The Dominion Review.

VOL. II. JULY, 1897. NO. 7.

THE VALUE OF PAIN.

BY WOODS HUTCHINSON, M.D., UNIVERSITY OF BUFFALO.

PAIN is one of the essential conditions of progress. Not merely in the sense of being part of the friction which necessarily accompanies all movement, but as a vital precedent of all possibility of movement. Ask any biologist what is the first and most important property of living matter, and he will tell you that it is "irritability"—the power of responding to stimuli or impressions. Touch with a needle point the most beautiful and brilliant crystal, and you get absolutely no response; turn to the grayest and flabbiest bit of ditch-water animal-jelly that you can find, and he moves himself away from the steel at once. He can feel, therefore he lives. And if he feels at all, he must be able to feel pain as well as pleasure. Nay, it is even more important that he should perceive the disagreeable stimulus than the agreeable, for the former needs to be moved away from, while the latter does not. Leave him capable of only pleasurable sensations and he will be destroyed within an hour

In this earliest form, the powers of sensation and of responding to impressions are combined in the same cell, but as the organism becomes more complex, more extensive and powerful movements are called for, and special cells are set aside for contractile purposes alone, leaving to the surface cells the duty of sensation only. Later, it becomes not merely a question of escape, but also of retaliation; and a central office to combine the muscle-strands in orderly military movements is needed, and the ganglion-brain is called into being. In the meantime, the surface cells have been dividing up the work of feeling among themselves; some have educated themselves to catch the finest variations in the light-rays, some confine their study entirely to the sound-waves, others to the changes of temperature, while the vast majority of them simply refine upon their original powers of contact-perception or touch. Thus out of the simple possibility of discomfort arise the five senses, their muscle-standing-army, and their joint judicio-executive brain. Pain is the mother of the mind, and muscle is its father.

Nor can this powerful factor in the creation of the body-organism be permitted to "rest upon the seventh day," like the Jahveh of Genesis, when its work is apparently completed. The possibility of the continuance of life absolutely depends upon its incessant activity. Cut the nerve which connects any part or organ with the conscious brain, and

you place it in serious peril at once. Precisely as if you blindfolded a man and then turned him loose in an enemy's country, or as if you cut the wire which connected an outlying military post with head-quarters. You may cut the motor nerve which conveys orders from the brain, or, what is equivalent, destroy the "motor centre" of the part in the brain with comparative impunity, as far as the nutrition of the limb is concerned; it loses the power of motion, but even the muscles retain their bulk for a long time in spite of the lack of exercise, and the general health of the member remains perfect.

But it is far otherwise when sensation is destroyed. The benumbed hand or foot goes stumbling along like a blind man, cutting itself here, burning itself there, rasping its surface against a hundred objects, and from every merest scratch an ulcer forms. So long as all its cells are in health and vigor and can live on the standard rations of the rest of the body, issued to them through the blood-vessels, all goes well, but the moment any of them fall below par from injury or otherwise and cannot notify the central commissariat of the fact, they fall into the plight of a baby trying to live on government rations of hard-tack and salt beef. That heat and swelling about a wound which we term "inflammation" is merely a forced and special feeding-up of the neighboring cells to enable them to breed rapidly and fill the gap, and while in excess it is a source of danger in itself, in its absence there can be no healing.

Observe, it is not the loss of the power to pass the signal "All's well" that is injurious, it is the inability to report discomfort. Not the absence of all sensation, but the absence of painful ones, that is fatal.

For instance, in paralysis of the aged, one of the chief dangers to life is from the formation of ulcers about the back and hips due solely to pressure against the mattress, and hence known as "bed-sores." The peculiar danger of these is, first, that, sensation being abolished, they will form without the patient's knowledge, and in neglected cases will often attain the size of the palm of the hand and a depth of an inch or more before they are discovered; and second, that communication with the brain being cut off, little or no inflammation occurs, and they are extremely difficult to heal. It is no uncommon thing to see them six inches in diameter and an inch deep, and yet with scarcely enough inflammatory reaction around them to redden the skin at their edges. This absence of pain and consequent inflammation not only impairs healing-power, but also deprives the general system of one of its chief barriers against the absorption of the products of decay, and a fatal blood-poisoning is extremely apt to occur.

A peculiar illustration of the uses of pain is afforded by that dreadful disease leprosy. Here one of the earliest symptoms is the loss of sensation in a hand and arm or foot while the muscular power is unaffected. Many a victim has first discovered his condition by severely burning or cutting himself without feeling pain. In one dramatically tragic case a planter who supposed himself in perfect health thoughtlessly caught a

heated lamp-chimney which was falling, and didn't know it was burning him until the smell of his scorching fingers attracted his attention! What is the result? In a very short time tiny cracks, bruises, and scratches develop all over the hand or limb affected, these rapidly grow into ulcers and either heal very slowly or steadily deepen until fingers, toes, nay even hands and feet are completely amputated by them, or the limb is so drawn and crippled by the great scars that it becomes almost useless. There are, of course, active processes of destruction at work as well in the disease, but the greater part of the terrible deformities of the limbs produced by leprosy are due solely to this negative destruction of sensation and its consequences. In modern hospitals it is found that by keeping lepers in bed in comfortable wards, and protecting their extremities against injury and irritation in every possible way, their lives may be very greatly, if not almost indefinitely, prolonged.

But there is also another way in which pain is of marked benefit in case of disease or injury, and that is by securing rest for the part affected. The agony of an inflamed joint, for instance, is an imperative order to the muscles controlling its movements to keep it perfectly still and motionless. And the order is usually strictly obeyed. So important does nature consider it that, by a curious transference, the pain of a diseased hip-joint, for instance, will be felt by the sufferer in the knee and ankle, so as to keep the whole limb at rest. This function of pain is beautifully illustrated in the lower animals. A broken leg in a dog or a deer, for instance, will be so carefully protected against the pain of movement, supported against the other limb, rested against the side of the body and swung along with such a gentle movement, with its toe just trailing on the ground, that the results are often equal to the best that we can boast with all our splints and bandages. Truly, pain is nature's splint.

A similar protective influence is exerted over the inflamed lung by the acute distress of pleurisy.

"But," says some one, "what of those diseases in which pain is the principal evil, in which no structural changes can be found in any way proportionate to the agony endured: what of neuralgia, of blinding 'sick headache,' of sciatica? Is not the pain the disease in these cases?" By no means. It cannot be too emphatically asserted that pain always *means something*. It does not occur simply as an accident of chance, still less for the purpose of developing patience, or as a "means of grace," but as a pointed reminder that something is going wrong. Neuralgia is the cry of the nerves for more sunlight, "sick-headache" a protest against eye-strain. In themselves comparatively harmless, as danger-signals they are simply invaluable. Hence the seeming paradox, that those who suffer most, often live the longest: the sensitiveness of their nerves absolutely compels them to halt at the very threshold of danger.

Pain is literally the price of life. And this brings us to the question: "What is pain?" abstractly considered. "What is the difference and

what the relation between it and pleasure?" We are all perfectly clear in our own minds on these questions, in the concrete, from personal experience, but how shall we define our conception? On careful ultimate analysis we are driven to the somewhat unexpected conclusion that pain and pleasure are really both vibrations of one and the same chord. That the very sensitiveness which makes the one possible, necessarily makes the other also possible. That the only way to prevent painful impressions, from our environment, is to destroy the mechanism which permits the reception of pleasurable ones. In short, life without pain would necessarily be life without pleasure. The old mythic poets made a shrewd guess at this scientific truth when they described the life on Olympus as "colorless," "joyless," and sang of the "twilight of the gods." And Kipling's prophetic insight has caught the same ray, in his magnificent parable, the greatest poetic conception of the century, "The Children of the Zodiac."

More than this, the two sensations are not merely vibrations of the same chord, but varying degrees of the *same vibrations*. The difference between them is one not of kind, but of degree. Almost any pleasurable sensation can be transformed into a painful one by simply increasing its intensity, and many painful ones into pleasurable merely by decreasing their intensity or changing the circumstances.

The instantaneous coolness of a piece of ice placed upon a parched tongue is delicious, but let contact be prolonged only a few seconds and the very same "coolness" becomes intense discomfort. The similar "transformation" of the warmth of a Yule log is another illustration which of course suggests itself. A flood of golden sunlight is the most pleasing sight which falls upon our retina, but throw the rays directly into the eye and a dazzling pain takes the place of the former enjoyment. A gentle friction of the body-surface is an agreeable sensation to nearly everyone, but increase the pressure or rapidity a little and it produces a burning pain. The sensation of "sweetness" is so keenly enjoyable that it has become in connection with "light" a critical synonym for the highest good, and in childhood an abundance of "sweeties" or "candy" is temporary Paradise, yet how many adults are there in whom a very few spoonfuls of simple sugar will not promptly convert this delight into loathing, and how few to whom the "over-sweet" taste of glycerine, chloroform, or saccharine is not positively repulsive?

In short, pain is *any* sensation raised above a certain intensity. And even the degree of this intensity varies widely with the individual and the circumstances.

On the other hand, it is well-nigh impossible to draw a line of demarcation between, for instance, the pangs of hunger and the pleasant cravings of appetite, between an intolerable itching and a pleasant tickling sensation, between the joy of longing and the bitterness of "hope deferred."

"But," asks some one, "even granting that pain is necessary, is it

not merely a necessary evil, and are not its general effects purely disastrous?" Quite the contrary, the effects of pain in improving and developing both the individual and the social organism have been just as powerfully beneficent as in creating them.

It is, of course, obvious that pain or the dread of it has been the chief factor in the development of the means of escape from it, and of the myriad mechanisms in beast, in bird. and fish that subserve this end. It is no mere coincidence that the most timid creatures are also the fleetest, the trout, the deer, the hare, the swallow, for instance, while their fleetness again is the only thing that enables them to afford such rare beauty of form and coloring. The fin of the fish, the wing of the bird, the legs of the deer, owe their development in large measure to hunger and fear.

There is also a pretty direct connection between the sensitiveness of animals and the degree of their intelligence. The indifference of the turtle to pain is largely concerned with his limited cerebral capacity, the thickness of the pig's hide is a good index of his mental power, and the stupidity of the sloth is closely connected with the dullness of all his perceptions.

But it is when we come to consider the potency of pain in social development that its value stands out most clearly. The earliest political unit is a group formed for mutual protection against hunger, cold, and wild beasts. Danger compels men to herd together, and all the social virtues are fostered by it.

The rowels of nature's most powerful spur, hunger, are continually reddening the flanks of the primitive community. The Apostle's scathing arraignment of the Cretans, "whose god is their belly," would literally apply to every savage tribe—and many a civilized one. Hunger is one of the mainsprings of progress. At its imperative command the flint was chipped into the arrow-head, the dart, the spear. In its honor the net was woven, the hoe was made, and the soil broken. To appease its cravings the wild bull is broken to the yoke, the forests are felled, the ditch is dug through the marsh.

On its errands the ship is launched on the perilous deep and the band sent out upon the war-path. Into its service have been impressed the winds of heaven, the steam-wreaths of the cauldron, and the glittering shafts of the lightning. It is the real Aladdin's lamp of civilization. The ceaseless westward flow of the human stream and march of the "star of empire" has been at the behest of its Genii. Whether it be born of a barren soil and a cruel sky or of the pressure of over-population, it has played a leading part in the destinies of the nations.

In the fall of every world-empire from Assyria to Rome, the conquering race has invariably come from a mountainous or barren land, or from a sterner sky.

And still to-day the nations of the bleakest belt of the temperate zone, where the struggle with soil and climate is severest, the Scotch, the English, the Dutch, and the North-Germans, are over-running the whole of

the habitable globe, and bid fair to far out-do Alexander by more peaceable and far more stable means.

To what is the Scotchman more deeply indebted for his world-renowned "long-headedness," enterprise, and frugality than to his stony soil, his barren muir-lands, and his "dour" climate, to say nothing of the kilted Highlander on one side of him and the English guager on the other? Have the dogged perseverance, the quenchless love of liberty, and the sturdy honesty of the Dutchman which have written him such a brilliant record on the pages of modern history no connexion with his ceaseless struggle to beat back the cruel tooth of gray old ocean from his hearthstone? An old historian has quaintly suggested one reason for the extraordinary exploring-enterprise of those matchless old sea-falcons, our Viking ancestors, in the statement that they were "certaine of lighting upon no more cheerlesse place than that whence they sette forthe."

Indeed, it is almost an axiom of anthropology that the white race cannot flourish where the snow never lies. Below a certain degree of latitude it invariably degenerates. The stinging kiss of the Frost-king is absolutely necessary to the perfect development of the blood-red flower of civilization.

In fine, hunger, cold and poverty are veritable blessings in disguise, and even to-day prompt a large proportion of our productive activities. There is the soundest physical basis for the spiritual beatitude, "Blessed are the poor."

