all know, cut up a piece from the vigorous thallus of a *Lunularia vulgaris* with a sharp knife, on a smooth plate of cork, until the fragments were so small as to form a coarse-grained pulp, whose largest pieces did not much exceed a cubic millimètre. This pulp was then spread out on moist sand, and protected as far as possible from disturbing agencies. After some time young sprouts showed themselves in increasing numbers on the chopped pieces, till a forest of young fronds grew from the pulpy mass. Most of the particles, in fact, remained fresh, and were able to produce young sprouts. The unity of the organism is potentially contained in each single cell, as Vöchting thinks; and his experiments on willows even convinced him that if one could isolate a single uninjured cambium cell, that cell would doubtless be able to reproduce the whole organism.

I do not propose to enter at present into the implications of this case; and when I do so I shall try to look at it in exactly the opposite light to that in which it is regarded by Eimer and most other anti-Weismannites. For the moment I shall content myself with leading on to a few other equally familiar instances, which I mean to employ in the same way as aids to a fresh envisagement of the subject at issue. There is the famous example of *Begonia phyllomaniaca*, which, as Mr. Spencer observes, "habitually develops young plants from the scales of its stem and leaves—nay, many young plants are developed by a single scale." So, too, in *Malaxis paludosa*, an English marsh orchid, self-detached cells from the surface of the leaves give rise to new plants. A single leaf of the common yellow stonecrop, detached accidentally by a bird, roots and grows into a new organism. In short, very small portions of a vegetable organism constantly reproduce the entire plant, with all its peculiarities.

Now let us continue upwards this reverse process of the familiar argument, confining ourselves for the time being to the case of plants. How do these instances differ in essence from the ordinary instance of growth and assimilation? They simply mean that a plant grows continually as itself, not some other. You take a rose-cutting and place it in moist earth. It roots and grows. And what does it become? A pine tree?—a bramble? No; a rose, individually similar to the earlier rose from which you took it. Not only is it a rose-bush, but it is a Maréchal Niel or a Gloire de Dijon, as the case may be—exactly like its predecessor, of which it is a member. Continually taking in fresh carbon and nitrogen compounds from the air and the soil, it proceeds to manufacture them, not merely into starch, and protoplasm, and chlorophyll, but into that particular modification of protoplasm which is capable of forming the leaves, and flowers, and fruit, and peculiarities of a Maréchal Niel or a Gloire de Dijon.

What alternative have we, save to conclude that the chemical and physical constitution of that particular protoplasm and that particular chlorophyll is such that it must arrange itself, and all other similar matters that it comes across, under the influence of incident solar energy, and of the complex internal chemistry, into the particular form of a particular rose-bush, in all its individual traits and characteristics?

We go a step further. Year after year the leaves fall and die. The individual tree ceases often for a time to display externally the majority of its most marked and vital features. But next year it leaves again. The protoplasm within it once more forms the same sort of leaves and the same sort of flowers as in the previous season. And it retains from year to year its individual character. Year after year it goes on assimilating; year after year the same general features are produced with individual distinctness. The living material of the tree is of such a sort that it makes absolutely like itself, down to the minutest particular, all the non-organic bodies which it absorbs, decomposes, and synthesises again by means of its roots or its foliage.

I venture, then, to suggest that assimilation, in this wider sense—the making of the Not-Me into the Me, which takes place every day in the tissues of every plant on earth—lies at the root of the supposed mystery of genesis and heredity. I venture to suggest that when the Not-Me thus becomes the Me, the real miracle is wrought; and that, compared with this vast and deep-reaching miracle, the miracle of reproduction is but a minor detail. And when I say "miracle" I need hardly add I mean it, of course, in a strictly physical sense; I mean it as a symbolical term for an intricate problem of minute and subtle chemical or physical reactions, not yet deciphered, though capable in their nature of ultimate decipherment with increased knowledge.

Plants throw comparatively little light,

however, upon the Weismannic question of acquired character. The acquired characters of plants are small in number and difficult of ascertainment. It is when we come to animal life that we get a glimpse of the analogy which most helps us to understand the problem of the transmission of such acquired characters to descendants.

An amœba takes into its own body certain foreign organic substances, absorbs and alters some of them, and rejects the remainder. Now what does it do with those it absorbs? Well, as we say, it assimilates them. In other words, writ large, it makes them into amœba; actually into amœba, a part of itself. They were before some other form of protoplasm; they are now the form of protoplasm that makes up amœbæ. So far as we know, no distinction at all exists between the original and the acquired amœba-stuff. In point of fact, it is all acquired amœba-stuff; for it keeps breaking up into fresh masses, and forming new amœbæ as fast as ever it gains fresh material for doing so. There is no need here to distinguish between one sort of plasm and another. It is all amœba-plasm alike, taking up whatever it can get outside, and converting it within itself into more amœba-plasm.

How does it do it? What is the chemistry — what the physics of the change? That is a question we cannot yet answer. But what I insist on is that here, as it seems to me, the essential part of the reproductive process is really performed when non-amœba is converted all at once into amœba. If only we knew how that conversion is wrought, "we should know what God and what man is."

Amœba absorbs non-amœba, converts it into amœba, divides in half, and there are two amœbæ.

Take, at the opposite end of the scale, a higher animal, say man, if you will, for here we can instance familiar habits and psychological experiences. Your man eats food, say bread and beefsteak; and, after he has eaten it, it passes into his stomach and intestines, and is absorbed and assimilated. Now, I am not going to dogmatise about the precise change that comes over it when it passes from the Not-Me into the Me. I do not know, and I cannot tell whether anybody living knows, how or where this transformation is most completely effected. I will not try to follow it up through stomach and intestines, lymph and chyle, white or red corpuscles. All I can say is this: the food that went into William Evans's body as brown bread and beefsteak ceases sooner or later to be bread and beef, and becomes transformed into the formative material of William Evans, in all his parts and organs. It becomes, not merely human lymph or human blood, but European white man's lymph and blood, Welshman's blood, William Evans's blood, the identical formative and restorative material of William Evans. It circulates freely through William Evans's body, and rebuilds every part of it, not merely as mammal, as man, as Welshman, but personally and individually as William Evans. And when it does that, it performs, I think, the real miracle; of which the other embodiment, that William Evans's children are half himself and half his wife, Mary Evans's, is but a slight and unimportant corollary.

William Evans makes himself daily out of meal and mutton. *There* is the mystery.

Much has been made of the power of recrescence. A lobster is able to reproduce its lost claws; lizards their tails; newts their eyes; insects their legs; and snails their tentacles. And I do not deny that this is a singular and striking power. The organism seems to recover its complex totality in somewhat the same way as a crystal, plunged in its mother liquor, restores lost portions. But, after all, such occasional recrescence is nothing more than a special case of the normal repair that is going on daily and hourly in every organism. The point to which I wish here to direct attention is this—that the animal takes

in continually from without portions of the Not-Me, reduces them by assimilation to portions of the Me, components of its own structure, and then uses them up in all parts of the body to supply the wear and tear of every-day existence.

Nor is that all. These new materials preserve the memory of all the functional changes of the organism of which they form a part. Not only do they constantly rebuild William Evans in all his entirety, but they rebuild him with all the marks of his past history imprinted upon him. Every particle that once formed his body gets slowly replaced by other particles, which, however, keep up the continuity of the individual body, so that face and features, eyes and hair, retain to the end pretty much their original shape and colouring. More than that: the signs of function still remain; the memory of past acts is still present to the new and ever-renewed body. Go back to the place where you lived as a child, some twenty or thirty years after. Not a particle of the primitive You may now survive in your brain; but the You of to-day vividly recognises ten thousand spots, ten thousand objects, whose images were stamped on the You of twenty years ago. Wherein does this process differ from that of the crustacean which replaces its lost tail, or that of the rose bush, which from a single branch grows out again into the complete Gloire de Dijon? Is it not clear that assimilation turns the Not-Me, inorganic or vegetal, into the Me, vegetal or animal; turns it into the Me, generic, specific, individual, and personal; the Me of the now, with all the history of the past everywhere written upon it? Refrain from swimming for ten years, and then try the water once more; you will find the acquired power is still present in arms and legs, no actual living particle of which ever before performed any active work in swimming. From day to day, as it seems to me, the Not-Me is constantly becoming the Me, capable of building up every part of the organism, and of building it up, so to speak, up to date, with all the latest acquisitions and improvements included.

Why, then, need we call in a perfectly hypothetical continuous germ-plasm to do for the reproductive cell what the ordinary protoplasm of the body is daily doing for each portion of the organism? What do we gain by the concept? If it be admitted that one cell can reproduce a whole plant, apart from sexual genesis; and if it be admitted that a hydra polyp can be divided into four parts, as Trembley long since showed, each of which will grow out into a perfect hydra, why do we want a special explanation of the sexual mode of reproduction? Especially when we see that each plant and animal is itself, in ultimate analysis, a product of the Not-Me assimilated to the Me; and that it goes on producing and rebuilding the whole of the Me, with all its peculiar individual features. What, then, is the germ-plasm? Clearly, it, too, must ultimately be fed from the Not-Me, because it cannot possibly be capable of indefinite subdivision. What is it, then? So far as I can see, it can only differ from the ordinary somatic material in this—that it is a part of the organism specially kept apart for the bare purpose of asserting its "continuity" and transmitting to future organisms just that amount of individuality which it first received from its parents before it. But why should it do this? Why should it be so specialised for so useless and positively deleterious a purpose? Is it only in order that it may boast of its "continuity," and give Dr. Weismann an occasion for a theory? For we see that the ordinary body-plasm is capable of keeping up the continuity of the body and of rebuilding it, not only entire, but also with all its individuality, including the results of its functionally-acquired characters, down even to memory. Why, then, do not organisms use a portion of this common unspecialised body-plasm (as, indeed, they seem to do in the Begonia, the liverworts, the bulbils of tiger-lilies, and many other instances) for reproductive

purposes? The body-plasm, it seems to me, is capable of rebuilding the entire body, acquired characters and all; it contains them potentially; and to transmit these acquired characters, if it were found possible, would surely be an obvious advantage to the species—especially in the higher animals, where psychological acquisitions have become so very important. One would say, therefore, that even if a continuous germ-plasm existed in nature, natural selection would be sure, at least in the higher animals, to supplement this wasteful and clumsy method of reproduction, which took no heed of functional improvements, by an alternative system of reproduction from the body-plasm direct, which must be capable of acquiring and rebuilding afresh all new organs or modifications of organs. So that, even if continuity of germ-plasm once existed, one would expect it to be superseded in the higher animals by reproduction direct from the docile and, so to speak, photographic body-plasm.

But if we set aside for a moment the hypothetical germ-plasm, which is, after all, a mere biological figment, and consider the facts anew from our present standpoint, what do we find to be the simplest explanation of the phenomena of assimilation and genesis? Why, simply to throw all the burden of the work on the senior partner—assimilation—which we know to a certainty to be amply capable of it. Grant for a moment that individual qualities (not acquired during the individual life) are transmitted from parent to offspring. What is that but a particular case of the general fact—that every day the parent is taking material from the outer world, inorganic or organic, as the case may be, and converting that material in its own tissues by its own subtle chemistry into the various components of its own body? Suppose it is a plant. It may use up those materials, now assimilated and converted from the Not-Me into the Me, in building up new leaves and branches on its own stem; or it may use them up in dropping bulbils, or in sending forth runners, which root and develop into separate plants; or it may use them up in producing ovules and pollen, which, after sexual union, drop on the ground as seeds, and similarly grow into independent plantlets. The process in every case is one and similar. Suppose, again, it is an animal. It may use up those materials in rebuilding its eyes and its muscles or its nerves, after daily wear and tear; or in promoting the recrescence of some amputated part; or in the production of a germ-cell or sperm-cell, which, after sexual union with a similar cell, may grow afresh into a new organism, reproducing the main features of both its parents. If the assimilated materials are used up in reproducing lost parts or repairing waste of the parent body, they will carry with them the functionally-acquired characters of that body—a fact of which we have amply sufficient proof in the existence of memory, or, for the matter of that, of acquired functions and structures of any sort. These persist and are constant in the individual organism. The new material acquired by the body is capable of repairing and rebuilding them. Why not, then, also the germ-cell and sperm-cell? The Not-Me, when it becomes the Me, becomes the Me of the Now and the Here—the Me with all its acquired as well as all its inherited faculties. If it can rebuild the parent, why not also the offspring? If it can pass on the new faculties to the new bits of the body it is engaged in maintaining and repairing, why not also to the individually distinct body it is engaged in building up *de novo?*

"But how," you ask, "can a single little cell contain the potentiality of so many organs, so many faculties?" Ah, how, indeed? Yet we know that, so far as concerns the generic, specific, and individual characters, it actually does contain them; and what sensible addition is it to so strange a miracle to say the germ-cell also contains potentially

the functionally-acquired modifications? Shall we strain at a gnat after swallowing a camel? But, more than that, we know to a certainty that this identical miracle does take place—so far as concerns the parent body. The Not-Me, which, assimilated, becomes the Me, is actually so capable of rebuilding the body, generic, specific, individual, identical, with all its original and all its acquired peculiarities. Why, then, invent a continuous germ-plasm to do partially, and badly, for the offspring what the assimilated protoplasm does better and more fully for the original body?

In short, the question I wish to raise is this: Is there any real and essential difference between the transmission of functionally-acquired modifications to offspring, and their registration or persistence in the individual organism?

All which I respectfully submit, with the utmost diffidence, as a piece of bare philosophical thinking, to the kindly consideration of those who have a better right than I to a biological opinion.

A THINKING MACHINE

"THINGS marvellous there are many," says the Attic dramatist, "but among them all nought moves more truly marvellous than man." And, indeed, when one begins seriously to think it over, there is no machine in all the world one half, nay one millionth part, so extraordinary in its mode of action as the human brain. Minutely constructed, inscrutable in all its cranks and wheels, composed of numberless cells and batteries, all connected together by microscopically tiny telegraphic wires, and so designed (whether by superior intelligence or evolutionary art) that every portion of it answers sympathetically to some fact or energy of the external universe—the human brain defies the clumsy analysis of our carving-knife anatomists, and remains to this day a great unknown and almost unmapped region, the *terra incognita* of modern physiology. If you look into any one of the ordinary human machines, with its spokes and cogs, its springs and levers, you can see at once (at least, if you have a spark of native mechanical intelligence within you) how its various portions are meant to run together, and what is the result, the actual work, to be ultimately got out of it. But not the profoundest microscopist, not the acutest psychologist, not the most learned physiologist on earth, could possibly say, by inspecting a given little bit of the central nervous mechanism of humanity, why the excitation of this or that fragment of grey matter should give rise to the picture of a brown umbrella or the emotion of jealousy, why it should rather be connected with the comprehension of a mathematical problem than with the consciousness of pain or the memory of a grey-haired, military-looking gentleman whom we met three years ago at an hotel at Biarritz.

Merely to state these possible alternatives of the stimulation of a portion of the brain is sufficient to bring up vividly into view the enormous and almost inconceivable complexity of that wonderful natural mechanism. Imagine for a moment a machine so delicate that it is capable of yielding us the sensation of a strawberry ice, the æsthetic delight of a beautiful picture, the intellectual perception of the equality of the angles at the base of an isosceles triangle, the recollection of what we all said and did the day we went for that picnic to the Dolgelly waterfalls, the vague and

inconsistent dissolving views of a disturbed dream, the pain of toothache, and the delight at meeting once more an old friend who has returned from India. The very mention of such a complicated machinery, let alone the difficulty of its possession of consciousness, is enough to make the notion thus nakedly stated seem wild and absurd. Yet there the machine actually is, to answer bodily for its own possibility. You cannot cavil at the accomplished fact. It may be inconceivable, but at any rate it exists. Logic may demolish it; ridicule may explode it; metaphysics may explain it away; but, in spite of them all, it continues still imperturbably to be, and to perform the thousand and one incredible functions which argument conclusively and triumphantly demonstrates it can never compass. Call it materialism or what else you like, experimental physiology has now calmly demonstrated the irrefragable fact that on the brain, and on each of its parts, depends the whole of what we are and what we feel, what we see and what we suffer, what we believe and what we imagine. Everything that in our inmost souls we think of as *Us*, apart from that mere external burden, our body, is summed up in the functions and activity of a single marvellous and inscrutable organism, our human brain.

But though physiology can tell us very little as yet about how the brain does its work, it can nevertheless tell us something; and late researches have made such a difference in our way of looking at its mode of activity, and have so upset many current and very crudely materialistic errors, that it may perhaps be worth while briefly to state, in popular and comprehensible language, how the organ of thought envisages itself in actual working process to the most advanced among our modern physiological psychologists.

Let us begin first with the old-fashioned and, as we now believe, essentially mistaken view—the view which found its fullest and most grotesque outcome in the spurious science of so-called phrenology, but which still lingers on, more or less carefully disguised, among the "localisations" and "specific energies" of many respectable modern authorities.

According to this superficial view, overtly expressed or implicitly suggested in different cases, each cell and ganglion and twist of the brain had a special function and purpose of its own to subserve, and answered to a single special element of sensation or perception, intellect or emotion. In a certain little round mass of brain matter, in the part of the head devoted to language (if we push the theory to its extreme conclusion), must have been localised the one word "dog"; in the next little mass must have been localised "horse"; in the next, "camel"; in the next, again, "elephant," and so on *ad infinitum*. Here, a particular cell and fibre were entrusted with the memory of the visible orange; there, another similar little nervous element had to do with the recollection of the audible note *C* flat in the middle octave of a cottage piano. Thus reduced to its naked terms, of course, the theory sounds almost too obviously gross and ridiculous; but something like it, not quite so vividly realised or pushed so far into minute detail, was held not only by the old-fashioned phrenologists, but also by many modern and far more physiological mental philosophers.

When we come to look the question in the face, however, the mere number of cells[1] and fibres in the human brain, immense as it undoubtedly is, would surely never suffice for the almost infinite variety of perceptions and facts with which our memory alone (not to mention any other mental faculty) is so abundantly stored. Suppose, for example, we take merely the human beings, living or extinct, with whose names or personalities we are more or less fully acquainted, and try to give a cell or a fibre or a ganglion to each; how many cells or fibres or ganglia would be left

[1] Estimated at three thousand millions.—E. C.

unappropriated at the end of the enumeration for all the rest of animate or inanimate nature, and all the other facts or sensations with which we are perfectly familiar, to say nothing of emotions, volitions, pleasures, pains, and all the other minor elements of our complex being? Let us begin, by way of experiment, with Greek history alone, and try to distribute one separate nerve element apiece to Solon and Periander, to Themistocles and Aristides, to Herodotus and Thucydides, to Zeuxis and Pheidias, to Socrates and Plato, to Æschylus and Sophocles, to Aristides and Alexander, and so on straight through down to the very days of the Byzantine empire. Then let us begin afresh, and give a cell all round to the noble Romans of our happy school-days, Romulus and Remus (myth or reality matters little for our present purpose), the seven kings and the ten decemvirs, the Curtius who leaped into the gulf and the Scævola who burnt his hand off in the Etruscan fire, those terrible Scipios and those grim Gracchi, our enemy Horace with his friend Mæcenas, and so down through all the Cæsars to the second Romulus again, pretty much where we originally started. Once more, apply the same thing to English history, and allot a single brain element apiece to everybody we can remember, from Cerdic of Wessex to Queen Victoria, from Cædmon the poet, through Chaucer, Shakespeare, Milton, and Pope, to Tennyson, Swinburne, and Oscar Wilde—a cell each for all the statesmen, priests, fighters, writers, thinkers, doers, and miscellaneous nobodies whom we can possibly recall from the limbo of forgetfulness, from the days when Hengist and Horsa (alas! more myths) drove their symmetrical three keels ashore at Ebbsfleet, to the events recorded for our present edification in this evening's newspaper. (And observe in passing that, out of deference to advanced Teutonic scholarship, I have simply flung away Caractacus and Boadicea, Carausius and Allectus, and all the other vague and vaguely-remembered personalities of the earlier British and Romano-British history.) Why, by the time we had got through our historic personages alone, we should have but a very scanty remnant of places for the thousands and thousands of living individuals with whom each one of us must have come in contact, and each of whom seems to occupy a separate niche or distinct pigeon-hole in the endless archives of the particular memory.

And this is only a single small department of the possibly memorable, a mere specimen category out of an innumerable collection that might equally well have been adduced in evidence. Take the animal world, for example—the creatures themselves, and not their names—and look at the diversity of cats and dogs, goats and sheep, beetles and butterflies, soles and shrimps, that even the ordinary unlearned man knows and recognises, and mostly remembers. Narrow the question down to dogs alone, and still you get the same result. Consider the St. Bernards and the mastiffs, the pugs and the bull-dogs, the black-and-tans and the King Charlies, the sheep-dogs and the deer-hounds, the shivering little Italian greyhounds, and the long dachshunds that you buy by the yard. Every one of these, and countless others, has got to have its cell all to itself in the classificatory department of the human brain, and, I suppose, another cell for its name in the portion specially devoted to language also. Add to these the plants, flowers, fruits, roots, and other well-known vegetable products whose names are familiar to almost everybody, and what a total you have got at once! A good botanist, to take a more specific case, knows (in addition to a stock of general knowledge about equivalent, on the average, to anybody else's) the names and natures of hundreds and thousands of distinct plants, to say nothing about innumerable small peculiarities of stem, and leaf, and flower, and seed in every species and variety among them all. No, the mere bare

weight of dead fact with which everybody's memory is stored and laden defies the possibility of reckoning and pigeon-holing. Make your separate dockets ever so tiny, reduce them all to their smallest dimensions, and yet there will not be room for all of them in the human brain. The more we think on it the more will the wonder grow that one small head can carry all that the merest infant knows.

