

The Open Court

A MONTHLY MAGAZINE

Devoted to the Science of Religion, the Religion of Science, and the
Extension of the Religious Parliament Idea

Founded by EDWARD C. HEGELER

VOLUME XL (No. 9)

SEPTEMBER, 1926

(No. 844)

CONTENTS

	PAGE
<i>Frontispiece.</i> Ashikaga Yoshimasa.	
<i>A Life and a Way of Life.</i> W. G. BLAIKIE MURDOCH.....	513
<i>Factors in the Transition from Mediaeval to Modern Science.</i> IVOR B. HART	522
<i>Social Science, Subjectivism, and the Art of Thinking.</i> VICTOR S. YARROS..	537
<i>The "Pursuit of Happiness."</i> F. W. FITZPATRICK.....	547
<i>Are You Training Your Synapse?</i> CLARA STEVENS.....	552
<i>The Solipsism of Religion.</i> T. B. STORK.....	558
<i>Environment and Character.</i> HARDIN T. MCCLELLAND.....	567
<i>The Crocodiles of Tubigan.</i> GEORGE BALLARD BOWERS.....	573

The Open Court Publishing Company

122 S. Michigan Ave.

Chicago, Illinois

Per copy, 20 cents (1 shilling). Yearly, \$2.00 (in the U.P.U., 9s. 6d.)

Entered as Second-Class Matter March 26, 1887, at the Post Office at Chicago, Ill., under Act of March 3, 1879.
Copyright by THE OPEN COURT PUBLISHING COMPANY, 1926.

Cornell Studies in Philosophy

Published Under the General Editorial Supervision
of the Professors in the Sage School of
Philosophy in Cornell University

RECENT NUMBERS

- No. 12. **Some Modern Conceptions of Natural Law.** By
Marie T. Collins, A.M., Ph.D.—pp. vi, 103.....\$1.00 net
- No. 13. **The Ethical and Economic Theories of Adam Smith.**
B Glenn R. Morrow, A.M., Ph.D.—pp. vi, 92.... 1.00 net
- No. 14. **The Philosophical Bases of Asceticism in the Pla-
tonic Writings and in Pre-Platonic Tradition.** By
Irl Goldwin Whitchurch, A.M., Ph.D.—pp. 108.... 1.00 net
- No. 15. **The Logic of Contemporary English Realism.** By
Raymond P. Hawes, A.B., Ph.D.—pp. 147..... 1.25 net
- No. 16. **The Philosophy of Emile Boutroux as Representa-
tive of French Idealism in the Nineteenth Century.**
By Lucy Shepard Crawford, A.B., Ph.D.—pp. viii,
154 1.25 net
- No. 17. **The Philosophical Presuppositions of Mathematical
Logic.** By Harold R. Smart, A.M., Ph.D.—pp. v,
98 1.00 net
-
-

LONGMANS, GREEN & CO.

55 FIFTH AVENUE

NEW YORK



ASHIKAGA YOSHIMASA.
(Sculpture Said to Be By Himself.)

THE OPEN COURT

A MONTHLY MAGAZINE

Devoted to the Science of Religion, the Religion of Science, and
the Extension of the Religious Parliament Idea

VOL. XL (No. 9)

SEPTEMBER, 1926

(No. 844)

Copyright by THE OPEN COURT PUBLISHING COMPANY, 1926

A LIFE AND A WAY OF LIFE

MEMOIRS OF ASHIKAGA YOSHIMASA

BY W. G. BLAIRIE MURDOCH

SO MUCH has been said about light being essential to human progress, so much about the opposition to light by the Catholic Church, that there are people who are apt to forget how finely practical an institution it was and is. If its hierarchs opposed the early efforts to discover anaesthetics, the Protestant bodies have never quite rivalled the Catholic, in the matter of offering men and women things which are of practical value, as bringing comfort in the battle of life. Enquiring as to how the Buddhist Church has compared, in this particular, with the two main Christian bodies, it is felt that the philosophy unfolded by the Rev. Ashikaga Yoshimasa is, in a sense, rather like the Confessional. Looming silliness itself to the logician, this last has yet been of extraordinary worth to simple folk. And apparently trivial as they are, the things which Yoshimasa set forth are nevertheless calculated, to be of high use to mankind. The world may change endlessly, but what this vanquished Japanese taught will still be of excellence.

