Falling in Love

With Other Essays on More

Exact Branches of Science

by

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Preface

Some people complain that science is dry. That is, of course, a matter of taste. For my Own part, I like my science and champagne as dry as I can get them. But the public thinks otherwise. So I have ventured to sweeten accompanying samples as far as possible to suit the demand, and trust they will meet with the approbation of consumers.

Of the specimens here selected for exhibition, my title piece originally appeared in *the fortnight review:* `Honey Dew' and The First Potter' were contributions to *Longman`s Magazine:* and all the rest found friendly shelter between the familiar yellow covers of the good old *cornhill.* My thanks are due to the proprietors and editors of those various periodicals for kind permission to reproduce them here.

G.A.
THE NOOK, DORKING:
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An ancient and famous human institution is in pressing danger. Sir George Campbell has set his face against the time-honoured practice of Falling in Love. Parents innumerable, it is true, have set their face against it already from immemorial antiquity; but then they only attacked the particular instance, without venturing to impugn the institution itself on general principles. An old Indian administrator, however, goes to work in all things on a different pattern. He would always like to regulate human life generally as a department of the India Office; and so sir George Campbell would fain have husbands and wives selected for one another (perhaps on Dr. Johnson`s principle, by the Lord Chancellor) with a view to the future development of the race, in the process which he not very felicitously or elegantly describes as` man breeding.' `Probably,' he says, as reported in Nature, `we have enough physiological knowledge to effect a vast improvement in the pairing of individuals of the same or allied races of we could only apply that knowledge to make fitting marriages, instead of giving way to foolish ideas about love and the testes of young people, whom we can hardly trust to choose their own

bonnets, much less to choose in a graver matter in which they are most likely to be influenced by frivolous prejudice.' He wants us, in other words, to discard the deep - seated inner physiological prompting of inherited instinct, and to substitute for them some clam and dispassionate but artificial selection of a fitting partner as the father or mother of future generations.

Now this is of course a serious subject, and it ought to be treated seriously and reverently. But, it seems to me, Sir George Campbell's conclusion is exactly the opposite one form the conclusion now being forced upon men of science by a study of the biological and psychological elements in this very complex problem of heredity. So far from considering love as a `foolish idea,` opposed to the best interest of the race, I believe most competent physiologists and psychologists, especially those of the modern evolutionary school, would regard it rather as an essentially beneficent and conservative instinct developed and maintained in is by natural causes, for the very purpose of insuring just those precise advantages and improvements which Sir George Campbell thinks he could himself effect by a conscious and deliberate process of selection. More than that I believe, for my own part (and I feel sure most evolutionists would cordially agree with me), that this

beneficent inherited instinct of Falling in love effects the object it has in view far more admirably, subtly, and satisfactorily, on the average of instances, than any clumsy human selective substitute could possibly effect it.

In short, my doctrine is simply the old-fash-Ioned and confiding belief that marriages are made in heaven: with the further corollary the heaven manages them, one time with another, a great deal better than Sir George Campbell.

Let us first look how Falling in Love affects the standard of human efficiency; and then let us consider what would be the probable result of any definite conscious attempt to substitute for it some more deliberate external agency.

Falling in Love, as modern biology teaches us to believe, is nothing more than the latest, highest, and most involved exemplification, in the human race, of that almost universal selective process which Mr. Darwin has enabled us to recognize throughout the whole long series of the animal kingdom. The but-terfly that circles and eddies in his aerial dance around his observant mate is endeav-ouring to charm her by the delicacy of his colouring, and to overcome her coyness by the display of his skill. The peacock that struts about in imperial pride under the eyes of his

attentive hens, is really contributing to the future beauty of strength of his race by collecting to himself and harem through whom he hands down to posterity the valuable qualities which have gained the admiration of his mates in his own person. Mr. Wallace has shown that to be beautiful is to be efficient; and sexual selection is thus as it were, a mere lateral form of natural selection__a survival of the fittest in the guise of mutual attractiveness and mutual adaptability, producing on the average a maximum of the best properties of the race in the resulting offspring. I need not dwell here upon this aspect of the case, because it is one with which, since the publiccation of the `Descant of Man,' all the world has been sufficiently familiar.

In our species, the selective process is marked by all the features common to selection throughout the whole animal kingdom; but it is also, as might be expected, far more specialised, far more individualised, far more cognisant of personal traits and minor peculiarities. It is furthermore exerted to a far greater extent upon mental and moral as well as physical peculiarities in the indicidual.

We cannot fall in love with everybody alike. Some of us fall in love with one person, some with another. This instinctive and deep-seated differential feeling we may regard as the out-

come of complementary features, mental, moral, or physical, in the two persons concerned; and experience shows us that, in nine cases out of ten, it is a reciprocal affection,
that is to say, in other words, an affection roused in unison by varying qualities in the respective individuals.

Of its eminently conservative and even upward tendency very little doubt can be rea- sonably entertained. We *do* fall in love, taking us in the lump, with the young, the beautiful, the strong, and the healthy; we do *not* fall in love, taking us in the lump, with the aged, the ugly, the feeble, and the sickly. The prohibi- tion of the Church is scarcely needed to pre- vent a man from marrying his grandmother. Moralists have always borne a special grudge to pretty faces; but, as Mr. Herbert Spencer admirably put it (long before the appearance
of Darwin's selective theory), `the saying that beauty is but skin-deep is itself but a skin-
deep saying.' In reality beauty is one of the very best guides we can possibly have to the desirability, so far as race-preservation is con- cerned, of any man or any woman as a partner in marriage. A fine form, a good figure, a beautiful bust, a round arm and neck, a fresh complexion, a lovely face, are all outward and visible signs of the physical qualities that on
the whole conspire to make up a healthy and vigorous wife and mother; they imply sound-

ness fertility, a good circulation, a good digestion. Conversely, sallowness and paleness are roughly indicative of dyspepsia and anaemia; a flat chest is a symptom of deficient maternity; and what we call a bad figure is really, in one way or another, an unhealthy departure from the central norma and standard of the race. Good teeth mean good deglutition; a clear eye means an active liver; scrubbiness and undersizedness mean feeble virility. Not are indications of mental and moral efficiency by any means wanting as recognised elements in personal beauty. A good-humoured face is in itself almost pretty. A pleasant smile half redeems unattractive features. Low, receding foreheads strike us unfavourably. Heavy stolid, half-idiotic countenances can never be beautiful, however regular their lines and contours. Intelligence and goodness are almost as necessary as health and vigour in order to make up our perfect ideal of a beautiful human face and figure. The Apollo Belvedere is no fool; the murderers in the Chamber of Horrors at Madame Tussaud's are for the most part no beauties.

What we all fall in love with, then, as a race, is in most cases efficiency and ability. What we each fall in love with individually is, I believe, our moral, mental, and physical complement. Not our like, not our counterpart; quite the contrary; within healthy limits, our

unlike and our opposite. That this is so has long been more or less a commonplace of ordinary conversation; that it is scientifically true, one time with another, when we take an extended range of cases, may, I think, be almost demonstrated by sure and certain war- ranty of human nature.

Brothers and sisters have more in common, mentally and physically, than any other mem- bers of the same race can possibly have with one another. But nobody falls in love with his sister. A profound instinct has tough even the lower races of men (for the most part) to avoid such union of the all-but-identical. In the higher races the idea never so much as occurs to us. Even cousins seldom fall in love __seldom, that is to say, in comparison with the frequent opportunities of intercourse they enjoy, relatively to the remainder of general society. When they do, and when they carry out their perilous choice effectively by mar- riage, natural selection soon avenges Nature upon the offspring by cutting off the idiots, the consumptives, the weaklings, and the crip- ples, who often result from such conssn- guineous marriages. I narrow communities, where breeding in-and-in becomes almost inevitable, natural selection has similarly to exert itself upon a crowd of *cr'etins* and other hapless incapables. But in wide and open champaign countries, where individual choice

has free room for exercise, men and women as a rule (if not constrained by parents and moralists) marry for love, and marry on the whole their natural complements. they prefer outsiders, fresh blood, somebody who comes from beyond the community, to the people of their own immediate surroundings. In many men the dislike to marrying among the folk with whom they have been brought up amounts almost to a positive instinct; they feel it as impossible to fall in love with a fellow-townswoman as to fall in love with their own first cousins. Among exogamous tribes such as instinct (aided, of course, by other extraneous causes) has hardened into custom; and there is reason to believe (from the universal traces among the higher civilisations of marriage by capture) that all the leading races of the world are ultimately derived from exogamous ancestors, possessing this healthy and excellent sentiment.