And now observe once more a still greater and more fatal difficulty. I have spoken throughout, after the manner of men, as though each separate object, or word, or idea, had a clearly-defined and limited individuality, and that it could be distinctly located and circumscribed by itself in a single solitary isolated cell of the nervous mechanism. But, in reality, the very terms I have been obliged to use in describing the matter have themselves contained the implicit condemnation of this crude, hard, and impossible materialistic conception. For no idea and no word is, as a matter of fact, so rigidly one and indivisible, like the French Republic. Take, for example, once more our old friend "dog," and let us confine our attention just now to the word alone, not to the ideas connoted by it. "Dog" is not one word; it is a whole group and set of words. There is, first of all, the audible sound, "dog," as it falls upon our ears when spoken by another. That is to say, there is, *imprimis*, "dog" auditory. Secondly, there is the muscular effort, "dog," as it frames itself upon our own lips and vocal organs when we say it aloud to another person. That is to say, there is, *secundo*, "dog" pronounceable. Thirdly, there is the written or printed word, "dog"—DOG—in capitals or minuscules, script, or Roman, or italic, as we recognise it visibly when seen with our eyes in book or letter. That is to say, there is, *tertio*, "dog" legible. Now, it is quite clear that each of these three distinct "dogs" is made up of separate elements, and cannot possibly be regarded as being located in a single cell or fibre alone. "Dog" auditory is made up of the audible consonantal sound D, the audible vowel sound aŭ or ŏ (unhappily, we have no universally recognised phonetic system), and the other audible consonantal sound G hard; in that precise order of sequence and no other. "Dog" pronounceable is made up of an effort of breath against tongue and teeth, producing the soft dental sound D, followed by an unimpeded vocalised breath, producing the audible vowel sound aŭ or ŏ, and closed by a stoppage of the tongue against the roof of the mouth, producing the soft palatal G. Finally, "dog" legible, in print at least, is composed of the separate symbols D and O and G, or d and o and g, or *d* and *o* and *g*. Yet all these distinct and unlike "dogs" would be unhesitatingly classed by most people under the head of language, and be located by phrenologists, with their clumsy, lumping glibness, in the imaginary "bump" thereto assigned, or by more modern physiologists (whose excellent scientific work I should be the last to undervalue) in the particular convolution of the left hemisphere found to be diseased in many cases of "atactic aphasia," or loss of speech.

How infinitely more complex and varied, then, is the idea of dog, for which all these heard, spoken, written, and printed dogs are but so many rough and incomplete symbols. For the idea of dog comprises the head thereof, and the tail, the four legs, the eyes, the mouth, the nose, the neck, the body, the toes, the hair, the bark, the bite, the canine teeth that inflict it, and all the other known and remembered peculiarities of perfect doghood as ideally realisable. If we are to assign, peradventure, a special tract in the brain to the concept dog, it must be clear at once that that tract will be itself a very large and much-subdivided region. For it must include all the separate visible attributes of the dog in general; and also it must contain as sub-species in subordination to it every kind of known dog, not only

those already enumerated, but also the Eskimo dog, the Pomeranian, the French poodle, the turnspit, the Australian dingo, the Cuban bloodhound, the Gordon setter, and so forth through every other form of dog the particular possessor of that individual brain has ever seen, cognised, or heard of. Is it not clear that, on the hypothesis of such definite and distinct localisation, dog-tract alone ought to monopolise a region about one-sixth as big every way as our whole assignable provision of brain surface?

Moreover, about this point we seem to be getting ourselves into a sad muddle. For we have next to remember our own private dog—Grip, let us call him, or, if you prefer it, Prince or Ponto. Now, I suppose, his name, viewed as a name, will be localised in the language department of our particular brain, and will there be arranged under the general heading of proper names, division dog-names. But there must be some intimate cross-connection between the cell or cells representing the audible and pronounceable name Grip, or the letters G, R, I, P, and the cell or cells which have to do with the idea dog, and also, I imagine, with the name dog; for both the word Grip is intimately connected in my mind with the words "my dog," and the idea Grip is intimately connected in that same humble empirical subjectivity with the idea of dog in general. In fact, I cannot think of Grip without thinking at once of his visible appearance, his personal name, and his essential dogginess of name and nature. Grip is to me a symbol, primarily, of some dog or other, and secondarily, or more particularly, of my dog. But whether Grip and Ponto are arranged and pigeon-holed in cells next door to one another, as being both by name dogs; or whether one is arranged under G, as in a dictionary, and the other under P (just after Pontius, for example, and just before Pontus Euxinus, both of which form distinct component elements of my verbal memory), I cannot imagine. At each step in the effort to realise this wooden sort of localisation, is it not clear that we are sinking deeper and deeper into a bottomless slough of utter inconceivability?

Once more (and this shall be my last attempt to point out the absurdity of the extreme cell-theory), what are we to make of the case of a man who knows more than one language? Take, for example, the word *chien*. Here, in one direction, all the associations and connections of idea are exactly the same as in the word *dog*. If I happen to be speaking English, I say, "It's a dog"; if I happen to be speaking French, I say, "C'est un chien"; and in both cases with just about the same idea in my mind. The picture called up by the one word is exactly the same, in most respects, as the picture called up by the other. Yet not precisely. If I write Paris, so, the notion immediately aroused in the reader's mind is that of a white and glaring brand-new city across the Channel where we all go to waste our hard-earned money at periodical intervals. But if, in the preceding line, I had happened to talk of Priam and Helen, the idea called up by that self-same combination of one capital letter and four small ones would have been a wholly different one, of an idyllic shepherd, as in Tennyson's *Œnone*, or of a handsome scamp, as in (Homer's) *Iliad*. If I write "baker," everybody knows I mean the man who supplies hot rolls for breakfast; but if I write "Baker," everybody is aware that I allude to Sir Samuel or to his brother the Pacha. Now, this alternative possibility is even worse in the case of *chien*. For, if I am talking French, the sight of a particular animal which usually calls up to my lips the word "dog" calls up instead the totally different word *chien*. And if the subject in hand is philology, while dog immediately suggests to me the curious practical falling out of our language of the primitive word hund—hound—now only applied to a special class of dogs, and the substitution for it

of a Scandinavian and Dutch root not found in Anglo-Saxon, *chien* immediately suggests to me its ultimate derivation from its original *canis*, and the habitual change of *c* before *a* into *ch* in the passage of words into French from Latin. By this time I think the reader (with his usual acuteness) will begin to perceive into what a hopeless network of cross-connections and crooked combinations we have managed to get ourselves in our search after the definitely localisable.

How, then, does the mechanism of the brain really act? I believe the true answer to this question is the one most fully given by M. Ribot, and never yet completely accepted by English psychologists. It acts, for the most part, as a whole; or, at least, even the simplest idea or mental act of any sort is a complex of processes involving the most enormously varied brain elements. Instead of dog being located somewhere in one particular cell of the brain, dog is an idea—audible, visible, legible, pronounceable—requiring for different modes of its perception or production the co-operation of an enormous number of separate cells, fibres, and ganglia.

Let us take an illustration from a kindred case. How clumsy and awkward a supposition it would be if we were to imagine there was a muscle of dancing, and a muscle of walking, and a muscle of rowing, and a muscle of cricketing, and a muscle for the special practice of the noble art of lawn tennis. Dancing is not a single act; it is a complex series of co-ordinated movements, implying for its proper performance the action of almost all the muscles of the body in different proportions, and in relatively fixed amounts and manners. Even a waltz is complicated enough; but when we come to a quadrille or a set of lancers everybody can see at once that the figure consists of so many steps forward and so many back; of a bow here, and a twirl there; of hands now extended both together, and now held out one at a time in rapid succession; and so forth throughout all the long and complicated series. A quadrille, in short, is not a name for one act, for a single movement of a single muscle, but for many acts of the whole organism, all arranged in a fixed sequence.

It is just the same with the simplest act of mental perception. Orange, for example, is not the name of a single impression; it is the name of a vast complex of impressions, all or most of which are present to consciousness in the actuality whenever we see an orange, and a great many of which are present in the idea whenever we remember or think of an orange. It is the name of a rather soft yellow fruit, round in shape, with a thick rind, white inside, and possessing a characteristic taste and odour; a fruit divisible into several angular juicy segments, with cells inside, and with pips of a recognised size and shape—and so forth, *ad infinitum*. In the act of perceiving an orange we exercise a number of separate nerves of sight, smell, taste, and feeling, and their connected organs in the brain as well. In the act of thinking about or remembering an orange we exercise more faintly a considerable number of these nerves and central organs, though not, of course, all distinctly or all together; otherwise, our mental picture of an orange would be as vivid and all-embracing as the sight of the actual orange itself.

Now, the name orange calls up more or less definitely the picture of several among these separate qualities. But it does not call them all up; indeed, the word in itself may not perhaps call up any of them. For instance, in the phrase, the Prince of Orange, where identical symbols meet the eye, I do not think of the fruit at all; I think, according to circumstances and context, either of William III. of blessed memory, or of the eldest son of the present King of the Netherlands, whose memory (in Paris especially) is somewhat more doubtful. An orangeman and an orange-woman are not, as one might innocently

imagine, correlative terms. Even without this accidental ambiguity, derived from the name of the town of Orange on the Rhone, the word "orange" need not necessarily connote anything more than the colour by itself; as when we say that Miss Terry's dress was a deep yellow or almost orange. Nay, when we actually mean the fruit in person, not the tree, flower, or colour, the picture called up will be very different according to the nature of the phrase in which the word occurs. For if I am talking about ordering dessert, the picture in my mind is that of five yellow fruits, piled up pyramid-wise on a tall centre-dish; whereas, if I am talking to a botanical friend, my impression is rather that of a cross-section through a succulent fruit (known technically as a hesperidium), and displaying a certain familiar arrangement of cells, dissepiments, placentas, and seeds. In short, the word "orange," instead of being a single unity, localisable in a single ganglion, represents a vast complex, of which now these elements are uppermost in consciousness and now those, but which seems to demand for its full realisation an immense co-operation of very diverse and numerous brain organs.

Every thought, even the simplest, involves for its production the united or associated action of a vast mass of separate brain cells and separate brain fibres. One thought differs from another dynamically rather than statically. It differs as running differs from dancing—not because different muscles are employed, but because the same muscles are employed in a different manner.

Trains of thought are, therefore, like a quadrille. One set of exercises is followed by another, which it at once suggests or sets in motion.

Of course, I do not mean to deny that every cell and fibre in the brain has its own particular use and function, any more than I would deny that each particular muscle in the body is intended to pull a particular bone or to move a particular definite organ. But what I do mean is that each such separate function is really elementary or analytical: its object is to assist in forming a conception or idea, not to contain, as it were, a whole conception ready made. Chinese symbols stand each for an entire word, and it takes thousands of them to make up a language; alphabetical letters stand each not for a word, but for an elementary sound or component of a word, and twenty-six of them do (very badly, it is true) for all the needs of our mother English. Just so, each cell or fibre in the brain does not stand for a particular word or a particular idea, but for some element of sensation or memory or feeling that goes to make up the special word or idea in question. Horse is made up of five letters, or of four phonetic letters; it is made up also of a certain form and size and colour and mode of motion; and when we speak of it all these elements are more or less vaguely present to our consciousness, coalescing into a sort of indefinite picture, and calling up one another more or less symbolically.

This theory at first sight seems to make the explanation of memory far more difficult and abstruse than formerly. For on the old hypothesis (never, perhaps, fully pushed to its extreme in realisable thought by any sensible person) it seemed easy enough to say that every act of perception and every fact learnt was the establishment of a line of communication between two or more distinct cells or ganglia in the brain, and that the communication, once fairly established, persisted pretty constantly ever afterwards. I am told "Shakespeare was born at Stratford-on-Avon"; and forthwith, cell Shakespeare (or Shakspere, or Shakspear, etc.) has a line run from it to cell birth and cell Stratford-on-Avon (a pretty complex one indeed, this last), which line remains from that day forward permeable to any similar exercise of nervous energy. This method is undeniably simple, neat, and effective. But, setting aside the difficulty of realising that any one tract of the brain

can possibly hold our whole vast mental picture of Shakespeare or of Stratford-on-Avon (especially if we have ever read the one or visited the other), there is the grotesque difficulty of the innumerable lines and cross-connections of association. A central telephone station would be the merest child's play to it. For even so simple a word and idea as gooseberry is capable of arousing an infinite number of ideas and emotions. It may lead us at once to the old garden in the home of our childhood, or to the gooseberry-fool we ate yesterday; it may suggest the notion of playing gooseberry, or the big gooseberry of the newspaper paragraph; it may lead to etymological dissertation on its derivation from gooseberry, allied to north country grosers and French groseille, or it may summon up visions of bad champagne, incidentally leading to the Vicar of Wakefield, and the famous wine manufactured only by Mrs. Primrose. In fact, I have no hesitation at all in expressing my private opinion that, if the chart of the brain were at all like what most people imagine it to be, the associations of the word gooseberry alone would suffice to give good and solid employment to every fibre, cell, and convolution it anywhere possesses.

On the other hand, if we regard the brain as mainly dynamical, as an organism capable of very varied combinations of action, we can easily see, not only how memory becomes possible, but also how such infinite variations of association are rendered conceivable. For if every thought or perception is, as it were, an organised tremor in a vast group of diverse nerve-elements, often, indeed, in almost all together, it is simple enough to understand how these tremors may fall into regular rhythms, may excite one another in regular successions, may get habitual, just as the steps do in dancing, or the movements of the hand in writing a familiar and well-remembered formula—for example, in signing one's name. Here, in this immense and minutely-organised workshop, we have a constant succession of motions in wheels and gearing, so arranged that each motion may be communicated in a thousand directions, and what is apparently a single impetus may call up the most diverse and extraordinary results. But in reality the impetus is not single; for when we are thinking of horse in one way, we have a certain fixed form of movement called up; while, if we are thinking of it in another way, the form called up, though analogous in many respects, is far, indeed, from being identical. When I write "nice" you think of something or other vaguely pleasant; but when I write "Nice" the very pronunciation is altered into something very like "niece," and the picture that rises before your mind is the very definite one of the Promenade des Anglais, with its long line of white villas and stunted palm-trees, bounded by the blue horizon of the Mediterranean and the beautiful slopes of the coast towards Villefranche. It is just the same with the apples and the oranges. The elements of the picture vary incessantly; and while one combination now suggests one association, another combination another time suggests a second. The elements join together in an infinite variety of ways, and so a finite number of cells and fibres enable us to build up all the wealth of thought, just as twenty-six tiny symbols allow us to express all the wonderful conceptions of Milton and all the beautiful ideas of Shelley. There are only fifty-two cards in a pack, it is true; but no two games of whist ever yet played, in all probability, were absolutely identical.

To sum it all up: it is the brain as a whole that thinks, and feels, and desires, and imagines, just as it is the body as a whole that walks, and swims, and digs, and dances. To locate, say, the faculty of language in a particular convolution of a particular hemisphere is almost as absurd, it seems to me, as to locate, say, the faculty of writing in the last joint of the right forefinger. Convolution and forefinger may be absolutely essential or

indispensable for the proper performance of speech or writing, but to say that is not to say that the function in question is there localised. The brain as a whole is the organ of mind, but there is no organ for the word Canonbury or for the proper perception of a Mrs. Pollock geranium.

THE CAUSE OF CHARACTER

It may be taken for granted that almost everybody has a character, be the same more or less, good, bad, or indifferent, as the case may be. The exception, in fact, need only be made in favour of imbecile persons and idiots, who usually possess no character at all to speak of, or whose character is, at least, of a decidedly negative and uninteresting variety. Even those good people whom the uncompromising Scotch law describes with charming conciseness as "furious or fatuous," and delivers over to the cognisance of their "proximate agnate," must needs possess at least so much of character as is implied in the mere fact of their furiousness or their fatuity, as circumstances may determine. And furthermore, roughly speaking, no two of these characters are ever absolutely identical. The range of idiosyncrasy is practically infinite. Just as out of two eyes, one nose, a single mouth, and a chin with the appendages thereof, hirsute or otherwise, the whole vast variety of human faces can be built up, with no two exactly alike; so, out of a few main mental traits variously combined in diverse fashions, the whole vast variety of human character can be mixed and compounded to an almost infinite extent. To be sure, there are some large classes of mankind so utterly commonplace and similar that, from a casual acquaintance, it is hard to distinguish the individuality of one of them from that of the other; just as there are large classes of typical faces, such as the Hodge, the 'Arry, the Jemimer Ann, and the Mrs. Brown, which appear at first sight absolutely identical. But when you come to know the Hodges and the 'Arries personally, you find that, as one Hodge differs slightly from another in countenance, so do even they differ slightly from one another in traits of character and intellectual faculty. No two human beings on this earth—not even twins—are ever so utterly and absolutely alike that those who have known them familiarly for years fail to distinguish one from the other.

The problem of this difference of idiosyncrasy, indeed, is one so intimately bound up with all our ideas of our own origin and nature that it well deserves a few minutes' consideration at the hands of the impartial psychological philosopher. It has for each of us a personal interest and importance as well; for each of us wishes naturally to know how and why he happened to come by his own charming and admirable character. Yet, unhappily, while there is no subject on earth so interesting as ourselves (the one theme on which "all men are fluent and none agreeable"), there is none upon which the views and opinions of other people appear to us all so lamentably shallow and lacking in insight. They talk about us, forsooth, exactly as if—well, exactly as if we were other people. They bluntly ignore those delicate and subtle distinctions of idiosyncrasy which raise each of us, viewed with his own introspective eyeglass, into a class by himself, infinitely superior to the rest of creation.

Let us see how far we can gain any light from the doctrine of heredity on

this curious question of the origin of character.

If a white man marries a negress, their children, boys and girls alike, are all mulattos. Let us make to ourselves no illusions or mistakes upon this score; each one is simply and solely a pure mulatto, exactly halfway in colour, feature, hair, and stature, between his father's race and his mother's. People who have not lived in a mixed community of blacks and whites often ignore or misunderstand this fundamental fact of hereditary philosophy; they imagine that one of the children of such a marriage may be light brown, and another dark brown; one almost white, and one almost black; that the resulting strains may, to a great extent, be mingled indefinitely and in varying proportions. Not a bit of it. A mulatto is a mulatto, and a quadroon is a quadroon, with just one-half and one-fourth of negro blood respectively; and anybody who has once lived in an ex-slave-owning country can pick out the proportion of black or white elements in any particular brown person he meets with as much accuracy as the stud-book shows in recording the pedigree of famous race-horses. Black and white produce mulattos—all mulattos alike, to a shade of identity; mulatto and white produce quadroon—all quadroon and no mistake about it; mulatto and black produce sambo; quadroon and white give us octoroon; and so forth *ad infinitum*. After the third cross persistently in either direction, the strain of which less than one-eighth persists becomes at last practically indistinguishable, and the child is "white by law," or "black by law," as the case may be, without the faintest mark of its slight opposite intermixture. I speak here of facts which I have carefully examined at first hand; all the nonsensical talk about finger-nails and knuckles, and persistence of the negro type for ever, is pure unmitigated slave-owning prejudice. The child of an octoroon by a white man is simply white; and no acuteness on earth, no scrutiny conceivable, would ever discover the one-sixteenth share of black blood by any possible test save documentary evidence.

Here, then, we have a clear, physical, and almost mathematically demonstrable case, showing that, so far as regards bodily peculiarities at least, the child is on the average just equally compounded of traits derived from both its parents. Among hundreds and hundreds of mulatto and quadroon children whom I have observed, I have never known a single genuine instance to the contrary. Heredity comes out exactly true; you get just as much of each colour in every case as you would naturally expect to do from a mixture of given proportions. In other words, all mulattos are recognisably different from all quadroons, and all quadroons from all octoroons or all sambos.

This simple fact, I venture to think, gives us at once the real key to the whole complex problem of idiosyncrasy and character. Every child on the average represents one-half its father and one-half its mother. It is a Jones in this, and in that a Robinson. Here it takes after its grandfather the earl, and there it resembles its grandmother the washerwoman. These traits it derives from the distinguished De Montmorencies, and those from the family of the late lamented Mr. Peace the burglar. But, on the whole, however diversely and curiously the various individual peculiarities may be compounded, it is at bottom a Robinson-Jones, a complex of all its converging strains, its diverse noble and ignoble ancestors. It represents a cumulative effect of antecedent causes, all of which it shares equally on the average with every one of its brothers and sisters.

How does it happen, then, suggests the easy objector, that two brothers or two sisters, born of the same father and mother, twins it may even be, "are often more unlike each other in character and mental qualities than any two ordinary strangers"? Well, the answer simply is, it doesn't happen. Make sure of your

facts before you begin to philosophise upon them. Children of the same parents are always very much like one another in all essential fundamentals; they may differ a good deal among themselves, but their differences are really and truly as nothing compared with the vast complexity of their resemblances. The case of twins, in fact, is a peculiarly unfortunate one to allege in this respect, for Mr. Galton has collected an immense mass of evidence tending to show that just as twins usually resemble one another, almost indistinguishably, in face and feature, so do they resemble one another almost as narrowly in character and intellect. I know an instance myself of two twin sisters, one of whom has lived all her life in England, and the other in India, but who, in spite of this difference in circumstances, preserve so entirely their original identity of form and nature that I do not myself in the least discriminate between them in any way, mentally or physically, though they happen to be members of my own family. It does not at all matter to me whether it was Polly who said a thing or Lucy. I regard it in either case as a simple expression of the Polly-Lucian shade of character. This is the rule in nine cases out of ten; twins are all but absolutely identical.