At the close of the twelfth century A. D., when rule in Japan slipped from the Mikado's court, and was acquired by the Shogun, or military dictator, the event was accompanied by wide metamorphosis. Heretofore, the life of the upper classes had been a marvel of refinement; now, conversely, there grew manifest among them a rude militarism. Hitherto they had worshipped skill in verse, or in painting; now, in contrast, physical strength and martial prowess were the things they extolled. As the years sped on, the new spartanism evolved into an awful turbulence, with the sword-bearing aristocracy, who became little better than banditti. And Nippon stood desperately in need of an ameliorating influence, when Yoshi-

masa was born in 1435, by which time the Shogunate had been made an hereditary office with his family, the Ashikaga.

When he was only eight, Yoshimasa became nominally Shogun. He chanced to give offence to a powerful nobleman, Lord Yamana Mochitoyo. And it illustrates well the robberlike ways of the barons with their utter contempt for the so-called government, that in 1455 the offended peer vented his spite at the young Shogun by marching as conqueror into Kyoto, the metropolis, with an army of retainers. It was not long before it was only too evident that Yoshimasa was utterly unfitted for the task which he was fated to essay. He was unjust in his mode of levying taxes; his real interest lay in the fine arts; he reflected an excellent connoisseurship moreover. Having an especial fondness for the beautiful plays, called generically *No*, or *Accomplishment*, he keenly endeavored to get the men of the military aristocracy to engage in amateur performances of those dramas. His favorite painter was Oguri Sotan, to whom always on New Year's Day he presented a silken robe. It pleased the Shogun to befriend young men, who gave promise of talent. And he selected as his page the boy, Goto Yujo, of whose chisellings on sword-furniture an enthusiastic commentator, Inaba Michitatsu, was to write long afterwards, that they "resembled the weeping willow, swaying gently in the breeze, or the lovely lotus, spangled with pearls of dew."

Fair words indeed! But whilst the Ashikaga dictator was showing forth his sound taste in art, the Sunrise Land was steadily growing more and more combustible. In 1464 the Shogun, being childless, named as his prospective successor in office, his brother, Gijin, a priest, who accordingly re-entered the world. Scarcely had these things been done, when a boy was born to Yoshimasa, who weakly sought to annul his promise to Gijin. A vast civil-war ensued, nearly all the barons plunging into it. One party stood for the ex-priest, the other for the Shogun's infant son. Kyoto and neighborhood were devastated; the national finances passed into an awful plight. At length the bewildered Yoshimasa vowed despairingly, that he could try no longer to manage the country. And in 1474 he abdicated, his son of nine years old becoming nominally Shogun. But the huge internecine contest blazed on, till 1477.

Close to Kyoto is Mount Higashi. And on that side of it further from the town is Ginkagu, or the Silver Pavilion. It is embowered in a forest of the richest; everywhere only greenery is seen; the stillness is tense. And the mere consciousness that Kyoto, with

her myriads, lies but on the other side of the hill, hidden thereby, render deeper the feeling of seclusion at the Silver Pavilion. There are three houses, each small and quite simple, save that on one of the group the caves are painted beneath with silvern pigment, whence the name of the trio, Ginkagu. This decoration was executed at the behest of Yoshimasa, apparently when he was still in office. For it seems to have been then that he built the secluded country home, where he lived always after his abdication. And henceforth he was usually spoken of as Mr. Mount Higashi. If it was bitter to be styled thus, after being overlord of all Nippon, if the ex-Shogun's purse was now small furthermore, assuredly his little domain was



GINKAGU OR SILVER PAVILION

ideal, for one whose dream was to forget the storms of life. It was seldom, if ever, that statesman or soldier visited the forestbound retreat. But it soon became the prime rallying-point with the outstanding artists of the time, whatever the form of art they practised. And there was a strong religious bond between Yoshimasa and this circle of congenial friends.