In minor matters, it is of course universally admitted that short men, as a rule, prefer tall women, while tall men admire little women. dark pairs by preference with fair; the commonplace often runs after the original. People have long noticed that this attraction towards one’s opposite tends to keep true the standard of the race; they have not, perhaps, so generally observed that it also indicates roughly the existence in either individual of a desire for its

own natural complement. It is difficult here to give definite examples, but everybody knows how, in the subtle psychology of Falling in Love, there are involved innumerable minor elements, physical and mental, which strike
us exactly because of their absolute adaptation to form with ourselves an adequate union. Of course we do not definitely seek out and dis- cover such qualities; instinct works far more intuitively than that; but we find at last, by subsequent observation, how true and how trustworthy were its immediate indications.
That is to say, those men do so who were wise enough or fortunate enough to follow the ear- liest prompting of their own hearts, and not
to be ashamed of that divinest and deepest of human intuitions, love at first sight

How very subtle this intuition is, we can only guess in part by the apparent capriciousness
and incomprehensibility of its occasional action. We know that some men and women
fall on love easily, while others are only moved to love by some very special and singular com- bination of peculiarities. We know that one
man is readily stirred by every pretty face he sees, while another man can only be roused by intellectual qualities or by moral beauty. We know that sometimes we meet people pos- sessing every virtue and grace under heaven, and yet for some unknown and incomprehen- sible reason we could no more fall in love

with them then we could fall in love with the Ten Commandments. I don't, of course, for a moment accept the silly romantic notion that men and women fall in love only once in their lives, or that each one of us has somewhere on earth his or her exact affinity, whom we must sooner or later meet or else die unsatisfied. Almost every healthy normal man or woman has probably fallen in love over and over again in the course of a lifetime (except in case of very early marriage), and could easily find dozens of persons with whom they would be capable of falling in love again if due occasion offered. We are not all created in pairs, like the exchequer tallies, exactly intended to fit into one anothers minor idiosyncrasies. Men and women as a rule very sensibly fall in love with one another in the particular places and the particular societies they happen to be cast among. A man at Ashby-de-la-Zouch does not hunt the world over to find his pre-established harmony at paray-le-Monial or at Denver, Colorado. But among the women he actually meets, a vast number are purely indifferent to him; only one or two, here are there, strike him in the light of possible wives, and only one in the last resort (outside Salt Lake City) approves herself to his inmost nature as the actual wife of his final selection.

Now this is very indifference to the vast mass of our fellow-countrymen or fellow-country-woman, this extreme pitch of selective preference in the human species, is just one mark of our extraordinary specialization, one stamp and token of our high supremacy. The brutes do not so pick and choose, though even there, as Darwin has shown, selection plays a large part (for the very butterflies are coy, and must be wooed and won). It is only the human race itself that selection descends into such minute, such subtle, such indefinable discriminations Why should a universal and common impulse have in our case these special limits? Why should we be by nature so fastidious and so diversely affected? Surely for some good and sufficient purpose. No deep-seated want of our complex life would be so narrowly restricted without a law and a meaning. Sometimes we can in part explain its conditions. Here, we see that beauty plays a great *role*; there, we recognise the importance of strength, of manner, of grace, of moral qualities. Vivacity, as Mr. Galton justly remarks, is one of the most powerful among human attractions, and often accounts for what might otherwise seem unaccountable preferences. But after all is said and done, there remains a vast mass of instinctive and inexplicable elements: a power deeper and more marvelous in its inscrutable ramifications than human consciousness. `What on earth,' we say `could

So-and-so see in So-and-so to fall in love with?' This very inexplicability I take to be the sign and seal of a profound importance. An instinct so conditioned, so curious, so vague,
so unfathomable, as we may guess by analogy with all other instincts, must be Nature's
guiding voice within us, speaking for the good of the human race in all future generations.

On the other hand, let us suppose of a moment (impossible supposition!) that mankind could conceivably divest itself of `these foolish ideas about love and tastes of young people,' and could hand over the choice of partners for life to a committee of anthropologists, presided over by Sir George Campbell. Would the committee manage
things, I wonder, very much better than the Creator has managed them? Where would they obtain that intimate knowledge of individual structures and functions and differences which would enable them to join together in holy matrimony fitting and complementary idiosyncrasies? Is a living man, with all his organs, and power, and faculties, and dispositions, so simple and easy a prob- lem to read that anybody else can readily undertake to pick out off-hand a help meet for him? I trow not! A man is not horse or a ter- rier. You cannot discern his `points' by simple inspection. You cannot see *a priori* why a Hanoverian bandsman and his heavy, igno-

rant, uncultured wife, should conspire to pro- duce a Sir William Herschel. If you tried to improve the breed artificially, either by choice from outside, or by the creation of an inde- pendent moral sentiment, irrespective of that instinctive preference which we call Falling in Love, I believe that so far from improving man, you would only do one of two things—either spoil his constitution, or produce a tame stereotyped pattern of amiable imbecili- ty. You would crush out all initiative, all spon- taneity, all diversity, all originality; you would get an animated moral code instead of living men and women.

Look at the analogy of domestic animals. That is the analogy to which breeding reformers always point with special pride: but what does it really teach us? That you can't improve the efficiency of animals in any one point to any high degree, without upsetting the general balance of their constitution. The race-horse can run a mile on a particular day at a particu- lar place, bar accidents, with wonderful speed: but that is about all he is good for. His health as a whole is so surprisingly feeble that he has to be treated with as much as care as a delicate exotic. `In regard to animals and plants,' says Sir George Campbell, `we have very largely mastered the principles of heredity and cul- ture, and the modes by which good qualities may be maximised, bad qualities minimised.'

True so far as concern a few points prized by ourselves for our own purposes. But in doing this, we have so lowered the general constitutional vigour of the plants or animals that our vines fall an easy prey to oidium and phylloxera, our potatoes to the potato disease and the Colorado beetle; our sheep are stupid, our rabbits idiotic, our domestic breeds generally threatened with dangers to life and limb unknown to their wiry ancestors in the wild state. And when one comes to deal with the infinitely more complex individuality of man, what hope would there be of our improving the breed by deliberate selection? If we developed the intellect, we would probably stunt the physique or the moral nature; if we aimed at a general culture of all faculties alike, we would probably end by a Chinese uniformity of mediocre dead level.

The balance of organs and faculties in a race is a very delicate organic equilibrium. How delicate we now know from thousands of examples, from the correlations of seemingly unlike parts, from the wide-spread effects of small conditions, from the utter dying out of races like the Tasmanians or the Paraguay Indians under circumstances different from those with which their ancestors were familiar. What folly to interfere with a marvellous instinct which now preserves this balance intact, in favour of an untried artificial system which

would probably wreck it as helplessly as the modern system of higher education for women is wrecking the maternal powers of the best class in our English community!

Indeed, within the race itself, as it now exists, free choice, aided by natural selection, is actu- ally improving every good point, and is for
ever weeding out all the occasional failures and shortcomings of nature. For weakly chil- dren, feeble children, stupid children, heavy children, are undoubtedly born
under this
very regime of falling in love, whose average result I believe to be so highly beneficial.
How is this? Well, one has to take into consid- eration two points in seeking for the solution
of that obvious problem.

In the first place, no instinct is absolutely per- fect. All of them necessarily fail at some
points. if on the average they do good, they are sufficiently justified. Now the material with which you have to Start in this case is not perfect. Each man marries, even in favourable circumstances, not the abstractly best adapted woman in the world to supple- ment or counteract his his individual peculiari- ties, but the best woman then and there obtainable for him. The result is frequently far from perfect; all I claim is that it would be as bad or a good deal worse if somebody else made the choice for him, or if he made the

Choice himself on abstract biological and `eugenic` principles. And, indeed, the very existence of better and worse in the world is a condition precedent of all upward evolution. Without an overstocked world, with individual variations, some progressive, some retrograde, there could be no natural selection, no survival of the fittest. That is the chief besetting danger of cut-and-dried doctrinaire views. Malthus was a very great man; but if his principle of prudential restraint were fully carried out, the prudent would cease to reproduce their like, and the world would be people in a few generations by the hereditarily reckless and dissolute and imprudent. Even so, if eugenic principle were universally adopted, the chance of exceptional and elevated natures would be largely reduced, and natural selection would be in so much interfered with or sensibly retarded.