Are the benefits of pain limited to the purely physical, the commercial and the military aspects of man's development? Far from it, for in the intellectual and moral realms its laurels are brighter yet. I venture to claim it as the very father of science. The earliest dawn of knowledge in the mind of our primitive ancestors was a recognition of the healthfulness or harmfulness of all objects as articles of diet. A knowledge gained by bitter experience. To this day a baby's first and chief criterion of everything about him is his mouth. Into that rosy opening is thrust impartially, just as far as it will go, everything that his chubby paws can clutch from the contents of the coal bucket to the painted monkey on a stick. And his earliest mental concept divides the universe simply into two divisions, that which tastes nice and that which does not.

Some of you may have seen a picture by the idealist Watts which represents our first parents seated side by side upon a sunny sea-beach. A number of empty clam, oyster, whelk, and other gaudily colored seashells are strewed about them, the evident remains of a primitive "clambake" in which the couple have just been indulging. There is a pained and regretful expression upon the countenance of the man, and he presses his hand over his distended stomach in a most expressive fashion, while his wife watches him in surprise and uneasiness. Some of the shell-fish have evidently been out of season or of a poisonous variety. The title of the picture is brief but expressive: "The Birth of Experience." And after some such fashion unquestionably did human

experience and human wisdom begin. And more progress was due to the bitter episodes than to the sweet, for the impression made by them was incomparably deeper. The school of experience is proverbially a "hard" one, and "sadder but wiser" has become a household word. Literally "the fear of the Lord is the beginning of wisdom." Just as most of the implements of peaceful industry were originally weapons of war, so many of our most valuable scientific discoveries and inventions have their origin in the bitter stress and makeshift of acute discomfort. For instance, our entire knowledge of the structure and workings in health of this wonderful body of ours had its birth in the study of its condition in disease. Pathology is the mother of both physiology and anatomy. By a singular oversight, several of our organs are still described in our text-books to-day, not as they appear in health or during life, but as they appear after death or in positively diseased conditions. For so many centuries our attention had been called to them only when diseased or upon the post-mortem table that we had unconsciously come to regard these as their normal appearances. The first and only thing that induced primitive man to concern himself with his interior arrangements was their causing him discomfort. This discomfort, whether apparently primary as pain or fever, or secondary as hunger or frost-bite, was promptly set down as due to the activities of more or less numerous evil spirits. To cure these evils it is necessary to appease the spirits; sacrifices are made and a ritual is born.

Thus the earliest gods of our race are deified discomforts And the Jehovah of the Decalogue, the "angry god" of the Puritan, still bears sad but distinct traces of his origin. A distinct class quickly springs up, whose sole function it is to propitiate or even at times repel these troublesome influences. This caste, formed for the simple but comprehensive purpose of relieving discomfort or averting disaster, individual as well as tribal, is primarily medical in the broadest sense of the term. Not only is personal healing required of it, but also state medicine—sanitary science in the widest sense. But, as most of the disturbances he is confronted with are attributed to spiritual agencies, his work rapidly takes on a priestly character as well. The shaman, conjuror, rain-doctor, or voodoo, is neither priest nor physician—but the common ancestor of both, as his Indian name of "medicine man" indicates to this day. And from this singular and oft-times grotesque individual spring not only two out of our three "learned professions," but also, incredible as it may seem, most of our scientists as well. Thus part of the bitterness of the warfare between theologians and scientists may be accounted for on the ground that it is a family feud. To aid him in the individual part of his duties, the relief of aches, of fevers, of dysenteries, our physician-priest presses into his service the herbs, the roots, the berries of the surrounding copses, or the mineral earths of the cliffs, and from these crude beginnings botany and chemistry, with their descendants biology and geology, are born. To this day a number of our common plants still bear

the names given them from their supposed medicinal virtues; such as "boneset," "liverwort," "sorrel" ("sore heel"), "feverfew," etc. For assistance in the tribal part of his functions, the prevention of drought, the securing of plentiful crops, and assuring against defeat in battle, he naturally appeals to the only heavenly bodies visible to him, and astronomy, and its daughters physics and navigation, are brought into being.

Many if not most of our best-known stars and planets still bear as scientific titles the names given to them when prayed to for aid or used in the construction of horoscopes.

Even as the greedy quest of the philosopher's stone led to many an invaluable chemical discovery far more "golden" to the race than the discovery of its object would have been, or as the wild and eager search after the fountain of youth developed continent after continent of undreamed-of richness and beauty, so the desperate shifts and vigorous efforts to escape the sharp spear of pain have won for the race a knowledge, a power, and a happiness beyond their wildest dreams.

As to the uses and value of pain in the moral realm, these have been so fully and constantly insisted upon by prophets of every creed, that nothing more than the merest allusion is needed here. Indeed, its importance has, if anything been exaggerated, but even upon the soberest view of the subject it must be rated very high.

For instance, it is obvious that without pain or the possibility of it there could be no true courage, no patience, no self-denial or devotion; without hardship, no endurance or fortitude; without tribulation, no faith.

It is not too much to say that without suffering no true character or virtue could be developed, any more than muscle and vigor without hunger and cold; that the choicest of the saints are and ever have been "they that have come up out of great tribulation."

Pain is by no means the only or even the chief influence in moulding the destiny of man; indeed, as our next contention will be, its antithesis, joy, is equally necessary and even more potent; but it is the keen and biting chisel under whose edge alone can the figure of the perfect man be hewn out of the lifeless marble.*

* Reprinted from THE MONIST, Chicago.

THE NECESSITY FOR IMPROVING NATURAL KNOWLEDGE.

BY THE LATE THOMAS H. HUXLEY

I CANNOT but think that the foundations of all natural knowledge were laid when the reason of man first came face to face with the facts of Nature; when the savage first learned that the fingers of one hand are fewer than those of both; that it is shorter to cross a stream than to head it; that a stone stops where it is unless it is moved, and that it drops from the hand which lets it go; that light and heat come and go with the sun; that sticks burn away in a fire; that plants and animals grow and die; that if he struck his fellow-savage a blow he would make him angry, and perhaps get a blow in return, while if he offered him a fruit he would please him, and perhaps receive a fish in exchange. When men had acquired this much knowledge, the outlines, rude though they were, of physics, of mathematics, of chemistry, of biology, of moral, economical, and political science, were sketched. Nor did the germ of religion fail when science began to bud. Listen to words which, though new, are yet three thousand years old:

> "..... When in heaven the stars about the moon
> Look beautiful, when all the winds are laid,
> And every height comes out, and jutting peak
> And valley, and the immeasurable heavens
> Break open to their highest, and all the stars
> Shine, and the shepherd gladdens in his heart."*

If the half-savage Greek could share our feelings thus far, it is irrational to doubt that he went further, to find, as we do, that upon that brief gladness there follows a certain sorrow—the little light of awakened human intelligence shines so mere a spark amidst the abyss of the unknown and unknowable; seems so insufficient to do more than illuminate the imperfections that cannot be remedied, the aspirations that cannot be realized, of man's own nature. But in this sadness, this consciousness of the limitation of man, this sense of an open secret which he cannot penetrate, lies the essence of all religion; and the attempt to embody it in the forms furnished by the intellect, is the origin of the higher theologies.

Thus it seems impossible to imagine but that the foundations of all knowledge—secular or sacred—were laid when intelligence dawned, though the superstructure remained for long ages so slight and feeble as to be compatible with the existence of almost any general view respecting the mode of governance of the universe. No doubt, from the first, there were certain phenomena which, to the rudest mind, presented a constancy of occurrence, and suggested that a fixed order ruled, at any rate, among them. I doubt if the grossest of fetish-wor-

* Need it be said that this is Tennyson's English for Homer's Greek?

shippers ever imagined that a stone must have a god within it to make it fall, or that a fruit must have a god within it to make it taste sweet. With regard to such matters as these, it is hardly questionable that mankind from the first took strictly positive and scientific views.

But, with respect to all the less familiar occurrences which present themselves, uncultured man, no doubt, has always taken himself as the standard of comparison, as the centre and measure of the world; nor could he well avoid doing so. And, finding that his apparently uncaused will has a powerful effect in giving rise to many occurrences, he naturally enough ascribed other and greater events to other and greater volitions, and came to look upon the world and all that therein is as the product of the volitions of persons like himself, but stronger, and capable of being appeased or angered, as he himself might be soothed or irritated. Through such conceptions of the plan and working of the universe all mankind have passed or are passing. And we may now consider what has been the effect of the improvement of natural knowledge upon the views of men who have seached this stage, and who have begun to cultivate natural knowledge with no desire but that of "increasing God's honor and bettering man's estate."

For example: What could seem wiser, from a mere material point of view, more innocent, from a theological one, than that they should learn the exact succession of the seasons, as warnings for their husbandmen, or the positions of the stars, as guides to their rude navigators? But what has grown out of this search for natural knowledge of so merely useful a character? You all know the reply. Astronomy—which of all sciences has filled men's minds with general ideas of a character most foreign to their daily experience, and has, more than any other, rendered it impossible for them to accept the beliefs of their fathers. Astronomy—which tells them that this so vast and seemingly solid earth is but an atom among atoms, whirling, no man knows whither, through illimitable space; which demonstrates that what we call the peaceful heaven above us, is but that space, filled by an infinitely subtle matter, whose particles are seething and surging like the waves of an angry sea; which opens up to us an infinite region where nothing is known, or ever seems to have been known, but matter and force, operating according to rigid rules; which leads us to contemplate phenomena the very nature of which demonstrates that they must have had a beginning, and that they must have an end, but the very nature of which also proves that the beginning was, to our conceptions of time, infinitely remote, and that the end is as immeasurably distant.

But it is not alone those who pursue astronomy who ask for bread and receive ideas. What more harmless than the attempt to lift and distribute water by pumping it; what more absolutely and grossly utilitarian? But out of pumps grew the discussions about Nature's abhorrence of a vacuum; and then it was discovered that Nature does not abhor a vacuum, but that air has weight; and

that notion paved the way for the doctrine that all matter has weight, and that the force which produces weight is co-extensive with the universe,—in short, to the theory of universal gravitation and endless force. While learning how to handle gases led to the discovery of oxygen and to modern chemistry, and to the notion of the indestructibility of matter.

Again, what simpler or more absolutely practical than the attempt to keep the axle of a wheel from heating when the wheel turns round very fast? How useful for carters and gig-drivers to know something about this; and how good were it, if any ingenious person would find out the cause of such phenomena, and thence educe a general remedy for them. Such an ingenious person was Count Rumford; and he and his successors have landed us in the theory of the persistence, or indestructibility, of force. And in the infinitely minute, as in the infinitely great, the seekers after natural knowledge, of the kinds called physical and chemical, have everywhere found a definite order and succession of events which seem never to be infringed.

And how has it fared with "Physick" and Anatomy? Have the anatomist, the physiologist, and the physician, whose business it has been to devote themselves assiduously to that eminently practical and direct end, the alleviation of the sufferings of mankind,—have they been able to confine their vision more absolutely to the strictly useful? I fear they are the worst offenders of all. For if the astronomer has set before us the infinite magnitude of space and the practical eternity of the duration of the universe; if the physical and chemical philosophers have demonstrated the almost infinite minuteness of its constituent parts and the practical eternity of matter and of force; and if both have alike proclaimed the universality of a definite and predicable order and succession of events, the workers in biology have not only accepted all these, but have added more startling theses of their own. For, as the astronomers discover in the earth no centre of the universe, but an eccentric spec, so the naturalists find man to be no centre of the living world, but one amidst endless modifications of life; and as the astronomer observes the mark of practically endless time set upon the arrangements of the solar system, so the student of life finds the records of ancient forms of existence peopling the world for ages, which, in relation to human experience, are infinite.

Furthermore, the physiologist finds life to be as dependent for its manifestation on particular molecular arrangements as any physical or chemical phenomenon; and, wherever he extends his researches, fixed order and unchanging causation reveal themselves as plainly as in the rest of Nature.

Nor can I find that any other fate has awaited the germ of Religion. Arising, like all other kinds of knowledge, out of the action and interaction of man's mind with that which is not man's mind, it has taken the intellectual coverings of Fetichism or Polytheism; of Theism or Atheism; of Superstition or Ration-

alism. With these, and their relative merits and demerits, I have nothing to do; but this it is needful for my purpose to say, that if the religion of the present differs from that of the past, it is because the theology of the present has become more scientific than that of the past; because it has not only removed idols of wood and idols of stone, but begins to see the necessity of breaking in pieces the idols built up of books and traditions and fine-spun ecclesiastical cobwebs, and of cherishing the noblest and most human of man's emotions, by worship, "for the most part of the silent sort," at the altars of the Unknown and the Unknowable.