If Christianity is a term with a wide variety of significance, if consequently it is difficult to offer an adequate definition of the faith, it is easy to specify things which came out of it: for example, given forms of art, or of charity. The Buddhist body, in which Yoshimasa

was brought up, was the Zen Shu, or Contemplation Church, the particular branch to which he belonged being called the Rinzai. The alleged founder of the Zennists was a Hindu, Bodhidharma, who lived at the outset of the sixth century A. D., and personally expounded his creed in China. A noted Zen priest there, in the ninth century, was Rinzai, after whom is called the Rinzai branch of the Contemplation Church. The Zennists were addicted to the contention, that a man will win the salvation of his soul by beholding, through concentrated thought, his own inner nature. And if this sounds rather cryptic, it is among the recorded sayings of Bodhidharma himself, that the gospel of Zen is really too mysterious to be described in words. Nevertheless, out of the Zen Shu, as from Christianity, there emanated various things which are easily defined. In China, under the Sung Kings, in power from 960 to 1277, there grew prominent a particular type of painting, which was chiefly if not exclusively practised by Zennists, and which owed its character to Zen teaching. Of hieratic pictures or sculptures, the votaries of concentrated thought took little heed; their temples were plain; numerous Zennists were great devotees of the beauties of nature. And thus the Zen type of painting consisted, not in studies of deities and angels, but in landscapes wrought just with Indian ink on a yellowish ground, the draughtsmanship being always of a bold, simple kind. The Zennists first became numerically strong in Japan at the beginning of the thirteenth century, when militarism was growing widespread with the upper classes. And at that time it was from the sword-bearing aristocracy, that the Contemplation Church principally gained its adherents. Inculcating, as it did, self-discipline, it perforce appealed to the hardy men-at-arms. It was partly if not largely through their pre-occupation with Zen, that the warriors learnt to commit suicide calmly by the awful way of disembowelment. And it was the destiny of Yoshimasa, and his circle, to uphold a gentler side of Zen teaching than that reflected by this readiness for a gruesome death.

Political events inhibited the speedy passing from China to Japan of the Zen mode in pictorial art. With the fall of the Sung dynasty, China became a province of the huge empire of Kubla Khan, whose abortive invasion of Japan resulted in that country's ceasing to have intercourse with her continental neighbor. In 1368, however, the Chinese throne passed back to native kings, whereupon Japan and China resumed their ancient friendship. In 1370 a Chinese priest, Josetsu, received a charge at Sokokuji, a Kyoto temple of the

Zen Shu. He was a painter in the plain Zen style, which had been prominent in the Sung days; and he commenced to give at the Kyoto temple, lessons in art of that description. With his death, Sokokuji remained a stronghold of such art, laymen besides churchmen going there for tuition in handling the brush. It was of Sokokuji, that Yoshimasa himself was a member. Whence it was to be expected, that the gifted people he gathered round him, after his abdication, were mostly men who were, or had been, associated with that fame in Kyoto, and were imbued with Zennism in its gentler aspects. Of these men were Sesshu, Kano Masanobu, and his son, Kano Motonobu, the first being still regarded by Nippon as her supreme master in the monochromatic landscape or bird-piece. And it was in the simple mode of pictorial work, that the Kano pair won their laurels.

Although tea was known in Japan in the eighth century, if not still earlier, in Yoshimasa's day it had not yet much favor in the country. But among the Ginkagu coterie was Shuko, who had good reasons for having a high opinion of tea-drinking. He was, for a while, priest in a temple near Osaka, losing his position because, being over inclined to sleepiness, he was found guilty of neglecting his duties. And it was after this dismissal, that he came in contact with Zen teaching. At a remote date some of the Zennists in China were wont to enact a sort of Communion Service, in which they drank tea with great solemnity, the one bowl being passed round. Shuko traveled for a time in China, where, perhaps, he saw this Service. He discovered that tea helped him to fight his trouble of drowsiness, and was thus an aid to the long religious meditations, the concentrated thought which Zen demanded. He grew eager that many Japanese, besides himself, should know the value of tea in this relation. In his desire to popularize the beverage, he was quite conceivably influenced by the fact that his old friend Sesshu, was somewhat addicted to alcohol. Aware, as Shuko was, how keen an appeal is made to the Japanese mind by formalities, he sought to bring tea-drinking into vogue, by giving it a quaintly formal character. Yoshimasa approved, and hence it was at Ginkagu there was inaugurated, the Cha-no-yu, or Tea Ceremony. What was the tenor of the code at the tea-parties there?