In the second place, again, it must not be forgotten that falling in love has never yet, among civilised men at least, had a fair field and no favour. Many marriages are arranged on very different grounds—grounds of convenience, grounds of cupidity, grounds of religions, grounds of snobbishness. In many cases it is clearly demonstrable that such marriages are productive in the highest degree of evil consequences. Take the case of heiresses. An heiress is almost by necessity the one last fee-

ble and flickering relic of a moribund stock—often of a stock reduced by the sordid pursuit of ill-gotten wealth almost to the very verge of actual insanity. But let her be ever so ugly, ever so unhealthy, ever so hysterical, ever so mad, somebody or other will be ready and eager to marry her on any terms. Considerations of this sort have helped to stock the world with many feeble and unhealthy persons. Among the middle and upper classes it may be safely said only a very small percentage of marriages is ever due to love alone; in other words, to instinctive feeling. The remainder have been influenced by various side advantages, and nature has taken her vengeance accordingly on the unhappy offspring. Parents and moralists are ever ready to drown her voice, and to counsel marriage within one's own class, among nice people, with a really religious girl, and so forth *ad infinitum*. By many well-meaning young people these deadly interferences with natural impulse are accepted as part of a higher and nobler law of conduct. The wretched belief that one should subordinate the promptings of one's own soul to the dictates of a miscalculating and misdirecting prudence has been instilled into the minds of girls especially, until at last many of them have almost come to look upon their natural instincts as wrong, and the immoral, race-destructive counsel of their seniors or advisers as the truest and

purest earthly wisdom. Among certain small religious sects, again, such as the Quakers, the duty of `marrying in' has been strenuously inculcated, and only the stronger-minded and more individualistic members have had courage and initiative enough to disregard precedent, and to follow the internal divine monitors, as against the externally-imposed law of their particular community. Even among wider bodies it is commonly held that Catholics must not marry Protestants; and the admirable results obtained by the mixture of Jewish with European blood have almost all been reached by male Jews having the temerity to marry `Cristian' women in the face of opposition and persecution from their co-nationalists. It is rarely indeed that a Jewess will accept a European for a husband. In so many ways, and so many grounds, does convention interfere with the plain and evident dictates of nature.

Against all such evil parental promptings, however, a great safeguard is afforded to society by the wholesome and essentially philosophical teaching and romance of poetry. I do not approve of novels. They are for the most part a futile and unprofitable form of literature; and it may profoundly be regretted that the mare blinds laws of supply and demand should have diverted such an immense number of the ablest minds in England, France,

and America, from more serious subjects to the production of such very frivolous and, on the whole, ephemeral works of art. But the novel has this one great counterpoise of undoubted good to set against all the manifold disadvantages and shortcomings of romantic lecture—that it always appeals to the true internal promptings of inherited instincts, and opposes the foolish and selfish suggestions of interested outsiders. It is the perpetual protest of poor banished human nature against the expelling pitchfork of calculating expediency in the matrimonial market. While parents and moralists are for ever saying `Don't marry for beauty; don't marry for inclination; don't marry for love; marry for money, marry for social position, marry for advancement, marry for our convenience, not for your own,' the romance-writer is for ever urging, on the other hand, `Marry for love, and for love only.' His great theme in all ages has been the opposition between parental or other external wishes and the true promptings of the young and unsophisticated human heart. He has been the chief ally of sentiment and of nature. He has field the heads of all our girls with what Sir George Campbell describes off-hand as ` foolish ideas about love.' He has preserved us from the hateful conventions of civilisation. He has exalted the claims of personal attraction, of the mysterious native yearning of heart for heart, of the indefinite

and indescribable element of mutual selection; and, in so doing, he has unconsciously proved himself the best friend of human improvement and the deadliest enemy of all those hideous `social lies which warp us from the living truth.' His mission is to deliver the world from Dr. Johnson and Sir George Campbell.

For, strange to say, it is the moralists and the doctrinaires who are always in the wrong; it is the sentimentalists and the rebels who are always in the right in this matter. If the com- mon moral maxims of society could have had their way__ if we had all chosen our wives and our husbands, not for their beauty or their manliness, not for their eyes or their mous- taches, not for their attractiveness or their vivacity, but for their `sterling qualities of
mind and character,' we should now doubtless be a miserable race of prigs and bookworms,
of martinets and puritans, of nervous invalids and feeble idiots. It is because our young men and maidens will not hearken to this penny- wise apophthegms of shallow sophistry— because they often prefer *Romeo and Juliet* to the `Whole Duty of Man,' and a beautiful face to a round balance at Coutts's—that we still preserve some validity and some individual features, in spite of our grinding and crushing civilisation. The man who marry balances, as Mr. Galton has shown, happily die out, leaving

none to represent them; the men who marry women they have been week enough and silly enough to fall in love with, recruit the race with fine and vigorous and intelligent children, fortunately compounded of the complementary traits derived from two fairly contrasted and manually reinforcing individualities.

I have spoken throughout, for argument's sake, as tough the only interest to be considered in the married relation were the interests of the offspring, and so ultimately of the race at large, rather than of the persons themselves who enter into it. Now it is one of the strongest points in favour of the system of falling in love that it does, by common experience in the vast majority of instances, assort together persons who subsequently prove themselves thoroughly congenial and helpful to one another. And this result I look upon as one great proof of the real value and importance of the instinct. Most men and women select for themselves partners for life at an age when they know but little of the world, when they judge by superficially of characters and motives, when they still make many mistakes in the conduct of life and in the estimation of chances. Yet most of them find in after days

that they have really chosen out of all the world one of the persons best adapted by native indiosyncrasy to make their joint lives enjoyable and useful. I make every allowance
for the effects of habit, for the growth of senti- ment, for the gradual approximation of tastes
and sympathies; but surely, even so, it is a common consciousness with every one of us who has been long married, that we could hardly conceivably have made ourselves happy with any of the partners whom others have chosen; and that we have actually our- selves under the guidance of an almost unerring native instinct. Yet adaptation between husband and wife, so far as their own happiness is concerned, can have had compar- atively little to do with the evolution of the instinct, as compared with adaptation for the
joint production of vigorous and successful offspring. Natural selection lays almost all the stress on the last point, and hardly any at all
upon the first one. If, then, the instinct is found on the whole so trustworthy in the greater matter—greater, I mean, as regards the inter-
ests of the race—for which it has been mainly
or almost solely developed!

I do not doubt that, as the world goes on, a deeper sense of moral responsibility in the matter of marriage will grow up among us. But it will not take the false direction of ignor- ing these our profoundest and holiest
instincts. Marriage for money may go; mar- riage for rank may go; marriage or position may go; but marriage for love, I believe and trust, will last for ever. Men in the future will probably feel that a union with their cousins
or near relations is positively wicked; that a union with those too like them in person or disposition is at least undesirable; that a union based upon considerations of wealth or any other consideration save considerations of immediate natural impulse, is base and dis- graceful. But to the end of time they will con- tinue to feel, in spite of doctrinaires, that the voice of nature is better far than the voice of the Lord Chancellor or the Royal Society; and that the instinctive desire for a particular helpmate is a surer guide for the ultimate hap- piness, both of the race and of the indivudial, than any amount of deliberate consultation. It is not the foolish fancies of youth that will
have to be got rid of, but the foolish, wicked, and mischievous interference of parents or outsiders.

Right and Left

Adult man is the only animal who, in the familiar scriptural phrase, `knoweth the right hand from the left.' This fact in his economy goes closely together with the other facts, that he is the only animal on this sublunary planet who habitually uses a knife and fork, articulate language, the art of cookery, the common pump, and the musical glasses. His right-handedness, in short, is part causes and part effect of his universal supremacy in animated nature. He is what he is, to a great extent, `by his own right hand;' and his own right hand, we may shrewdly suspect, would never have differed at all from his left were it not for the manifold arts and trades and activities he practises.

It was not always so, when wild in woods the noble savage ran. Man was once, in his childhood on earth, what Charles Reade wanted him again to be in his maturer centuries, ambidextrous. And lest any lady readers of this volume—in the Cape of Good Hope, for example, or the remoter portions of the Australian bush, whither the culture of Girton and the familiar knowledge of the Latin language have not yet penetrated—should com-

plain that I speak with unknown tongues, I will further explain for their special benefit that ambidextrous means equally-handed, using the right and the left indiscriminately. This, as Mr. Andrew Lang remarks in immortal verse, `was the manner of Primitive Man.' He never minded twopence which hand he used, as long as he got the fruit or the scalp he wanted. How could he when twopence wasn't yet invented? His mamma never said to him in early youth, `Why-why,' or `Tomtom,' as the case might be, `that's the wrong hand to hold your flint-scraper in.' He grew up to man's state in happy ignorance of such minute and invidious distinctions between his anterior extremities. Enough for him that his hands could grasp the forest boughs or chip the stone into shapely arrows; and he never even thought in his innocent soul which particular hand he did it with.