Such are a few of the new conceptions implanted in our minds by the improvement of natural knowledge. Men have acquired the ideas of the practically infinite extent of the universe and of its practical eternity; they are familiar with the conception that our earth is but an infinitesimal fragment of that part of the universe that can be seen; and that, nevertheless, its duration, as compared with our standards of time, is infinite. They have further acquired the idea that man is but one of innumerable forms of life now existing on the globe, and that the present existences are but the last of an immeasurable series of predecessors. Moreover, every step they have made in natural knowledge has tended to extend and rivet in their minds the conception of a definite order of the universe—which is embodied in what are called, by an unhappy metaphor, "the laws of nature"—and to narrow the range and loosen the force of men's belief in spontaneity, or in changes other than such as arise out of that definite order itself.

Whether these ideas are well or ill-founded is not the question. No one can deny that they exist, and have been the inevitable outgrowth of the improvement of natural knowledge. And if so, it cannot be doubted that they are changing the form of men's most cherished and most important convictions.

And as regards the second point—the extent to which the improvement of natural knowledge has remodelled and altered what may be termed the intellectual ethics of men—what are, among the moral convictions, most fondly held by barbarous and semi-barbarous people?

They are the convictions that authority is the soundest basis of belief; that merit attaches to a readiness to believe; that the doubting disposition is a bad one and scepticism a sin; that when good authority has pronounced what is to be believed, and faith has accepted it, reason has no further duty. There are many excellent persons who yet hold by these principles, and it is not my present business, or intention, to discuss their views. All I wish to bring clearly before your minds is the unquestionable fact, that the improvement of natural knowledge is effected by methods which directly give the lie to all these convictions, and assume the exact reverse of each to be true.

The improver of natural knowledge absolutely refuses to acknowledge any authority, as such. For him, scepticism is the highest of duties; blind faith the

one unpardonable sin. And it cannot be otherwise; for every great advance in natural knowledge has involved the absolute rejection of authority, the cherishing of the keenest scepticism, the annihilation of the spirit of blind faith; and the most ardent votary of science holds his firmest convictions, not because the men he most venerates hold them, not because their verity is testified by portents and wonders, but because his experience teaches him that, whenever he chooses to bring these convictions into contact with their primary source, Nature—whenever he thinks fit to test them by appealing to experiment and to observation—Nature will confirm them. The man of science believes in justification, not by faith, but by verification.

Thus, without for a moment pretending to despise the practical results of the improvement of natural knowledge, and its beneficial influence on material civilization, it must, I think, be admitted that the great ideas, some of which I have indicated, and the ethical spirit which I have endeavored to sketch in the few moments at my disposal, constitute the real and permanent significance of natural knowledge.

If these ideas be destined, as I believe they are, to be more and more firmly established as the world grows older; if that spirit be fated, as I believe it is, to extend itself into all departments of human thought, and to become co-extensive with the range of knowledge; if, as our race approaches its maturity, it discovers, as I believe it will, that there is but *one kind of knowledge and but one method of acquiring it;* then we, who are still children, may justly feel it our highest duty to recognize the advisableness of improving natural knowledge, and so to aid ourselves and our successors in their course towards the noble goal which lies before mankind.—*Lay Sermons.*

To be able to discern that what is true is true, and that what is false is false—that is the mark and character of intelligence.—*Emerson.*

IF any man is able to convince me and show me that I do not think or act rightly, I will gladly change; for I seek the truth, by which no man was ever injured. But he is injured who abides in his error and ignorance.—*M. Aurelius Antoninus.*

Readers of the *Outlook* must have noticed that Dr. Lyman Abbott has stated several times recently that there is no good reason for the existence of the Universalist denomination. I applied the same sentiment to the sect of which Dr. Abbott is a flickering, flaming, and smoking light; and Dr. Abbott, on hearing this, told a friend of mine that he considered me a Large Mouse-Colored Ass. If you ask Dr. Abbott what denominations are unnecessary, he says, "Oh! the others, the others, the others!"—*Philistine.*

THE DIVISIBILITY OF MATTER.

BY PROFESSOR DOLBEAR.

PARTICLES of matter as small as the hundred thousandth of an inch may be seen with a good microscope as the smallest visible thing, but there is no reason for thinking that such a degree of fineness is any approach to the ultimate fineness of the parts into which it is possible to divide matter. For a long time philosophers have considered whether or not there could, in the nature of things, be an actual limit to the divisibility of matter, so that the smallest fragment could not be again divided into two or more parts by the application of appropriate means, thus making matter infinitely divisible, at any rate ideally.

In Mr. Spencer's "First Principles," this subject is considered at length, and the conclusion reached that it is impossible to conceive the existence of real atoms—bodies that cannot be divided into halves; nevertheless, we shall see presently that it is possible to conceive precisely that thing. It will be best here to note how far division has been carried and the means employed to effect it.

If a bit of phosphorus be put into a solution of gold, the gold will be set free in such a finely-divided state that the particles remain suspended in the solution, giving it a blue, green, or ruby color, depending upon the degree of fineness into which it has been broken up. Faraday estimated that the particles of gold in the ruby-colored liquid did not exceed the five-hundred thousandth part of the volume of the liquid. One-eighth of a grain of indigo dissolved in sulphuric acid will give a distinctly blue color to two and a half gallons of water, which would be about the millionth part of a grain to a drop of the water.

A grain of musk will keep a room scented for many years. During the whole of the time it must be slowly evaporating, giving out its particles to the currents of air to be wafted presently out of doors; yet in all this time the musk seems to lose but little in weight.

The acute sense of smell of the dog is well known, for he can detect the track of his master long after the tracks have been made, which shows that some slight characteristic matter is left at each footfall.

A spider's web is sometimes so delicate that an ounce of it would reach three thousand miles, or from New York to London. No one would think it likely that such a web would be made up of a single row of atoms, like a string of beads; for it would not seem probable that such a string could have such a degree of cohesion as spiders' webs are known to possess.

Chemists have concluded from their experiments with matter in its various forms and conditions that it is really reducible to ultimate particles which have never been broken up, no matter what conditions they have been subjected to;

and these ultimate particles are called *atoms*. The term is not now understood to signify what is implied in its derivation, as something that cannot be divided, only something that has not yet been broken up into smaller parts. Thus, hydrogen, oxygen, iron, silver, are reducible to such ultimate atoms; and there are now known about seventy different kinds of atoms, and these are often spoken of as the elements. Though they are excessively minute when compared with ordinary objects of sight, yet they have a real magnitude, which the physicist has measured in several different ways. Most of these methods are complicated, and in order to be understood require a pretty thorough knowledge of molecular physics; but the following one may probably serve to give one an idea of the degree of smallness which atoms must have.

When a soap-bubble is blown, the material of the film slides down the sides, making the bubble thinnest on top. When a certain degree of thinness has been reached at the top, colors begin to appear in concentric rings, and these colors appear to move towards the equatorial regions, new rings being formed at the top as fast as room is made for them by the displacement of the earlier ones. These colors always appear in the same order as they are in the rainbow, namely, beginning with the red and ending with the violet; then another set with the same order, until there have been two or more sets of rainbow tints. They are explained as being due to what is called "interference" in the light waves that fall upon the film. Light is reflected more or less from every surface it reaches. Some light is reflected from the first or outer surface of the film; some goes through the film to the inner surface, and is there reflected back to the outer surface, and then takes the direction that the light has which is reflected from the first surface, so that the light that reaches the eye from a point on a bubble comes from both outer and inner surfaces. That coming from the inner surface has had to travel farther than that coming from the outer surface by a distance of twice the thickness of the film. As light consists of waves, if one set of waves all of a length be made to move in the same direction as another set having the same length, their crests may coincide and produce a single higher wave; or the crest of one may be behind the crest of the other at any distance up to one-half the length of the wave itself, in which case the crest of one will coincide with the trough of the other, and the two waves will cancel each other, and this process is called interference. Now, in the case of the bubble, when the thickness is such that the distance through the film and back again is such as to equal half a wave length of a given kind of light, that particular wave is extinguished; and when one of the constituents of white light is wanting, that which is left is seen as colored light, and the color seen must depend upon the kind of color that has been cancelled. Red light has the longest wave length, about one forty-thousandth of an inch, and violet, the shortest of the waves we see, about one sixty-thousandth of an inch; and when these colors are seen

upon the bubble, we are assured that the interferences are produced by thicknesses due to fractional parts of such wave lengths. As the ray must go through the thickness twice in order to fall behind one-half of a wave, it follows that the thickness of the film where the last set of colors appears can be no more than one-fourth of the wave-length of the shortest wave we can see; that is:

$$\frac{1}{4} \times \frac{1}{60{,}000} = \frac{1}{240{,}000} \text{ of an inch.}$$

When a bubble has reached this degree of thinness, so that no more colors are to be seen, a rather remarkable physical effect may be noticed. The film becomes almost jet black, with a jagged edge well defined between it and the brighter-colored rings where the adjacent tint is purplish. The thickness of the film has fallen suddenly off here to about one-fortieth of the thickness it has where the tint is visible, and the bubble breaks in a second or two after this black patch appears; that is, when its thinness at any point becomes as small as:

$$\frac{1}{240{,}000} \times \frac{1}{40} = \frac{1}{9{,}600{,}000} \text{ of an inch.}$$

As the bubble, however, does persist for a short time, and the thin film has cohesion enough to enable it to support the weight of the bubble, it seems highly probable, but is not absolutely certain, that it must be more than one molecule of water thick at the thinnest place, which is, as shown, only about the one ten-millionth of an inch thick. If one thinks it probable that it be, say five molecules thick in order to have the degree of cohesion it shows, then the size of such molecule of water out of which the bubble is made can be but the one-fifth of the above small fraction, which gives about the one fifty-millionth part of an inch as the diameter of a molecule of water.

But a molecule is not the same thing as an atom: it is made up of atoms, chemically combined, and is defined generally as being the smallest fragment of a compound body that can exist and possess the physical characteristics that belong to such body. Thus a drop of water possesses all the characteristics of any larger quantity of it, and a drop may be divided into smaller and smaller globules, perhaps a million of them, each one being visible with a good microscope; but if the division be carried to a higher degree, as it can be by various methods, chemical, electrical, and thermal, the qualities of water disappear, and two different substances, oxygen and hydrogen, are left, both gaseous under ordinary conditions, and neither of them exhibiting any properties like water or from which any of the properties of water might be inferred. It may be well to remark here that this is only one illustration out of multitudes that might be named throughout the whole domain of physical science, that the properties of things under common observation are not simply the properties that belong to the elements out of which the things are built up; such properties being the result of collocation rather than inherent qualities.

The molecule of water is, then, a compound thing, and is made up of three atoms,—two of hydrogen and one of oxygen,—and therefore the actual size of an atom of hydrogen must be less than that represented by the above small fraction of an inch. Evidently a thing made up of three individual parts and two dissimilar substances cannot be spherical, and it will be well to bear this in mind in thinking of molecular forms. One may imagine the atoms themselves to be spheres, or cubes, or tetrahedra, or rings, or disks, or any other forms he likes, for the purpose of getting some sort of a mental picture of what a molecule might look like if it could be seen with a microscope; and it is probable that very many persons have hoped or thought that the microscope would sometime be so far perfected as to enable one to actually look upon the molecules of matter and perhaps upon their individual atoms. Let us therefore consider the problem of how much more powerful a microscope must need to be than any we possess to-day in order that one should see a molecule! We will assume atoms to be about the one fifty-millionth of an inch in diameter, and that when combined into molecules they are geometrically arranged so that the diameter of a molecule made up of a large number of atoms is proportional to the cube root of the number of atoms, as is the case with larger bodies, say a box of bullets.

A molecule of water contains three atoms, a molecule of alum about one hundred, while, according to Mulder, a molecule of albumen contains nearly a thousand atoms. Then according to the assumption, the molecule of alum would have a diameter equal to

$$\frac{\sqrt[3]{100}}{50{,}000{,}000} = \frac{1}{10{,}776{,}000} \text{ of an inch.}$$

and that of albumen would be equal to—

$$\frac{\sqrt[3]{1{,}000}}{50{,}000{,}000} = \frac{1}{5{,}000{,}000} \text{ of an inch.}$$

Now, the best microscope made to-day will enable one to see as barely visible a point the one hundred-thousandth of an inch, so that such a microscope would need to be as much more powerful than it now is as one hundred thousand is contained in five millions, that is 50 times, in order to see the albumen molecule, and for the alum molecule as many times as one hundred thousand is contained in ten million seven hundred thousand, that is, one hundred and seven times. Now, one who is familiar with the microscope would probably admit that one might be made through improved methods of making and working glass hereafter to be discovered, two or three, or even ten times better than the best we have now; but the idea of one being made fifty or one-hundred times more powerful than we have to-day, I do not think would be allowed to have any degree of probability. The case may be illustrated as follows: Suppose in the days of the stage-coach some one had imagined that by some improvement in methods of

travelling one might some day travel one hundred times faster than the stage-coach could then go. Twelve miles an hour was not an uncommon rate then; but one hundred times that would be twelve hundred miles an hour, and that is sixteen times faster than the best we can now do, and about twenty-five times faster than express trains now go. As a matter of fact, we travel about three or four times than the best stage coaches did, and, on a spurt, may go six or eight times faster. The powers of the microscope have not been doubled within the last fifty years, and I suppose more time and ingenuity have been given to the problem of improving it than will ever be given to it in the same interval again.