Narrow is the way which leads to the goal of the Buddhists: the state which Cakyamuni called "supreme, perfect enlightenment." For it is written, in the Scriptures of the Light of Asia, that to allow oneself to be worried is a sin, a barrier on the path to enlightenment! And doubtless, it was with this text in mind that Shuko

laid down, as one of the laws of the Cha-no-yu, that all those assembled must ever be imperturbable, invariably courteous. Even as the Zen Shu linked itself with a simple style in painting, so also it was ordained that the utensils at the tea-parties should be plain though beautiful. There were self-colored pottery bowls; there were lacquered jars in pure black. It was prescribed just how the guests should gather, just how the host should receive them. And since to ban smoking would have been quite impossible at a Japanese meeting, there were exact regulations concerning the way in which ashes should be knocked from a pipe. No gossip was allowed; none might broach the topic of politics. Conversation must turn exclusively on art and religion.

In the Orient, the charming little art of floral composition had a religious origin. The Buddhist saints were, in a sense, heralds of Darwinism, for at a far-off day some of them were wont, after storms, to garner in the flowers which had suffered, and put them in water. This was done, because it was held that whatsoever things have life are possessed of the seed of Buddhahood, the possibility of evolving to the enlightened state. And the flowers were viewed as being thus endowed. In the thirteenth century, a Japanese prelate, Nichiren, wrote an essay on this form of evolution. And there is a reference to it in *Kumasaka*, a drama with passages of high beauty. Its title a personal name, the piece was written in Yoshimasa's time: and one of the characters observes with tense seriousness, that he believes prayer can be heard, even for the grass. This attitude to the plant world was notably strong with the Zennists, in some measure underlying their love of the beauties of nature, the sentiment which begot their remarkable pre-occupation with landscape-painting. Wherefore, it is anything but surprising that the arranging of flowers was an important factor in the life of the *Gin-kagu* circle. It is they who are pointed to in the East, as having brought floral composition to recognized status as an art, duly possessed of a name, the thing being known henceforth as *Ikebana*, or *Living Flower*. There is great significance in the term, moreover. For if in the West there are people who indulge in profuse, ostentatious display of flowers, it was the opposite of this plan which was loved by Yoshimasa and his intimates. True Zennists that they were, their aspiration was to adorn the room with one little bouquet, exquisitely put together. They aimed at giving it an air of the completely natural, in consonance with which ideal the blossoms were always put in the plainest receptacles. Mr. Mount Higashi was the

first Japanese to set his floral arrangements in a vase, whose outside was but a straw basket. He was the first Japanese to use vases, which were no more than bamboo tubes.