How can I make this confident assertion, you ask, about a gentleman whom I never personally saw, and whose habits the intervention of five hundred centuries has precluded me from studying at close quarters? At first sight, you would suppose the evidence on such a point must be purely negative. The reconstructive historian must surely be inventing *a priori* facts, evolved, *more Germanico*, from his inner consciousness. Not so. See how clever modern archaeology has become! I base my assertion

upon solid evidence. I know that primitive Man was ambidextrous, because he wrote and painted just an often with his left as with his right, and just as successfully.

This seems once more a hazardous statement to make about a remote ancestor, in the age before the great glacial epoch had furrowed the mountains of Northern Europe; but nevertheless, it is strictly true and strictly demonstrable. Just try as you read, to draw with the forefinger and thumb of your right hand an imaginary human profile on the page on which these words are printed. Do you observe that (unless you are an artist, and therefore sophisticated) you naturally and instinctively draw it with the face turned towards your left shoulder? Try now to draw it with the profile to the right, and you will find it requires a far greater effort of the thumb and fingers. The hand moves of its own accord from without inward, not from within outward. Then, again, draw with your left thumb and forefinger another imaginary profile, and you will find, for the same reason, that the face in the case looks rightward. Existing savages, and our own young children, whenever they draw a figure in profile, be it of man or beast, with their right hand, draw it almost always with the face or head turned to the left, in accordance with this natural human

instinct. Their doing so is a test of their perfect right-handedness.

But Primitive Man, or at any rate the most primitive men we know personally, the carvers of the figures from the French bine-caves,
drew men and beasts, on bone or mammoth- tusk, turned either way indiscriminately. The inference is obvious. They must have been ambidextrous. Only ambidextrous people
draw so at the present day; and indeed to scrape a figure otherwise with a sharp flint on
a piece of bone or tooth or mammoth-tusk would, even for a practised hand, be compara- tively difficult.

I have begun my consideration of rights and lefts with this one very clear historical datum, because it is interesting to be able to say with tolerable certainty that there really was a
period in our life as a species when man in the lump was ambidextrous. Why and how did he become otherwise? This question is not only
of importance in itself, as helping to explain the origin and source of man's supremacy in nature—his tool-using faculty—but it is also of interest from the light it casts on that fallacy of poor Charles Reade's already alluded to --that we ought all of us in this respect to hark back to the condition of savages. I think when we have seen the reasons which make civilised man now right-handed, we shall also

see why would be highly undesirable for him to return, after so many ages of practice, to the condition of his undeveloped stone-age ancestors.

The very beginning of our modern right-handedness goes back, indeed, to the most primitive savagery. Why did one hand ever come to be different in use and function from another? The answer is, because man, in spite of all appearances to the contrary, that the apex of the heart inclines to the left side, and that the liver and other internal organs show a generous disregard for strict and formal symmetry. In the irregular distribution of those human organs which polite society agrees to ignore, we get the clue to the irregularity of right and left in the human arm, and finally even the particular direction of the printed letters now before you.

For primitive man did not belong to polite society. His manners were strikingly deficient in that repose which stamps the caste of Vere-de Vere. When primitive man felt the tender passion steal over his soul he lay in wait in the hush for the Phyllis or Daphne whose charms had inspired his heart with young

desire; and when she passed his hiding-place, in maiden meditation, fancy free, he felled her with a club, caught her tight by the hair of her head, and dragged her off in triumph to his cave or his rock-shelter. (Marriage by capture, the learned call this simple mode of primeval courtship.) When he found some Strephon or Damoetas rival him in the affections of the dusky sex, he and that rival fought the matter out like two bulls in a field; and the victor and his Phyllis supped that evening off the roasted remains of the vanquished suitor. I don't say these habits and manners were pretty; but they were the custom of the time, and there's no good denying them.

Now, Primitive Man, being thus by nature a fighting animal, fought for the most part at first with his great canine teeth, his nails, and his fists; till in process of time he added to these early and natural weapons the further persuasions of a club or shillelagh. He also fought, as Darwin has very conclusively shown, in the main for the possession of the ladies of his kind, against other members of his own sex and species. And if you fight, you soon learn to protect the most exposed and vulnerable portion of your body; or, if you don't, natural selection manages it for you, by killing you off as an immediate consequence. To the boxer, wrestler, or hand-to-hand combatant, that most vulnerable portion is

undoubtedly the heart. A hard blow, well delivered on the left breast, will easily kill, or at any rate stun, even a very strong man. Hence, from a very early period, men have used the right hand to fight with, and have employed the left arm chiefly to cover the heart and to parry a blow aimed at that spe- cially vulnerable region, And when weapons of offence and defence supersede mere fists and teeth, it is the right hand that grasps the spear or sword, while the left holds over the heart of defence the shield or buckler.

From the simple origin, then, the whole vast difference of right and left in civilised life takes its beginning. At first, no doubt, the superiority of the right hand was only felt in the matter of fighting. But that alone gave it a distinct pull, and paved the way, at last, for its supremacy elsewhere For when weapons
came into use, the habitual employment of the right hand to grasp the spear, sword, or knife made the nerves and muscles of the right side far more obedient to the control of the will then those of the left. The dexterity thus acquired by the right—see how the very word `dexterity' implies this fact—made it more natural for the early hunter and artificer to employ the same hand preferentially in the manufacture of flint hatchets, bows and
arrows, and in all the other manifold activities of savage life. It was the hand with which he

grasped his weapon; it was therefore the hand with which he chipped it. To the very end, however, the right hand remains especially
`the hand in which you hold your knife;'
and that is exactly how our own children to this
day decide the question which is which, when they begin to know their right hand from their left for practical purposes.

A different like this, once set up, implies thereafter innumerable other differences which naturally flow from it. Some of them ere extremely remote and derivative. Take, for examples, the case of writing and printing. Why do these run from left to right? At first sight such a practice seems clearly contrary to the instinctive tendency I noticed above—the tendency to draw from right to left, in accor- dance with the natural sweep of the hand and arm. And, indeed, it is a fact that all early writing habitually took the opposite direction from that which is now universal in western countries. Every schoolboy knows, for instance (or at least he would if he came up to the proper Macaulay standard), that Hebrew
is written from right to left, and that each book begins at the wrong cover. The reason is that words, and letters, and hieroglyphics
were originally carved, scratched, or incised, instead of bring written with coloured ink,
and the hand was thus allowed to follow its natural bent, and to proceed, as we all do in

naïve drawing with a free curve from the right leftward.

Nevertheless, the very same fact—that we use the right hand alone in writing—made the let- ters run opposite way in the end; and the
change was due to the use of ink and other pigments for staining papyrus, parchment, or paper. If the hand in this case moved from
right to left it would of course smear what it had already written; and to prevent such untidy smudging of the words, the order of writing was reversed from left rightward. The use of wax tablets also, no doubt, helped for- ward the revolution, for in this case, too, the hand would cover and rub out the words
written.

The strict dependence of writing, indeed, upon the material employed is nowhere better shown than in this case of the Assyrian cuneiform inscriptions. The ordinary substi-
tute for cream-laid note in the Euphrates val- ley in its palmy days was a clay or terra-cotta tablet, on which the words to be recorded— usually a deed of sale or something of the short --were impressed while it was wet and then baked in, solid. And the method of impressing them was very simple; the workman merely pressed the end of his graver or wedge into
the moist clay, thus giving rise to triangular marks which were arranged in the shapes of

various letters. When alabaster, or any other hard material, was substituted for clay, the sculptor imitated these natural dabs or triangular imprints; and that was the origin of those mysterious and very learned-looking cuneiforms. This, I admit, is a palpable digression; but inasmuch as it throws as indirect light on the simple reasons which sometimes bring about great results, I hold it not wholly alien to the present serious philosophical inquiry.

Printing, in turn, necessarily follows the rule of writing, so that in fact the order of letters and words on this page depends ultimately upon the remote fact that primitive man had to use his right hand to deliver a blow, and his left to parry, or to guard his heart.

Some curious and hardly noticeable results flow once more from this order of writing from left to right, You will find, if you watch yourself closely, that in examining a landscape, or the view from a hill-top, your eye naturally ranges from left to right; and that you begin your survey, as you would begin reading a page of print, from the left-hand corner. Apparently, the now almost instinctive act of reading (for Dogberry was right after all, for the civilised infant) has accustomed our eyes to this particular movement, and has made it especially natural when we are trying

to `read' or take in at a glance the meaning of any complex and varied total.