There is another and still more serious reason why there is no probabitity that any one will ever see a molecule, even though the microscope had the magnifying power sufficient to reveal it; namely, the motions that molecules are known to have would absolutely prevent one from being seen. A free molecule of hydrogen has a velocity of motion at ordinary temperatures of upwards of a mile in a second, and its direction of motion is changed millions of times in a second. A microscope magnifies the movements of an object as much as it does the object itself. An object in the field of a microscope that should have a movement no greater than the hundredth of an inch in a second could only be glimpsed, so there is no possibility of one's being able even to see a free gaseous molecule. Supposing one should be seized and held in the field, even then it is to be remembered that it is in a state of vibration, changing its form constantly on account of its temperature, so that its wriggling would prevent any inspection.

Lastly, there is every reason to believe that the molecules of all bodies are so perfectly transparent that they can no more be seen than can the air, even if there were no difficulty from their smallness and their motions.

If the atoms of a single element like hydrogen are so minute, so restless, and so transparent that no one can hope to see them so as to make out their forms and what gives them their characteristic properties, what shall be said of the case of seventy or more elements similarly minute and restless and transparent, yet each one easily identified in several ways, physical and chemical? Does it seem in any way probable that such differences in properties as are exhibited by gold, carbon, iron, and oxygen can be due simply to differences in size or shape of the atom? Presumably not; and the constitution of matter has, therefore, always been a mystery to philosophers; for if one is to attempt to philosophize upon the subject in accordance with such knowledge as we have, one would need to conclude that if the different kinds of matter, the elements as we know them, were formed out of some prior kind of substance, as bullets and marbles are formed out of lead and clay, then there must be as many kinds of substance out of which the different elementary atoms are formed as there are different elements, which proposition does not seem to have such a degree of probability that any one could adopt it. If one sought for the explanation of the differen

properties by assuming that all the different kinds of elements were formed out of one and the same fundamental substance, then it is equally difficult to understand how mere differences in size and shape could give such profound differences in quality as the elements possess.

Then, again, it appears that the individual atoms of each element are precisely alike. One atom of hydrogen is precisely like every other atom, so far as we have definite knowledge. Sir John Herschel likened them to manufactured articles on account of their exact similarity. A machine may turn out buttons or hooks or wheels or coins so exactly like one another that no one can tell them apart. It is really appalling to think of the immense numbers of atoms of every one of these seventy elements. It is a simple matter to calculate how many atoms there must be in say a cubic inch. It requires no other process than the application of the multiplication table. If the diameter of one be the fifty-millionth of an inch, then fifty millions in a row would reach an inch, and a cubic inch would contain the number represented by the cube of fifty millions which is 125,000,000,000,000,000,000,000, a number which is more conveniently represented by 125×10^{21}. The utter impossibility of conceiving such a number will be apparent if one would try to represent to himself what the magnitude of only one million really is. Go out on a clear but moonless night and the heavens appear to be filled with stars. Count all that can be seen in a certain portion of the sky, say one-tenth, as nearly as can be estimated, and then determine the number in the sky that are in sight by multiplication. It will be discovered that only about two thousand can be seen in the whole sky. If one million stars were to be thus visible, it would require five hundred firmaments as large and as well filled as the one looked at to contain them. With the largest telescope less than a hundred millions of stars are visible; but what shall one say when he learns that beyond a peradventure the number of atoms in a single cubic inch of matter of any sort is more than a million of million times all the stars in all the heavens visible in the largest telescope?

If one fancies that kind of work he may compute the number of atoms that make up the world. Of course it will make the number larger; but when written out not so much longer as one might think, for when it is multiplied a million times it will add but six ciphers to it. Some mathematicians have been to the pains to compute the number of atoms there are in the visible universe, or, rather, the number that cannot be exceeded; for if the number stated above fills a cubic inch, if one knows the diameter of the visible universe, the space it occupies can readily be known in cubic miles and cubic inches, and if all this space was filled with atoms one could know and write down their number. Astronomers tell us that some stars are so distant that their light requires as long as five thousand years to reach us, although the velocity of light is as great as 186,000 miles in a second, and this distance is to be measured in every direction

about us. If this be our visible universe, then the maximum number of atoms in it are calculable, and are stated to be represented by the figure 6 followed by ninety-one ciphers, or as it is usually written, 6×10^{91}.

If we return to microscopic dimensions, and compute the number of atoms, there will be in the smallest amount of matter that can be seen with the highest powers of the microscope, the one hundred-thousandth of an inch, it will be seen that five hundred atoms in a row would just reach the distance; and the cube of 500 is 125,000,000, that could be contained in a space so small as to appear like a vanishing-point and the structure or details be utterly invisible. We have read of spirits that could dance upon the point of a needle, but the point of a needle would be a huge platform when compared with this last visible point with the microscope; and the spirit that should dance upon it might be a million times bigger than an atom of matter and not be in danger of vertigo. One may be astonished at the amount of intelligence associated with the minute brain structure of some of the smaller forms of animal life—say the ants; but from the above it will be seen that, so far as such intelligence is associated with atomic and molecular brain structure, the size of the brain in the smallest ant, though measured in thousandths of an inch, is sufficiently large to involve billions of atoms, and the permutations possible are almost unlimited. The same idea is applicable to the brain of man, and seems to indicate that such differences in quality of mind as we see are not so much due to the differences in amount of brain, measured in cubic inches, as in atomic and molecular structure.

The work of physicists and chemists, carried on for many years, has convinced them that none of the processes to which matter has been subjected has affected its quantity in the slightest degree. A definite quantity of hydrogen, or, what is precisely the same thing, a definite number of hydrogen atoms, may be subject to any conditions of temperature, may be made to combine with other elements successively, forming with them solids or liquids or gases, and no atom is destroyed nor its individual properties changed in any degree. Neither has any phenomenon been discovered indicating that new atoms of any kind are ever produced by any physical or chemical changes yet known. Time does not alter them. Elements that have been embedded in rocks from primeval times, reckoned by millions of years, when liberated to-day and tested, exhibit precisely the same characteristics as those obtained from other sources and that have been subject to many artificial conditions. Sometimes a meteorite reaches the earth, a sample specimen from distant space, having moved in some orbit about the sun for millions of years. Thousands of such bodies are in our possession, and they have been carefully analyzed, but no element unfamiliar to the chemist has been found among them; and the iron, the nickel, the carbon, the hydrogen, and all the rest of the elements that compose them, behave in every particular like those found on the earth.

So far as spectroscopic evidence goes, it testifies to the presence of the same elements in the sun and planets and comets; and it is as certain as anything physical can be, that the expert chemist here would be an equally expert chemist in the planet Mars, if he could find a way to cross the immense space that separates that star from us.

These facts and conclusions are frequently stated in such a form as this, namely, that matter cannot be created or annihilated. All that can fairly be meant by such language is that under all the conditions at present known, the quantity of matter remains constant; and this proposition has a high degree of importance in social affairs as well as in philosophy. If matter were liable to change in its quantity or quality by being subject to various physical conditions, all industries involving commercial interests would be in an unstable state. If the ton of iron ore should turn out, when smelted, only fifty per cent. of iron instead of sixty per cent., as now,—the rest being either annihilated or transformed into lead or gold, or something else,—the smelting company would soon go bankrupt, even if gold were the product of iron, for if gold were liable to be produced in that kind of a way, its value would be next to nothing as a standard of value.

The old alchemists sought to transmute what they called the baser elements into gold. It is safe to say, if it were physically possible to do it and some one should discover the art, and it were an economical process, commercial disaster such as the world has never known would follow its announcement. It would be as if the volcanoes of the world should suddenly begin to eject gold in the place of lava.

Stability of physical properties is as essential for the stability of society as the regular recurrence of day and night; and philosophy would be impossible if fundamental data were not in every way immutable.

These physical principles lead to some curious and most interesting conclusions with regard to the great difference there is between bodies of matter of any and all kinds that are familiar to our senses, and the atoms out of which these larger bodies are composed. In every case, where there is a difference in movement between two of these larger bodies made up of atoms, there is what we call friction, which invariably results in wearing away some of the material of both. It is the result of mechanical friction, to tear away some of the surface molecules of the two bodies. Bodies in use much, and therefore most subject to friction, become worn out. Our clothing is a familiar example; the journals of machinery, the tires of wheels, the sharpening of tools, the polishing of gems, the weathering of wood and stone,—all show that attrition removes some of the surface materials of such bodies, but there is nothing to indicate that attrition among atoms or molecules ever removes any of their material. It appears as if one might affirm in the strongest way that the atoms of matter never wear out,

are not subject to such friction and the consequent destruction as comes to all bodies made up of them. The molecules of oxygen and nitrogen that constitute the air about us have been bumping and brushing against each other millions of times a second for millions of years probably, and would have been worn out or reduced, as the rocks upon the seashore have been beaten and ground into sand, if they had been subject to friction. So one may be led to the conclusion that, whatever else may decay, atoms do not, but remain as types of permanency through all imaginable changes—permanent bodies in form and in all physical qualities, and permanent in time, capable, apparently, of enduring through infinite time. Presenting no evidence of growth or decay, they are in strong contrast with such bodies of visible magnitude as our senses directly perceive. Valleys are lifted up and become mountain-tops; mountains wear away and are washed into the ocean; the beds of the ocean sink and rise; and the boundaries of continents may be worn and washed away through the incessant beatings of waves against their coasts. Wear and tear go on in all inanimate nature unceasingly, so that it is only a question of time when everything we see upon the earth will have changed beyond identification. The sun is shrinking, and must sometime cease to shine. The stars, too, are changing likewise, because they shine, and their places in the firmament will be vacant. All living things grow because of change, and decay because of more rapid change, and there appears to be nothing stable but atoms. If it could be shown that life itself and the mind of man were in some way associated with atoms of some sort, as inherent properties, the hopes and longings cherished by mankind for continuous existence beyond the short term of three score years and ten would give way to convictions as strong as one has in any physical phenomena whatever; the evidence would be demonstrative in the same sense as it is for the existence of atoms and their physical qualities.

FREEDOM OF CONSCIENCE.

Oh! brave Apostle, thou hast truly said—
  It is a trivial thing indeed to be
  Judged of man's judgment. Conscience must be free,
Nor blindly nor dogmatically led,
Either by living oracles or dead;
  For truth admits of no monopoly,
  And where it points each for himself must see,
Nor fears an independent path to tread.
Honor to him who speaks his honest thought,
  Who guards his reason as a sacred trust,
Demands the truth for every dogma taught,
  And turns dissenter only when he must!
For he shall rise by whom the light is sought,
  To the high plane where stand the wise and just.

—*W. Lloyd Garrison.*

THE RESURRECTION MYSTERY.

BY J. M. WHEELER.

"And the Spring arose on the garden fair,
Like the Spirit of Love felt everywhere;
And each flower and herb on Earth's dark breast
Rose from the dreams of its wintry rest." —*Shelley.*

THE mystery of the Resurrection is a very simple one. It comes before us with each returning year—

"When the hounds of spring are on winter's traces.
The mother of months on meadow or plain
Fills the shadows and windy places
With lisp of leaves and ripple of rain."

When the seed underground germinates; when plants burst into bud, and blossoms peep above the dull earth, like daffodils—

"That come before the swallow dares, and take
The winds of March with beauty;

when verdant foliage, bursting from barren branches, tells of the rejuvenescence of life, we celebrate the true perpetual miracle of nature's resurrection, not the paltry thaumaturgy of a Jerusalem ghost.

The spring poet is responsible for much. He it was who first saw in the return of life the sign and seal of his own re-emergence from the underworld of darkness and death to a land of pure delight—

"Where everlasting spring abides,
And never-withering flowers."

Leave it as poetry, and the hope of immortality must ever awaken sympathy. Sighs at the sad futility of human hopes may mingle with smiles at the absurdity of human egotism. Preachers of every age and creed have followed in the poet's wake, picturing the miracle of nature's resurrection in various forms of myth and fable, as the return of Persephone or the resurrection of Osiris, Thammuz, Adonis, Attis or Jesus Christ.

It was this wonder of life rising out of death that was the great theme of all the ancient mysteries. The explanation will form an important chapter in "Footsteps of the Past." Briefly, the custom of placing food with the dead led to the plants which sprang from the seeds being regarded as embodied spirits or the return made by the ghosts for the food. Hence wide-spread tree-worship, and the idea that the death was essential to the life. Hence, too, sacrifices to promote agriculture, at first human, then animal, the victim being identified with the god who gave the food.