Still, there is such a thing as idiosyncrasy, and the reason for its existence is a very simple one. Each separate human being, it is true, is, on the average, an equal compound of his father and his mother, his grandfathers and grandmothers, but not necessarily, or even probably, the same compound. Suppose you take a lot of red and white ivory billiard balls—say a thousand—and cast them down upon the surface of the billiard-board. Let five hundred be red and five hundred white; then every time the total result will be in one sense the same, while in another sense it will be quite different. For there will always be five hundred of each, but the arrangement will never be exactly identical; each throw will give you a new combination of the balls—a combination which will often put a totally different aspect upon the entire picture. Now, in the case of a human being, you deal with infinitely more subtle factors, combined in infinitely more subtle fashions. Father and mother have each in their being myriads of traits, both mental and physical, any one of which may equally happen to be handed down to any of their children. And the traits handed down from each may not happen to be by any means always the same in the same family. Though each child resembles equally, on the average, both father and mother, yet this child may resemble the father in this, and that child in that; each may combine in any possible complexity of intermixture traits derived from either at random.

Here, for example, are an English father with light hair and blue eyes; a Spanish mother with black locks, an iris dark as night, and a full, olive-coloured, southern complexion. Clearly the children may differ indefinitely in appearance, some with darker eyes, some with lighter; some, as men, may grow dark-brown beards, and some may have black whiskers and hazel eyes, and clear, half-Spanish, dusky skin. One may have wavy hair like the mother, yet almost as light in hue as the father's; another may have it rather straight, but dark. Similarly, too, with the features. The forehead and chin may resemble the father, the nose and mouth may rather approximate to the maternal pattern. So, at least, we often say in our folly; but, in reality, when we come to examine closely, we see that no single feature, even, owes everything absolutely to one parent only. Those dark eyes may, indeed, be Spanish in colour, with a gleam of bull-fighting in their cruel depths, but they are set in the head after an English pattern, and have an English solidity of Philistine hardness. That pretty little nose may have much of the father in the bridge and the tip, but do not you catch faint hints of the mother,

too, in the quivering nostril and the expanded wings? The chin recalls an Andalusian type, to be sure, but the tiny fold of flesh beneath foreshadows the fat double crease of later life derived from that old burly Lincolnshire grandfather. And so on throughout. Not a feature of the face that is not true at bottom, in one point or another, to both its ancestries; not a shade of expression that does not recall in varying degrees some mingled traits of either parent.

The number of possible traits, then, is so immense, and the modes of their possible combination so infinite, that no two people, not even twins, ever come out exactly similar. Box and Cox are twain, not one; the Corsican Brothers are known as a pair to their intimate circle. Nevertheless, brothers and sisters do, on the whole, closely resemble one another, and this we, all of us, instinctively recognise whenever we talk of a family likeness. These family likenesses are almost always far stronger, both in mind and body, than members of the incriminated family itself ever care at all to recognise. It often happens, for instance, that Fred and Reginald fail to perceive the faintest resemblance between their sisters Maud and Edith. But a stranger, looking through the family album (poor victimised martyr!), says to Fred, as he comes upon one of their photographs: "I'm quite sure that's one of your sisters; but which is it, Miss Maud or Miss Edith?" Nay, I have even known a father himself mistake a portrait of Maud for Edith. The photograph obscured some external difference of tint or complexion, and, therefore, brought out in stronger relief the underlying similarity of feature and expression. It must have happened to most men to be mistaken for their own brothers by people who had never seen them before, though they themselves, looking complacently in the truth-telling glass, can hardly imagine how anyone on earth could take them for such a fellow as Tom or Theodore. Tom's so very much plainer than they are, and Theodore looks so infinitely less gentlemanly. All round, in short, families resemble one another, and it is only after a considerable acquaintance with their minuter details that strangers really begin accurately to distinguish certain of their members. To themselves the differences mask the likeness, to outsiders the likenesses mask the difference.

It is just the same, be sure, in mental matters. There are family characters and family intelligences, as there are family faces and family figures. Each individual member of the brood has his own variety of this typical character, but in all its basis is more or less persistent, though any one particular trait, even the most marked, may be wanting, or actually replaced by its exact opposite. Still, viewing the family idiosyncrasies as a whole, each member is pretty sure to possess a very considerable number of peculiarities more or less in common with all the remainder. True, Jane may be passionate while Emily is sulky; Dick may be a spendthrift, while Thomas is a miser. But Jane and Dick are both humorous, Emily and Thomas both musical, Thomas and Dick both sensitive, Emily and Jane both sentimental, and all four of them alike vindictive, alike intelligent, alike satirical, and alike fond of pets and animals. Look at the persistent Tennysonian tone in Charles and Alfred Tennyson; look at the parodying power of the two Smiths in *Rejected Addresses;* look at the Caracci, the Rossettis, the Herschels, and then say whether even minute touches of taste and sentiment do not come out alike in brothers and sisters. Almost everybody who meets brothers or sisters or cousins of his own after a long separation (when use has not dulled his apprehension of the facts) must have noticed, with mingled amusement and dissatisfaction, in ten thousand little ways and sayings how very closely he and they resemble one another. Sometimes the very catchwords and phrases they use, their pet aversions and their pet sympathies, turn out at every twist of life to be

absurdly identical. One may even be made aware of one's own unsuspected and unobtrusive failings by observing them, as in a mirror, in the minds of one's relations, like King George's middy in Mr. Gilbert's story, who meets himself on an enchanted island, and considers his double the most disagreeable fellow he ever came across.

Why is it, then, that most people will not admit their own essential unity and identity of character with their brothers and their sisters, their cousins and their aunts? Vanity, vanity, pure human vanity, is at the bottom of all their violent reluctance. Every man flatters himself at heart that he possesses an immense number of admirable traits not to be found in any other and inferior members of his own family. Those spurious imitations may indeed resemble him somewhat in the rough, as coarse pottery resembles eggshell porcelain; but they lack that delicacy, that refinement, that native grace and finishing touch of character which distinguish Himself, the cream and flower of his entire kindred, from all the rest of a doubtless worthy but very inferior family. I fancy I see you now—you, even you, my excellent critic—with that graceful cynical smile of yours playing lambent upon your intellectual upper lip, while you loll at your ease in your club armchair, and murmur to yourself complacently as you read: "The idea of identifying *me* with my brother Tom, for instance! Me, a cultivated, intelligent, university man, with that stolid, stupid Philistine sugar-broker! If only I'd his wealth, how differently I'd use it! The notion's simply too ridiculous! Why, I'm worth a dozen of him!" My dear sir, believe me, at this very moment your brother Tom, glancing hastily through the pages of the present paper in an interval of relaxation on his way home by Metropolitan Railway from his lair in the city, is observing with a corresponding calm smile of superiority to himself: "Ha, ha, what an absurd idea of this magazine fellow, to tell me I'm no better than my brother Jack, that briefless barrister! Jack, indeed, in the name of all that's ridiculous! If only, now, I'd had his advantages and his education—sent to Rugby and Oxford for the best years of his life, while I was stuck at seventeen into a broker's office to shift for myself and pick up my own living! And yet, what has my native talent and industry enabled me to do? Here am I at barely fifty a wealthy citizen, in spite of all my disadvantages, while he, poor idle dog, has never been able to secure as much as a brief, with all his learning! I'm fifty per cent. a better man than he is!" Vanity of vanities, saith the preacher, all is vanity.

The fact is, if we want impartially to discuss this question of characters we must each leave our own supernaturally beautiful character out of the question, and think only of the vastly inferior and ordinary characters of other people. We mustn't even allege striking instances from the history of our sisters, our cousins, and our aunts, because there, on the one hand, our calm sense of the excellence of the stock from which we ourselves are the final flower and topmost outcome is apt to prejudice our better judgment, while, on the other hand, our natural contempt for the gross shortcomings of our near relations under such closely similar circumstances, when compared with our own virtues and strong points, is liable to beget in us too lordly a superciliousness towards their obvious failings. It is best entirely to dismiss from consideration all the persons standing to ourselves within the list of prohibited degrees set forth in the Prayer Book, to abstain from too fond an affection for our grandmother, and to concentrate our attention wholly on the persons of that common vulgar herd of outsiders falling as aforesaid under the contemptible category of other people.

Examined from this impartial and objective point of view, then, other families beside our own show us at once how much light may be cast upon the origin of character by the study of

fathers and mothers, brothers and sisters, first and second cousins, and so forth indefinitely. Mr. Galton's exhaustive paper upon the habits and manners of the common twin is an admirable example of the precise results that may be obtained by such minute and accurate objective study of hereditary peculiarities. For it must always be remembered that two brothers ought by nature to resemble one another far more closely than father and son. People often wonder why such-and-such a great man's son should not be a great man also; they ought, if logical, rather to ask why his brothers and sisters were not all of them equally great men and women. I will not insult the intelligence of the reader by pointing out to him why this should be—why the father's traits in such a case should be diluted just one half by the equal intermixture derived from the mother. For the same reason, of course, two sisters ought by nature to resemble one another far more closely than mother and daughter. Again, a son ought on the average to resemble his father in character somewhat more closely than he resembles his mother, because in the one case the identity of sex will cause certain necessary approximations, and in the other case the diversity of sex will cause certain necessary divergencies. The barber in Leech's picture explains his young customer's defective whiskers on the ground that he probably "took after his ma!" but experience shows that in such matters men usually "take after their pa" instead. Once more, for a similar reason two brothers will tend to resemble one another, time and again, somewhat more closely than a brother and a sister. Furthermore, the two elder children and the two younger will tend to resemble one another more, as a rule, than the eldest resembles the youngest, and for a very sufficient reason, because all the habits and constitution of the two parents are liable to change from time to time, and especially after a long interval of years. Hence it will follow by parity of reasoning that two brothers or two sisters, born twins, will tend to resemble one another on the average far more intimately than do any two other members even of the same family. The rationale of this is clear. They are both the children of the one father and the one mother, they are both of the same sex, and they are both born at the same time, and therefore under exactly the same conditions of age, health, habit, and constitution on the part of both parents.

Here, then, we have a crucial instance by which we may test the physical and psychical correctness of this our general *a priori* principle. If character results in the way I say it does—if it is a product of the interaction of two independent sets of factors, derived equally on the whole from father and mother—then it will follow that, mentally and physically, twins will far more closely resemble one another than ordinary brothers and sisters do. Now, does the case of twins bear out in actual facts this debated deductive conclusion? Common experience tells us that it does, and Mr. Galton has supplemented that fallible and hasty guide by the most rigorous inductive collection of instances. The result of his investigation is simply this, that many twins do actually behave under similar circumstances in almost identical manners, that their characters often come as close to one another as it is possible for the characters of two human beings to come, and that even where the conditions of later life have been extremely different the original likeness of type often persists to the very end, in spite of superficial variations in style or habit of living. Some of his stories, carefully verified, are very funny. I will supplement them by two of my own. In one case a couple of twins (men) had a quarrel over a perfectly unimportant matter. They came to very high words, and parted from one another in bad blood. On returning to their rooms—they lived apart—each of them suffered from a fit of remorse, and sat down to

write a letter of contrition to the other, to be delivered by the morning post. After writing it one brother read his letter over, and, recalling the cause of quarrel, added at once a long postscript, justifying himself, and reopening the whole question at issue. The other brother posted his note at once, but, thinking the matter over quietly, afterwards regretted his action again, and supplemented it by a second palinodia, almost unsaying what he had said in the first one. I saw all three letters myself the next morning, and was simply amazed at their absolute sameness of feeling and expression.

The other story relates to a fact which happened, not to twins, but to two successive brothers extremely like one another in build and feature, and evidently modelled in mind and character on the self-same mould. It is only a small incident, but, as I can vouch for the correctness of the minute details, it has a certain psychological interest of its own. They met a lady dressed in blue, whom they had never seen before, at a military dance. Each of them asked at once to be introduced to her at first sight; each asked the same officer for an introduction (though they had several friends in common present); each described her in the same way, not as "the lady in blue" (the most obvious point of appearance about her), but as "the lady with the beautiful ears"; each fell desperately in love with her offhand; and each asked her for a particular flower out of a little bouquet containing four or five more conspicuous blossoms. Finally, each came up at the end of the evening to confide in the same married lady of their acquaintance their desire to see more of the beautiful stranger. Now, small as are all these little coincidences, they nevertheless show, to my mind, a more profound identity of mental fibre than far larger and more important matters of life could do. For on great emergencies, or in the great affairs of one's conduct, it is only natural that somewhat similar characters, being governed by the same general emotions, should act on the whole very much alike; while often, on the other hand, a particular difference will make the action of similar characters at a special crisis extremely divergent. Thus the two Newmans, essentially the same in fibre, both re-examining their creed at a certain epoch of life, follow out their own logical conclusions with rigorous precision, one to Free Thought, the other to the Cardinalate—so that outsiders would be apt to say at first sight, "What a striking difference between two brothers!" But the exact identity of tastes and preferences shown in these minute touches of feeling—the choice of an introducer, the phrase about the ears, the selection of a particular flower (it was not even a violet, which might occur to anybody, but a spray of plumbago, in itself quite without sentimental interest), and the unburdening of mind to a particular confidante—all these things abundantly testify to an underlying similarity of mental structure, down to the merest side-tracts and by-ways of the brain, which could hardly happen under any other conceivable circumstances than those of actual family identity.

Still, even twins do distinctly differ in some things from one another. However much they may look alike to strangers, they are always discriminable by those who know them well, and even in early childhood by mothers and nurses. The babies who have to be distinguished by red and blue ribbons tied round their wrists, and who finally get mixed up at wash, so that the rightful heir is hopelessly muddled with the wrongful, and the junior by ten minutes preferred to his senior, belong only to the realm of the novelist; and even there we have always the well-known mark on the left shoulder to fall back upon, which invariably proves the genuine title-deed to the family estates and the hand of the heroine. But, in real life, Huppim may always be readily

distinguished from Muppim by some slight divergence of feature or expression; Huz is always a trifle fatter or thinner than Buz his brother; the two Dromios and the two Antipholuses may deceive the outer public by their close resemblance, but not even Shakespeare himself can make us believe that Mrs. Antipholus was really mistaken as to the personal identity of her own husband. I do not want to be too hard on a lady, but I fancy, myself, she was glad of the excuse for a little innocent and easily explicable flirtation with an agreeable stranger.

Yes, everybody has a character and an idiosyncrasy different in many points from everybody else's. Not even twins, who come closest together of all humanity, merge their individuality absolutely into mere replicas one of the other. Such utter identity is quite impossible in the human family. And the reason, I think, is simply this: the infinite number of separate traits possessed by each human being is too immensely incalculable ever to admit of any two throws, however near, producing precisely the same resultant. I do not doubt that there may be snails or jelly-fish built absolutely on the same pattern in every particular, mental or physical; though, even there, the man that knows them well is often astonished at the way in which one snail differs from another in aspect, or one jelly-fish differs from another in character and intellect. But while the papa snail and the mamma snail are distinguishable in a few traits only, discoverable by none but the close observer, the papa and mamma among human beings are distinguishable by ten thousand diverse peculiarities, mental and physical, all of them obvious to the veriest outsider. Each child is, as it were, a meeting-place and battle-field for these diverse paternal and maternal tendencies. It must resemble one or other in every fibre of every feature; it cannot possibly resemble both exactly in those points in which they conspicuously differ. Hence the resultant is, so to speak, a compromise or accommodation between the two; and the chances of the compromise being ever absolutely equal in any two cases are practically none. You might throw down the letters of the alphabet which compose *Paradise Lost* for ever and ever, but you would never get even one line by accident in the exact order that Milton wrote it. In the struggle for life between each unit or cell that goes to make up brain and face and nerve and muscle, here the father conquers, and there the mother, and yonder a truce is struck between them; but that any two among the children should ever represent exactly the same result of the desperate struggle is so infinitely improbable as to be practically impossible.

One last word as to the difficulty which some observers doubtless find in making this theory fit in with the facts as they observe them. While writing this paper I paused in the midst, laid down my pen, and went from my study into the adjoining room for an intercalary cup of five o'clock tea with the members of my family. (After all, we are all vertebrate animals and human beings; why attempt to conceal the fact out of consideration for the dignity of literature?) The talk turned, as it often does turn under such circumstances, on the subject about which I had just been writing. I expounded these my views on the origin of character to the attentive ears of a critical domestic audience. To my utter dismay and discomfiture, I found that they of mine own household were firmly opposed to me. "Why," said the person who of all others on earth ought to back me up most surely in my worst heresies, "look at So-and-so and So-and-so! You know they are twins; and yet how utterly unlike one another they are in character!" Now, will you believe me, as it so happened, So-and-so and So-and-so were two of the very cases on which I most relied in my own mind when making some of my present generalisations about twins and their identity! This, of course,

conclusively shows that people sometimes differ in opinion. Some of us see differences more acutely, and some of us likenesses. To some of us the So-and-so family are all alike as two peas; while to others of us there is absolutely nothing common to all of them. Depend upon it, neither side is right; the So-and-so's are in some ways very much alike, and yet in other ways very different. The family face and the family character run pretty impartially through them all; but each wears it in his own fashion and with his own special combination of peculiarities. One side has a keen eye for the resemblances; the other has a keen eye for the differences. Mr. Galton's method, by taking the mean of many observations, effectually gets rid, so far as possible, of this little natural "personal equation."

A single example will make this matter clearer than pages of abstract argument could make it. One of the instances I cited above was that of two brothers so identical in fibre that each did exactly the same thing, at times, with exactly the same minute touches of feeling and expression. They recognised the absolute identity themselves; it was often to them a cause of some laughter, and not infrequently of some confusion and suspicion also. Each knew a trifle too well what the other was likely to do and think of. Yet I have on paper a letter from one of their acquaintances, saying, in so many words, "James has been staying here for some weeks; we like him very much, indeed, but oh how different he is from *our* Mr. Trois Etoiles!" Now the fact is, that was probably the judgment of everyone everywhere who knew them both only superficially. The younger brother, whom I have ventured here to call James, because James is a good solid Christian name, implying honest industry and business ability, had been put to work at his father's occupation early in life, and was known to most men as a quiet, sober, steady-going man of affairs. The elder brother, whom I will christen Percy, because the name Percy has a fine literary flavour about it, and suggests either Shelley or the reputed author of Aytoun's *Firmilian*, according to the taste and fancy of the reader, had been sent, as the heir of the house, to Cambridge, and, having there acquired the habit of literature, took to journalism and other reprehensible pursuits, and sank at last into a confirmed scribbler. The world at large always said that Percy was a very clever fellow, while that man James had absolutely nothing at all in him. His entire interest was absorbed in the tea trade. We who knew them both well, however, could clearly discern that the mere difference of position and education masked in James the very characteristics that were plainly developed and abnormally nurtured in his brother Percy. And Percy often said to me in confidence, after eleven o'clock at night, as we sat together over our glass of whiskey toddy, "If James had only been sent to Cambridge, he'd have been a deal cleverer fellow than I am." It may have been rude of me, but I always agreed myself with Percy.

WHAT IS THE OBJECT OF LIFE?

FROM the modern evolutionary point of view, the very question "What do we live for?" becomes, when abstractly regarded, in itself superfluous and meaningless. For it implies that everything has an object or purpose; implies, in fact, the old, exploded dogmatic fallacy that the cosmos has been constructed upon a definite plan and with a deliberate design, instead of being merely, as we now know it to be, the inevitable outcome of unconscious energies. In order to see the true futility of the naked question we need only ask ourselves the exactly analogous and parallel question, "What is the object of the nebula in Orion?" or "What do the satellites of Saturn revolve for?" The obvious answer is, that Orion's nebula and Saturn's moons exist where they are, and act as they do act, not for any profound and hidden cosmical purpose, but simply because, in the ceaseless redistribution of matter and motion which constitutes the process of evolution, those particular masses of cosmic material were so conditioned as regards environing forces and energies that they had to move in such or such particular curves or orbits, and in no other. There is no *why* in the case at all; there is merely the fact, with nothing else behind it.

To suppose otherwise is to fall implicitly into anthropomorphic and anthropocentric error. It is to figure to one's self the universe as an objective totality, worked upon from without by a vast and idealised quasi-human artificer and designer, who moulds and models every part and detail of his work with special reference to its preordained place in his projected scheme of a cosmical system. Those who think in this manner think anthropomorphically; they accept that conception of the outer world which Herbert Spencer well describes as the "carpenter theory of creation." More than that, they think anthropocentrically as well. For this whole idea of an object for everything in the universe has been imported into the wider fields of thought—into astronomy, for example, and into ontology—from the theological explanations usually given of small difficulties in the practical life of human beings. "What is the use of earwigs?" people ask, taking for granted that earwigs and everything else must have a use; and by a use implicitly meaning to say, a definite purpose of good for the human species. Darwinism, however, has conclusively taught us that in this sense nothing is useful; the earwig exists for itself alone; every species of plant or animal is adapted solely for its own good, and fills no place or subserves no purpose (save incidentally) in the life of any other species whatever, the human included. The seeds of wheat are not for us to feed upon, but to perpetuate the kind of the parent wheat plant. The fur of the ermine is not for us to make judges' robes of, but to keep the ermine himself snug and warm, and to enable him to steal unperceived upon his prey in the white snowfields of a northern winter. We know now that every part of every plant and every animal is designed, not to subserve any function "in the wider economy of nature" (which always means, on human lips, with ultimate reference to some purely human want), but to subserve the needs and functions of the species itself to which it belongs, and no other.