In the matter of pictures, I notice, the correla- tion has even gone a step father. Not only do we usually take in the episodes of a painting from left to right, but the painter definitely
and deliberately intends us so to take them in. For wherever two or three distinct episodes in succession are represented on a single plane
in the same picture—as happens often in early art—they are invariably represented in the precise order of the words on a written or printed page, beginning at the upper left-hand corner, and ending at the lower right-hand angle. I first noticed this curious extension of the common principle in the mediaeval fres- coes of the Campo Santo at Pisa; and I have since verified it by observations on many
other pictures elsewhere, both ancient and modern. The Campo Santo, however, forms an exceptionally good museum of such story- telling frescoes by various painters, as almost every picture consists of several successive episodes. The famous Benozzo Gozzoli, for example, of Noah's Vineyard represents on a single plane all the stages in that earliest
drama of intoxication, from the first act of gathering the grapes on the top left, to the scandalised lady, the *vergognosa di Pisa*, who covers her face with her hands in shocked hor-

ror at the patriarch's disgrace in the lower right-hand corner.

Observe, too, that the very conditions of *tech- nique* deman this order almost as rigorously
in painting as in writing. For the painter will naturally so work as not to smudge over what he has already painted: and he will also natu- rally begin with the earliest episode in the
story he unfolds, proceeding to the others in due succession. From which two principles it necessarily results that he will begin at the upper left, and end at the lower right-hand corner.

I have skipped lightly, I admit, over a consid- erable interval between primitive man and Benozzo Gozzoli. But consider further that during all that time the uses of the right and
left hand were becoming by gradual degrees each day still further differentiated and spe- cialised. Innumerable trades, occupations, and habits imply ever-widening differences in the way we use them. It is not the right hand
alone that has undergone an education in this respect: the left, too, though subordinate, has still its own special functions to perform, If
the savage chips his flints with a blow of the right, he holds the core, or main mass of stone from which he strikes it, firmly with his left. If one hand is specially devoted to the knife, the other grasps the fork to make up for it. In

almost every act we do with both hands, each has a separate office to which it is best fitted. Take, for example, so simple a matter as buttoning one's coat, where a curious distinction between the habits of the sexes enables us to test the principle with ease and certainty. Men's clothes are always made with the buttons on the right side and the button-holes on the left. Women's, on the contrary, are always made with the buttons on the left side, and the button-hold on the right. (The occult reason for this curious distinction, which has long engaged the attention of philosophers, has never yet been discovered, but it is probably to be accounted for by the perversity of women.) Well, if a man tries to put on a women's waterproof, or a woman to put on a man's ulster, each will find that neither hand is readily able to perform the part of the other. A man, in buttoning, grasps the button in his right hand, pushes it through with his right thumb, holds the button-hole open with his left, and pulls all straight with his right forefinger. Reverse the sides, and both hands at once seem equally helpless.

It is curious to note how many little peculiarities of dress or manufacture are equally necessitated by this prime distinction of right and left. Here are a very few of them, which the reader can indefinitely increase for himself. (I leave out of consideration obvious cases like

boots and gloves: to insult that proverbially intelligent person's intelligence with those were surely unpardonable.) A scarf habitually tied in sailor's knot acquires one long side,
left, and one short one, right, from the way it
in manipulated by the right hand; if it were tied by the left, the relations would be reversed. The spiral of corkscrews and of ordi- nary screws turned by hand goes in accor- dance with the natural twist of the right hand: try to drive in an imaginary corkscrew with
the right hand, the opposite way, and you will see how utterly awkward and clumsy is the motion. The strap of the flap that covers the keyhole in trunks and portmanteaus always
has its fixed side over the right, and its buckle to the left; in this way only can it be conveniently buckled by a right-handed per- son. The hands of watches and the numbers of dial-faced barometers run from left to right:
this is a peculiarity dependent upon the left to right system of writing. A servant offers you dishes from the left side: you can't so readily help yourself from the right, unless left-hand- ed. Schopenhauer despaired of the German race, because it could never be taught like the English to keep to the right side of the pave- ment in walking. A sword is worn at the left hip: a handkerchief is carried in the right
pocket, if at the side; in the left, if in the coat- tails: in either case for the right hand to get at
it most easily. A watch-pocket is made in the

left breast; a pocket for railway tickets halfway down the right side. Try to reverse any one of these simple actions, you will see at once that they are immediately implied in the very fact of our original right-handedness.

And herein, I think, we find the true answer to Charles Reade's mistaken notion of the advantages of ambidexterity. You couldn't make both hands do everything alike without a considerable loss of time, effort, efficiency, and convenience. Each hand learns to do its own work and to do it well; if you made it do the other hand's into the bargain, it would have a great deal more to learn, and we should find it difficult even then to prevent specialisation. We should have to make things deliberately different for the two hands—to have rights and lefts in everything, as we have them now in boots and gloves—or else one hand must inevitably gain the supremacy. Sword-handles, shears, surgical instruments, and hundreds of other things have to be made right-handed, while palettes and a few like subsidiary objects are adapted to the left; in each case for a perfectly sufficient reason. You can't upset all this without causing confusion. More than that, the division of labour thus brought about is certainly a gain to those who possess it: for if it were not so, the ambidextrous races would have beaten the dextrosinistrals in the struggle for existence;

whereas we know that the exact opposite has been the case. Man's special use of the right hand is one of his points of superiority to the brutes. If ever his right hand should forget its cunning, his supremacy would indeed begin to totter. Depend upon it, Nature is wiser than even Charles Reade. What finds most useful in the long run must certainly have many good points to recommend it.

and this last consideration suggests another aspect of right and left which must not be passed over without one word in this brief survey of the philosophy of the subject. The superiority of the right caused it early to be regarded as the fortunate, lucky, and trusty hand; the inferiority of the left caused it equally to be considered as ill-omened, unlucky, and, in one expressive word, sinister suspicions, On the other hand, it is `over the left' that we believe a doubtful or incredible statement; a left-handed compliment or a left-handed marriage carry their own condemnation with them. On the right hand of the host is the seat of honour; it is to the left that the goats of ecclesiastical controversy are invariably relegated. The very notions of the right hand and ethical right have got mixed up

inextricably in every language: *droit* and *la droite* display it in Franch as much as right and the right in English, but to be *gauche* is merely to be awkward and clumsy; while to be to be right is something far higher and more important.

So unlucky, indeed, does the left hand at last become that merely to mention it is an evil omen; and so the Greeks refused to use the true old Greek word for left at all, and preferred euphemistically to describe it as *euonymos,* the well-named or happy-omened. Our own *left* seems equally to mean the hand that is left after the right has been mentioned, or, in short, the other one. Many things which are lucky if seen on the right fateful omens if seen to leftward. On the other hand, if you spill the salt, you propitate destiny by tossing a pinch of it over the left shoulder. A murderer's left hand is said by good authorities to be an excellent thing to do magic with; but here I cannot speak from personal experience. Nor do I know why the wedding-ring is worn on the left hand; though it is significant, at any rate, that the mark of slavery should be put by the man with his own right upon the interior member of the weaker vessel. Strong-minded ladies may get up an agitation if they like to alter this gross injustice of the centuries.

one curious minor application of right and lefts is the rule of the road as it exists in Eng-

land. How it arose I can't say, anymore then I can say why a lady sits her side-addle to the left. Coachmen, to be sure, are quite unanimous that the leftward route enables them to see how close they are passing to another carriage; but as all continental authority is equally convinced the other way, I make no doubt this is a mere illusion of long-continued custom. It is curious, however, that the English usage, having once obtained in these islands, has influenced railways, not only in Britain, but over all Europe. Trains, like carrages; go to the left when they pass; and this habit; quite natural in England, was transplanted by the early engineers to the Continent, where ordinary carriages, of course, go to the right. In America, to be sure, the trains also go right like the carriages; but then, those Americans have such a curiously un-English way of being strictly consistent and logical in their doings. In Britain we should have compromised the matter by going sometimes one way and sometimes the other.

Evolution

Everybody nowadays talks, about evolution. Like electricity, the cholera germ, Woman's right, the great mining boom, and the Eastern question, it is `in the air.' It pervades society everywhere with its subtle essence; it infects small-talk with its familiar catchwords and its slang phrase; it even permeates that last stronghold of rampant Philistinism, the third leader in the penny papers. Everybody believes he knows all about it, and discusses it as glibly in his everyday conversation as he discuss the points of racehorses he has never seen, the charms of peeresses he has never spoken to, and the demerits of authors he has never read. Everybody is aware, in a dim and nebulous semi-conscious fashion, that it was all invented by the late Mr. Darwin, and reduced to a system by Mr. Herbert Spencer—don't you know?--and a lot more of those scientific fellows. It is generally understood in the best-informed circles that evolutionism consists for the most part in a belief about nature at large essentially similar to that applied by Topsy to her own origin and early history. It is conceived, in short, that most things `growth.' Especially is it known that in the opinion of the evolutionists as a

body we are all of us ultimately descended from men with tails, who were the final offspring and improved edition of the common gorilla. That, very briefly put, is the popular conception of the various point in the great modern evolutionary programme.