Hippolytus ("Ref. of All Her.," v. 3) tells us the central mystery at Eleusis was giving the initiate an ear of corn, a symbol of the resurrection.

Paul says, unpolitely and mistakenly: "Thou fool, that which thou sowest is not quickened except it die"; and the passage, in which he uses the same illustration of immortality as was used in the Eleusinian

mysteries, has been taken as part of the burial service throughout Christendom. The naturalist may answer Paul, "Thou Christian, that which thou sowest is not quickened if it die." It is only when the principle and power of life have never been for one instant interrupted that resurrection takes place.

The key to the mystery of the Christian Resurrection may be found in my "Footsteps of the Past"; or, better still, in Mr. J. G. Frazer's "Golden Bough," which traces the mystery of the priest of the grove of Nemi, the King of the Wood, who was the sylvan deity incarnate in a man whom it was necessary should be put to death while in the full bloom of manhood, in order that his sacred life, transmitted in unabated force to his successor, might reincarnate itself ever fresh and young.

Readers of my chapter on "Sympathetic Magic" will understand how the rites of the old faiths sought to assist nature by enacting its processes. Of this, the dancing round Jack-in-the-Green, and the customs of performing all such actions as stirring a pot "sunwise" are interesting remnants. Before the days of reading and writing, doctrines were taught by action; and long before the Christian era women mourned for Adonis, and rejoiced at his resurrection, much as Christians celebrate Good Friday and Easter Sunday. In Sicily to-day, at the approach of Easter, they sow wheat, lentils, and canary seed in plates, which are kept in the dark and watered. The plants soon shoot up; the stalks are tied with red ribbons and placed on the sepulchres, which, with effigies of the dead Christ, are made up in Roman Catholic and Greek churches, "just as the gardens of Adonis were placed on the grave of the dead Adonis," says Mr. Frazer ("Golden Bough," i. 195).

Scenes of the death and resurrection are still enacted in Jerusalem. Before men were acquainted with any book-story of a resurrection, they had for ages been used to an enacted representation of it. One of these services used in the churches in the Middle Ages, entitled "Mystery of the Resurrection of our Lord Jesus Christ," has come down to us with particulars of the way in which it was performed. Three deacons, arrayed in dalmaticas, and their heads covered with veils "like women," representing the three Marys, advanced, with vases in their hands, to the middle of the choir. With their heads bent down they proceeded singing the anthem, "Who shall roll away for us the stone from the tomb of the sepulchre?" A chorister boy, "after the manner of an angel," attired in a white alb, and holding a palm branch, addressed to them the question, "Whom seek ye here?" to which the three deacons replied, "We seek Jesus of Nazareth." Then they are told he is risen. A triumphal chorus celebrates the victory of Christ over the grave. Throughout this mummery, as much as in the old customs of carrying out Winter, bringing in Spring, and in the decoration of the altar with lights and flowers at Easter, we have the constant symbolism of the triumph of life over death, the resurrection from the underworld, of vegetative life, symbolized in the old Saxon spring goddess Œstre.—*Freethinker.*

EVOLUTION BEFORE DARWIN AND AFTER.

BY B. F. UNDERWOOD, CHICAGO, ILL.

EVOLUTION TWO GENERATIONS AGO.

To those especially who were early interested in Evolution as a world-conception, (as was the writer, with whom it was a subject of thought and study forty years ago), there is much satisfaction in the knowledge that the doctrine is now generally accepted by independent thinkers. Two generations ago there were but few comparatively who had any belief or serious interest in the theory. The mass of people, with their secular teachers and theological guides, were satisfied with the old *a priori* hypothesis of special, miraculous creation. The man who, here and there, dissented from this doctrine, either affirmed belief in the eternity of worlds, including species, or, in the absence of data, declined to express or to form any opinion on the subject. When the Development theory, as it was then called--the word Evolution having been substituted for it by Herbert Spencer—was mentioned, people generally thought it a fantastic notion and treated it with ridicule. A serious defence of it was regarded as an indication of an unbalanced mind and of low moral tastes and ideals.

NOT FEARED BY SPECIAL CREATIONISTS.

For a long time Evolution was not feared by special creationists, for apparently there was no likelihood that it would ever commend itself to reasonable minds. Later, as the theory gained adherents, it excited religious opposition which was often very bitter; even the high character and eminent services of Charles Darwin were "no safeguard against the attacks instinct with malignity and spiced with shameless impertinence."

For some time after the publication of Robert Chambers' "Vestiges of Creation," the theory was without standing among recognized teachers of science. Professor Huxley, who did not declare in favor of Evolution till after 1858, says:

"Within the ranks of the biologists at that time (1851-8) I met nobody except Dr. Grant, of University College, who had a word to say for Evolution, and his advocacy was not calculated to advance the cause. Outside these ranks, the only person known to me whose knowledge and capacity compelled respect and who was at the same time a thorough-going evolutionist, was Mr. Herbert Spencer, whose acquaintance I made, I think, in 1852, and then entered into the bonds of a friendship which, I am happy to think, has known no interruption."

GOETHE.

Notwithstanding the fact that the publication of the "Origin of Species," with its promulgation of the principle of Natural Selection, gave a wonderful impulse to evolutionary thought, the theory of Evolution had long had its supporters and

teachers, though they were few in numbers and lacked data for proving the theory scientifically, which Darwin and subsequent writers supplied. In his "Metamorphosis of Plants," published in 1790, Goethe derives all vegetable forms in the world from one, and all the different organs of the plant by development from one organ, the leaf. In his lines, "Proteus Delphis," he says :

"Through myriad forms of being wending
To be a man in time thou'lt rise."

ERASMUS DARWIN, ST. HILAIRE, LAMARCK, EMERSON, TENNYSON.

In "Zoonomia, or the Laws of Organic Life," in 1795, and later in the poem, "Temple of Nature," Erasmus Darwin advocated with great boldness and eloquence, but not, of course, with scientific precision, the natural origin and development of life. Geoffrey St. Hilaire, and Lamarck, among naturalists, later identified their names with the defence of this view. Emerson, whose intellectual hospitality made him receptive to truth which was in advance of his time, was early interested in Evolution, and in a lecture given on "The Relation of Man to the Globe," in 1833, he said :

"The most surprising, I may say the most sublime, fact is, that man is no upstart in the creation, but has been prophesied in Nature for a thousand, thousand ages before he appeared ; that from times incalculably remote there has been a progressive preparation for him, an effort to produce him ; the meaner creatures containing the elements of his structure and pointing at it from every side..... His limbs are only a more exquisite organization—say rather the finish—of the rudimental forms that have been already sweeping the sea and creeping in the mud ; the brother of his hand is even now cleaving the Arctic Sea in the fin of the whale, and innumerable ages since was pawing the marsh in the flipper of the Saurian."

More familiar to the general reader to-day in connection with Evolution is the oft-quoted poem where Emerson says :

"And striving to be man, the worm
Mounts through all the spires of form."

Less definitely Evolution is taught in the early poems of Tennyson, thus in "The Two Voices," which appeared in 1842 :

"Or if through lower lives I came
Though all experience past became
Consolidate in mind and frame."

Herbert Spencer, more than forty years ago, wrote in defence and exposition of Evolution, laying the foundations of that system of Universal Evolution to the working out of which he has given his life.

BUT FEW EXPRESSED EVOLUTIONARY THOUGHT.

All these writings were read, and they had their influence, of course ; but so

general and thoroughly established was the old conception of creation by miracle and of the fixity of species, that the few who, imbued with the idea of the unity of Nature and the reign of law, gave expression to evolutionary thought, seemed to produce but little impression, though probably their influence was deeper and more far-reaching that it at that time appeared to be. Literature generally ignored the theory. The secular press, when the subject came to its notice, made fun of it, reflecting in this respect the popular feeling. Since it was opposed to the current theological belief, they who ventured to advocate it were supposed to be "unbelievers." The theory was associated in the common mind with Atheism. The "Vestiges of Creation" was sold in New York and Boston among "infidel" publications like the "Age of Reason" and "Volney's Ruins."

SPIRITUALISTS AND DEVELOPMENT.

The Spiritualists made the Development theory a part of their philosophy. It was made prominent, though treated discursively, in "Nature, Divine Revelations," by Davis, the "Poughkeepsie Seer;" and with larger knowledge of facts and with more definiteness of statement, in a work which appeared later, entitled "The Arcana of Nature," by Hudson Tuttle. Some time in the fifties, William Denton, a Spiritualist and a man of considerable scientific attainments, defended the natural origin of man by development in a public debate at Chagrin Falls, Ohio, with James A. Garfield, then a Campbellite preacher, afterwards President of the United States.

THE "EPOCH-MAKING BOOK."

In 1859 appeared the "epoch-making book," the "Origin of Species." Supported by Hooker, Huxley, and other strong men of science, it gave to evolutionary thought an impulse as remarkable as any in the history of the human mind, and from that time Evolution has gained ground steadily and rapidly; it has revolutionized Zoology, compelled the revision of theological creeds, permeated literature, and so completely established itself among thinkers of every class that its influence is seen in all intellectual circles and in all departments of thought. There is no subject which is not now studied in the light of Evolution. Its principles are freely applied to religion as well as to language, government, art, etc. One rarely meets now a well-informed man who was not intellectually rigid before modern scietific thought had made any considerable progress among common readers, in whose mind the conception of Evolution has not replaced that of special creation. Although held by many with qualifications modifying and suiting it to their religious beliefs, which are not entirely acceptable to "thorough-going evolutionists," the essential thought, that not creative fiats, but continuity and growth, not miracle, but law, has prevailed always and everywhere, has come to be a strong conviction with thinkers generally. It now dominates in the world of thought.

RELIGIOUS BELIEFS AFFECTED BY EVOLUTION.

Of course there are still many who without much, if any, real thought on the subject, still assent to the old view. This element represents the extreme conservatism which is the last to break away from traditional ideas and methods, and the last to surrender to the progressive thought and spirit of the age. But the orthodox churches, in whose pulpits the old view has been so stubbornly defended, have not escaped the influence of Evolution. Religious beliefs, and the way of looking at things, have been and are there, as elsewhere, undergoing a marked change. Among the orthodox clergy the word Evolution is indeed no longer an offensive word. The sermons preached and the books written by representatives of the old faith, show that Evolution has modified their interpretations of natural facts as well as of the Scripture, and also their general modes of thought and their attitude in relation to other religions than their own. The revision of creeds is but one of the more superficial indications of the work of Evolution in the churches.

RAPID PROGRESS OF EVOLUTIONARY THOUGHT.

In 1871 the writer gave a course of lectures in Eugene City, Oregon, among other places in that state and in other States on the Pacific Coast, on Evolution and its relation to current theological beliefs. The opposition of the churches was aroused and there was preaching against Evolution in that city for a long time. On returning there in 1873, arrangements were made by which President T. F. Campbell, of Monmouth College, was to oppose Evolution in a joint debate. The discussion occurred, was continued several evenings, and it attracted large audiences. President Campbell took the ground that Evolution could not be true because it was a degrading conception and in conflict with the Word of God. The general feeling was strong against Evolution, and the arguments for it may at that time have puzzled more people than they convinced. But what no speaker could accomplish was there brought about, as it has been in thousands of places, by a process of growth. On returning to the city in 1888, the third time, the writer found that the State University had been established there, and that Evolution was taught in that institution, the works of Prof. LeConte being used as text books. There was no longer hostility to the conception among the leading minds. These facts serve to illustrate the rapidity with which the transition from the old to the new thought has been going on in all the more enlightened communities.

Such radical changes in so short a space of time are remarkable. They would not have been possible in any previous period, owing to the absence of the mental conditions, products of Evolution, which have been important factors in this transition. The conception of Evolution itself has been slowly evolved, as well as the state of mind which has made its acceptance possible.

HUXLEY UNCONVINCED BEFORE DARWIN.

Prof. Huxley, referring to his discussion of Evolution with Herbert Spencer from 1852 to 1858, says: "Many and prolonged were the battles we fought on this topic. But even my friend's dialectic skill and copiousness of apt illustration could not drive me from my agnostic position. I took my stand upon two grounds: firstly, that up to that time the evidence in favor of transmutation was wholly insufficient; and secondly, that no suggestion respecting the causes of the transmutation assumed, was in any way adequate to explain the phenomena. Looking back at the state of knowledge at that time, I really do not see that any other conclusion was justifiable."

"THE ORIGIN OF SPECIES."