Life as a whole, therefore, has no object, any more than the revolution of the planets has an object, or the double refraction of Iceland spar, or the particular flow of the back currents that swirl and eddy below the spray of Niagara. All these things are the necessary outcome of pre-existent conditions; their laws of sequence and causation can be

investigated and proved; but the idea of an object as applied to them is philosophically inadmissible; for an object implies a person who designs, a person who overcomes particular difficulties in the raw material on which he works, by some particular and cunning arrangement of its parts and organs. But the power which underlies the universe works on very different lines indeed from these. We only degrade it to our own puny level of handicraft by conceiving of it (to use Paley's famous analogy) as we conceive of a watchmaker making a watch. Life is merely one particular set of correlated movements occurring under the influence of solar radiation, in a certain peculiar group of material bodies on the surface of one small and unimportant planet, in a minor solar system, hidden away on the skirts of a galaxy in some lost corner of a boundless cosmos. Why on earth should it have a purpose to subserve any more than the bubbles that rise and fall aimlessly on the wave, or the terrific commotions that rend and revolutionise the sun's photosphere?

Nor does human life, so far as science can tell us, fall under any different category. The human race is one of the most advanced groups of terrestrial mammals, and, therefore, a highly evolved final outcome of kinetic energy, falling upon the aqueous and gaseous envelopes of this particular earth's surface. But, viewed abstractly, it cannot have any special purpose to subserve in the scheme of the universe, any more than the fungus of the vine-disease, or the maidenhair fern, or the little green aphides that feed upon our rose-bushes; because, first of all, the universe has no scheme; and, further, man is only a result of just the same local causes in a petty satellite as all the rest of the living creatures yet known to us. Pushed to its very furthest term, the idea of a purpose necessarily implies that the cosmos was made by a sort of glorified great Man, and that he made it all for the ultimate benefit of the lesser men, created in his own image, who occupy a fragment of dry land in one of the tiniest and most insignificant of its component bodies. The question of the object of life really descends to us from a time when men did not in the least realise their own absolute and utter smallness in the hierarchy of nature. They thought the universe was made for them, as implicitly as the London cockroach still believes that London was built in order to afford a convenient home, in its well-warmed kitchens, for myriads of sleek and well-fed cockroaches.

So much for the abstract view of the question. Life as a whole, and human life in particular, can have no object at all, looked at from outside, as component factors in that vast assemblage of atoms and energies that we call the cosmos. No more has the sun; no more has the milky way; no more has the little wingless parasite that lives between the close and jointed armour of the honey-bee. But, looked at from inside, as a question of mere personal conduct, life has, of course, an object of some sort for each individual person; and in so far as the race is made up of individuals, the average object of all put together may be looked upon as the object of the entire aggregate.

Can we find any such objects common to the vast mass of individuals? Perhaps not. Two only seem to be fairly universal, and those two are, to a large extent, unconscious. They are, first, self-preservation; and, secondly, race-preservation, as shown in the production and care of children.

I know this is an unfamiliar view, but it is one forced upon us by biological considerations. Every species of plant or animal knows, as a species, but one main desire—specific continuation. This desire produces two effects—devices for the preservation of the individual, and devices for the due production and culture of new generations. The sole purpose of humanity, as such, therefore, seems to be its own continuous perpetuation. And, in effect, who can doubt that

such is really the main central object of our race? If we view humanity from outside, as objectively given to us in the street, the shop, the house, the factory, do we not see it forever striving simply, through its millionfold embodiments, for daily bread for itself and its children? Is not hunger the most imperative stimulus of the species, and, after hunger, the need for warmth, for fuel, for clothing? Supply these needs, and what comes next? The instinctive impulse to take to one's self a wife and family. Every man's first want in life is self-maintenance; that attained, his next want is marriage and children. The profoundest ingrained feelings of the race are the feelings that prompt, first, to the preservation of the individual life; next, to the perpetuation and propagation of the species. To some extent, indeed, the last aim, which is the most important for the race as a whole, outweighs the first one; for parents are frequently ready to sacrifice themselves on behalf of their children; and in our existing industrial state a vast number of parents do, more or less completely, so sacrifice themselves, by working harder, longer, and more continuously than is at all desirable from the point of view of individual preservation alone.

"But these two aims, the main central aims of the human species, are not, for the most part, consciously present to men at all, as an integral portion of their object in life." No, certainly not. They are innate and inherent, not reasoned and deliberate—physiological, not psychological. The question whether life is worth living is a question which nature, blind, dumb nature, never posits definitely to herself. If she did, it could have no effect upon her. Suppose a certain number of living beings—say the whole human race—to have thoroughly convinced themselves of the pessimistic position, to be quite certain of the undesirability of existence; and, in pursuance of that conscious bit of ratiocination, to set aside all the instinctive love of life, and to commit one great unanimous holocaust of universal suicide—what would be the consequence? Why, simply that the next highest remaining animals would go on, under stress of circumstances, evolving to something much like the human condition, and that history would, on the whole, pretty well repeat itself, barring the minor details of special incidents. The creatures that were not rational enough to kill themselves out and extinguish their race would go on living, and would do so just in virtue of these instinctive "objects of life" which underlie all our conscious wishes and preferences. Men live, in the main, not for the objects that make life "worth living," but for the blind instincts and innate impulses they can never get rid of.

Nevertheless, there are purposes in life which seem (fallaciously enough) to the reasoning minority among us to constitute the sufficient ground (if any) for continued existence. Why do we not all commit suicide? That is, in fact, the real inquiry which veils itself under all the nebulous current pessimistic questioning as to the use and value and import of life. The answers are various—various in the degree of human idiosyncrasy. The vast majority do not commit suicide because they are restrained from it by pure instinct. The natural clinging to life is far too strong for them. And, indeed, if it comes to that, they have never even asked themselves the question, "What do I live for?" Furthermore, they are mostly of opinion that suicide (or death generally, for that matter) does not really terminate existence. They believe they would be jumping, only too literally, out of the frying-pan into the fire. Of the remainder, the cultivated and educated minority, some are, no doubt, more or less optimistic by nature; admitting the world to be (for us) far from perfect, they are prepared, at any rate, to make the best of it. That is, perhaps, all things considered, about the sanest and wisest philosophy left us. The final

residuum, the pessimists pure and simple, remain alive because it is so very troublesome and difficult to commit suicide. Besides, they always want to do something or other special tomorrow. The plot-interest of life is sufficient to deter them. Usually it takes the form of wife and children, acquired, no doubt, before the duty of checking the multiplication of the human race became quite apparent to their emancipated understandings.

But if human life has in this very restricted sense any general object at all —any conscious object present as a rule to the mind of the individual—that object is undoubtedly happiness, and happiness may be approximately defined as a decided surplus of personal pleasure over personal pain. In the species as a whole, no such object is primarily inherent; race-preservation is its sole generic aim and purpose. But inasmuch as pleasure, on the whole, roughly coincides with race-preservative activities, and pain, on the whole, roughly coincides with race-destructive activities (as I have endeavoured to show in *Physiological Æsthetics*), it follows that these two apparently distinct objects, the unconscious generic aim, and the conscious individual aim, are at bottom practically almost identical. In other words, what to the race is preservative instinct is to the individual, in nine cases out of ten, the conscious pursuit of his own happiness.

His own happiness I say advisedly, but not necessarily to the exclusion of the happiness of others. Quite the contrary: even in the lowest races some regard for the happiness of wives and offspring enters into the concept of happiness for the individual, and among the higher outcomes of the highest races pleasure for others has become a necessary element in pleasure for self. One cannot yet say that in humanity as a whole the object of life, as consciously apprehended, includes the idea of equal happiness for all, but an approximation is ever being made in that direction. Misery for others, especially when brought home to us, suffices to make most members of the higher races thoroughly miserable, and the tendency is always to minimise as far as possible such misery, and to equalise as far as possible all available means of pleasure. Such a consummation—the socialistic and Christian ideal—is continually retarded by the as yet unconquered selfishness of the mass of men, and it is also at least retarded equally by the existing bad social arrangements and the blind conservatism of even well-meaning and philanthropic people. But as an ideal goal, realised already by the chosen few of all nations, we may say that the aim and object of human life in its entirety, apart from the conflicting aims and objects of its several component elements, is the greatest total happiness of all, consistent with the equal individual happiness of each separately.

In our present confessedly imperfect moral state this ideal goal is recognised by only very few; it is aimed at, it must be feared, by fewer still. The actual object of life, as conceived by the vast majority of existing human beings, is the enjoyment of mere selfish personal pleasure and the avoidance of threatened personal pain, with very little regard at all to the imagined pleasures or pains of others. And so far as mankind in the lump can be said now to live for anything in particular, outside the instinctively guarded aim of race-preservation, such purely selfish and personal happiness is the real object that most of them live for. Even in the worst cases, however, it is slightly tempered by the thin end of the altruistic wedge, which necessarily comes in, no matter how imperfectly, with the first introduction of the wife and children.

PRACTICAL RELIGION

If you were to ask almost any intelligent and unsophisticated child who had not read *Robert Elsmere*, "What is religion?" he would answer offhand, with the clear vision of youth: "Oh, its saying your prayers, and reading your Bible, and singing hymns, and going to church, don't you know, on Sundays." If you were to ask any intelligent and unsophisticated Hindu peasant the same question, he would answer in almost the self-same spirit: "Oh, it's doing poojah regularly, and paying your dues every day to Mahadeo." If you were to ask any simple-minded African savage, he would similarly reply: "It's giving the gods flour, and oil, and native beer, and goat-mutton." And, finally, if you were to ask a devout Italian contadino, he would instantly say: "It's offering up candles and prayers to the Madonna, attending mass, and remembering the saints on every festa."

And they would all be quite right. This, in its essence, is precisely what we call religion. Apart from the special refinements of the higher minds in particular cults or creeds, which strive to import into it all, according to their special tastes or fancies, a larger or smaller dose of philosophy, or of metaphysics, or of ethics, or of mysticism, this is just what religion means and has always meant to the vast majority of the human species. What is common to it throughout is custom or practice; a certain set of more or less similar observances; propitiation, prayer, praise, offerings; the request for divine favours, the deprecation of divine anger or other misfortunes; and, as the outward and visible adjuncts of all these, the altar, the sacrifice, the temple, the church, priesthood, services, vestments, ceremonial.

What is not at all essential to religion in its wider aspect—taking the world round, both past and present, Pagan, Buddhist, Mohammedan, Christian, savage, and civilised—is the ethical element, properly so-called. And what is very little essential, indeed, is the philosophical element, theology or mythology, the abstract theory of spiritual existences. This theory, to be sure, is in each country or race closely related with religion under certain aspects; and the stories told about the gods or God are much mixed up with the cult in the minds of worshippers; but they are no proper part of religion, strictly so-called. In a single word, I contend that religion, as such, is essentially practical; theology or mythology, as such, is essentially theoretical.

Moreover, I also believe, and shall attempt to show, that the two have to a large extent distinct origins and roots; that the union between them is in great part adventitious; and that, therefore, to account for or explain the one is by no means equivalent to accounting for and explaining the other.

Frank recognition of this difference of origin between religion and mythology would, I imagine, largely reconcile the two conflicting schools of thought which at present divide opinion between them on this interesting problem in the evolution of human ideas. On the one side, we have the mythological school of interpreters, whether narrowly linguistic, like Professor Max Müller, or broadly anthropological, like Mr. Andrew Lang, attacking the problem from the point of view of myth or theory alone. On the other side, we have the truly religious school of interpreters, like Mr. Herbert Spencer, and to some extent Mr. Tylor, attacking the problem from the point of view of practice or real religion. The former school, it seems to me, has failed to perceive that what it is accounting for is not the origin of religion at all—of

worship, which is the central-root idea of all religious observance, or of the temple, the altar, the priest, and the offering, which are its outer expression —but merely the origin of myth or fable, the mass of story and legend about various beings, real or imaginary, human or divine, which naturally grows up in every naïve community. The latter school, on the other hand, while correctly interpreting the origin of all that is essential and central in religion, have perhaps under-estimated the value of their opponents' work through regarding it as really opposed to their own, instead of accepting what part of it may be true in the light of a contribution to an independent but allied branch of the same inquiry.

In short, if the view here suggested be correct, Spencer and Tylor have paved the way to a true theory of the origin of religion. Max Müller, Lang, and the other mythologists have thrown out hints of varying value towards a true theory of the origin of mythology, or of its more modern equivalent and successor, theology.

A brief outline of facts will serve to bring into clearer relief this view of religion as essentially practical—a set of observances, rendered inevitable by the primitive data of human psychology. It will then be seen that what is fundamental and essential in religion is the body of practices, remaining throughout all stages of human development the same, or nearly the same, in spite of changes of mythological or theological theory; and that what is accidental and variable is the particular verbal explanation or philosophical reason assigned for the diverse rites and ceremonies.

In its simplest surviving savage type, religion consists wholly and solely in certain acts of deference paid by the living to the ghosts of the dead. I shall try to show in the sequel that down to its most highly evolved modern type in the most cultivated societies, precisely similar acts of deference, either directly to ghosts as such, or indirectly to gods who were once ghosts, or were developed from ghosts, form its essence still. But to begin with, I will try to bring a few simple instances of the precise nature of religion in its lowest existing savage mode.

I might, if I chose, take my little collection of illustrative facts from some theoretical writer, like Mr. Herbert Spencer, who has collected enough instances in all conscience to prove this point, but I prefer to go straight to an original observer of savage life and habit, a Presbyterian missionary in Central Africa—the Rev. Duff Macdonald, author of *Africana*—who had abundant opportunities at the Blantyre Mission for learning the ideas and practice of the natives, and who certainly had no theoretic predisposition towards ultimately resolving all religious notions into the primitive respect and reverence for the worship of ancestors.

Here, in outline, but in Mr. Macdonald's own very words, are the ideas and observances which this careful and accurate investigator found current among the tribes of the heart of Africa. "I do not think," he says, "I have admitted any point of importance without having heard at least four natives on the subject. The statements are translations, as far as possible, from the *ipsissima verba* of the negroes."

The tribes he lived among "are unanimous in saying that there is something beyond the body which they call spirit. Every human body at death is forsaken by this spirit." That is the universal primitive belief, whose necessary genesis has been so well traced out by Mr. Herbert Spencer, and more recently in America with great vigour and clearness by Mr. Lester Ward.

"Do these spirits ever die?" Mr. Macdonald asks. "Some," he answers,

> I have heard affirm that it is possible for a troublesome spirit to be killed. Others give this a direct denial. Many, like Kumpama, of Cherasulo, say: "You ask me whether a man's spirit ever dies. I

cannot tell. I have never been in the spirit world, but this I am certain of, that spirits live for a very long time."

On the question, "Who the gods are?" Mr. Macdonald says:

In all our translations of Scripture where we found the word God we used *Mulungu*, but this word is chiefly used by the natives as a general name for spirit. The spirit of a deceased man is called his Mulungu, and all the prayers and offerings of the living are presented to such spirits of the dead. It is here that we find the great centre of the native religion. The spirits of the dead are the gods of the living.

Where are these gods found? At the grave? No. The villagers shrink from yonder gloomy place that lies far beyond their fields on the bleak mountain side. It is only when they have to lay another sleeper beside his forefathers that they will go there. Their god is not the body in the grave, but the spirit, and they seek this spirit at the place where their departed kinsman last lived among them. It is the great tree at the verandah of the dead man's house that is their temple, and if no tree grow here they erect a little shade, and there perform their simple rites. If this spot become too public, the offerings may be defiled, and the sanctuary will be removed to a carefully selected spot under some beautiful tree. Very frequently a man presents an offering at the top of his own bed beside his head. He wishes his god to come to him and whisper in his ear as he sleeps.

And here, again, we get the origin of nature-worship:—

The spirit of an old chief may have a whole mountain for his residence, but he dwells chiefly on the cloudy summit. There he sits to receive the worship of his votaries, and to send down the refreshing showers in answer to their prayers.

Almost as essential to religion as these prime factors in its evolution—the god, worship, offerings, presents, holy places, temples—is the existence of a priesthood. Here is how the Central Africans arrive at that special function:—

A certain amount of etiquette is observed in approaching the gods. In no case can a little boy or girl approach these deities, neither can anyone that has not been at the mysteries. The common qualification is that a person has attained a certain age, about twelve or fourteen years, and has a house of his own. Slaves seldom pray, except when they have had a dream. Children that have had a dream tell their mother, who approaches the deity on their behalf. (A present for the god is necessary, and the slave or child may not have it.)

Apart from the case of dreams and a few such private matters, it is not usual for anyone to approach the gods except the chief of the village. He is the recognised high priest who presents prayers and offerings on behalf of all that live in his village. If the chief is from home his wife will act; and if both are absent, his younger brother. The natives worship not so much individually as in villages or communities. Their religion is more a public than a private matter.

But there are also further reasons why priests are necessary. Relationship forms always a good ground for intercession. A mediator is needed.

"The chief of a village," says Mr. Macdonald,

has another title to the priesthood. It is his relatives that are the village gods. Everyone that lives in the village recognises these gods, but if anyone remove to another village he changes his gods. He recognises now the gods of his new chief. One wishing to pray to the god (or gods) of any village naturally desires to have his prayers presented through the village chief, because the latter is nearly related to the village god, and may be expected to be better listened to than a stranger.

A little further on Mr. Macdonald says:—

On the subject of the village gods opinions differ. Some say that everyone in the village, whether a relative of the chief or not, must worship the forefathers of the chief. Others say that a person not related to the chief must worship his own forefathers, otherwise their spirits will bring trouble upon him. To reconcile these authorities we may mention that nearly everyone in the village is related to its chief, or, if not related, is, in courtesy, considered so.

Any person not related to the village chief would be polite enough on all public occasions to recognise the village god; on occasions of private prayer (which are not so numerous as in Christendom) he would approach the spirits of his own forefathers.

Besides, there might be a god of the land. The chief Kapeni prays to his own relatives, and also to the old gods of the place. His own relatives he approaches himself, the other deities he may also approach himself; but he often finds people more closely related, and consequently more acceptable, to the old gods of the land.

The African pantheon is thus widely peopled. Elimination and natural selection next give one the transition from the ghost to the god, properly so called.

Ordinary ghosts are soon forgotten with the generation that knew them. Not so a few select spirits—the Cæsars and Napoleons, the Charlemagnes and Timurs of savage empires.

A great chief that has been successful in his wars does not pass out of memory so soon. He may become the god of a mountain or a lake, and may receive homage as a local deity long after his own descendants have been driven from the spot. When there is a supplication for rain the inhabitants of the country pray not so much to their own forefathers as to the god of yonder mountain on whose shoulders the great rain clouds repose. (Smaller hills are seldom honoured with a deity.)

Well, in all this we get, it seems to me, the very essentials and universals of religion generally—the things without which no religion would exist—the vital part, without the ever-varying and changeable additions of mere gossiping mythology. In the presents brought to the dead man's grave to appease the ghost, we have the central element of all worship, the practical key of all cults, past or present. On the other hand, I have just re-read carefully, for the purpose of comparison, my friend Mr. Andrew Lang's *Myth, Ritual, and Religion*, in order to see if I could find in it anywhere any light thrown by mythology on these, the eternal and immutable factors of religious practice. I found in it none. There is much learning, many strange myths, great comparison of stories spread all the world over, a profusion of knowledge about the tales which Greeks told of Halcyon or Deucalion, and which Maoris tell of Maui and Tani, but not one word, from beginning to end, that helps one to explain the origin of worship, prayer, sacrifices, altars, temples, churches, praise, adoration. In short, in spite of its name, that able work appears to me to contain a great deal about myth, very little about ritual, and hardly anything at all about true religion.[1]

Now, mythology is a very interesting study in its own way, and Mr. Lang has done excellent work in rescuing it from the clutches of the solar faddists; but to treat as religion a mass of stories and legends about gods or saints, with hardly a single living element of practice or sacrifice, seems to me simply to confuse two totally distinct branches of human inquiry. The origin of tales has nothing at all to do with the origin of worship.

In Mr. Macdonald's account of a native funeral, after describing the deposit of articles belonging to the deceased chief, he goes on to say:

If the deceased owned several slaves, an enormous hole is dug for a grave. The slaves are now brought forward. They may be either cast into the pit alive or the undertakers may cut all their throats. The body of their master or their mistress is then laid down to rest above theirs, and the grave is covered in.

After this the women come forward with the offerings of food, and place it at the head of the grave. The dishes in which the food was brought are left behind. The pot that held the drinking water of the deceased and his drinking-cup are also left with him. These, too,

[1] Exception may be made in favour of a few scattered passages about the worship of unhewn stones (i., 274), and about human sacrifices and other really religious exercises.