One of the Ginkagu circle was Soami, a painter in the Zen mode, who gained wide celebrity in landscape-gardening. And it was he who helped Yoshimasa to lay out his little domain. It is the fairer through the presence of water; a lakelet, artificial presumably, laps at the very base of the houses; and sundry parts of the garden have lovely names. There is the Vale of the golden Sands; there is the Bridge of the Pillar of the Immortals; there is the Rock of the Mountain Fairies. And in at least one case, the nomenclature has religious inception; for a part of the garden is called the Gate of the Dragon, being the name of a glen in far China, sacred through its Buddhist rock-sculptures. Mr. Mount Higashi sometimes himself took a role, in performances or No dramas. And although it seems that the game, quaintly entitled *Ko Awase*, or Listening to Incense, was known in Japan before his day, it was he and his friends who, with their fondness for the pastime, originally brought it into prominence. The host, taking sticks of perfume and lighting each for an instant, gave it a number. Then he lit them in a fresh order, competitors being challenged to tell from the aroma which stick was being burned. And they were expected to give the aroma at issue an appropriate designation, by preference one embodying an allusion to classical Eastern literature. If the little muster of art treasures at Ginkagu cannot have been wholly formed by the ex-Shogun, for it includes pictures wrought later than his times, it is largely composed of things in the unpretentious manner which the Zennists adored. And consequently these works harmonize to perfection with the guise of the rooms, never one of them showy, each refined. There is a painting by Soami; there is one by Motonobu; there is one by Sesshu. And the grand portrait-sculpture of Yoshimasa shows him in sacerdotal robes; for in 1485 he culminated his quest for an escape from life, by entering the clergy of the Rinzai branch of the Zen Shu.

Tradition maintains that Mr. Mount Higashi was himself an artist, and that the sculpture of him is of his own fashioning. It depicts exactly the face normally looked for, considering the story of the man, the face of a dreamer. And it certainly cannot have been a worldly motive which prompted him to take ordination vows; for the Zen priests were long thought of in Japan as a very emblem of extreme poverty. It does not seem to be known whether the Rev.

Ashikaga Yoshimasa ever officiated in his hieratic capacity. But he bequeathed his forestbound home to the Contemplation Church, to make of it a hall of prayer, so that the place, still showing though it does the mere guise of a manor, is spoken of now as Ginkaguji, this suffix "ji" meaning fane. The ex-Shogun died in 1490, and he was buried at the Zen temple of many memories, Sokokuji, Kyoto. If he had lived in an epoch of peace, when the Japanese treasury was full, he would no doubt have earned fame as one of those very few potentates who evinced sharp discrimination in art. As time sped on, people would have ceased to recollect the unduly lavish spending which marked him in his Shogunal days. They would have forgotten this fault in admiration for his true interest in high beauty, and for his efforts to foster it. Under those circumstances, however, the world would have been poorer, through lacking the spectacle of the effect of Zen philosophy on an unfortunate person, vanquished, talented, devout. There would have been missing the little sidelights on Buddhism, which are formed by the doings of the Ginkagu coterie.

Which is the more valuable aspect of Zen teaching? Is it the martial side, reflected by the spartanism of those men-at-arms who were members of the Contemplation Church, the marvellous fortitude with which many of them went to a terrible death by their own hand? Or is it the gentler side, mirrored by the love of nature with the Zennists, their zest in landscape-painting, their passion for flowers? Few are the people who have not dire need, often, of courage to face physical suffering; and a sound religion is that which engenders nerve. Nevertheless, the Zennism which taught men to disembowel themselves is not one which will endure. And to repeat, are there not lessons of eternal value among those taught at the Silver Pavilion?

If it was only too long a while, ere the robber barons of Japan truly felt those lessons, surely Cha-no-yu, and Ikebana and Ko Awase, each of which gradually increased in favor after Yoshimasa's day, all played their little part in making the life of the Japanese nation eventually so exquisite. It was in no idle moment that tea-drinking was encircled by a code of ceremonial, which stipulated even the way in which ashes should be knocked from a pipe. For there is a close relation between formalities and consideration for others than one-self, good manners in the true sense. And why is it that, of people in Nippon today, the humbler folk are those who chiefly show such consideration? Why are they the real ladies and