It was Darwin's "Origin of Species" which converted Professor Huxley to the doctrine of Evolution. It was natural that he should think the evidence which had been adduced before he became acquainted with this work "insufficient," and, of course, a man of his intellectual integrity could not give adhesion to any theory until he was satisfied of its truth. But while Professor Huxley's statement, considered as an explanation why he and other men of science did not accept Evolution earlier is unobjectionable, it does scanty justice to those who were evolutionists before Darwin made his great contribution to the world's knowledge.

SCIENCE IN THE HIGHER SENSES.

A thinker who reaches correct conclusions in regard to complex problems, under the disadvantage of having a small amount of data upon which to base his inductions, may thereby show a knowledge of the relations of things, an appreciation of the evidential value of known facts, and a comprehensiveness of view, which denote a high order of intellect. In the higher sense, the man of science is he who has not only powers of observation, but ability to take the facts which are known, and to arrange them so as to explain their meaning, by discovering the principles which underlie them, as Newton explained the phenomenon of the fall of the apple, when he conceived that the same force which brought the apple to the ground also held the planets in their orbits. Mere observation and collection of facts would never lead to a great discovery; there must be reason, imagination and insight, power to understand the significance of groups of phenomena, and to think beyond what is actually known, as well as care and caution in verifying what is conceived and held tentatively until it is fully established by larger knowledge. Imagination is to the scientist what the lamp is on the cap of the miner: it enables him to see a little beyond the position occupied.

PREDECESSORS OF DARWIN.

The work of Darwin in laboriously collecting evidence of organic evolution, and in showing that natural selection was an important factor in the transmutation of species, was a stupendous work which cannot be overestimated. The "Origin

of Species" was an epoch-making book, which has revolutionized zoology, and led to radical and widespread modifications and reconstructions of thought in every department of research. And for the work he did, Darwin has received his full meed of praise; has been honored as no other man of science in his age has for the work which his genius and labor accomplished. But Darwin was not, as has been shown, the originator of the theory of Evolution, which itself has been evolved through many centuries. Facts which were a matter of knowledge long before the "Origin of Species" appeared, had led not a few acute thinkers to believe that species came by gradual transmutation through natural agencies.

PRIORITY OF HERBERT SPENCER AS AN EVOLUTIONIST.

Years before the "Origin of Species" was published, Herbert Spencer brought forward some of the strongest evidences in support of Evolution. His facts are incontestable, and his arguments are as valid to-day as they were then. The force of his reasoning, which failed at the time to convince men like Huxley, who required more evidence, is now acknowledged by them, showing that Spencer's earlier acceptance of Evolution was owing to his true interpretation of natural phenomena and greater freedom from the influence of traditional beliefs and authorities, while their inability to accept the theory was due to their limitations, and not to their more correct judgment of what the evidence should be to render the theory probable.

SPENCER'S EVOLUTION A UNIVERSAL PROCESS.

Spencer conceived Evolution, not merely as a transmutation of species, but as a universal process as presented in the system which he has since elaborately worked out in his voluminous works. In "Principles of Psychology," published before Darwin's "Origin of Species" appeared, Spencer assumes the truth of organic evolution, and applies himself to the task of showing how the mind has been developed from low and simple to high and complex conditions. Whether we accept all his views or not, as evolutionists, we must acknowledge the force of his arguments, based upon facts, for the doctrine of Evolution, in distinction to the conception which prevailed when he began writing on this subject.

HUXLEY'S TARDY CONVERSION.

Professor Huxley, after his acceptance of Evolution, repeated many of these facts and arguments which before, though they had convinced others, had failed to convince him. Had he possessed that larger range of vision, that philosophic grasp, that synthetic power and that wonderful faculty of dealing with problems in the algebra and geometry of thought which distinguished Herbert Spencer among thinkers of this country, Professor Huxley would probably have accepted Evolution prior to 1858, upon such evidence as was then accessible.

I do not underestimate Professor Huxley. He was a man of scientific attain-

ments and literary accomplishments of a high order, a careful investigator in several departments of knowledge, a brilliant and fearless expounder of scientific truth, and an admirable character, but this fact, with his tardy conversion to Evolution, should not be construed to the discredit of those who accepted the doctrine upon evidence which he regarded as "insufficient." The facts of embryology, of homology, of rudimentary parts, etc., known before the publication of the "Origin of Species," were to some minds as strong indications as they are now of the transmutation of species; but to them had to be added more facts, and some method suggested by which species could have been changed, before men like Huxley could declare in favor of Evolution. This shows how important and necessary was Darwin's work to the wider acceptance and progress of evolutionary thought, but it does not in the least abate from the soundness of the general reasoning of those who, from the facts known arrived at the conclusion which Professor Huxley reached, at a later date.

OFFICIAL SCIENCE.

The "rigorous methods of science," which save us from *a priori* speculation and many unwarranted inferences, may sometimes be applied in a way to delay the acceptance of a truth seen by a great thinker long before he can satisfy others that the objections are irrelevant or unsound, and that the evidence justifies his conclusions. Many scientific men and teachers of science in the colleges were very confident that Darwin's conclusions were not "justifiable;" several years after Huxley accepted, and like a brave knight, defended them against scientific and theological assailants

PIONEER THINKERS.

Among observers and thinkers there are always some who are in advance of others in accepting or in anticipating newly announced truths. It is doubtless well that the majority, subject to the influence of custom, authority and associations, change slowly; for thereby is maintained that stability which is the safeguard of society and a condition of progress. But it is desirable that we recognize the merit and service of those who are the first to understand and assimilate a new idea or to adopt and work for a great principle, for they are the pioneers of these changes in thought and method, which are necessary to overcome the tendency to conformity, uniformity and conservation which steal like a mist over a nation, resulting in "intellectual peace at the price of intellectual death."

THE STORY OF THE GREAT INDIAN MUTINY.

BY E. W. L.

VI.

IT will be recollected that General Anson died at Kurnaul on the 27th of May. On the previous day Sir Henry Barnard had arrived; he was in command of a detachment of the field force which was being organized to besiege Delhi. This was the great stronghold and the rallying-point of the mutineers. Sir Henry, who had distinguished himself in the Crimea, succeeded Anson locally. Sir Patrick Grant was appointed Commander-in-Chief of the Bengal army. As we have seen, native priests and fakirs had made the most of a doubtful prophecy (doubtful as to its origin) to the effect that the British rule should last a century and then come to an ignominious end. Mention has also been made of a Sikh prophecy. The British and the Sikhs were to join hands, capture and loot Delhi, and so bring down the wrath of heaven upon a people who more than 150 years before had beheaded Tej Singh, a Sikh saint, and made him a martyr. This prophecy aided the British cause.

Sir John Lawrence, Mr. Montgomery, and the rest of that gallant band of born commanders, acted with a decision that overcame all obstacles. That fatal defect of most Governments, especially of the British Government, Red-tapism, was the first impediment to be overcome. One stroke of the pen brought about the needed reformation: Red-tapism was abolished in the Punjab. The sacredness of the post-office was violated; letters in transit were opened, and dark was the abyss thereby revealed. The mutineers had such faith in the power they were laboring to overthrow, that letters of deepest import were forwarded by the mails. Many of these fell into the hands of the Punjab Government, and made their task easier. Several cases of unsuspected treason were brought to light, and the gravity and the real nature of the mutiny were thus made known. The mutiny was more wide-spread than was at first imagined; and the mutineers, by magnifying their successes and boasting of their power, were exerting all their influence and all their eloquence to induce those Sepoys who still remained faithful to join them. To the people at large, great inducements were held out in the shape of unrestricted pillage of British residences and places of business. The Punjabees, however, remembered too well what "home rule" meant, and the population was in favor of British rule. Fugitive mutineers were captured and brought into the British lines by the villagers.

Besides the peaceful villagers, there were hordes of native warriors, somewhat like the European free lances of the Middle Ages, who cared little which side proved victorious. They were willing to help the conquerors to slay, and, above

all, to loot. "Show us," they had the effrontery to tell the Punjab Government, "that you are stronger than your enemies, and we will help you!" They were shown; but promiscuous looting and cold-blooded murders were interdicted. This part of the programme the "Free Lances" had not bargained for; but *maugre* the restriction they did good service in the British cause.

Fortunately for the British there was found, every here and there, an Abdiel, "faithful among many faithless," who remained true to his "covenant of salt." It has already been stated that the 64th B.N.I. had been ordered to occupy certain small forts near Peshawur. An Abdiel was found in one of these forts. The 51st B.N.I. wrote to the Sepoys of the 64th begging them to march into Peshawur on the 22nd May; everything was ready for the slaughter and success was certain. The Sepoys stationed in and around Peshawur were to follow the grand example set them by their brethren of Delhi and Meerut. This letter was addressed to the "Abdiel"; the faithful Sepoy took it straight to the officer commanding the fort, and begged him to act at once, as no time was to be lost. That officer instantly forwarded the missive to the officer commanding at Peshawur.

Do "time and chance happen to all?" Or are these spirits hovering around us which take such a keen interest in our doings that in times of special emergency they burst through all restraints, risking whatever punishment may follow their disobedience, and give us hints of the impending perils? Leaving to others the task of solving the mystery, I will simply state that a strange combination of "time and chance" happened about May 22, 1857, which saved the lives of the Europeans in the vicinity of Peshawur, and averted the wreck of British rule in the Punjab. Colonel Nicholson, having in reality nothing more tangible to go upon than suspicions, scented danger; he prevailed upon Sir John Lawrence to send back to the Peshawur district half of the 27th Regiment of foot. About the same date the Punjabee troops were returning from the frontier. These were ordered to march to Peshawur. Then the fatal letter was sent to a Sepoy, faithful among several hundreds of them who were faithless; and lastly in Peshawur somebody suspected a fakir. The fakir was instantly seized and searched; and upon him was found a letter informing the Sepoys that "now was the accepted time," and that now was come the day of their salvation. And these Sepoys were prayed to bring with them "a few pounds of fruit," to wit, European heads!

And now the authorities at Peshawur decided to show the "Free Lances" the token they wanted to see. Cotton, Edwardes and Nicholson were at Peshawur; an abler trio to rule in the hour of peril it would be difficult to find. A council was forthwith convened; the commanding officers of the native regiments declared, hap what might elsewhere, in Peshawur the Sepoys were to be trusted. The brigadier (Cotton) would not listen to these officers; the order was given that the 24th, 27th and 51st B.N.I. and the 5th B.N. Cavalry were to be disarmed

on the 22nd May. Confidence was still reposed in the 21st B.N.I. and 7th and 15th Irregulars. The whole force was ordered to parade on the morning of the 22nd May at sunrise. Each native regiment was notified to parade on its own ground. The Sepoys suspected nothing; they mustered on parade as usual. Two brigades of British soldiers (artillery and foot) and the Mooltanee corps of cavalry suddenly put in an appearance. Clear and sharp rang out the command "Pile....arms!" The Sepoys, thunder stricken and surprised, sullenly obeyed the order; and the piled arms were carried off to a place of safety.

Deeply interested spectators were watching the scene; hardly were the Sepoys disarmed when the chiefs of the "Free Lances" dashed up to Brigadier Cotton. Throwing down their swords at his feet, they swore to obey his behests or die in attempting to execute them. Their services were accepted.

The 55th B.N.I., bordering on open mutiny, were in possession of Hotee Murdan; three companies of this regiment held two places of minor importance. The fort of Attock, on the left bank of the Indus, was occupied by the 5th Regt. of Punjabees; these men were raithful Opposite Attock were stationed 100 Pathans commanded by Futteh Khan. The 55th B.N.I., tried to seduce the Pathans, but the Pathans reported the matter. The 55th then threw off the mask and declared themselves mutineers. They soon learned what this declaration was to cost them; a force was sent against them. They did not wait to receive their visitors; they made for the hills. But Nicholson was at their heels. With a small force he dashed down upon them; a hundred or more Sepoys were slain and about 120 taken prisoners. Those who escaped from Nicholson met with a worse fate. The majority of them were seized by hill tribes and sold into slavery. Some were killed by villagers; and the rest were brought as prisoners into the British lines. One sad consequence of the mutiny of the 55th B.N.I. has to be recorded. To the very last moment their colonel, Henry Spottiswoode, believed in the fidelity of his Sepoys. When at last his eyes were forced open, his right hand clutched the fatal pistol, and his death was instantly reported.

(To be continued.)

The *St. James' Gazette* says:—There is a good story going about Prince Alexander, the son of Princess Beatrice, who, at the early age of eleven years, is giving evidence that he will miss his vocation—that he ought, in fact, to become a commercial man, so the correspondent of the *Liverpool Post* says. He received a present of one sovereign from his mother, and, having quickly spent it, applied for a second. He was gently chided for his extravagance, but, unabashed, wrote to his grandmamma. The Queen had probably been warned, for she replied in the same strain of remonstrance, whereupon the young prince responded as under:

"Dearest Grandmamma, —I received your letter, and hope you will not think I was disappointed because you could not send me any money. It was very kind of you to give me good advice. I sold your letter for £4 10s."