> might be coveted by the witch, but a hole is pierced in the pot, and the drinking-calabash is broken.
>
> The man has now gone from the society of the living, and he is expected to share the meal thus left at his grave with those that have gone before him. The funeral party breaks up; they do not want to visit the grave of their friend again without a very good reason. Anyone found among the graves may be taken for a cannibal. Their friend has become a citizen of a different village; he is with all his relatives of the past. He is entitled to offerings or presents which may come to him individually or through his chief. These offerings, in most cases, he will share with others, just as he used to do when alive.

Sometimes the man may be buried in his own hut:—

> In this case the house is not taken down, but is generally covered with cloth, and the verandah becomes the place for presenting offerings. His old house thus becomes a kind of temple..... The deceased is now in the spirit world, and receives offerings and adoration. He is addressed as "Our great spirit that has gone before." He has now a certain power over the lives and destinies of his surviving relatives. If anyone dream of him, it is at once concluded that the spirit is "up to something." Very likely he wants to have some of the survivors for his companions. The dreamer hastens to appease the spirit by an offering.

So real is this society of the dead that Mr. Macdonald says:—

> The practice of sending messengers to the world beyond the grave is found on the West Coast. A chief summons a slave, delivers to him a message, and then cuts off his head. If the chief forget anything that he wanted to say, he sends another slave as a postscript.

I have quoted at such length from this recent and extremely able work because I want to bring into strong relief the fact that we have here going on under our very eyes, from day to day, *de novo*, the entire genesis of new gods and goddesses, and of all that is most central and essential to religion—worship, the temple, the altar, sacrifice. Nothing that the mythologists can tell us about—the Dawn, or the Storm-cloud, or Little Red Riding Hood, or Cinderella and the Glass Slipper—comes anywhere near the Origin of Religion in these its central and universal elements. Those stories, or guesses, may be of immense interest and importance as contributions to the history of ideas in our race; but nothing we can learn about the savage survival in the myth of Cupid and Psyche, or about the primitive cosmology in the myth of the children of Kronos, helps us to get one inch nearer the origin of prayer, of worship, of religious ceremonial, of the temple, the church, the sacrifice, the mass, or any other component part of what we really know as religion in its essence. Those myths may be sometimes philosophic guesses, sometimes primitive folk-tales, but they certainly are not the truths of religion. On the other hand, the living facts, here so simply detailed by a careful, accurate, and unassuming observer, strengthened by the hundreds of other similar facts collected by Tylor, Spencer, and others, do help us at once to understand the origin of the central core and kernel of religion as universally practised all the world over.

For, omitting for the present the mythological and cosmological factor, which so often comes in to obscure the plain religious facts in missionary narrative or highly-coloured European accounts of native religions, what do we really find as the underlying truths of religion? That all the world over practices essentially similar to those of these savage Central Africans prevail among mankind—practices whose affiliation upon the same primitive ideas has been abundantly proved by Mr. Herbert Spencer; practices which have for their essence the propitiation or adulation of a spiritual being or beings, derived from ghosts, and conceived of as similar, in all except the greatness of the connoted attributes, to the souls of men. "Whenever the [Indian] villagers are questioned

about their creed," says Sir William Hunter, "the same answer is invariably given: 'The common people have no idea of religion, but to do right [ceremonially] and to worship the village god.'"

In short, I maintain that religion is not mainly, as the mistaken analogy of Christian usage makes us erroneously call it, Faith or Creed, but simply and solely Ceremony, Custom, or Practice.

If one looks at the vast mass of the world, ancient and modern, it is quite clear that religion consists, and has always consisted, of observances essentially similar to those just described among the Central African tribes. Its core is worship. The religion of China is to this day almost entirely one of pure ancestor cult. The making of offerings and burning of joss-paper before the family dead form its principal ceremonies. In India, while the three great gods of the mystical Brahmanist philosophy are hardly worshipped in actual practice at all, every community and every house has its own particular gods and its own special cult of its little domestic altar.

> The first Englishman [says Sir William Hunter] who tried to study the natives as they actually are, and not as the Brahmans described them, was struck by the universal prevalence of a worship quite distinct from that of the Hindu deities. A Bengal village has usually its local god, which it adores either in the form of a rude, unhewn stone, or a stump, or a tree marked with red-lead. Sometimes a lump of clay placed under a tree does for a deity, and the attendant priest—when there is one—generally belongs to one of the half-Hinduised low-castes. The rude stone represents the non-Aryan fetish; and the tree seems to owe its sanctity to the non-Aryan belief that it forms the abode of the ghosts or gods of the village.

Omitting the mere guess-work about the fetish and the gratuitous supposition, made out of deference to the dying creed of Max Müllerism, that ancestor-worship must necessarily be a "non-Aryan" feature, this simple description shows us the prevalence all over India of customs essentially similar to those in Central Africa and in the Chinese provinces.

The Roman religion, in somewhat the same way, separates itself at once into a civic or national and a private or family cult. There were the great gods, native or adopted, whom the State worshipped publicly, as the Central African tribes worship the chief's ancestors; and there were the Lares and Penates, whom the family worshipped at its own hearth, and whose very name shows them to have been in origin and essence ancestral spirits. And as the real or practical Hindu religion consists mainly of offering up rice, millet, and ghee to the little local and family deities, or to the chosen patron god in the Brahmanist pantheon, so, too, the real or practical Roman religion consisted mainly of sacrifice done at the domestic altar to the special Penates, *favre pio et saliente mica.*

I will not go on to point out in detail how Professor Sayce similarly finds ancestor-worship and Shamanism (a low form of ghost-propitiation) at the root of the religion of the ancient Arcadians; how other observers have performed the same task for the Egyptians and Japanese; and how like customs have been traced among Greeks and Amazulu, among Hebrews and Nicaraguans, among early English and Digger Indians, among our Aryan ancestors themselves and Andaman Islanders. Every recent narrative of travel abounds with examples. Of Netherland Island I read, "The skulls of their ancestors were treasured for gods"; of the New Hebrides, "The people worshipped the spirits of their ancestors. They prayed to them, over the kava-bowl, for health and prosperity." In New Caledonia, "Their gods were their ancestors, whose relics they kept up and idolised." At Tana, "The general name for gods seemed to be *aremha;* that means a *dead man*, and hints," says the Rev. George Turner, with refreshing frankness, "alike at the

origin and nature of their religious worship." When the chief prayed he offered up yam and fruits, saying: "Compassionate father, here is some food for you; eat it. Be kind to us on account of it." Those who wish to see the whole of the evidence marshalled in battle array have only to turn to the first volume of Mr. Herbert Spencer's *Principles of Sociology*, where they will find abundant examples from all times and places gathered together in a vast and overwhelming phalanx.

What concerns me here a little more is to call attention to the fact that even in Christianity itself the same primitive element survives as the centre of all that is most distinctively religious, as opposed to theological, in the Christian religion.

It is the universal Catholic custom to place the relics of saints or martyrs under the altars in churches. Thus the body of St. Mark the Evangelist lies under the high altar of St. Mark's at Venice; and in every other Italian cathedral, or chapel, a reliquary is deposited within the altar itself. So well understood is this principle in the Latin Church that it has hardened into the saying, "No relic, no altar." The sacrifice of the mass takes place at such an altar, and is performed by a priest in sacrificial robes. The entire Roman Catholic ritual is a ritual derived from the earlier sacerdotal ideas of ministry at an altar, and its connection with the primitive form is still kept up by the necessary presence of human remains in its holy places.

Furthermore, the very idea of a church itself is descended from the early Christian meeting-places in the catacombs or at the tombs of the martyrs, which are universally allowed to have been the primitive Christian altars. We know now that the cruciform dome-covered plan of Christian churches is derived from these early meeting-places at the junction of lanes or alleys in the catacombs; that the nave, chancel, and transepts indicate the crossing of the alleys, while the dome represents the hollowed-out portion or rudely circular vault where the two lines of archway intersect. The earliest dome-covered churches were attempts, as it were, to construct a catacomb above ground for the reception of the altar-tomb of a saint or martyr. Similarly with the chapels that open out at the side from the aisles or transepts. Etymologically, the word chapel is the modernised form of *capella*, the arched sepulchre excavated in the walls of the catacombs, before the tomb, in which it was usual to offer up prayer and praise. The chapels built out from the aisles in Roman churches, each with its own altar and its own saintly relics, are attempts to reproduce above ground in the same way the original sacred places in the early Christian excavated cemeteries.

Thus Christianity itself is linked on to the very antique custom of worship at tombs, and the habit of ancestor-worship by altars, relics, and invocation of saints, even revolutionary Protestantism still retaining some last faint marks of its origin in the dedication of churches to particular evangelists or martyrs, and in the more or less disguised survival of altar, priesthood, sacrifice, and vestments.

Now, I do not say ancestor-worship gives us the whole origin of everything that is included in Christian English minds in the idea of religion. I do not say it accounts for all the cosmologies and cosmogonies of savage, barbaric, or civilised tribes. Those, for the most part, are pure mythological products, explicable mainly, I believe, by means of the key with which Mr. Andrew Lang supplies us; and one of them, adopted into Genesis from an alien source, has come to be accepted by modern Christendom as part of that organised body of belief which forms the Christian creed, though not in any true sense the Christian religion. Nor do I say that ancestor-worship gives us the origin of those ontological, metaphysical, or mystical conceptions which form part of the philosophy or theology of many priesthoods. Religions, as we generally get

them envisaged for us now-a-days, are held to include the mythology, the cosmogony, the ontology, and even the ethics of the race that practises them. These extraneous developments, however, I hold to spring from different roots, and to have nothing necessarily in common with religion proper. If we have once accounted for the origin of ghosts, gods, tombs, altars, temples, churches, worship, sacrifice, priesthoods, and ceremonies, then we have accounted for all that is essential and central in religion, and hand over all the rest—the tales, stories, and pious legends—to the account of comparative mythology or of the yet unfounded science of comparative ideology.

Once more, I do not wish to insist, either, that every particular individual god, national or naturalistic, must necessarily represent a particular ghost—the dead spirit of a single definite once-living person. It is enough to show, as Mr. Spencer has shown, that the idea of the god, and the worship paid to a god, are directly derived from the idea of the ghost, and the offerings made to the ghost, without necessarily holding, as Mr. Spencer seems to hold, that every god is necessarily in ultimate analysis the ghost of a particular human being. Once the conception of gods had been evolved by humanity, and had become a common part of every man's imagined universe—of the world as it envisaged itself to the mind of the percipient—then it was natural enough that new gods should be made from time to time out of abstractions or special aspects and powers of natures, and that the same worship should be paid to such new-made and purely imaginary gods as had previously been paid to the whole host of gods evolved from personal and tribal ancestors. It is the first step that costs; once you have got the idea of a god fairly evolved, any number of extra gods may be invented or introduced from all quarters. A great pantheon readily admits new members from many strange sources. Familiar instances in the best-known pantheon are those of Concordia, Pecunia, Aino, Locutius, Rediculus Intanus. The Romans, indeed, deified every conceivable operation of nature or of human life; they had gods or goddesses for the minutest details of agriculture, of social relations, of the first years of childhood, of marriage and domestic arrangements generally. Many of their deities were obviously manufactured to meet a special demand on special occasions. But, at the same time, none of these gods, so far as we can see, could ever have come to exist at all if the ghost-theory and ancestor-worship had not already made familiar to the human mind the principles and practice of religion generally. The very idea of a god would not otherwise have been evolved; though, when once evolved, any number of new beings could readily be affiliated upon it by the human imagination.

Still, to admit that other elements have afterwards come in to confuse religion is quite a different thing from admitting that religion itself has more than one origin. Whatever gives us the key to the practice of worship gives us the key to real religion. Now, one may read through almost any books of the mythological school without ever coming upon a single word that throws one ray of light upon the origin of religion itself thus properly called. To trace the development of this, that, or the other story or episode is in itself a very valuable study in human evolution; but no amount of tracing such stories ever gives us the faintest clue to the question why men worshipped Osiris, Zeno, Siva, or Venus; why they offered up prayer and praise to Isis, or to Artemis; why they made sacrifices to Capitolian Jove at Rome, or slew turtle-doves on the altar of Jahweh, god of Israel, at Jerusalem. The ghost-theory and the practice of ancestor-worship show us a natural basis and genesis for all these customs, and explain them in a way to which no mythological inquiry can add a single item of fundamental interest.

It may be well to attempt some slight provisional disentanglement of the various extraneous elements which interweave themselves at last with the simple primitive fabric of practical religion.

In the first place, there is the mythological element. The mythopœic faculty is a reality in mankind. Stories arise, grow, gather episodes with movement, transform and transmute themselves, wander far in space, get corrupted by time, in ten thousand ways suffer change and modification. Now, such stories connect themselves sometimes with living men and women. Everybody knows how many myths exist even in our own day about every prominent or peculiar person. They also gather more particularly round the memory of the dead, and especially of any very distinguished dead man or woman. Sometimes they take their rise in genuine tradition; sometimes they are pure fetches of fancy or of the romancing faculty. The ghosts or the gods are no less exempt from these mythopœic freaks than other people; and as gods go on living indefinitely, they have time for plenty of myths to gather about them. In some cases, myths demonstrably older than a particular human being—say Cæsar, Virgil, Arthur, Charlemagne—get fitted by later ages to those special personalities. The same thing may often happen with gods. Myth comes at last, in short, to be the history of the gods; and a personage about whom many myths exist, whether real or imaginary, a personification of nature or an abstract quality, may grow in time to be practically a divine being, and to receive worship, the final test of divinity.

Again, myths about the gods come in the long run, in many cases, to be written down, especially by the priests, and themselves acquire a considerable degree of adventitious holiness. Thus we get sacred books; and in most advanced races the sacred books tend to become an important integral part of religion, and a test of the purity of tenets or ceremonial. But sacred books almost always contain rude cosmological guesses and a supernatural cosmogony, as well as tales about the doings, relationships, and prerogatives of the gods. Such early philosophical conjectures come then to be intimately bound up with the idea of religion, and in many cases even to supersede in certain minds its true practical central kernel. The extreme of this tendency is seen in English Protestant Dissenting Bibliolatry.

Rationalistic and reconciliatory glosses tend to arise with advancing culture. Attempts are made to trace the pedigree and mutual relations of the gods, and to get rid of discrepancies in earlier legends. The Theogony of Hesiod is a definite effort undertaken in this direction for the Greek pantheon. Often the attempt is made by the most learned and philosophically-minded among the priests, and results in a quasi-philosophical mythology like that of the Brahmans. In the monotheistic or half-monotheistic religions, this becomes theology. In proportion as it grows more and more laboured and definite, the attention of the learned and the priestly class is more and more directed to dogma, creed, faith, abstract formulæ of philosophical or intellectual belief, and less and less to ritual or practice. But the popular religion remains usually, as in India, a religion of practical custom and observances, having very little relation to the highly abstract theological ideas of the learned or the priestly.

Lastly, in the highest religions, a large element of ethics, of sentiment, of broad humanitarianism, of perverted emotion, is allowed to come in, often to the extent of obscuring the original factors of practice and observance. We are constantly taught that "real religion" means many things which have nothing on earth to do with religion proper, in any sense, but are merely high morality, tinctured by emotional devotion towards a spiritual being or set of beings.

Owing to all these causes, modern investigators, in searching for the origin of religion, are apt to mix up with it,

even when dealing with savage tribes, many extraneous questions of cosmology, cosmogony, philosophy, metaphysics, ethics, and mythology. They do not sufficiently see that the true question narrows itself down at last to two prime factors—worship and sacrifice. In all early religions the practice is at a maximum, and the creed at a minimum. We, nowadays, look back upon these early cults, which were cults and little else, with minds warped by modern theological prejudices—by constant wrangling over dogmas, clauses, definitions, and formularies. We talk constantly of the Hindu faith or the Chinese belief, when we ought rather to talk of the Hindu practice or the Chinese observances. By thus wrongly conceiving the nature of religion, we go astray as to its origin. We shall only get right again when we learn to separate mythology entirely from religion, and when we recognise that the growth and development of the myth have nothing at all to do with the beginnings of worship. The science of comparative mythology and folk-lore is a valuable and light-bearing study in its own way, but it has no more to do with the origin of religion than the science of ethics or the science of geology. There are ethical rules in most advanced cults; there are geological surmises in most sacred books; but neither one nor the other are on that account religion, any more than the history of Jehosaphat or the legend of Samson.

These are only, I admit, very brief and hasty hints on a great subject. If I were a Gifford Reader, or a Hibbert Lecturer, I would work them out in detail with illustrative examples. As I am not, I can only write a review article about them. But what I want to suggest sums itself up in one sentence thus: Religion is practice, mythology is talk.

THE LIVING EARTH

SCIENCE is a terrible radical. It is one of its chief functions to be always upsetting our most cherished convictions. It delights in paradoxes. If the plain man sees for himself that the sun goes round the earth, rising and setting daily, some meddlesome Copernicus or some argumentative Galileo is sure to intervene with his absurd suggestion that the earth, on the contrary, goes round the sun, clean against the evidence of the plain man's senses. So in our own day, the plain man knows well that all living things must sooner or later die, and that death is naturally and necessarily followed by decomposition. And then, in steps some intrusive Paul Pry of a Weismann, to assure him that all organisms do *not* inevitably die—that some of them are and must be immortal and eternal; or some bacteriological faddist to assert uncompromisingly that death is not by nature succeeded by decomposition, but that all dead bodies, if left to themselves, and uneaten by other species, remain for ever, like King Oswald's right hand, "pure and uncorrupted." In short, it is the paradoxical opinion of modern science that hardly anything dies unless something else kills it; and that nothing at all decays unless something else eats it.

All these doctrines are by this time, no doubt, familiar truths of science to those who have followed its most recent investigations; and not a few of them are known in a more or less vague form even to that apocryphal creature, the

General Reader. But they have been involved for the most part in so much technical phraseology, and mixed up with so much biological dispute as to matters of detail, that the General Reader has hardly been permitted the chance of understanding their drift in his own dialect. I propose, therefore, in the present paper, to set forth very briefly, and in quite popular language, the chief results of modern investigation in this curious field, with only just such necessary simplification as is required for easy comprehension of the subject; and I will admit beforehand that my treatment will be, so to speak, diagrammatic—that is to say, in order to fix attention on the main results, I shall glide very lightly over many of the more obscure or specialist details. I am going to show, in the first place, that dying is merely a bad habit which certain races have acquired; and, in the second place, that decay is merely one phase of life under another of its manifold kaleidoscopic disguises.

The plain man knows, of course, that every plant or animal lives for a longer or shorter term of life, and then dies "a natural death," unless previously destroyed by some forcible agency. He knows, also, that such "natural" lifetimes vary in length; that some plants, like wheat and peas, are always annuals, and that some, like the oak, the banyan, and the yew, are many times over centenarians. He is aware, in like manner, that the green-flies on roses are just as much annuals as the poppies or the cornflowers; while the elephant and the rook are longer-lived than humanity. But, sooner or later, he takes it for granted, every plant and every animal must reach the end of its tether; and then it must die and decay like the rook and the elephant, or rot at heart like the yew tree in the churchyard. Weismann was the first of our biologists to point out that this supposed invariability of mortality was only apparent; that certain classes of plants and animals are really immortal. Very simple organisms, which consist of one cell alone, go on growing up to a certain point, and then divide or split themselves into two. Each half thereupon proceeds to feed and grow once more, until, when it reaches its limit of size, it again divides into a couple more organisms. I put this diagrammatically, because sometimes the original body splits up, not into two, but into several, and there are various minor details in the mode of their division which can only be apprehended by the use of illustrations. But, in the main, the generalised truth is this: very simple organisms never die a natural death at all; they go on for ever, growing and dividing, growing and dividing, without ever getting old or losing their prime vigour. It is true such organisms may now and then be killed by accident, such as burning, freezing, or being devoured by others. But, as a rule, the chain of division and subdivision continues for ever, each half of the divided mass being equally parent and offspring, equally old and young, without invidious distinction. The continuity of the protoplasm is never once broken.

How, then, from the strictly physical point of view, did death come into the world, other than death by accident? How did "growing old" become a fact in nature? Simply by the advance of animals and plants from the one-celled and simple to the many-celled and complex condition. In very early or primitive stages of life, where organisms only split, there is really no such thing as distinct parentage; in more advanced stages the original organism does not divide; it merely gives off small offshoots or buds—call them eggs, or germs, or seeds, as you will—and continues its own life quite separate from its offspring. Under these circumstances it is only the race that persists; the individual, having specialised various parts for various functions, loses, thereby, that plasticity, that fulness of vitality all over, that simple protoplasmic activity which characterises the more primitive plant or animal; he gets gradually clogged by

effete or outworn matter. Even very low organisms sometimes feel this difficulty, but they get over it by a curious process known as rejuvenescence—ah! why did we ever lose it?—a process in which the body sloughs off at one effort all its hardened coverings, and emerges afresh as young and vigorous protoplasm. But more complex organisms cannot thus, alas! renew their youth; they cannot divest themselves of old bones or wood. Little by little they get clogged by dead matter or by foreign bodies; their organs wear out beyond the possibility of repair; and if no accident intervenes to kill them meanwhile, they die at last "a natural death"—a death of senile decay, as medical science calls it.