It is scarcely necessary to inform the intelligent reader, who of course differes fundamenttally from that inferior class of human beings known to all of us in our own minds as 'other people; that almost every point in the catalogue thus briefly enumerated is a popular fallacy of the wildest description. Mr. Darwin did not invent evolution any more than George Stephensen invented the steam-engine, or Mr. Edison the electric telegraph. We are not descended from men with tails, any more than we are descended from Indian elephants. there is no evidence that we have anything in particular more than the remotest fiftieth cousinship with our poor relation the west African gorilla, science is not in search of a ‘missing link; few links are anywhere missing, and those are for the most part wholly unimportant ones. If we found the imaginary link portant ones. If we found the imaginary link In question, he would not be a monkey, nor yer in any way a tailed man. And so forth genearlly through the whole list of popular beliefs and current fallacies as to the real meaning of evolutionary teaching. Whatever most people

think evolutionary is for the most part a pure parody of the evolutionists opinion.
but a more serious error then all these pervades what we may call the drawing-room view of the evolutionist theory. So far as society with a big initial is concerned evolutionism first began to be talked about, and therebefore known (for society does not read; it listens, or rather it otherhears and catches fragmentary echoes) when Darwin published his 'origin of species.' that great book consisted simply of theory as to the causes which led to the distinctions of kind between plants and animals. With evolution at large it had nothing to do; it took for granted the origin of sun, moon, and stars, planets and comets, the earth and all that in it is, the sea and the dry land, the mountain and the valleys, nay even life itself in the crude form, everything in fact, save the one point of the various types and species of living beings. Long before Darwin's book appeared evaluation had been a recognised force in the moving world of science and philosophy kant and laplace had worked out the development of suns and earths from white-hot star-cloud. Lyell had worked out the evolution of the earths surface to its present highly complex geographical condition. Lamarck had worked out the descent of plants and animals from a common ancestor by slow modification. Herbert spencer had

worked out the growth of mind from its simplest beginnings to its highest outcome in human thought.

But society, like gallio cared nothing for all these things. The evolutionary principle had never been put into a single big book, asked for at mudie's, and permitted to lie on the Drawing-room table side by side with the last new novel and the last fat volume of scandalous court memories therebefore society ignored them and knew them not; the word evolution scarcely entered at all as yet into its Polite and refund dinner-table vocabulary. It Recognised only the ‘Darwin theory; `natural selection; the missing link; and the belief that men were merely monkeys who had lost their tails, presumably by sitting upon them. To the world at large that learned Mr. Darwin had invented and patented the entire business, including descent with modi fiction, if such notions ever occurred at all to the world-at-larges speculative intelligence. now, evolutionism is really a thing of far deger growth and older antecedents than this easy, superficial drawing-room view would lead us to imagine. It is a very ancient and respectable theory induced, and it has an immense variety of minor development. I am not going to push it back, in the fashionable modern scientific manner, to the vague and

indefinite hints in our old friend Lucretius. the great original Roman poet—the only original poet in the Latin language—did indeed hit out for himself a very good rough working sketch of a sort o nebulous and shapeless evolutionism. It was wonderful. But Lutcrefuls's Philosophy, like all the philosophies of the older world, was a mere speculative idea, a fancy picture of the development of things, not development upon observation of fact at all, but wholly evolved, like the German thinkers camel, out of its authors own pregnant inner consciousness. The Roman poet would no doubt have built an excellent superstructure if he had only possessed a little straw to make his brick of. As it was, however, scientific brick-making being still in its infancy, he could only construct in day a shadowy Aladin's palace of pure fanciful Epicurean phantasms, an imaginary world of imaginary atoms, fortuitously concurring out of void chaos into as orderly universe, as though by miracle. It is not thus that systems arise which regenerate the thought of humanity; he who would build for all time must make sure first of a solid foundation, and then use sound bricks in place of the airy nothings of metaphysical speculation.

the separate conceptions of Kant, Laplace, Lamarck, and Erasmus Darwin. These were the true founders of our modern evolutionism. Charles Darwin and Herbert Spencer were the Joshuas who led the chosen people into the land which more than one venturous Moses had already dimly descried afar off from the Pisgah top of eighteenth century.

Kant and LaPlace came first in time, as astronomy comes first in logical order. Stars and suns, and planets and satellites, necessarily precede in development plants and animals. You can have no cabbage without a world to grow them in. The science of the stars was therefore reduced to comparative system and order, while the sciences of life, and mind, and matter were still a hopeless and inextricable muddle. It was no wonder, then, that the evolution of the heavenly bodies should have been clearly apprehended and definitely formulated while the evolution of the earth's crust was still imperfectly understood, and the evolution of living beings was only tentatively and hypothetically hinted at in a timid whisper.

In the beginning, say the astronomical evoluTionists, not only this world, but all the other worlds in the universe, existed potentially, as the poet justly remarks, in `a haze of fluid light; a vast nebula of enormous extent and

almost inconceivable material thinness. The world arose out of a sort of primitive world-gruel. The matter of which it was composed was gas, of such an extraordinary and unimaginable gasiness that millions of cubic miles of antibilious pill-box. The pill-box itself, in fact, is the net result of a prolonged secular condensation of myriads of such enormous cubes of the primaeval matter. Slowly setting around common centres, however, in anticipation of Sir Issaac Newtons gravitative theories, the fluid haze gradually collected into suns and stars, whose light and heat is presumably due to the clashing together of their component atroms as they fall perpetually towards the central mass. Just as in a burning candle the impact of the oxygen atoms in the melted and rarefied wax or tallow produce the light and heat of the flame, so in nebula or sun the impact of the various gravitating atoms one against the other produces the light and heat by whose aid we are enabled to see and know those distant bodies. The universe, according to this now fashionable nebular theory, began as a single vast ocean of matter of immensense tenuity, spread all alike over all space as far as nowhere, and comparatively little different within itself when looked at side by side with its own final historical outcome. in Mr. Spencer's perspicuous phrase, evolution in

this aspect is a change from the homogeneous
to the heterogenous, from the indefinite to the
definite condition. Difficult words at first to
apprehend, no doubt, and therefore to many
people, as to Mr. Matthew Arnold, very repel-
Lent, but full of meaning, lucidity, and sugges-
Tiveness, if only we once take the trouble fairly
and squarely to understand them.
Every sun every star thus formed is for
ever gathering in the hem of its outer robe
upon itself, for ever radiating off its light and
heat into surrounding space, and for ever
growing denser and colder as it sets slowly
Towards its Centre of gravity. Our own sun and
Solar system may be taken as good typical
working examples of how the stars thus con-
Stantly shrink into smaller and ever smaller
dimensions around their own fixed Centre.
Naturally, we know more about our own solar
system then about any other in our uni-
Verse, and it also possesses for us a greater
practical and personal interest then any out-
side portion of the galaxy. Nobody can pre-
tend to be profoundly immersed in the
internal affairs of Sirius or of Alpha centauari
A fiery revolution in the belt of Orion would
affect us less than a passing finger-ache in a
certain single terrestrial baby of our own
household. Therefore, I shall not apologies in
Any way for leaving the remainder of the side-

real universe to its unknown fate, and concentrating my attention mainly on the affairs of that solitary little, out-of-the-way, second-rate System, whereof we form an inappreciable portion. The matter which now composes the sun and its attendant bodies (the satellites included) was once spread out, according to Laplace, to at least the furthest orbit of the Outmost planet—that is to say, so far as our present knowledge goes, the planet Neptune. Of course, when it was expanded to that immense distance, it must have been very thin Indeed, thinner than our clumsy human sense can even conceive of. An American would say, too thin; but I put Americans out of court at once as mere irreverent scoffers. From the orbit of Neptune, or something outside it, the faint and cloud-like mass which bore within it caesar and his fortunes, not to mention the reminder of the earth and the solar system, began slowly to converge and gather itself in, growing denser and denser but smaller and smaller as it gradually neared its existing dimensions. How long a time it took to do it is for our present purpose relatively unimportant: the cruel physicists will only let us have a beggarly hundred million years or so for the process, while the grasping and extravagant evolutionary geologistics beg with tears for at least double or even ten.

most of us are personally concerned, the difference of one or two hundred million, if it come to that, is not really at all an appreciable one.