ENGLISH CO-OPERATION.

BY GEORGE JACOB HOLYOAKE.

CO-OPERATION is organized self-help by honest labor and honest trade; the profits being equitably divided among those who create them, whether by work of hand or work of brain. That is what we understand Industrial Co-operation to be.

There is a familiar use of the word "Co-operation," which means two or more persons or things acting together to produce some result—as when a man and a lever act together to move a log, or a cat's paw is employed to pull chestnuts from the fire; or when one thief holds the bag, while another thief fills it; or as when a physician marries the daughter of an undertaker, with a view to unite the businesses. In these cases the log is not consulted, the cat gets no chestnuts, the owner is plundered by two thieves united, and the patient does not profit by the union of the pestle and the spade. To the general public, these acts of concert equally mean Co-operation. We mean by the word, the Co-operation of honest Industry, with a view to an equitable share of the profits made. We put the word "honest" into the definition, because if the laborer and the trade be not honest, the public are cheated, and Co-operation is but an organized form of fraud.

Trouble has been taken by recent writers to estimate how far this new scheme of business has gained ground and advanced. It is now generally admitted that eighteen years after the formation of the existing society of Rochdale Equitable Pioneers,—that is, in 1862—there were 450 stores established. Ten years later—that is, in 1872—there were 920. In the next ten years—that is, in 1882—the stores had increased to 1,200.

The number of members, which in 1862 was 90,000, had in 1872 increased to 340,000, and in 1882 it amounted to 640,000. The share and loan capital of the stores, which was in 1862 £450,000, amounted in the next ten years to £3,340,000, and in 1882 it had reached £8,000,000.

The business of the stores rose also from period to period. The annual sales increased from £2,350,000 in 1862, to £13,000,000 in 1882. The profits made by the stores were not less remarkable. In 1862 they were £166,000; in 1872 they were £935,500; while in 1882 they had risen to £2,000,000.

The sum total of this co-operative activity is, that we now have about 1,200 stores, or Distributive Societies, as we call them, which have 640,000 members, and £6,000,000 of share capital, and the annual sales of the societies amount to £18,000,000.

All we have at present to show of work-shop Co-operation are about twenty-two Producing or Manufacturing Societies. These belong to the denomination of Farm or Workshop Societies. The aim of all is to

establish the principle of Equitable Profit-sharing among working people. But there is not much done in this way yet.

There are also five Federal Corn Mills, which grind corn for the stores in their district. There are two Wholesale Societies—one in England and one in Scotland. The business done by the Manufacturing Societies is about £220,000; by the Corn Mills, £1,300,000; by the Wholesale Societies, £6,000,000. The annual business of all the societies exceeds £25,000,000 (125,000,000 dollars).

Distributive Co-operation is well established, and extending. Leeds, for instance, has upwards of 20,000 members. It has so many branch stores, and is so continually erecting new ones, that they keep a staff of builders who move from place to place as new stores have to be built. During the last twenty years the business done by working men is estimated at £250,000,000, and the profits at about £20,000,000, all of which has gone into their own pockets. There are three Civil Service Stores in our Union, that do a business of £2,500,000; but as they are cheap selling stores their business is not included in the statistics given, which are confined to stores dividing profits on purchases. For the same reason Joint Stock Companies are not included among Co-operative Productive Societies, because the workmen do not participate in the profits made.

The two great Wholesale Buying Societies are more and more appreciated. Without them, the stores cannot command genuine goods and commodities, and cannot fulfil the first condition of a store—that of guaranteeing pure, unadulterated articles.

Many stores have no Educational Fund, but there is increase in this useful respect. No store that begins with one ever goes back. No store beginning without it ever establishes one, not knowing that no investment pays like associative knowledge.

There have lately been formed two societies for promoting co-operative production. We value the extension of Co-operation to the workshop, because it increases the means and the prospects of labor, and therefore elevates it; gives labor a dignity—for self-dependence and assured competence make dignity. Every co-operative workshop in which the worker receives his or her equitable proportion of gain made, allures labor and contents it.

Next to co-operative workshops—and perhaps before them—is profit-sharing in factories and places of business and commerce. Manufacturers are increasing who offer their workpeople a participation in profits. We hope before long that trade unions will encourage their members to prefer working for those firms in which profit-sharing is adopted. One day workmen will refuse to work where this is not done.

State socialism signifies state patronage, which many are ready to administer at the public expense; and many are willing to receive who despair of the better day, because despair has made them abject. When I first knew Rochdale, all the working people needed relief. All who

could get it had it, and the chief hope of others was that the workhouse might not be too full when their turn came. Now they subscribe to relief funds, to hospitals, present fountains to the town, and in all things give like gentlemen.

It is Co-operation which has enabled them to do this. It has transformed a similar class of people in a similar way in many towns. The fear of Ferdinand Lassalle that the working class must always be bound by the "brazen law of wages" and never have capital of their own, is no longer true, where co-operation is adopted and persisted in. Many stores have now more money than they know what to do with profitably; it is, therefore, that we are directing attention to investments in houses, farms and manufactories. Thus it has been abundantly shown in England that Co-operation can permanently and definitely improve the condition of the people. It may accomplish this result slowly, but it accomplishes it faster than revolution would, and without sacrifice of life!

DEATH.

BY ALONZO LEORA RICE, RAY'S CROSSING, INDIANA.

BESIDE the casket that contained
The mortal remnant of our friend,
We sat till midnight, and remained
In silence without end.

A cricket housed beneath the eaves,
The lonely wind along the hill,
The rustle of the withered leaves,
Made quietude more still.

At last I said, Is grief like this
Meet for our friend who is not here,
But roaming in a land of bliss
Without a grief or tear?

The woes of life we still partake,
The burdens under which we moan,
The pain with which our hearts still break,
By him are all unknown.

And shall we sigh for one whose bark
The turbid waves in peace has crossed,
While through the deep, unfriendly dark
Our own are tempest-tossed?

From life and all its many ills
His weary soul has sought release;
From storms upon a thousand hills
To vales of perfect peace.

When he was here he winged the hours
With cheerful song and pleasing talk;
Life's way led on through fields of flowers
When he would with us walk.

He would not that grief overcast
A single hour, whose life was spent
In gilding clouds that o'er us passed
With beams of merriment.

We grasped each other's hands andsang
The songs in life he loved to hear,
And while the dusky rafters rang
We banished every tear.

We turned the leaves he loved to read,
And dwelt upon the pleasing thought
That we had still the word and deed
By which his life was wrought.

Without a cloud the morning rose,
He stirred not with the fading dawn;
We inly pined for the repose
In which he slumbered on.

Above his grave a sparrow sings,
"Here is the empty chrysalis;
The butterfly has spread its wings
In fairer climes than this."

THE STAGE AND ORCHESTRA.

The Drama.

WHILE the dramatic season just closed has not been successful financially in Toronto, it has been—from an artistic point of view—better than we had reason to expect. The Princess Theatre has been practically closed all the year, and it has been "dark" at the Grand Opera House much too often still; we have had some good things here, as the following lists will show:

Of Shakespearian plays we have had "Hamlet," "Othello," "The Merchant of Venice," and "The Tempest," presented by Mr. Walker Whiteside, Mr. Keene, Mr. Mantell, and other lesser lights. These Shakespearian performances have been better attended than has been the case with the ordinary run of plays.

Among the notable actors and actresses who have appeared here this season were Mr. John Hare, Mr. Willard, Mr. Sothern, Mr. Albert Chevalier, Miss Loie Fuller, Mdlle. Yvette Guilbert, Miss Vanburgh, and Mr. and Mrs. Bouchier. The best plays have been "The Rogue's Comedy," "An Enemy to the King," "The Middleman," "The Lady Slavey," "The Professor's Love Story," "Caste," "The Hobby Horse," "The Geisha," and "A Pair of Spectacles."

The performances of opera have been numerically large, but the list includes four weeks at the Toronto Opera House, where—I regret to say—the work done was of little (if any) artistic merit. All told, we have had played here this past season 21 operas, making 94 performances. Here they are, with the number of performances marked after each opera:

American Beauty (3)	Kerker.
Trovatore (2)	Verdi.
Lucia (1)	Donizetti.
Martha (2)	Flotow.
Cavalleria Rusticana (1)	Mascagni.
Faust (1)	Gounod.
Carmen (1)	Bizet.
Bohemian Girl (1)	Balfe.
Mandarin (8)	De Koven.
Wang (5)	Woolson Morse.
Wizard of the Nile (4)	Victor Herbert.
Robin Hood (3)	De Koven.
Prince Ananias (1)	Victor Herbert.
Brian Boru (7)	Julian Edwards.
Rob Roy (2)	De Koven.
Lady Slavey (4)	Various.
Geisha (16)	Sidney Jones.
Said Pasha (9)	R. Stahl.
Tar and Tartar (5)	Itzel.
Pirates of Penzance (9)	Sullivan.
Pinafore (9)	Sullivan.

The support given to opera (except opera of the lightest kind) has been such as to cause one to fear that the better class of opera will for some time be scarce in Toronto, and of grand opera we may see none at all.

The Concert Season.

Those readers of the DOMINION REVIEW who have done me the honor to follow my theatrical and musical gossip month by month, may have thought that

I have been very sparing of my remarks in connection with the concert stage. And I have; but for the best of all reasons: the concert season has been a lamentable failure. In these circumstances I thought the less said probably the better, and I held back, hoping that the next month would give me an opportunity to say something more encouraging. The only concert of the season that I believe did really pay was that given by the Mendelssohn Choir at the Massey Hall. Seidl's orchestra (a remarkably good one) did not play to enongh money to pay transport from and to New York; and such other concerts as have been artistically successful have been by the public left severely alone. Among the leading solo artists who have appeared in Toronto during the season were these vocalists: Mme. Albani, Mme. Marie Decca, Mme Alma Powell, Mme. Emma Juch, Mme. Van Der Veer Green, Miss Amy Hartley, Miss Louise Engel, Mlle. Verlet, Mme. Chalia, Mme. Rosa Linde, Mlle. Toulinquet, Mlle. Seygard, Miss Elsie Lincoln, Miss Sybil Sammis, Miss Elizabeth Northrop, Miss Detta Zeigler, Messrs. Watkin Mills, William Lavin, Ben Davies, David Bispham, Plunket Greene, Signor Foli, Signor Giannini, Signor de Bassini, Thomas McQueen, Winfred Goff, Braxton Smith, Lempriere Pringle, Dr. Dufft; pianists, Miss Aus der Ohe, Mme Rive-King, Martinus Sieveking, Jacques Friedberger, Rudolph von Scarpa; violinists, Herr Gregorowitch, Miss Martina Johnstone, Mr. Yunck, and Miss Beatrice Langley.

The permanent departure of Mr. Field from Toronto to reside in Germany is matter of much regret to Mr. Field's many friends; he was an excellent musician, an accomplished gentleman, and an all-round jolly good fellow. Other departures from Toronto of some of our best musical material are probable, as even an artist has to eat and drink and pay rent.

The Grand Opera House and the Princess Theatre will both re-open for the season of 1897-8 on the 30th of next month (August); the Toronto will start again on Monday, the 16th of August.

Theatre-goers must have read the death of William Hoey, the comedian, with much regret. Hoey's fun was natural, not forced. On the occasion of his last appearance in Toronto he played at the Grand Opera House, in a kind of musical comedy the name of which I cannot recall; but on that occasion Mr. Hoey created a favorable impression by his clever rendering of a species of topical song entitled "She's After Me."

Theatrical Notes and Gossip.

De Koven and Smith's new operatic comedy is entitled "The Paris Doll."

Mme. Marchesi, the famous singing teacher from Paris, is coming to this country next season.

Mme. Nansen, the wife of the famous explorer, is a vocalist, and will soon make her debut in London.

Miss Fay Davis will take Julia Neilson's place as Rosalind during George Alexander's tour with "As You Like It" through the English provinces.

Since leaving America Mme. Calve has been resting in Paris and taking a preliminary survey of Massenet's "Sappho," which is to be her next novelty.

The Professional Woman's League is busy formulating plans for its grand jubilee and dramatic pageant, to be given at the Madison Square Garden, New York, September 1.

Mr. Beerbohm Tree has secured the English rights of "Le Passe," a new play by M. Porto Riche, which will be produced by Sara Bernhardt at the Paris Renaissance Theatre in the autumn. Mrs. Tree will play Sara Bernhardt's part and Mr. Tree that of a young man of the world.

James O'Neill will revive "The Dead Heart" next season. He is also negotiating with Joseph Hatton for the dramatic rights of his novel, "When Greek Meets Greek." The original dramatization was entitled "The Roll of the Drum." Olga Nethersole presented a version in the United States under the title of "A Daughter of France."