At the same time, we must always remember that *no* death except that of senile decay, where the clogged and overworked organs refuse slowly to function, can, in the strictest sense, be described as natural. To be killed in a railway accident is clearly not a natural death in this sense; nor is it natural to be eaten by a bear, or to be devoured piecemeal by ants, vermin, or insects. Therefore, no more is death by typhoid, yellow fever, or consumption natural. For we now know that in these cases the body is attacked by hostile little organisms which just as truly eat it up by degrees as a wolf or a swarm of tropical insects could do; and this analogy is important to bear in mind hereafter as explaining decomposition. We may say, in short, of the living organism, that under normal circumstances it goes on living and reproducing itself for ever, *except* when it is so complex that it becomes liable to get gradually clogged and worn out by use; in which last case, again, it goes on normally living till it ceases from activity through senile decay, *unless* it is previously destroyed by crushing, breaking, burning, or freezing, or by the attacks of other kinds, large, small, or infinitesimal. Or, to put it in another way, simple organisms, as a rule, live for ever, bar accidents. Complex organisms, as a rule, live till they die of old age, in the strictest sense, unless they are prematurely destroyed either by accidents in general or by being eaten up by others; and these others may be either large foes of the species, such as lions, tigers, eagles, hawks, and locusts, or small foes, such as internal parasites, or infinitesimal foes, such as the bacilli of cholera, typhoid fever, or the diseases of cattle. Incidentally, I may add, a vastly larger number of organisms are thus devoured by one another, great or small, than ever die of senile decay or natural dissolution. To be killed by violence is the rule; to "stop short," like grandfather's clock, is normal, but unusual.

These instances lead us naturally up to the second class of cases, where an organic body, already killed or dead, is equally devoured by other organisms. The general rule is that an organic body, left quite to itself, retains (or would retain) its form and organisation for an indefinite period, unless forcibly dismembered. Bar accident or interference, the dead body is practically eternal. If the temperature is low, say below freezing-point, it will remain fresh for ever, like the Swiss guide who was lost in a glacier, and whose corpse was recovered many years later from the lower end of the glacier when the girl he was to have married was an old woman. She saw his face, the face of a young and full-blooded man, as she had seen it fifty years earlier. Still more striking is the instance of the Siberian mammoths (engulfed in the glacial period), which are sometimes melted entire out of the frozen moss of the tundra, so fresh that the wolves attack and eat them. In very dry climates, on the other hand, the body may be desiccated; it becomes a mummy, but it does not tend to decay. Naturally and normally, there is no such thing as putrefaction—I mean, decay is not a necessary chemical process in dead organisms; no body is destroyed, roughly speaking, unless something else attacks and eats it.

The living animal, great or small, may be assailed by wolves, hawks, insects, spiders, and other carnivorous enemies. Just similarly the dead body may be assailed by jackals, vultures, worms, fly-grubs, burying-beetles, mites, moulds, mildews, and other carrion-feeders. Once more, the living body may be attacked by small vermin. Just similarly the dead body may be attacked by ants or worms, or endless tribes of minute scavengers. Or, again, the living body may be attacked by the very tiny enemies which give rise to silkworm disease or rinderpest, to plague or diphtheria, as the case may be. Just similarly, the dead body may be attacked by the bacteria of decomposition, which eat it up as truly as the vultures and the jackals, the crows and the ravens. There is just this difference, however, between the two cases: the living body, if sound and vigorous, can often protect itself against the wolf or the tiger; the living tissue, if wholesome, can often protect itself against the bacilli of disease; but the dead body cannot war against the vulture or the carrion-crow; the dead tissue cannot fight down the bacteria of decomposition. Hence, while many living bodies go on living for years together, few dead bodies, freely exposed in warm moist air to the attacks of foes, long resist the assaults of the various disintegrating agents. Still, the great point to remember is simply this—no dead body tends to decay unless some living body attacks and devours it.

A great many proofs, now more or less familiar to most people, show quite clearly that the decay of animal or vegetable matter is not a simple chemical change, inevitable in the nature of things, but a violent interference with the natural course on the part of hostile organisms. The bacteria which produce decomposition are very minute plants, which grow, like mushrooms or moulds, upon organic matter, and which reproduce their like with incredible rapidity. Tyndall showed long ago that the spores of these plants exist in myriads in the air, floating everywhere around us, that they occupy all crannies and empty places on the surface of the earth, and that they swarm in their millions in all ponds and puddles. An easy way of proving that these spores alone, and the plant-colonies which spring from them, are the cause of putrefaction, may be obtained by boiling beef-tea in a test-tube, so as to kill the bacteria, and then, while the liquid is still steaming, closing up the mouth of the tube with a plug of cotton-wool, which admits the air but strains out the germs of the putrefactive organisms. Under these conditions, the beef-tea will keep good for years, but if you remove the plug it will begin at once to putrefy.

Boiling kills the germs, freezing only checks them; as soon as warmth returns they go on growing vigorously. Drying also prevents immediate development, but after a short period of damping the spores will grow again as well as ever We must, therefore, regard the whole surface of the earth as covered for many feet of thickness with a solid, liquid, and gaseous envelope of living things, actual or potential—plants and animals or eggs and spores—which cold or desert drought may succeed in checking, but which will germinate and flourish in untold millions as soon as they are supplied with warmth and moisture. An ocean of life surrounds the face of our planet; it forms an atmosphere round all hills and valleys and mountains; it penetrates the soil and fills up all interstices in the rocks and gravels. As the visible vegetation of trees, shrubs, and grasses clothes the fertile surface, so an invisible vegetation and an invisible fauna occupy the lower levels of the air, together with the land and the water, over the vastly greater part of the earth's surface. The few exceptions are the polar regions, the glacier-clad heights, and the driest deserts; while even these themselves may be regarded as temporary and relative rather than as permanent and absolute.

But the particular point on which I wish to lay stress here is the modern discovery that the soil itself—the layer of soft mould which clothes the surface of the earth in all cultivable districts, and from which vegetation springs—is actually in great part a living layer, a confused mass of tiny plants and animals. We think of the soil as dead, as mere mineral matter; and, of course, it is true that its substratum is composed of the worn *débris* of rocks, and that many grains of sand, which look under a lens like miniature rocks and boulders, are freely scattered through its vital portion. Still, the truth remains that the soil as a whole, and especially that part of it which is of importance to agriculture and to plant life in general, consists of a vast complex of living organisms—a huge ant-heap, so to speak; a subterranean forest of moulds and mildews. It is made up for the most part of matter which has once been alive and is now more or less dead, yet minutely interramified and devoured by countless myriads of small carrion-eating plants and tiny animals. In short, while the air is an ocean of floating germs, each inch of soil is a perfect London of microscopic organisms.

How soils originate is not quite entirely a matter of conjecture. We know that when new islands are thrown up by volcanic forces the first thin layer of inorganic soil is formed upon the bare rock by disintegration of the surface, under the influence of rain, wind, and friction. On the original basis thus produced lichens, and then mosses, begin to grow, as they do also on the bare red tiles of our house-tops. After the mosses decay and form an imperceptible layer of vegetable mould, the larger-leaved green plants find a chance of gaining a livelihood. These, by their roots and suckers, still further break up and open the rock for weathering and disintegration, and so pave the way for the accumulation of more soil in future. But it is the decayed and mouldering leaves of higher plants that really compose the mass of the soil, properly so called; without them we get not mould, but the dry sand of the desert. Our planet as it stands is covered over a large part of its land-surface by this thick black layer of ground rock, intermixed with decomposed or decomposing vegetation, intricately pervaded and fed upon in every direction by innumerable small organisms, mostly fungoid or bacteria-like.

It was Gilbert White, of Selborne, who first of all pointed out the importance of earthworms as producers and maintainers of this living layer of vegetable mould. But it was the patient investigations of Darwin which fully established this fact and raised it to the rank of a scientific discovery. Darwin showed that earthworms made long since, and now maintain, a large portion of our cultivable soil, and this in three different manners. In the first place, they open the ground for rain and roots to penetrate, while the acids they secrete act chemically upon the layer of rocks beneath in such a way as slowly to disintegrate them. In the second place, they crush in their gizzards small fragments of stone, and thus grind and liberate their mineral elements, such as lime and soda. In the third place—and this is by far the most important consideration—they drag down into their burrows countless numbers of leaves, which they eat and digest, and then carry up the refuse to the surface as worm-castings. No less than 53,000 worms on an average inhabit an acre of garden soil. These worms pass through their bodies in a year ten tons of material, and throw it up as mould at the rate of an inch deep of surface in every five years. Most of this mould is a rich compost of decayed or decaying leaves in a paste of finely divided minerals; it is mixed up with fragments of other fallen leaves that drop on it from the plants above, and it is permeated by roots, bulbs, and tubers, by countless small animals, and by still more countless hordes of parasitic or carrion-feeding bacteria.

Now, it is admitted since Darwin's time that earthworms are not, perhaps, quite so exclusively the sole origin of this vegetable mould as the great naturalist was at first disposed to believe. Some other causes of considerable importance assist in the process of soil-making. In the prairie region of America, for example, fire has helped largely to produce the surface mould; while everywhere, as Richthofen has pointed out, we cannot afford to overlook the constant showering of dust, a part of which at least is of cosmical origin. Still, allowing for all these various co-operating causes, we may nevertheless say, in a general sense, that the layer of vegetable mould is mainly due (in its most important part) to the decomposition of plants, and that it is stored and renewed for the most part by the action of earthworms and similar underground animals.

Again, I want the reader to observe that this seemingly dead layer of blackish surface soil is not really inert, but is a vast and perennial reservoir of life of every sort. And, in order to make him feel this, to realise it vividly, I will begin as before with the more obvious and visible cases of life in the soil-layer. We saw how the existence of vultures and jackals, of fungi and moulds, helped us to understand the true character and nature of the putrefactive bacteria. Great or small, the carrion-feeders all act in very similar manners. Just so, the number of plants and animals visibly packed together in the surface-soil helps us to understand the living character of the soil itself through which they ramify. Turn up a sod of earth in a pasture in winter, and at first sight it seems to consist of two well-marked portions, a living and a dead one—the green grass above and the black soil beneath it. But look closer into the mass, and what then do you see? A whole network of living beings. Matted roots of grass, just as much alive as the green blades above, spread and interlace themselves through the seemingly dead portion. Bulbs of bulbous buttercup, of orchids, of garlic, lie hidden in it everywhere. Root-stocks of plantain, of chervil, of pimpinel, of daisy, are knotted among its clods. Gaze closer still, and you will see it is all full of tubers or stocks of lesser weeds, in their dormant condition, all ready to spring afresh at the first breath of April. How the endless bulbs and corms and tap-roots manage to stow themselves away in so small a space is to me a perpetual mystery; in winter you hardly notice the little potato-like pills of the lesser celandine, but in spring the plants cover the ground with their golden blossoms, to be succeeded in due course by the spotted orchid, the buttercups, the centauries, the hawkweeds, and all the countless flowers of July and August. They are packed as tight as sardines in a tin. As for the seeds of small annuals, they lurk there by the thousand; sift out a little of the soil and plant it in a pot, and, hi presto! to your surprise, weeds will spring from it in incredible numbers. The whole mass teems with dormant germs innumerable.

It is the same with animals. You think of this soil as dead; but it is undermined by rabbits, rats, moles, and lizards. It swarms with invertebrates. Larvæ of tiger beetles lie in wait in its crannies; grubs and worms without end find a living in its hollows. Woodlice and petty snails lurk under every stone; centipedes and wireworms crawl through its interstices; testacella pursues earthworms as the ferret pursues the rat; a whole underground fauna lives and moves and has its being in that seemingly dead congeries. Turn up a handful of earth and examine it with a pocket lens; you will find it alive, like an anthill, with endless tiny mites and crawling creatures. Even if we take into consideration only the plants and animals visible to the naked eye, this soil beneath our feet is one heaving, seething, moving mass of live organisms; it has its jungle-law and its penalties, its feuds

and its alliances, its fierce struggle for life and its unspeakable tragedies.

But when we pass from the visible to the invisible world, the variety and fertility are even more conspicuous. Seen by the eye of imagination, with the aid of microscopic science and analogous reasoning, we behold this layer of soil as a thick stratum of small rocky boulders, all embedded in and bound together by a vast living and growing population of organic beings. Cheapside on Lord Mayor's Day, Paris turned out to behold the Czar, are mere petty crowds to it. Rather does it resemble the clustered ball of bees as they swarm on a tree, or the flies and wasps that crawl over one another in a bottle half full of sugar or treacle in a grocer's window. Only, in the soil the variety of species, both of plants and animals, is infinitely greater. Remember that this is the vast storehouse of animal and vegetable life, from which everything came, to which everything returns —the reservoir of organic or organisable material, ever dying, ever dead, ever rising into life again. All that has been goes back to it; all that is comes out of it; all that will be is contained in it. On dry land, I mean, for in the ocean it is water that plays the part of reservoir, while on earth the atmosphere is hardly more than a germ-carrier, or the supporter of a relatively smaller fauna and flora, whose numbers, nevertheless, cannot be reckoned or estimated by human numeration. The soil is the synthesis of all living material.

Moreover, taking it in a wide sense, it may be said that this living and seething mass is in one main aspect a gigantic theatre of decomposition. Every mouse, rat, bird, lizard, spider, beetle, fly, or midge that dies and falls on it is seized upon at once by other organisms, great or small—worm, grub, or bacterium —and more or less quickly disintegrated. Every leaf, plant, root, or tuber that dies or falls is similarly seized upon by its appropriate foes, and equally transmuted. Thus, in Milton's famous phrase, "All life dies, death lives," and everything passes again and again through endless cycles of living beings. The organisms in the soil are part of the now ordered balance of nature which has slowly grown up into a settled system through the struggle for life and the survival of the fittest.

Perhaps, however, the strangest of all these recent glimpses afforded us by science is the one which shows us that the minute putrefactive organisms themselves are a necessary part of the productive soil on which higher plants and, therefore, higher animals are to be finally nurtured. If you completely sterilise a soil—kill all the germs in it—and then sow seeds of grass, or wheat, or turnip, they will not grow; a sterilised soil is infertile. It is an acknowledged principle of modern science that the bacteria-like organisms which live in the vegetable mould are even more necessary than earthworms themselves for the growth of more developed plants; they prepare and make ready the constituents of the soil, and especially the important nitrogenous matter, so as to make it fit food for the seeds and seedlings to be sown in it. Without their aid, the higher plants could not assimilate the material supplied them, any more than we ourselves could assimilate grass, and clover, and heather-tops, until turned into beef or grouse for our use by the ox or the bird. It is the function of the minute organisms in the soil to prepare the manures, natural or artificial, with which it is supplied, so that they may be capable of being taken up by wheat, grass, or potato-plants, or, in the uncultivated condition, by the natural elements of the local flora. The nitrogenous materials which fall upon the surface, indeed, as manure or dead bodies, do not really act as direct food for green plants, but rather as food for these minute organisms, which work them up into a state in which they can be assimilated by the higher vegetation. Hence we arrive at the unexpected result that it is positively necessary for the

agriculturist to have germs of bacteria-like creatures in his fields; and that, long before agriculture existed at all, it was equally necessary for the higher plants in a state of nature to have the ground prepared for them by these silent and invisible workers. Just as worms are needful in order to correct and reinforce the layer of vegetable mould, so bacteria are needful in order to digest and render assimilable the nitrogenous food of the higher plants. Now that "germs" are in the air, most people cherish against them an undying grudge; it is well to remember that while, in certain forms, they produce disease in living bodies, yet, in certain other forms, they are useful as restoring to the common reservoir of being the bodies of dead organisms, be they plants or animals, and, in still other forms, as preparing for use the nitrogenous food of the green herbs and bushes.

The process of changing ammonia and other similar products of decay into the form of nitrates—in which form alone they can be assimilated by the higher plants—is known as *nitrification;* and a considerable amount of attention has lately been paid to these nitrifying bacteria. It is now known that all fertile soils are permeated by myriads of such tiny friends of agriculture, which, under suitable conditions of temperature, moisture, and the presence of lime, potash, or soda, continually perform their beneficent task of making ready the soil for its higher occupants. More than this, it has been shown that these little creatures possess the singular power of absorbing free nitrogen from the air, and working it up into the only form in which it can be utilised by green vegetation. This is particularly the case with a tiny microscopic parasite which occurs in vast quantities on the roots of plants of the peaflower tribe, such as clover, lucerne, sainfoin, and bird's-foot trefoil. Such plants have their rootlets covered with small round tubercles, and in their midst are embedded innumerable little parasitic creatures, whose function with relation to the plant is, nevertheless, a friendly one. For they supply it, so to speak, with non-organic manure—that is to say, they absorb nitrogen from the air, and turn it into compounds of such a sort that clover or lady's fingers can at once assimilate it. In order to judge of the great importance of this recently-discovered activity, we must look for a moment at the composition of our atmosphere.

Everybody knows that air is a mechanical mixture of oxygen and nitrogen. Most people also know that nitrogenous matter is indispensable to plant and animal life. Yet most plants and animals, though surrounded by a perfect ocean of nitrogen, cannot help themselves to it; it is a case of "water, water everywhere, and not a drop to drink." Just as sea water must be evaporated and recondensed, either naturally in clouds or artificially in a condenser, before we can drink it, so nitrogen must be converted into the form of nitrates before green plants can use it, or can hand it on in a utilisable condition to animals. Now, the parasite which inhabits the root-tubercles of the peaflower tribe has this unique power of turning nitrogen into nitrates; and hence, long before men knew why, they recognised the fact that certain crops of peaflowers had the special faculty of restoring fertility to exhausted soils. It is probable, however, that this discovery will further react upon agriculture, and that the fertilising bacteria will in future be deliberately sown, so to speak, by sowing the crops on whose roots they mostly congregate. As for the bacteria themselves, they will take care of themselves; *their* germs are everywhere, only waiting for the fitting plant to turn up with which to conclude a mutually advantageous alliance.

From all this it will be seen that "germs" are not by any means all of them noxious. They are merely seeds or spores of many various species. Indeed, the vast majority are quite innocuous. Some of the species are

harmful, and attack living bodies. Some are neutral, and live in our mouths and stomachs quite harmlessly. Some are good scavengers, breaking up the dead plants and animals into forms in which their materials can be employed over again for the production of fresh life. And some are highly important as doing work for plants, and therefore for us, which we and they cannot do in person. It is not improbable, indeed, that almost all the nitrogenous matter in the bodies of all existing plants and animals has been slowly purveyed for us through innumerable ages by successive generations of these invisible workers, or their analogues in earlier periods.

Earth, ocean, and the lower layers of the air are thus seen to consist of one vast stratum of actual or potential life—of living plants and animals, or of the germs, spores, seeds, and eggs which produce them. We must think of the atmosphere as filled with numberless floating organisms; we must think of the soil as a vast vitalised magma of all sorts of life—roots, stocks, and tubers; interlacing threads of moulds and fungi; worms and larvæ; shrews, moles, and beetles; creeping insects, crustaceans, and minute root-parasites; decaying leaves and bodies of small deer; each of which is in turn a pullulating mother of plants and animals. A mighty belt of life surrounds our planet like a robe; it spreads in a thick zone over plain and valley, over hill and mountain, through the depths of the sea, among the layers of the atmosphere. And every part of it falls in with every other element of life, not indeed in the sense that no conflict occurs (for "nature is one with rapine"), but in the sense with which Darwinism has made us familiar—that each must accommodate itself in the long run to the general mass around it. The whole is thus one vast "happy family." Portions of our earth are almost unfitted for life—the poles, the snowy mountains, the desert sands, though even there life is present in diminished numbers; but wherever a living is to be picked up by hook or crook, there somebody is picking it; and all work together as one boundless community, mutually unregarding, often mutually hostile, yet mutually helpful in a certain wider and deeper sense, which neglects the individual and embraces only the continued possibilities of the complex totality.

THE ORIGIN OF ANIMALS

We may, I think, take it for granted that the plant, and even, I will venture to say, the green plant, or something very like it, was necessarily and inevitably the earliest form of organic life on this planet. The question for our consideration here is, therefore, narrowed down to the minor problem—How, from the plant, was the earliest type of animal developed? And to this question I propose to give not indeed an answer, but a tentative and extremely conjectural suggestion of the way the answer probably lies. May so much modesty disarm aggressive criticism!

Let me clear the course beforehand, however, by briefly stating in very broad outline why I hold the green plant, or its essential equivalent, to have been of necessity the earliest possible organism. It has been so much the habit of biologists hitherto, in treating of the origin of all life, to deal mainly with very primitive animals, almost entirely to the exclusion of very primitive plants, that to some readers this bold assertion of

vegetable priority may come with all the sudden force of a rude shock.

Life, in ultimate analysis (as a phenomenon of certain material bodies), is based entirely upon one element—carbon. Organic chemistry has been aptly, if somewhat roughly, defined as the chemistry of the carbon-compounds. But in living creatures carbon is found for the most part either deoxidised or at least in union with smaller quantities of oxygen than those with which it is united in the inorganic world. The native form of carbon in external nature is that of carbonic acid (I purposely avoid too technical language, with the laudable object of being understanded of the people), in which the affinities of the carbon atom for oxygen are fully saturated, and which is therefore a relatively stable and inert body. In the green plant, under the influence of sunlight, this carbonic acid is decomposed; the oxygen it contains is turned loose upon the atmosphere, and the carbon, more or less freed from its hampering affinities, is built up, with the hydrogen of water in the plant's tissues, into starch and other constituents of vegetable growth. This deoxidising function is the most essential in the plant's life. The business of a green plant (and all other plants are functionally animals) is to take inert and lifeless carbonic acid, and, by getting rid of its oxygen under the influence of sunlight, to store it up in a relatively energetic state, where, in virtue of its chemical freedom, it possesses the power of reuniting with oxygen and giving out light, heat, and motion.