gentlemen of the land, if not because, in much greater measure than the so-called upper classes, the lowly ones are still under the power of the old Japanese civilization? As years went forward, after Mr. Mount Higashi's defeat and passing, the refinement which had marked the Japanese aristocracy, in the remote pre-Shogunal day, was not only revived with that class, but was also disseminated among the masses. The Tea Ceremony grew more elaborate still, and a form of symbolism entered into it. A host, making ready his tea-room, would decorate it in a way which he deemed suggestive, adorn it with this or that, calculated to evoke visions of the same thing, on a larger scale. For example, if he selected water-flowers for his single bouquet, his dream was that the guests, on seeing the garland, should suppose themselves viewing a wide marshland, fair with many blossoms. He or she is a curiously fortunate person, who does not stand in terrible necessity, often, of an escape from sorrow by an imaginative flight, as this at the Cha-no-yu, or as that which enabled the Ginkagu circle to perceive, in the aroma of a given incense-stick, something which might be appropriately defined by an ancient Chinese lyric, or a text from the Buddhist Scriptures. Pacifist in an epoch of bloodshed, Yoshimasa reminded men that it is wise to find leisure for friendship, and the interchange of ideas on art and religion. What R. L. Stevenson calls the "love of lovely words" was nurtured by the ex-Shogun, in naming the various parts of his garden; and he helped to demonstrate that much may be beautiful though simple. Is it his prime glory that he stressed that truth—which is the same yesterday, today and for ever—that the finest things in life are not to be bought for gold?

FACTORS IN THE TRANSITION FROM MEDIAEVAL TO MODERN SCIENCE

BY IVOR B. HART

I. INTRODUCTION

IT may be remarked at the outset that so far as the intellectual outlook of the Middle Ages was concerned, the views as to the scheme of the universe were those of Ptolemy, the views as to the science generally were those of Aristotle, and the views as to the relationship of man to the universe were derived from Plato's *Timaeus*. As an offshoot from this there had grown up the "pseudo science" of Alchemy, with its search for the philosophers' stone and the elixir vitae. What, however, the reader should most particularly remember is that, broadly speaking, the philosophers of the Middle Ages created nothing for themselves. Their science was not of their own production. It was almost entirely the science of the ancients in the somewhat distorted and garbled forms in which it had been passed on to Mediaeval Europe through the vicissitudes of the intervening ages.

Why should there have been this total lack of originality on the part of the philosophers of the Middle Ages? Does it not seem a little remarkable that throughout Europe, and stretching through a period of several hundreds of years, there should have been hardly anybody with something new to offer to the world? Yet there is an answer to this question, and it is to be found in the nature of the circumstances under which the glorious reign of the ancient scientists gave way to the profound and universal ignorance of the Dark Ages—the decline and fall of the Roman Empire, the devastating penetrations of the Saracen soldiery, and the narrowing restrictions of Church discipline. A world of nations cannot emerge to the fullness of wisdom from such intellectual darkness in a hurry. In these days, with our organized schemes of historical studies, the past is an open book, and each fresh scientific discovery becomes merely the jumping off point for the next stop. But in those days the posi-

tion was very different. The problem which confronted the civilizations of the early Middle Ages was first of all the recovery of the knowledge and the wisdom which had been lost or destroyed; and so there followed an era of reconstruction. In this task there was neither room nor intellectual fuel for originality. It sufficed for the students of those days to discover what it was that the Ancients had taught and written. We must remember, too, that with such brilliant exceptions as Alexander of Hales and Richard Grossteste and Roger Bacon, the mental standard of these students was not high. A keen appreciation of the wisdom of the ancients as it emerged from their efforts at reconstruction was the full extent to which they could go. The idea of criticizing what these ancients taught never so much as entered their heads. And so there developed, quietly but effectively, a tradition of the infallibility of the old Greek philosophers which amounted almost to hero-worship. Even the church was won over to their teachings, so that it came to be regarded as a heresy, for example, to deny Aristotle's doctrine that the earth was fixed, immovable, and at the center of the universe. In fact, the day of the Scholastics had begun.

Then came the Renaissance proper, with its revival of the Greek language, the passing of the Eastern Empire, the temporary diminution of the power of the papacy, the invention of printing, and the historic voyages of Columbus. Beginning in Italy early in the fifteenth century, it swept over the whole of Europe, shaping however a different course in each country, and finding its final expression, so far as science is concerned, in the Baconian philosophy of the experimental method. The early phase, in which reliance upon the schoolmen was substituted for the pronouncements of the ancients, in its turn gave way to the final overthrow of dogma and the direct appeal to experiment. In Italy, the birthplace of the Renaissance, the new spirit of Humanism, inaugurated by Petrarch (1304-1374) found its fuller development in the efforts of Marsilio Ficino (1433-1499). A word of caution in this connection is, however, to be noted. The impression has developed in recent years that the Humanistic outlook became a very general feature of the Renaissance in Italy. Humanism as an everyday attitude of the general world of culture was in fact of much later growth, even in Florence. The pioneers were there, and the movement was given a healthy beginning, but there were probably not more than a score of genuine humanistic teachers in the whole country. Their teaching was,

however, so vigorous and able that it has been easy for its early influence to become exaggerated.