As it condensed and lessened towards its central core, revolving rapidly on its irregular intervals the solar mist left behind at irregular intervals concentric rings or belts of cloud-like matter, cast off from its equator, which belts, once more undergoing a similar evolution on their own account have hardened round their private centres of gravity into Jupiter or Saturn, the Earth or Venus. Round these again, minor belts or rings have sometimes formed, as in Saturn's girdle of petty satellites; or subsidiary planets, thrown out into space, have circled round their own primaries, as the moon does around this sublunary world of ours. Meanwhile, the main central mass off all, retreating ever inward as it dropped behind it these occasional little reminders of its temporary stoppages, formed at last the sun itself, the main luminary of our entire system. Now I won't deny that this primitive Kantian and Laplacian evolutionism this nebular theory of such exquisite concinnity, here reduced to its simplest terms and most elementary dimensions, has received many hard knocks from later astronomers, and has been a good deal bowled over, both on mathematical and astronomical grounds, by recent investigators of

nebulae and meteors. Observations on comets and on the sun’s surface have lately shown erable fanciful admixture. It isn't more than half true; and even the half now totters in places. Still, as a vehicle of popular exposition the crude nebular hypothesis in its rawest form serves a great deal better than the truth, so far as yet known, on the good old Greek principle of the half being often more than the whole. The great point which it impresses on the mind is the cardinal idea of the sun and Planets with their attendant satellites, not as turned out like manufactured articles, ready made, at measured intervals, in a vast and deliberate celestial orrery, but as due to the slow and gradual working of natural laws, in accordance with which each has assumed by force of circumstance its existing place, Weight, orbit, and motion.

The grand conception of a gradual becoming, instead of a sudden making, which kant and Laplace thus applied to the component bodies of the universe at large, was further applied by Lyell and his school to the outer crust of this one particular petty planet of ours. While the astronomers went in for the evolution of the earth's surface. As theirs was stellar, so his was mundane. If the world began by being a

red-hot mass of planetary matter in high state of internal excitement, boiling and dancing with the heat of its emotions it gradually cooled down with age and experience, for growing old is growing cold As it passed from its fiery and volcanic youth to its staider and soberer middle age, a solid crust began to form in filmy fashion upon its cooling surface. The aqueous vapour that had floated at first as steam around its heated mass condensed with time into a wide ocean over the now hardened shall. Gradually this ocean shifted its bulk into two or three main bodies that sank into hollows of the viscid crust, the precursors of Atlantic, Pacific and the indian seas. Wrin-Killings of the crust, product by the cooling and consequent contraction, gave rise at first to baby mountain ranges, and afterwards to the earliest rough draughts of the still very vague and sketchy continents. the world grew daily more complex and more diverse; it progressed in accordance with the spencerian law, from the homogenous to the heterose-neous, and so forth, as aforesaid, with delightful regularity.

At last, by long and graduated changes, seas and lands, peninsulas and islands, lakes and rivers, hills and mountains were wrought out by internal or external energies on the crust thus generally fashioned. Evaporation from

the ocean gave rise to clouds and rain and hailstorms, the water that fell upon the mountain tops cut out the valleys and river basins; streams, streams into primaeval Niles, and Amazon, and mississippis, volcanic forces uplifted here an alpine, chain, or depressed there a deep-sea hollow. Sediment washed from the hills and plains, or formed from countless skeletons of marine creature, gathered on the sinking bed of the ocean as soft ooze, or crumbing sand, or thick mud, or gravel and conglomerate. Now upheaved into an elevated table-land, now slowly craved again, by rain and rill into valley and watershed, and now worm down once more into the underwent innumerable changes, but almost all of them exactly the same in kind, and mostly in degree, as those we still see at work imperceptibly in the world around us. Rain washing down the soil; weather crumbing the cliffs; rivers forming deltas at their barred mouths; shingle gathering on the low spits; floods sweeping before them the countryside; ice grading ceaselessly at the mountain top; peat filling up the shallow lake—those are the chief factors which have gone to make the

-- all are due to the ceaseless interaction of these separately small and unnoticeable causes, aided or retarded by the slow effect of elevation or depression from the earth the earth's shrinkage towards its own centre. Geology, in short has shown us that the world is what it is, not by virtue of a single sudden creative act, nor by virtue of successive terrible and recurrent cataclysms, but by virtue of the slow Continuous action of cause still always equally operative

Evolution in geology leads up naturally to evolution in the science of life. If the world itself grew, why not also the animals and plants that inhabit it? Already in the eager active eighteenth century this obvious idea had struck in the germ a large number of zoologists and botanists, and in the hands of Lamarck and Erasmus Darwin it took form as a distinct and elaborate system of organic evolution. Buffon had been the first to hint at the truth; but Buffon was an eminently respectable nobleman in the dubious days of the tottering monarchy, and he did not care personally for the Bastille, viewed as a place of permanent residence. In Louis Quinze's France, indeed, as things then went, a man who offended the orthodoxy of the Sorbonne was prone to find himself shortly ensconced in free quarters and kept there for the term of his natural existence Without expense to his heirs or executors so

Buffon did not venture to say outright that he thought all animals and plants were descended one from the other with slight modification; that would have been wicked, and the Sorbonne would have proved its ion by promptly getting him imprisoned or silenced. It is so easy to confure your opponenet when you are a hundred strong and he is one weak unit. Buffon merely said, therefore, that if we didn't know the contrary to be the case by sure warrant, we might easily have concluded (so fallible is our reason) that animals always varied slightly, and that such variations, indefinitely accumulated, would suffice to account for almost any amount of ultimate Difference. A donkey might thus have grown into a horse, and a bird might have developed from a primitive lizard. Only we know it was quite otherwise! A quiet hint from Buffon was as good as a declaration from many less knowing or suggestive people. All over Europe, the wise took Buffon's hint for what he meant it; and the unwise blandly passed it by as a mere passing little foolish vagary of that great ironical writer and thinker.

Erasmus Darwin the grandfather of his grandson, was no fool; on the contrary, he was the most far-sighted man of his day in England; he saw at once what Buffon was driving at; and he worked out 'Mr. Buffon's half-con

cealed hint to all its natural and legitimate Conclusions. The great Count was always plain Mr. Buffon to his English contemporary. Life, said Erasmus Darwin nearly a century since, began in very minute marine forms, which gradually acquired fresh powers and larger bodies, so as imperceptibly to transform themselves into different creatures. Man he remarked, anticipating his descendent, takes rabbits or pigeons, and alters them almost to his own fancy, by immensely changing their shapes and colours. If man can make a pouter or a fantail out of the common runt, if he can produce a piebald lop-ear from the brown wild rabbit, if he can transform dorkings into Black Spanish, why cannot Nature, with longer time to work in, and endless lives to try with, produce all the varieties of vertebrate animals out of one single common ancestor? It was a bold idea of the Lichfield doctor—bold, at least, for the times he lived in—when Sam Johonson was held a mighty sage, and physical speculation was regarded askance as having in it a dangerous touch of the devil. But the Darwins were always a bold folk, and had the courage of their opinions more than most men. So even in Lichfield, cathedral city as it was, and in the politely somnolent eighteenth century, Erasmus Darwin ventured to point out the probability that quadrupeds, birds, reptiles, and men were all mere divergent descendants of a single similar original form, and even that ‘one

And the same kind of living filament is, and has been, the cause of organic life;
The eighteenth century laughed, of course. It always laughed at all reformers It said Dr. Darwin was very clever, but really a most eccentric man. His ‘Temple of Nature; now, and his ‘Botanic Garden; were vastly fine and charming poems—those sweet lines, you know, about poor Eliza! ---But his zoological theories were built of course upon a most absurd and uncertain foundation. In prose, no sensible person could ever take the doctor seriously. A freak of genius--- nothing more; a mere desire to seem clever and singular. But what a Nemesis the whirligig of time has brought around with it! By a strange irony of fate, those admired verse are now almost entirely forgotten; poor Eliza has survived only as our awful example of artificial pathos; and the zoological heresies, at which the eighteenth century shrugged its fat shoulders and dimpled the corners of its ample mouth, have grown to be the chief cornerstone of all accepted modern zoological science.
In the first year of the present century, Lamarck followed Erasmus Darwins lead with an open avowal that in his belief all animals and plants were really descended from one or a few common ancestors. He held that organ-Isms were just as much the result of law, not

of miraculous interposition as suns and worlds and all the natural phenomena around us generally. He saw that what naturalistic call a species differs from what naturalistic call a Variety, merely in the way of being a little more distinctly marked, a little less like its nearest congeners elsewhere. He recognised the perfect gradation of forms by which in many cases one species after another merges into the next on either side of it. He observed the analogy between the modifications induced by man and the modifications induced by nature. In fact, he was a through-going and convinced evolutionist holding every salient opinion which society still believes to have been due to the works of Charles Darwin. In one point only, a mirror point to outsiders, though a point of cardinal importance to the inner brotherhood of evolu-tionism, he did not anticipate his more famous successor. He thought organic evolu-tion was wholly due to the direct action of surrounding circumstance, to the intercross ing of existing forms, and above all to the

the serpent had acquired its sinuous shape by constant wriggling through the grass of the meadows, Charles Darwin improved upon all that by his suggestive hint of survival of the Fittest, and in so far, but in so far alone, he became the real father of modern biological evolutionism.