The animal organism, on the other hand, does the exact opposite. It cannot start on its own account with inorganic material; it cannot manufacture life for itself; but it takes the carbon and hydrogen compounds already freed from their oxygen by the plant, and, after absorbing them into its own body (or, as we often more familiarly say, eating them), it there recombines them with free oxygen, producing in the process warmth and movement for its own purposes. The animal is a machine in which hydro-carbons and carbo-hydrates are slowly burnt, exactly as in a steam engine, their potential energy being given off in the act of low combustion as heat and motion.

Reduced thus to their most naked terms, the green plant is a storer of energy; the animal an expender of energy. The plant separates carbon and hydrogen from oxygen, under the influence of sunlight; the animal brings them together again, and produces once more in the act the inert carbonic acid with which we first started.

The inference is obvious. The earliest organism could not have been an animal, because the animal is not self-supporting. It absolutely implies the prior existence of a plant, which may have laid by for it the un-oxidised carbon or hydro-carbon compounds whose reunion with oxygen forms the essence of its life. We might as well suppose that steam engines preceded coal and wood as that animals preceded plants in the order of nature. And there we get the initial error of all those supposed experiments on the origin of life which consist in demonstrating the rise of bacilli or bacteria—organisms essentially similar to animals, in that they require for their activity the prior production of free carbon—in decoctions of hay or beef-tea. If we started with a world, indeed, whose oceans were full of ready-made beef-tea, the problem of the origin of life would no doubt be simple. But beef-tea and hay are themselves advanced products of organic life, and can in no way help us to understand the beginnings of life from inorganic matter. What we want is some simple organism which, setting out in a world of rock, water, and carbonic acid, will be able to build up its own life out of those inorganic materials by the sole aid of the solar rays.

Such an organism is the green plant (about whose possible origin I would

beg the aggressive critic to note that I broach no theory). By virtue of one of its constituents, chlorophyll (the green colouring matter of leaves), it possesses the power of inducing sunlight to break up carbonic acid in its tissues into free carbon and free oxygen, and to store the carbon in certain loose combinations, while it turns the oxygen adrift upon the circumambient atmosphere. Without the prior existence of the green plant there is no animal conceivable; but without the prior existence of the animal the green plant can live and grow and flourish exceedingly; while, by accumulating constantly fresh materials, it must necessarily give rise to new organisms out of its own surplus. For reproduction in its simplest form is nothing more than the splitting up of one loosely coherent mass of protoplasm and chlorophyll, as soon as it becomes unwieldily large, into two distinct masses, each of which continues under the influence of sunlight to go on growing and to split up once more into yet other fractions. The green plant, therefore, lies at the bottom of the problem of life. With it we must start in the present inquiry, as a fixed datum.

When I say "the green plant," however, I would wish it to be clearly understood that I use the phrase, for conscience sake, only in the most symbolical and (if I may be allowed the expression) Pickwickian sense. We must not picture to ourselves the primitive plants as in the remotest degree resembling the horse-chestnuts, or sweet-peas, or Mrs. Pollock geraniums, with which we are familiar. The original plants we have here in view are mere floating jelly-like aquatic specks, of a single cell each, or not even cellular and regular at all; plants only in the lowest physiological sense, in virtue of their power of decomposing carbonic acid, and rebuilding it into starchy or protoplasmic materials by combination with hydrogen and nitrogen from their native ocean. Moreover, also, when I say "green," I do not mean necessarily green to the outer eye at all, but only chlorophyll-bearing; for it is quite possible that the earliest forms of chlorophyll were not green, but blue, red, pink, or yellow, and that the earliest plants were inconceivably simpler than any plant we are now aware of. Nay, more, if I may venture to refine yet further, I do not want dogmatically to assert that these earliest plants contained chlorophyll itself of any colour, but only that they contained something unknown whose action under sunlight was more or less analogous to that of chlorophyll. All I really want to point out is this, that the kind of organisms with which we must start are organisms possessing the power of compelling sunlight to deoxidise carbonic acid for their use, and to build up the free carbon thus liberated into new and loose organic compounds. And such organisms, however simple, and whether green or not, would thereby resemble green plants in the most essential functions of plant life. Having thus explained away all definite connotation from all my own terms, I will continue my train of reasoning.

In short, the starting-point of life must apparently have been some very simple mass of matter, differing from the inorganic matter around it in one prime factor, its capacity for growth—that is to say, for the production of more matter similar to itself, from carbonic acid and water, under the separative influence of incident sunlight. The matter that can do this, whether green or grey, is in effect a true plant.

How that earliest plant first came to be I do not pretend to say or guess—any more than I pretend to know or conjecture how the earliest water or the earliest carbonic acid first came to be. For our present purpose I accept it as a datum. All I want to inquire here is just this—How, from these earliest hypothetical plants, may the most primitive animals most probably have been derived?

It will follow at once from what has been said above that growth is an

essential characteristic of plant life. In fact, growth flows directly from the chemical properties of chlorophyll itself; and chlorophyll, owing to its peculiar reproductive character, lies at the very root of all organic nature. Without chlorophyll, or something possessing the same powers, all life and all growth would be impossible. But given a material which is so constituted that under the influence of sunlight it unbuilds other unlike materials, and builds up again certain of their constituent atoms into material like itself, and the necessity for growth becomes immediately obvious. Or rather, growth in plants *is* this process summed up conveniently in a single word. (Growth in animals, as we shall see hereafter, is something quite different, having little or no real analogy with the process here contemplated.) Plant-stuff, in short, contains in its own very nature the necessity for making still more plant-stuff out of the inorganic materials by which it is surrounded, so long as it is exposed to the light of the sun. Animal-stuff has no such manufacturing power; it subsists off previously-made plant-material.

For the same reason, reproduction also necessarily results from the chemical properties of plant-stuff in general. For reproduction in its origin is merely growth, accompanied by splitting. As long as the mass holds together, however loosely, we say it grows; as soon as it splits, we say it reproduces. We can see this connection very well, even in advanced plants, in the case of suckers, bulbs, bulbules, layers, runners, and cuttings. As long as they remain united with the parent plant, we treat their increase as growth; when once they are severed, we treat it as reproduction. In the lowest plants, reproduction generally takes place by *fission* or simple splitting.

But from the very beginning of organic life, variation, with its necessary corollary the struggle for life, ending in natural selection or survival of the fittest, must have begun to show itself, and, under these influences, plants must have broken up into various groups, some of which varied from others, as in diverse points, so also in their particular mode of reproduction.

From some of these reproductive devices (unnecessary of recapitulation here in full), it seems to me, the earliest animals may most probably have been derived.

Let us examine in simple language a few of the common reproductive devices still in vogue among relatively simple existing plants, and see how far they may help us mentally to reconstruct the possible genesis of animal life.

Plants do not merely split and divide: they make distinct reproductive germs, endowed with special means of locomotion and selection of habitat.

Certain very primitive green plants (Nostoc and its allies, to wit) consist of lumps of shapeless jelly, floating in water or lying like a mould in damp earth. Embedded in the jelly may be seen (under a microscope) long hair-like strings of round cells, which form the living and active portion of the whole. Now and again, the mass gets softened by water, and some of these cells separate from the jelly, straighten themselves out, and float away in the pond or pool to form new colonies. As they do so, they become endowed with motion on their own account, and move through the water till they find a fitting place to settle themselves permanently. The new colony, at first microscopic, gradually envelopes itself in its gelatinous coat, and finally grows (by assimilating new material from carbonic acid) till it attains the size of a walnut.

In other cases (Pandorina and its allies) the mother plant breaks up into a number of swarming daughters, which surround themselves each with a gelatinous envelope and grow to the size of the original colony. The swarming of the zoospores, as they are significantly called, in some of these instances, so closely resembles animal life that at first sight, when one observes it under a

microscope, it is difficult to persuade oneself one is really dealing with true plants. But after a short period, when the swarming is over, the green plant nature becomes quite evident; the suggestion of animality is merely transitory, and the plant remains essentially a plant in the end in all its functions.[1]

Still more suggestive, however, are certain yet simpler phenomena of some more developed plants, known by the curious but perfectly applicable name of rejuvenescence. In these cases, the protoplasmic matter contained within a cell of the growing plant escapes through the cell-wall, and floats about in a free state through the surrounding water. While so floating, it mimics a very simple animal in every respect, having long vibratile hairs by which it propels itself along, and moving about with considerable rapidity in a manner that almost irresistibly suggests the notion of deliberate volition. After a time, however, its lower end flattens out into an attaching disk, with root-like processes, and it settles down on the bottom, where it grows forthwith into a true plant.

Now, the point to which I wish to direct attention here is just this—many such spores or swarm-cells of simple plants resemble animals for the time being not only in externals, which counts for little, but also in the most important physiological particulars. They start with a certain amount of organised material, laid up beforehand, which they use up during their locomotive state in producing movements; and these movements are necessarily accompanied by the absorption of oxygen and the evolution of carbonic acid. In short, for the moment, they are quasi-animals. They live as truly off their stored-up material as a lion lives off the meat it eats. They breathe oxygen; they exhale carbonic acid; they do nothing like plants and everything like animals.

[1] I purposely avoid all complication of the subject by references to sexual or asexual genesis.

In them, however, the animal stage is a very brief one; a mere episode in the sexual or asexual reproduction of their kind. As soon as the period of swarming is over, they assume once more the true plant type: they allow their chlorophyll to feed them in future, by assimilating material from the surrounding carbonic acid under the selective and disintegrating influence of the sun's rays. To say the truth, they have no alternative. The total amount of energy-yielding material they contain is very small; and as soon as that is all expended they must either recur to the plant condition to make more, or perish at once of virtual starvation, without hope of offspring. The quasi-animal stage has for them no other object than merely to ensure the placing of the young spore or swarm-cell in a free and unoccupied spot, where it will have ample elbow-room to develop its vegetative life unhampered, without fear of interference from the parent organism.

Suppose, however, any such free locomotive cell or spore, in the course of its casual wanderings, should ever have happened to collide against another similar cell of its own or of any other kind, and that the two should happen to coalesce, what would then be the natural consequence? Why, the joint cell thus produced, having now a little more energy-yielding material on which to draw than before, could continue for a somewhat longer time its locomotive existence. And suppose, among any set of such spores or cells, the habit of thus coalescing with stray material against which they happened to knock up should become fixed or organised, the locomotive state might continue indefinitely, and we should get, in a very simple form —nothing other than what we call an animal.

For the lowest animals are really no more than just such floating masses of protoplasmic jelly—free swarm-cells, as it were, unattached in the water, which glide about, with or without motile organs, and envelop any foreign body

they happen to meet with at all small enough for them to wrap themselves round and absorb slowly. The only conspicuous way in which these most primitive of existing animals differ from the naked swarm-cell of the lower plants is in their habit of thus encompassing whatever they meet in their own slime, and slowly digesting and assimilating it; or, in other words, using up its protoplasmic contents for their own continued existence as locomotive bodies.

This it is that is characteristic of animals—this habit of absorbing (or, as we say in the higher cases, eating) organic matter already laid up (directly or indirectly) by plants, and using up its energies to carry on their private motor energies. And this prolonged locomotive existence is what we mean (objectively) by animal life. The animal lives as long as it moves. As soon as all motion has ceased entirely, we say it is dead. Its cycle of change is then completely finished. Now, it seems to me highly probable that the earliest animals were essentially plant-organisms of a low type—mobile plant-organisms in something resembling the swarm-cell stage—which, instead of fixing themselves or floating loose as vegetal bodies, somehow acquired this peculiar habit of coalescing with other protoplasmic masses. At first, it is not necessary to suppose any very great distinction of eater and eaten. The two bodies, approximately equal, may merely have united into a single mass; and, in so uniting, they would necessarily acquire a somewhat longer lease of the power of movement. But in this simple act we get the germ of the whole animal economy. A new type of life has been rendered possible—a type of life which, instead of being self-supporting like the plant, depends for support upon externally-produced materials and energies. It is the destructive as opposed to the productive type; in it, to use the technical language of physics, potential energy becomes kinetic, while in the plant kinetic energy becomes potential.

Life of this sort can only continue in proportion as it absorbs external material, containing energy-yielding stuffs, already laid up, directly or indirectly, by plant organisms. And that is the distinguishing mark of the animal as opposed to the true or green plant. It grows by eating. It steals instead of manufacturing its own stuff.

Have we any reason to suppose that plant-spores can really thus take on animal functions? Well, so slight is the gap between the two forms that Professor Rupert Jones, writing of those simplest rhizopod animals, the Monera, goes so far as to say, "Some of them may even be the germ-products of low plant-structures." In other words, it is almost impossible to distinguish the simplest animals from the free and shapeless locomotive germs of many inferior plants.

If we look at that common higher rhizopod, Amœba, found almost anywhere—in fresh, brackish, or salt water—we can see these prime animal functions reduced almost to their very lowest term. Amœba consists of a small, soft, jelly-like mass of protoplasm, sometimes floating, sometimes creeping on mud or water-plants by pushing forth leg-like or finger-like projections of its own shapeless substance. Its form varies from moment to moment: it is protean in its infinite variety of shape, for it has no skin or boundary membrane, no distinction of inner or outer tissues. If in its wanderings it happens to meet any other small organic morsels, the Amœba glides slowly over them, surrounds them with its own soft and plastic body, and, assimilating the contained protoplasmic or starchy material, rejects the remainder. The food morsels are sometimes absorbed by any part of the mass, but oftenest at a particular region—a nascent mouth—where the sarcode or flesh-like matter of the animal is thinnest. There is no stomach; or, rather, the Amœba is everything in every part—all mouth, all stomach, all foot, all skin, all muscle.

After it has grown to a certain size, the body sometimes divides into two distinct animals; but sometimes it splits up (like some simple water-weeds) into a colony of zoospores, which closely resemble the similarly named zoospores of many low plants.

Nevertheless, even in this very rudimentary animal form we get the "promise and potency" of all higher types. For example, there is already the foreshadowing of a mouth in the thin receptive region; and the body is rudely divisible into two layers, an outer and an inner (skin and muscle), the folding inward of the outer layer as it envelops its prey suggesting the origin of the future stomach and intestinal canal. A zoospore which once takes to living on other zoospores or fragments of plant would already, in all essentials, be an animal organism.

In this way, as it seems to me, we may conjecture that animals took their rise from the motile germs of very low plants.

Let me add two needful comments, by way of precaution against misconception.

In the first place, I do not suppose that in the existing world (where all organisable material has long since been used up over and over again for the manufacture of organisms) we can get anything like either the primitive plant or the primitive animal. The illustrations and examples here employed must be regarded in the most shadowy symbolical light only. All I mean to suggest is, that early animals may perhaps have arisen from locomotive spores of early plant organisms, which, instead of developing chlorophyll and producing plant-material under the influence of sunlight, happened to strike out accidentally a new mode of life for themselves, by absorbing external protoplasmic or carbonaceous material, and using it up in locomotive energy. The mental picture I form of the process myself is one of the most studiously vague and generalised character.

In the second place, I wish to add (against possible criticism) that I do not regard this suggestion as in any way affording the slightest explanation of any higher characteristics of animal life. Especially do I not regard it as casting any light whatever upon the origin (if any) of sensation, consciousness, thought, or human subjectivity. How consciousness came to exist, or for the matter of that how protoplasm or chlorophyll came to exist, I no more know or even conjecture than I know or conjecture how oxygen, or nitrogen, or nebular tracts came to exist, or why there is a universe at all, material or spiritual. I offer the suggestion in the historical spirit alone; merely as a hint of how a particular step in the evolution of existing life from pre-existent matter may, perhaps, have taken place, and as such I attribute to it a conjectural value only.

SPENCER AND DARWIN

It is a familiar observation with people who have reached middle age that their chronological conception of their own time is often far more defective than their chronological conception of written history in which they have not themselves participated. Men of our own generation may remember exactly the relative dates of Pharsalia and Philippi; they may be clearly aware of just how

Raphael stood in time to Perugino or to Titian; they may know precisely how long Napoleon, Byron, and Talleyrand survived the Restoration. But about the events of their own lifetime they are always asking themselves, "In what year did Lord Beaconsfield die?" "How long did the Prince Imperial go on living after Sedan?" "Was Carlyle still among us when Mr. Gladstone was denouncing the Bulgarian atrocities?" —and so forth perpetually. Even the sequence of events in one's own life often similarly deceives one. We forget whether Tom went to Australia before or after Lucy's marriage; whether we had or had not made McFarlane's acquaintance at the time when Hingston was engaged in painting his first Academy picture. We remember events, but not their order. Daily facts of life, crowding in upon us too thickly for due note, defy all accurate chronological organisation. We recall them disconnectedly; the occurrences impress themselves more or less upon our brains, but their infinite concatenation with all other circumstances escapes us. Hence we are often more surprised at learning a little later how events really stood to one another in our own time than at anything which comes to us from unremembered periods.

Especially is this the case with slow organic or psychological movements—movements which grow unseen, and gain but gradual recognition. Cataclysmal events—the Déchéance of the Second Empire, the Italians in Rome, the assassination of the Czar—often fix themselves by their very vividness and unexpectedness on the memory, with their date and relations ineffaceably attached. But where we have to deal with the growth of opinion, most people fall into serious mental errors of chronology. Either they believe a movement began when they themselves first happened to hear of it; or else they date it from the appearance of some startling and much discussed publication.

Mr. Edward Clodd's *Pioneers of Evolution* brings this truth into strong relief. In this interesting and careful work Mr. Clodd has been at the pains to investigate thoroughly the part borne in the evolutionary revolution, both by the early precursors—Buffon, Lamarck, Laplace, and others—and by the three chief actors in the final triumphal stage of the theory, Darwin, Spencer, and Huxley. His analysis is marked by a conspicuous desire for fairness all round: he has honestly endeavoured to assign to each of these three great thinkers his own true share —no more, no less—in the genesis of the modern evolutionary concept. Yet, though the book contains, strictly speaking, little on this head that was not already implicitly within the reach of special students of the evolution of evolutionism, it will probably prove a great surprise to that large section of the reading public which habitually confines the idea of evolution to organic development alone, and which still believes that Darwin "invented" the theory of Descent with Modification. To all such people—and they include the mass of the averagely well-read—Mr. Clodd's revelation will come with all the charm of a sudden surprise. He has been enabled, through the kindness of Mr. Herbert Spencer, to give fuller and more authoritative details of the fundamental facts than have yet been published; and he shows more fully perhaps than anyone else has hitherto done the central importance of Mr. Spencer's position in the evolutionary advance.

May I begin with a passage which I quoted from one of Mr. Spencer's own early works no less than eleven years[1] since, in my little monograph on *Charles Darwin?* It occurs in an essay on "The Development Hypothesis," in that long defunct paper, the *Leader*. (The italics are in the original.)

Even could the supporters of the

[1] This essay was published in 1897 in the *Fortnightly Review*.

Development Hypothesis merely show that the origination of species by the process of modification is conceivable, they would be in a better position than their opponents. But they can do much more than this. They can show that the process of modification has effected, and is effecting, great changes in all organisms, subject to modifying influences.....They can show that any existing species—animal or vegetable—when placed under conditions different from its previous ones, *immediately begins to undergo certain changes of structure fitting it for the new conditions.* They can show that in successive generations these changes continue, until ultimately the new conditions become the natural ones. They can show that in cultivated plants, in domesticated animals, and in the several races of men, these changes have uniformly taken place. They can show that the degrees of difference, so produced, are often, as in dogs, greater than those on which distinctions of species are in other cases founded. They can show that it is a matter of dispute whether some of those modified forms *are* varieties or modified species. They can show too that the changes daily taking place in ourselves —the facility that attends long practice, and the loss of aptitude that begins when practice ceases—the development of every faculty, bodily, moral, or intellectual, according to the use made of it, are all explicable on this same principle. And thus they can show that throughout all organic nature there *is* at work a modifying influence of the kind they assign as the cause of these specific differences—an influence which, though slow in its action, does, in time, if the circumstances demand it, produce marked changes ; an influence which, to all appearance, would produce in the millions of years, and under the great varieties of condition which geological records imply, any amount of change.

Now, by most readers of the present day, this passage would undoubtedly be at once set down as "Darwinian." But when was it written? "Would you be surprised to learn" that it was published by Herbert Spencer in the *Leader* newspaper no less than *seven years* before the appearance of *The Origin of Species?* The essay which contains it was first printed in 1852 ; *The Origin of Species* was published in 1859. As I have already remarked in my *Charles Darwin:*

> This admirable passage.....contains explicitly almost every idea that ordinary people, not specially biological in their interests, now associate with the name of Darwin. That is to say, it contains, in a very philosophical and abstract form, the theory of Descent with Modification, *without* the distinctive Darwinian adjunct of Natural Selection, or Survival of the Fittest.