The chief mission of the Humanists was the reconciliation of knowledge with Christianity. Yet in all this science was but little touched. It was at first the day of letters. Luckily, when art following letters, next came under the influence of the revival, there was little to draw upon. As a consequence there was a much more vigorous display of originality, producing the typical cinquecento humanism in painting of Raphael, da Vinci, Titian, and Corregio, and in sculpture of Donatello, Michelangelo, and Sansovino, and in architecture of Bramenti, Omodeo and the Venetian Lombardi. So we come to science, which, touched last of all by the Renaissance, curiously enough received its first impetus in a warfare against the logicians and materialists through the medium of men of art—Alberti, da Vinci, Toscanelli, da Porta and others. These addressed themselves in a small way to the design of scientific instruments.

II. THE FACTORS OF DEVELOPMENT

Broadly speaking, what was the general legacy of science to which the dawn of the fifteenth century found itself the heir? There was, for one thing, the mediaeval acceptance of the doctrine of macrocosm and microcosm derived initially from Plato's *Timaeus* as translated by Apuleius and commentated upon by Chalcidius. The astrological implications, indeed, in spite of a temporary setback during the fourteenth century, gained added strength from the neo-Platonic vogue of the time, and Byrhtferth's disgrammatic scheme was still representative of the ideas generally prevalent. Another fundamental acceptance was the so-called Aristotelian four-element scheme of earth, water, air and fire, regarded as being compounded in binary combination with the four primary qualities of hot, cold, moist and dry—a macrocosmic conception which was brought into its proper microcosmic relationship by linking up with elemental earth the imaginary "humour" of black bile, with water phlegm, with air red bile, and with fire the imaginary "humour" of blood. The alchemists, however, were also by now developing their well-known theories of the basic importance of their salt-mercury-sulphur scheme but without in any sense displacing the original scheme in the affections of the masses. Turning to Cosmography, the principle of geocentric spheres was still the prevailing influence,

and Dante's conception of the universe was almost completely representative of current conviction. According to this, earth, the heaviest, drossest and least aspiring of the elements tended to the center of the world, whilst floating on it was the material water, and above the water the material air. These comprised the firmament. High up in the air, far beyond the reach of man, were the eternal zones of the planets and stars, each planet moving in its own sphere; whilst just below these spheres were the three concentric zones of the upper and pure elements in ascending degrees of tenuity, namely, water, air and fire. Surrounding and embracing the whole was the sphere of the *primum mobile*.

Gradually, however, circumstances were shaping themselves towards a growing discontent with the Ptolemaic scheme. Such world-wide epidemics as the Black Death in the later fourteenth century found their reflection in a vague dissatisfaction with accepted dogmas, and by the fifteenth century we find evidences of the discontent to extend to the entire mediaeval scientific scheme.

Let us consider briefly some of the factors which, with the Renaissance developing into its full stride, were promoting this active discontent. We may sum up the chief characteristics of mediaeval learning as comprising the subservience of all thought to theological purpose, the effecting of a compromise between the Church and classical teaching, and the creation of a circumscribed outlook in which the doctrine of macrocosm and microcosm was made to link up all things into one narrow and self-sufficient scheme. As against all this there began to creep into the "mental equipment chest" of the fifteenth century philosopher a love for and an increasing knowledge of mathematical processes the effect of which was to make for a greater clarity of thought. On the one hand we have the revival of trigonometry due to the work of Regiomontanus in his *De triangulis*, and on the other a development of algebra due to the labors of Fra Luca Pacioli, friend and intimate of Leonardo da Vinci—with his *Summa de Arithmetica, Geometrica, Proportionibus et Proportionalitate*, modelled after the writings of Leonardo of Pisa.