From the days of Lamarck, to the day when Charles Darwin himself published his wonderful ‘origin of species; this idea that plants and animals might really have grown, instead of having been made all of a piece, kept brewing everywhere in the minds and brains of scientific thinkers. The notions which to the outside public were staringly new when Darwins book took the world by storm, were old indeed to the thinkers and workers who had long been familiar with the principle of descent with modification and he speculations of the Lichfield doctor or the Paris philosopher. Long before Darwin wrote his great work, herbert spencer had put forth in plain language every idea which he drawing-room biologistic attributed to Darwin. The supporters of the development hypothesis, he said seven years earlier---yes, he called it the ‘development hypothesis’ in so many words ---can show that modification has effected and is effecting great changes in all organisms, subject to modifying influence; They can show, he goes on (if I may venture to con-

danse so great a thinker), that any existing plant or animals, placed under new conditions, begin to undergo adaptive changes of form and structure; that in successive generation these changes continue, till the plant or animal acquires totally new habits; that in cultivated plants and domesticated animals Changes of the sort habitually occur; that the difference thus caused, as for example in dogs, are often greater than those on which species in the wild state re founded, and that throughout all organic nature there is at work a modifying influence of the same sort as that which they believed to have caused the differences of species---'an influence which, to all appearance, would produce in the millions of years and under the great variety of conditions which geological records imply, any amount of chang; What is this but pure Darwinism, as the Drawing-room philosopher still understands the word? And yet it was written seven years before Darwin published the 'orgin of Species'

The fact is one might draw up quite a long list of Darwinians before Darwin. Here are a few of them—Buffon, Lamarck, Goethe, Oken, Bates, Wallace, Lecoq, Von Baer Robert Chambers, Matthew, and Herbert Spencer. Depend upon it, no one man ever yet of him- self discovered anything. As well say that

Luthe made the German Reformation that

Lionardo made the Italian Renaissance, or that Robespierre made that French revolution, as say that Charles Darwin, and Charles Darwin alone, make the evolutionary movement, even in the restricted field of life only. A thousand predecessors worked up towards hm; a thou- and contemporaries helped to diffuse and to confirm his various principle.

Charles Darwin added to the primitive evolutionary idea the special notion of natural selection. That is to say , he pointed out that while plants and animals vary perpetually and vary indefinitely, all the varieties so produced are not equally adapted to the circumstance of the species. If the variation is a bad one, it tends to die out, because every point of disadvantage tells against the individual in the struggle for life. If the variation is a good one, it tends to persists, because every point of advantage similarly tells in the individuals favour in that ceaseless and viewless battle. It was this addition to the evolutionary concept, fortified b Darwin's powerful advocacy of the general principle of descent with modifications, that won over the whole world to the ‘Darwinian theory.’ Before Darwin, many men of science were evolutionists: after Darwin, all men of science became so at once, and the rest of the world is rapidly preparing to follow their leadership.

As applied to life, then, the evolutionary idea is briefly this that plants and animals have all a natural origin from a single primitive living creature, which itself was the product of light and heat acting on the special chemical constituents of an ancient ocean. Starting from that single early, from the homogenous to the heterogenous, assuming ever more varied shapes, till at last they have reached their present enormus variety of tree, and shrub, and fish, and creeping insect. Evolution throughout has been one and continuous, from nebula to sun, from gas-cloud to planet, from early jelly-speck to man or elephant. So at least evolutionists say---and of course they ought to know most about it.

But evolution, according to the evolutionists, does not even stop here psychology as well as biology has also it evolutionary explanation: mind is concerned as truly as matter. If she bodies of animals are evolved, their minds must be evolved likewise. Herbert Spencer and his followers have been mainly instrumental in clucidating this aspect of the case. They have slown, or they have tried to show (for I don't want to dogmatise on subject), how mind is gradually built up from the simplest raw elements of sense and feelings; how emotions and intellect slowly arise; how the

action of the environment on the organism begets a nervous system of ever greater and greater complexity culminating at last in the brain of a Newton, a Shakespeare, or a Mendelssohn. Step by step, nerves have built themselves up out of the soft tissues as channels of communication between part and part. sense-organ of extreme simplicity have first been formed on the outside of the body, where it comes most into contact with external nature. Use and wont have fashioned them through long ages into organs of taste and smell and touch; pigment spots, sensitive to light or shade, have grown by Infinite gradations into the human eye or into the myriad facers of bee and beetle; tremulous nerves-ends, responsive sympathetically to waves of sound have turned themselves at last into a perfect gamut in the developed ear of men and mammals. Meanwhile corresponding percipient centres have grown up in the brain, so that the coloured picture flashed by an external scene upon the eye is telegraphed from the sensitive mirror of the retina, through the many-stranded cable of the optic nerve, straight up to the appropriate headquarters in the thinking brain. Stage by stage the continuous process has gone on unceasingly, from the jelly-fish with tiny black speaks of eyes, through infinite steps of progression, induced by ever-widening intercourse with the outer world to the final outcome in the sense and

the emotions, the intellect and the will, of civilized man. mind begins as vague consciousenss of touch pr pressure on the part of some primitive, shapeless, soft creature; it ends as an organised and co-ordinated reflection of the entire physical and physical universe on the part of a great cosmical Philospher.

Last of all, like diners-out at desert, the evolutionistis take to politics. Having shown us entirely to their own satisfaction the growth of suns, and systems, and worlds, and continents, and oceans, and pants, and animals, and minds, they proceed to show us the exactly analogous and parallel growth of communities, and nations, and language, and relations, and customs, and arts, and institulions, and literatures. Man, the evolving savage, as Tylor, Lubbock, and others have proved for us, slowly putting off his brute aspect derived from his early ape-like ancestors, learned by infinitesimal degree the use of fire the mode of manufacturing stone hatchets and flint arrowheads, the earliest beginnings of the art of pottery. With drill or flint he became the Prometheus to his own small heap of sticks and dry leaves among the tertiary forests. By his nightly camp-fire he beat out gradually his exited gesture-language and historical speech. He tamed the dog, the horse, the cow, camel. He taught himself to hew

small clearings in the woodland, and to plant the, banana, the yam, the bread-fruit, and the coco-nut. He picked and improved the seds of his wild cereals till he made himself from grass-like grains his barely, his oats, his wheat, his-Indian corn. In time, he dug out ore from mines, and learnt the use first of gold, next of silver, then of copper, tin, bronze, and iron . Side by side with these long secular changes, he evolved the family, communal. He clothed or adorned himself first in skins and leaves and features; next in woven woll and fibre; last of all in purple and fine linen, and fared sumptuously every day. He gathered into hordes, tribes, and nations; he chose himself a king, gave himself laws, and built up great empires in Egypt, Assyria china, and Peru. He raised him altars, stonehenges and karnaks. His picture-writing grew into hiegrophys and cuneiforms, and finally emerged, by imperceptible steps, into alphabetic symbols, the raw material of the art of printing. His dug-out canoe culminates in the iron-clad and great eastern; his boomerang and slingstone in the woolwich infant; his Boling pipkin and his picture-message in the locomotive engine, his picture-message in the telephone and the Atlantic cable. Here, where the course of evolution has really been most marvellous, its steps have been all move

distinctly historical; so that nobody now doubts the true descent of Italian, French, and Spanish from provincial Latin, or the success- sive growth of the trireme, the `Great Harry,' the `Victory,' and the `Minotaur' from the cora- cles or praus of prehistoric antiquity.

The grand conception of the uniform origin and development of all things, earthly or side- real, thus summed up for us in the one word evolution, belongs by right neither to Charles Darwin nor to any other single thinker. It is the joint product of innumerable workers, all working up, though some of them uncon- sciously, towards a grand final unified philoso- phy of the cosmos. In astronomy, Kant, Laplace, and the Herschels; in geology, Hut- ton, Lyell, and the Geikies; in biology, Buffon, Lamarck, the Darwins, Huxley, and Spencer; in psychology, Spencer, Romanes, Sully, and Ribot; in sociology, Spencer, Tylor, Lubbock, and De Mortillet—these have been the chief evolutionary teachers and discoverers. But the use of the word evolution itself, and the estab- lishment of the general evolutionary theory as a system of philosophy applicable to the entire universe, we owe to one man alone—Herbert Spencer. Many other minds—from Galileo and Copernicus, from Kepler and Newton, from Linnaeus and Tournrefort, from D'Alembert and Diderot, nay, even, in a sense, from Aristotle