To put it briefly, most people at the present day, now that evolutionism has practically triumphed, now that the evolutionary method is being applied to almost every form of scientific subject-matter, go doubly wrong as to the origin of that method. In the first place, they attribute mainly or exclusively to Darwin ideas which were current long before Darwin wrote; in the second place, they also attribute to Darwin ideas which were promulgated, in some cases before and in other cases after Darwin, by independent thinkers who accepted his theories as part only of their own systems. Mr. Spencer has been by far the greatest sufferer from this curious human habit of finding an ostensible figure-head for every great movement, and then attaching everything in the movement to that figure-head alone—Luther for the Protestant Reformation, Rousseau or Robespierre for the French Revolution, Pusey for the Anglo-Catholic Revival, and so forth. I am glad that Mr. Clodd has undertaken definitely to combat this doubly erroneous view, and that his book has allowed me the opportunity of adding my mite to this question of ascription.

At the same time, I should like to premise that I write this article in a spirit of the profoundest loyalty to Darwin's memory and opinions. No man could have a deeper respect than I have for the character and the life-work of that great man of science. But

loyalty, as I understand the term, consists in giving your hero credit for what he really was and what he really did; it does not consist in attributing to him the work actually done by others, while suppressing the very facts which form his chief claim to the gratitude and consideration of posterity. Now there is one invaluable piece of work which Darwin really did do, and do effectively—he discovered and proved to the hilt the theory of Natural Selection, as a cause, and probably the chief cause, both of the diversity of species and of their adaptation to the environment. And there are two important pieces of work which Darwin did not do, but with which he is generally credited—he did not originate the idea of Descent with Modification in plants and animals; and he did not originate the general idea of Evolution, as a Cosmical Process. These last two ideas come to us from elsewhere. That of Descent with Modification we derive from Erasmus Darwin, Lamarck, and others, following in the footsteps of still earlier vague guessers. That of Evolution as a pervading Cosmical Process we derive from Herbert Spencer, and I venture to say from Herbert Spencer alone. Even the word is Mr. Spencer's; before his time it was never used, I believe, in that particular sense; and after him it was seldom employed by Darwin, who used it (when he used it at all) in reference to Mr. Spencer's general concepts. So, too, the phrases, "survival of the fittest," "adaptation to the environment," and others, due entirely to Mr. Spencer, are regarded as a rule by the averagely well-read man as purely "Darwinian." It seems to me, therefore, that to do justice to Mr. Spencer in this matter is also incidentally to do justice to Darwin. For, in the first place, Darwin, with his inflexible sense of equity, his perfect generosity, his admirable self-effacement, would have been the last man to put forward a claim to what belonged of right to others; and, in the second place, with his cautious, experimental English mind, he would never have desired to have his name associated with many of Mr. Spencer's most brilliant and powerful *à priori* achievements.

Nevertheless, before the appearance of Mr. Clodd's book, there were, I believe, but two works extant which endeavoured to put this question in its true light, and even there mainly as regarded the theory of Natural Selection. One of those two books was Mr. Samuel Butler's *Evolution Old and New;* the other, if I may venture to mention it, was my own small volume on *Charles Darwin.* But Mr. Butler, both in the work I have just named, and still more in *Luck or Cunning*, while doing full justice to the precursors and contemporaries of Darwin, has suffered himself to be carried away by a most singular preconception as to Charles Darwin himself, and has represented that most modest and self-effacing of *savants* as deliberately endeavouring to filch for himself the discoveries and achievements of biologists who went before him. Mr. Butler's books, therefore, though useful as antidotes in the hands of those who understood the facts, could only mislead and puzzle outsiders. Nevertheless, they did actually do this piece of good service; they brought out in strong relief the true nature of Charles Darwin's magnificent life-work, as consisting entirely in the establishment of the principle of Natural Selection—a principle which made the previously discredited notion of Descent with Modification immediately commend itself to the whole biological world of his time, and more particularly to the younger generation. As to my own little book on *Charles Darwin*, if I dare to allude to it here, though it also insisted (from the opposite and sympathetic standpoint) upon this same cardinal fact, and likewise dwelt to a somewhat less degree upon the central importance of Mr. Spencer's position, it was published only in a popular series, and did not perhaps reach the eyes of those who mostly required to have these facts impressed upon them. I rejoice,

therefore, that Mr. Clodd should have reopened this serious question, and especially that the discussion to which his work is likely to give rise may result in putting Mr. Spencer's true place in the evolutionary movement before the eyes of his contemporaries while he is still among us to be gratified by a recognition too long withheld him.

The needful rectification of public opinion on this subject, it seems to me, embraces two points. In the first place, as regards Organic Evolution, Darwin was not in any sense the originator of the idea; he was anticipated by his own grandfather, by Lamarck, by Herbert Spencer (at least so far as priority of publication is concerned), and by several others. In the second place, as regards Evolution in General, the idea was not Darwin's at all; it was entirely and solely Herbert Spencer's. Each of these two points I shall treat briefly but separately.

Everybody now knows that the idea of Organic Evolution—the conception that plants and animals were not miraculously created, but developed by natural causes from a common original—was far older than Charles or even than Erasmus Darwin. In a certain vague way it was anticipated by several early philosophers, and somewhat more definitely, though still nebulously, by Lucretius. In modern times, however, it first took a regularly scientific shape with Erasmus Darwin. Most people believe that the theory never progressed beyond that somewhat amorphous stage up to the time when Charles Darwin published *The Origin of Species*. This is a serious mistake. The concept, once set on foot, grew rapidly in definiteness and in fulness of scientific basis up to the moment of Charles Darwin's cardinal discovery. With Erasmus Darwin, it was little more than a brilliant though pregnant *aperçu;* with Lamarck, it became a powerfully-supported scientific concept; in Herbert Spencer's hands it grew to be a probable and rational theory, based upon a serious array of confirmatory facts, and fulfilling all the conditions of a sound working hypothesis. If the reader will turn once more to Mr. Spencer's pronouncement, published seven years before *The Origin of Species*, he will see that there Mr. Spencer has brought together almost all the chief arguments which still weigh in favour of the theory of Descent with Modification. Mr. Clodd has collected a large number of passages from Mr. Spencer's early works—especially passages from scattered articles *prior* to the first public hint of Darwin's idea—which amply prove Mr. Spencer's claim to rank as an entirely independent author of the doctrine of Organic Evolution. The fact is, before Darwin's book appeared the Argument from Variation, the Argument from Plants and Animals under Domestication, the Argument from Embryology, the Argument from Geographical Distribution, the Argument from Distribution in Geological time, had all of them been brought forward, and some of them had been treated with great skill and effect, by Mr. Spencer. Indeed, it was above all Von Baer's law of embryological development which led Mr. Spencer both to his first clear conception of the method of Biological Evolution, and to his first incomplete conception of Evolution in General as fundamentally a progress from the homogeneous to the heterogeneous.

Why, then, if so many minds had already grasped the doctrine of Descent with Modification, did Darwin's immortal treatise produce so immediate and noteworthy a mental revolution? Why did the world which turned a deaf ear to Lamarck, and even to Spencer, listen gladly to Charles Darwin? Clearly, because Darwin had something new and important to add to the concept; and that "something new" was the theory of Natural Selection. This was Darwin's real contribution to the world's thought. He arrived at it at first as a stray *aperçu;* he followed it up, with Darwinian patience, with astonishing wealth of knowledge and instance, with single-hearted devotion to the particular

subject, through the whole of his life; and he left it at the end as nearly certain as such a thesis can ever be made by human intelligence. The weak point in the hypothesis of Organic Evolution, before Darwin, was the difficulty of understanding the nature and cause of Adaptation to the Environment. That weak point, when supplemented by theological preconceptions, made many or most biologists hesitate to accept the nascent theory, in Lamarck's and Spencer's presentment. It is true, minds like Lamarck's and Spencer's could never for a moment, on the other hand, have accepted the crude and unthinkable dogma of separate creation; but the mass of biologists, incapable of high philosophic reasoning, held their judgment suspended, and waited for some other explanation of the origin of species. Darwin's discovery converted them *en bloc*. It was easy to understand, by means of the clue he afforded, not merely *that* organisms had been naturally evolved from simple primitive forms, but also *how* and *why* they had been so evolved. Darwin's great work, then, consisted in this—that he made credible a theory which most people before him had thought incredible; that he discovered a tenable *modus operandi* for what before had been rather believed or surmised than definitely imaged.

I do not mean to say that Darwin did no more than this. He supplied the great key of Natural Selection; but he also added much in other ways to the doctrine, especially in the direction of piling up facts and meeting objections. His work had thus a double value. On the one hand, it is not probable that the general biological public would have been converted to evolutionism half so quickly if it had not been for the enormous mass of confirmatory evidence adduced by Darwin. In the second place, even those who, like Spencer, were already evolutionists—evolutionists in fibre, incapable of taking any supernaturalist view of the universe in which they lived—gladly availed themselves of Darwin's discovery of Natural Selection, as an explanation of one important set of features in Organic Evolution, thitherto most imperfectly and inadequately explained. Or let us put it another way. From the point of view of contribution to thought, it is Natural Selection that forms Darwin's great glory. But from the point of view of mere effective persuasion, it is the weight of evidence he brought up in favour of the older principle of Descent with Modification that told, and still tells, with the average mind. Hence it has happened, and perhaps will always happen, that Darwin has received more credit for that part of his theory which was not of his own invention than for that part of which he can justly claim the almost exclusive glory. Almost, I say, because the modifying adverb is demanded by justice to Mr. Alfred Russel Wallace, whose partial coincidence with Darwin in the discovery of Natural Selection now needs no advertisement.

As thinker, then, it is on Natural Selection as a *vera causa* of specialisation and adaptation among plants and animals that Darwin most securely rests his claim to celebrity. As prophet and apostle, on the other hand, it must be frankly admitted that he ranks first as a preacher of organic—but only of organic—evolution. In this repect, his importance, in England especially, can hardly be overrated. For it is a peculiarity of the practical English mind that it is more moved by a vast array of evidence, a serried mass of cumulative instances, than by any possible cogency of logical reasoning. Darwin's own mind was in this way intensely English. He piled up fact after fact, added case to case, till men whom no power of abstract argument could convince were convinced by pure force of successive witnesses. They were borne down by numbers. Your ordinary Englishman, indeed, is never quite satisfied by Euclid's demonstration that in a right-angled triangle the square on the

hypotenuse is equal to the sum of the squares on the two opposite sides; he honestly believes it when he sees it tried a hundred and twenty times by careful measurement, and still more when he finds that engineering works, which take it for granted as a basis, succeed in paying a satisfactory dividend. Proof that in the nature of triangles this truth is involved he does not regard; experimental verification, or what seems to be such, in a few concrete cases, amply satisfies him. Hence it came about that a world which would have listened coldly to Herbert Spencer's *à priori* reasonings or splendid generalisations was converted at once when Darwin brought up, with inexhaustible patience and extraordinary keenness of insight, his profound array of confirmatory facts about bees and cuckoos, about the fertilisation of orchids and the movements of tendrils.

Nobody has better summarised than Mr. Clodd the exact point which evolutionary theory had reached as regards plants and animals *before* the publication of *The Origin of Species*. Whoever wishes to learn just how much was surmised by the predecessors of Darwin, and just how much Darwin added to their ideas, cannot do better than consult his luminous exposition.

Once, indeed, no less than seven years before the publication of *The Origin of Species*, Mr. Spencer even trembled for a moment on the verge of the actual discovery of Natural Selection. This was in the essay on Population in the *Westminster Review* in 1852. The passage at full is too long to extract, but I will quote the last words of it:—

> All mankind subject themselves more or less to the discipline described; they either may or may not advance under it; but in the nature of things only those who *do* advance under it eventually survive. For, necessarily, families and races whom this increasing difficulty of getting a living which excess of fertility entails does not stimulate to improvements in production.....are on the high road to extinction; and must ultimately be supplanted by those whom the pressure does so stimulate.....And here, indeed, it will be seen that premature death, under all its forms, and from all its causes, cannot fail to work in the same direction. For, as those prematurely carried off must, in the average of cases, be those in whom the power of self-preservation is the least, it unavoidably follows that those left behind to continue the race must be those in whom the power of self-preservation is the greatest, must be the select of their generation.

Now, this is the doctrine of Natural Selection, or, as Mr. Spencer himself afterwards called it, Survival of the Fittest. Only, it is limited to the human race; and it is not recognised as an efficient cause of specific differentiation. As Mr. Spencer himself remarks, the passage "shows how near one may be to a great generalisation without seeing it." Moreover, Mr. Spencer here overlooks the important factor of spontaneous variation, which forms the cornerstone of Darwin's discovery, and which was also clearly perceived by Mr. Wallace. In short, in Mr. Spencer's own words, the paragraph "contains merely a passing recognition of the selective process, and indicates no suspicion of the enormous range of its effects, or of the conditions under which a large part of its effects are produced."

It is thus obvious, not only that Mr. Spencer was a believer in Organic Evolution long before the publication of Darwin's first utterance on the subject, but also that he almost succeeded, like Wallace, Wells, and Patrick Matthew, in anticipating the discovery of Natural Selection.

But besides the misconception about Mr. Spencer's relation to Darwin, as regards Organic Evolution, there remains the far deeper and more fatal misconception about his relation to Darwin as regards Evolution in General, viewed as a Cosmical Process. Most people imagine, I gather, that Mr. Spencer is a philosopher who has put

into a higher and more abstract form Darwin's discoveries and theories. In short, they regard him as a disciple of Darwin. And this brings me to the second of the two rectifications of public opinion which I promised above to attempt. Nothing could be more absurdly untrue than to regard Mr. Spencer as in any way, or in either department, a disciple of Darwin's. In the first place, as regards Organic Evolution, he was an avowed evolutionist long before the publication of Darwin's first hint on the subject. He continued an evolutionist, in the main on the same lines, after Darwin had brought out *The Origin of Species* and its ancillary volumes. He adopted, it is true, the theory of Natural Selection, as did every other evolutionist of his time (except Mr. Samuel Butler); but he adopted it merely as one among the factors of Organic Evolution, and, while valuing it highly, he never attributed to it the same almost exclusive importance as did Darwin himself—certainly not the same quite exclusive importance as has since been attached to it by the *doctrinaire* school of Neo-Darwinians, who employ it as the sole key which unlocks, in their opinion, all the problems of biology. On the contrary, he has always steadily maintained the existence and importance of other factors in Organic Evolution, and has combated with extraordinary vigour and acuteness the essentially Neo-Darwinian views of Weismann which make Natural Selection alone into the *deus ex machina* of organic development.

In the second place—and this is the more important point—as regards Evolution at Large, Mr. Spencer is not in the remotest degree beholden for the origin of his ideas to Darwin. So far as those ideas are not quite original with him—and no human idea is ever wholly original—they are derived from the direct line of Kant, Laplace, and the English geologists. For many years previous to Mr. Spencer's philosophic activity, the progress of human thought had been gradually leading up to the point where a cosmic evolutionism, such as Mr. Spencer's, became almost of necessity the next forward step. But to say this is not to detract in any way from Mr. Spencer's greatness—rather the other way; for it needed a man of cosmic intellect and of cosmic learning to make the advance which had thus become inevitable. The moment had arrived, and waited for the thinker; Mr. Spencer was the thinker who came close upon the moment. The situation is this. Kant and Laplace had suggested that suns and stars might have grown, and assumed their existing distribution and movements, by the action of purely natural laws, without the need for direct creative or systematising effort from without. The geologists had suggested that the crust of the earth might have assumed its existing stratification and sculpture through the agency of causes at present in action. Erasmus Darwin and Lamarck had suggested that plants and animals might have been developed and specialised from a common original by the direct action of the environment, aided in part by their own volition, where such existed. But all these thinkers, great and able in their day, had addressed themselves—as Charles Darwin later addressed himself—to one set of phenomena alone; had regarded the process which they pointed out, in isolation only. It remained for a man of commanding intellect and vast grasp of generalising faculty to build up and unify these scattered evolutionary guesses into a single consistent concept of Evolution. Herbert Spencer was that man. He gave us both the concept and the name by which we habitually know it. The words "Theory of Evolution" occur already, seven years before Darwin, in the *Leader* essay.

This point, again, Mr. Clodd has excellently elaborated. "Contact with many sorts and conditions of men," he says,

brings home the need of ceaselessly

dinning into their ears the fact that Darwin's theory deals only with the evolution of plants and animals from a common ancestry. It is not concerned with the origin of life itself, nor with those conditions preceding life which are covered by the general term, Inorganic Evolution. Therefore, it forms but a very small part of the general theory of the origin of the earth and other bodies, "as the sand by the seashore innumerable," that fill the infinite spaces.

It is Evolution in General, both the concept and the word, that we owe to Mr. Spencer; and Mr. Clodd's book brings into strong relief the actual relations existing in this respect between Herbert Spencer himself and his predecessors or contemporaries.

The genesis of the idea in his own mind Mr. Spencer has illustrated by a series of extracts from his original volume of *Essays*, published previously to *The Origin of Species*, and therefore necessarily independent of any Darwinian impulse. The series of extracts thus selected he has permitted Mr. Clodd to print entire; and with them the abstract supplied to Professor Youmans. These summaries I will not still further summarise; it must suffice here to note, for the benefit of those who have never considered dates in this matter, that the chronology of the subject is roughly as follows. In 1859 (almost 1860, for it was in the end of November) Darwin brought out *The Origin of Species*. Before that period Mr. Spencer had published (among others) the following distinctly evolutionary works:—In 1850, *Social Statics*, in which the idea of Human Evolution was clearly foreshadowed. In 1852, an article in the *Leader* on "The Development Hypothesis" (from which I have quoted a passage already), where the Evolution of Species of Plants and Animals was definitely set forth. In 1854, an article in the *British Quarterly Review*, on "The Genesis of Science," where Intellectual Evolution was distinctly mapped out. In 1855, *The Principles of Psychology* (first form), where Mental Evolution is fully formulated, and the development of animals from a common origin implied at every step. In 1857, an article in the *Westminster Review* on "Progress, its Law and Cause," where the conception of Evolution at Large was finally attained (though not quite in the full form which it afterwards assumed). From all of these, but especially the last, grew up the idea of the *System of Synthetic Philosophy*, the first programme of which was drawn up in January, 1858, nearly two years before the appearance of *The Origin of Species*. Thus, so far is it from being true that Mr. Spencer is a disciple of Darwin, that he had actually arrived at the idea of Organic Evolution, and of Evolution in General, including Cosmic Evolution, Planetary Evolution, Geological Evolution, Organic Evolution, Human Evolution, Psychological Evolution, Sociological Evolution, and Linguistic Evolution, before Darwin had published one word upon the subject.

To some people, in saying all this, I may seem to be trying to belittle Darwin. Not at all. You do not belittle a great man by giving him full credit for what he did, and none for what he did not do. You do not belittle Virgil by showing that he was not the powerful magician the Middle Ages thought him; nor do you belittle Bacon by proving that he did not write *Othello* and *Hamlet*. Nobody has a greater respect for Bacon, I believe, than Dr. Abbott; but Dr. Abbott does not think respect for Bacon compels him to father *Macbeth* and *Julius Cæsar* upon the author of the *Novum Organum*. Nobody has a greater respect for Darwin than I have; but I do not think that that respect compels me to credit Darwin with having originated the ideas due to Lamarck and to Herbert Spencer. Nay, more; I have so deep a respect for the work Darwin actually performed that I consider it quite unnecessary to filch from others in order to enrich him. He can well do without such disloyal friends. Indeed, it is Mr. Samuel

Butler's peculiar belief that Darwin did so attempt to filch on his own account. I cannot agree with Mr. Butler that the honestest and most candid of our biological thinkers ever made any such endeavour himself; nor can I believe one honours him by making it for him.

If I were to sum up the positions of these two great thinkers, Darwin and Spencer, the experimentalist and the generaliser, the observer and the philosopher, in a single paragraph each, I should be tempted to do it in somewhat the following fashion.

Darwin came at a moment when human thought was trembling on the verge of a new flight towards undiscovered regions. Kant and Laplace and Murchison and Lyell had already applied the evolutionary idea to the genesis of suns and systems, of continents and mountains. Lamarck had already suggested the notion that similar conceptions might be equally applied to the genesis of plant and animal species. But, as I have put it elsewhere, what was needed was a solution of the difficulty of Adaptation which should help the lame dog of Lamarckian evolutionism over the organic stile, so leaving the mind free to apply the evolutionary method to psychology, and to what Mr. Spencer has well called the super-organic sciences. For that office Darwin presented himself at the exact right moment—a deeply learned and well-equipped biological scholar, a minute specialist as compared with Spencer, a broad generalist as compared with the botanists, entomologists, and ornithologists of his time. He filled the gap. As regards thinkers, he gave them a key which helped them to understand Organic Evolution; as regards the world at large, he supplied them with a codex which convinced them at once of its historical truth.

Herbert Spencer is a philosopher of a wider range. All knowledge is his province. A believer in Organic Evolution *before* Darwin published his epoch-making work, he accepted at once Darwin's useful idea, and incorporated it as a minor part in its fitting place in his own system. But that system itself, alike in its conception and its inception, was both independent of and anterior to Darwin's first pronouncement. It certainly covered a vast world of thought which Darwin never even attempted to enter. To Herbert Spencer, Darwin was even as Kant, Laplace, and Lyell—a labourer in a special field who produced results which fell at once into their proper order in his wider synthesis. As sculptors, they carved out shapely stones, from which he, as architect, built his majestic fabric. The total philosophic concept of Evolution as a Cosmical Process—one and continuous, from nebula to man, from star to soul, from atom to society—we owe to Herbert Spencer himself, and to him alone, using as material the final results of innumerable preceding workers and thinkers.

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