Walter Damrosch, who is busily occupied in engaging artists for his next season's operatic venture, has, it is said, come to terms with Mlle. Toronto, to sing such *roles* as Cherubino in "The Marriage of Figaro," and to understudy Mme. Melba in many of her parts. Mlle. Toronto is a Canadian girl, who takes her theatre name from her native Toronto. The lady in private life is Miss Brimson.

A Polish theatrical company, which was not allowed to appear in Berlin for political reasons, is now playing to crowded houses at Warsaw, Poland. The company, which was organized at Posen, Germany, is the first to be allowed to play Polish national plays in the Russian province of Poland, which is considered by the Polanders as a very favorable indication of changed conditions under the young Czar.

Builders are busily at work on the Opera Comique in Paris, and it is expected that the new house will be ready in the autumn. The theatre will be more comfortable than its predecessors, and the spectators will have a good view of the stage from all the seats. Fire-proof material is being used throughout, and the laws of 1888 in regard to theatre-building are being rigidly enforced, all the more in view of the recent Parisian catastrophe.

Antonio Seidl conducted the orchestra at the production of "Siegfried," at the Covent Garden Opera House, London, on the night of the 26th of June, and left for Bayreuth the next day for the rehearsals of "Parsifal." From all accounts his success in London has been greater than that of any other foreign conductor, nearly all the critics admitting that his interpretation of Wagner has been a fresh revelation of the composer's work, and the best ever given to the English public.

Concerning the performance of "Lorenzaccio" by Sarah Bernhardt at the London Adelphi, the London *Times* says: "From a note by the adapter or the management one gathers that 'since Hamlet there exists no *role* more complex than that of Lorenzaccio, on whose pale face the effects of dissimulation and the iron will, betrayed at times by bodily weakness, maudlin sentimentality, and refined cruelty, are constantly reflected." The *role* is, in point of fact, the reverse of complex. It has no relief, no variety, being couched in one sombre key, befitting the youthful hero's crude scheme of political reform. Monotony must indeed be its name if the genius of Mme. Sarah Bernhardt fails to illuminate it. Here and there occurs a passage of passionate invective in which the actress's power is felt, but that strong womanly quality which distinguishes her acting is lost in the character of the boy. It is not Mme. Sarah Bernhardt's fortune, as it may be that of the burlesque actress, to be able to lay aside her petticoats with impunity. Assuredly the jubilee public who may judge of her by this unhappy impersonation will marvel at the fame she enjoys." WILFRID WISGAST.

From Our Own Observatory.

A Memorable Year.

This present year 1897 will undoubtedly be a notable one in future histories, even if there have been so far comparatively few events that may figure in the calendar. For Canada, and for Toronto especially, it will be a very conspicuous year. The Jubilee, with the prominent position in all the circumstances attending it taken up by the Canadian representatives, and the meeting of the British Association would be enough to shed lustre upon the name of Canada; but there have been many other events, not the least of which has been the meeting of the Epworth League, which show that Canada, and particularly her two chief cities, if their management be only moderately honest and able, have a bright future before them in the annals of peaceful progress. Owing chiefly to its vast extent, its sparse population, its almost unlimited opportunities, and the absence to a large degree of those dangerous foreign and "colored" elements which give our southern neighbors so much trouble, and notwithstanding many dark blots and much degrading vanity, Canada to-day is wanting in some of the greatest extremes of social life that characterize the more densely-peopled countries. It is for her statesmen to endeavor to facilitate the growth of her people on lines that will lead to their greater happiness and prosperity, not by coercive legislation and intrusive morality, not by class legislation, whether for paupers or for millionaires, but by removing as far as possible every restriction in the way of the freest development of her people—to "make it easy to do right and difficult to do wrong," as Gladstone said, not by a compact with the reactionary element in the church in an attempt to force people into the paths of rectitude, always a matter of doubt, but by the removal of every restriction not absolutely necessary for the public peace and safety. In this view, the recent meeting of Epworth Leaguers is not without an augury for good in its increased spirit of freedom.

The Diamond Jubilee.

Without question, we think, the late jubilee festivities formed in many ways the most remarkable event the world has ever seen. To make a Roman holiday the treasures of many a conquered country were exhibited, with all the luxurious surroundings that immense concentrated wealth alone could give. But this nineteenth century ovation to a very aged woman was a democratic and essentially a peaceful event; and, however vigorously we may object to much of the waste, and to very much of the fulsome and nauseating flattery indulged in by sycophants as well as by jingoes,—"adoration," even, was the word used by Lord Salisbury!—it is needless and useless to shut our eyes to the fact that a vast majority of the white population of the British Empire took an active part in making the jubilee what it was—a practical exhibition of the extent, resources, and to a large degree the present condition of the greatest empire of the world. Naturally, the darkest side of the picture could be but very imperfectly seen, even in the dinners given to the poor; but it is safe, we think, to say that, viewed as a whole, the jubilee shows the British Empire to be at the least as prosperous and happy and substantial as any other country. Perhaps we should be justified in strongly emphasizing this statement; but nothing is more likely to make it appear ridiculous and unreal than an effort to attribute the result to the efforts of the very "respectable," commonplace, and prosaic old lady in whose honor the jubilee was nominally held.

The Spencerian Age.

There need equally be no question that the progress made during the reign of the present British Queen has been without parallel in history, though there may be great diversity as to its causes. The people who repeat the silly story of the alleged reply of the Queen to an Indian prince's question—"The Bible is the source of England's greatness"—are naturally people who will be ready to accept any explanation that may be posited by their accepted authorities. Those, however, who look for efficient causes for all events, will not be satisfied with a statement which involves the idea that a cause which has only served to depress man for so many centuries could suddenly awake to become his savior. The causes which have led to the birth of the newly-developed power, and which have given such a vast impetus to the new ideas which have sounded the trumpet-blast of that great birth in nearly every direction in which the human mind can direct its inquiries, must have been in existence and must have been developing for many ages ere the daylight finally appeared. From Thales and Pythagoras, down through Plato, Aristotle, and Plotinus, the names of great thinkers and workers like Copernicus and Kepler, Galileo and Newton, Herschell, Lamarck, and Humboldt, Buffon, Cuvier, and Lyell, may mark stages in progress, but all of these were but prospectors in a field which required for its practical exploitation the work of a man of the broadest views, the clearest perceptions, indomitable perseverance and practical ability. Without such a man, the work of progress would have remained largely *in nubibus*, as for so many ages it had been. Without Charles Darwin, Spencer's grand work would probably have failed and his life been sacrificed many years ago, and much of the work of such men as Huxley and Tyndall, Faraday and Proctor, would have been heard of only in a limited circle. The Victorian Age might still have been a marvellous one, but it would have been wanting in those crowning glories that mark it as the starting-point in a new epoch—the Era of Evolution—the beginning of the final abolition of those ghosts and hobgoblins that have so sorely troubled mankind for so many long ages, and of the adoption of a new motto for humanity—"The earth is man's, and he shall make his heaven in it." The new science and the new Evolutionary philosophy, binding men together in one mighty brotherhood for mutual advantage, open up a vista of hope and of glorious possibilities for man beside which all the older religions and the older philosophies seem but the gloomiest pessimism.

Sixty Years of Progress.

During the last few months we have had tremendous lists of inventions and discoveries which have marked the sixty years during which Victoria has sat upon the British throne. At any previous time, probably,—the last decade, the last quarter or half-century, or the last century itself,—might have been cited as the most prolific in improvement. Still, take it all in all, one cannot but be struck with the immense strides that have been made in the latter portions of the period over whose marvels we are glorifying ourselves. To say that improvements have a tendency to propagate themselves in geometrical proportion is but a partial expression for the intensified mental activities of even the last decade. While however, such a long list of scientific triumphs is of vast interest to us all, some of the most important departments, we might say nearly all of the most essential factors in the real progress of the masses,—have been almost completely overlooked. We may divide broadly these factors into two classes: mental and

material, which we may describe as including, in the latter class, all those movements, such as co-operation, savings banks, building societies, assurance and benefit societies, etc., which give us practical evidence of material progress; and, in the former, those other movements the object of which is to free men's minds from the old trammels of ancient superstitions of all sorts, and thus leave them open to discuss measures of practical progress, without fear of the policeman's club, the preacher's scowl, or the idle tongue of Mrs. Grundy.

The Socialistic Tendency.

Nobody, we imagine, will deny that, whether rightly or wrongly, the tendency of the age has been steadily in favor of measures which can only be described as of a socialistic character. There may have been many advocates of a policy of anarchistic legislation,—and, so far as modern legislation has been of a liberal character, and its object chiefly to remit old restriction and give greater freedom to individuals, it must be admitted that it is of an anarchistic character;—but unquestionably measures which involve State interference in concerns hitherto regarded as strictly within the sphere of private rights have largely predominated in all civilized countries. This may be a necessary phase of progress, but, philosophically, we can only regard it as a temporary phase, inevitable in conditions of society in which the great bulk of the individuals are not yet sufficiently advanced for self-government. The question is, how can we regard this stage of partial State Socialism from an evolutionary standpoint? Is it in the direct line of civilized progress, or is it only a necessary stage—a product of preceding conditions affording rather a lesson of the practical effect of a principle which requires development on different lines?

The Great English Co-operative Movement.

Mr. Holyoake's synopsis of the English Co-operative movement in another page affords us a striking lesson in the material branch of our theme, and seems to point the way to the only safely practical solution of such problems, though the experience of the Co-operative movement shows how slowly even a strikingly successful lesson can be absorbed by the masses. The world has never witnessed the inception and successful working out of a useful scheme in such a rapid manner as that of the Co-operative movement in England. That success is still almost entirely in one branch—that of distribution. Now, very early in its growth, Mr. Holyoake—who clearly saw the proper and full scope of the organization—pointed out that, in order to reap the full advantage of the principle, it would be necessary that, not only the distributive, but the productive branch of Co-operation should be fully developed. Indeed, to a certain extent, the development of the distributive branch, without a corresponding development of production, rather tends to aggravate existing conditions, by adding to the army of capitalists, whose savings have to be paid for in interest,

The Limitation of Government Control.

If our reading of the lesson involved in this great organization be correct, then such organizations as are required for the ordinary social life should be undertaken and worked out by individual genius and individual effort, leaving the fullest liberty to individuals to avail themselves of the proposed advantages or not; and only such services should be undertaken by the State as manifestly, in the general interest, can only be properly managed by the central authority.

There will always be an amount of arbitration, of registration, and organization that only a central authority can properly undertake; but the experience of the Co-operative movement would seem to show that, at all events under present social conditions, the sphere of governmental control should not be rapidly extended.

Co-operation and Progress.

Without stopping to discuss the question as to how we may radically differentiate what we so glibly term barbarism from civilization, we might ask, Can we rationally apply the latter term to a state of society in which a large bulk of the people have difficulty in earning a livelihood and are totally without the prospect of a stable future and a comfortable old age? Except for a few very erratic episodes, the condition of the masses in these respects has made little advance in historical times. It seems opposed to all our notions of Evolution to expect a sudden change, and we are inclined to think that those who imagine such a change to be possible misread the signs of the times. The process of civilization is essentially a mental process, and though material progress may be the chief factor in producing it, the fact seems to be that it is yet in its infancy. What are the lines upon which a true civilizing process must be carried on? First of all, there must be an appreciation of the solidarity—the interdependence of all sections of the race, and of the rights and duties of men towards each other. Though trade is often said to be our chief civilizing agent, the basis of trade to-day is as much like open war as it could be without the actual use of gunpowder, and in some cases even this reservation is unnecessary. But, as Mr. Holyoake's article shows, an immense progress has been made among the Co-operators during the last half-century in their ethical standard, even though the development of the movement has so far been mainly in the direction of distribution, to the neglect of production, without which the chief good effect of Co-operation cannot be attained—the elimination of the warfare between capital and labor, as between the storekeeper and the consumer.

The Jubilee and British Federation.

But when we come to the chief question, How shall the note of progress be sounded throughout the world? or why should we ask "the heathen" to adopt Paine's humanitarian motto, "The world is my country, mankind my brethren, to do good my religion?" we are met by the fact that the British Jubilee fleet is the biggest and the most powerful the world has ever seen, and that the British empire seems as ready as ever to be cajoled or frightened or bullied into war. That the fleet is necessary to the national existence seems evident; unless we assume that the other nations are more civilized than Britain. The reverse of this, however, seems probable, and the great question comes back to us, What are the best means available to secure as far as possible that peace, internal and external, which is essential for the development of civilizing influences? It is in view of this question that the Jubilee gives what appears to us to be its most valuable lesson. It has brought the question of a British Federation into the hands of practical politicians and statesmen, and we look upon it that such a federation would be the most influential for peace of any agency within our reach, and if it should lead in the future to a still wider federation of English-speaking peoples, we should imagine that the surest foundation for progress had been laid that man is likely to achieve for ages.