One of the obvious consequences of the clearer thinking induced by this mathematical advance was the insistent demand for the correction of the many inaccuracies in the existing copies of Ptolemy's *Almagest*, and this work of correction, in the able hands of Peurbach and Regiomontanus, undoubtedly led ultimately to the intellectual revolution in cosmography which produced the Copernican system. But this was not all. In many another direction a different

atmosphere was creeping over mankind. The spirit of adventure was abroad. The great geographical discoveries of Columbus and his contemporaries filled Europe with wonder, and fired the imaginations of all thinking men. Leisure for thought was increasing also as a result of commercial prosperity. In Germany the Hanseatic League was monopolizing the trade of the north, whilst in the south there were close commercial relations with Italy. In this latter country, in spite of continual warfare, such towns as Venice and Florence were prospering commercially, so that more time was available for cultural development, and in the furtherance of this one need scarcely stress the importance of the advent of printing. It was consequently in these countries that the first Renaissance in science was to be found. It was in Germany, too, that Church authority was first successfully fought. The issue of the conflict against the dogmas of Rome carried with it the issue for science. In this fight, Italy, too, played its part, and we may justly regard Pomponazzi (1462-1525) as the great fifteenth century exponent of a new outlook on the relations between science and theology. In his great work *De immortalitate animi*, he boldly attacked the Aristotelianism of St. Thomas Aquinas upon which the whole theological standpoint of Rome was founded. Pomponazzi claimed the right of independent study and interpretation of Aristotle (a heresy in itself!), and in the exercise of that right he followed the Averroists in the contention that immortality does not imply the eternal separate existence of an individual soul. He went further. Following the second century contentions of Alexander of Arodisias, he taught that as soul is the form of the body, it must perish with the body. Here then was a philosophical materialism new to the fifteenth century world of theology. "Virtue for its own sake," by contrast with "virtue for the sake of the after-life," was a wholly new doctrine. It carried with it implications of importance in scientific method. Developing his views further (we must remember that Pomponazzi throughout claimed his adherence to the Catholic Faith) in his *De incantatione*, he definitely insists on the orderly sequence of cause and effect in nature, and so heralds the teachings of Francis Bacon a century later.

In the direction of applied science, too, we find the beginnings of a new spirit in the era under consideration. That commercial prosperity to which we have already alluded was beginning to make its inevitable demands on improvements in mechanical, constructional and manufacturing processes. Allied to this was the ever-present

stimulus of war. Happily fitting in with the new needs and the new demands, the search for classical manuscripts which characterized the early part of the fifteenth century brought to light such treasures as Vitruvius' *De Architectura* (discovered by Poggio Bracciolini in the monastery of St. Gallen in 1416, and first printed in 1486), the *De aquoeductibus* (and other works on military strategem) of Frontinus, and Hero's *Pneumatica*. These works at once received the enthusiastic attention of such illustrious Italian cinquecentist artists as Alberti, Duver, Bramente and da Vinci, men who were at one and the same time artists, architects and engineers, and of German technologists of the type of Konrad Kyesor. Their labors led directly to the great advance in scientific technology a century later in the hands of Georg Agricola in Germany, and Jacob Besson and Agostino Ramelli in France.

III. THE INFLUENCE OF NICHOLAS OF CUSA

Such then were the general conditions of science in the fifteenth century, and the general forces at work to promote the larger developments yet to come. The changing conditions were not sudden in their advent. The progress was slow and gradual, halting even. Yet they were definite enough, and indeed began to manifest themselves early in the century through the teachings of the illustrious German philosopher and divine, Nicholas of Cusa who, fittingly enough, was born in the first year of the new era. At an early age, he was sent to the then famous School of the Brothers of Common Life at Deventer, in Holland, under the patronage of Count Ulrich, who evidently had great faith in his protegee's future. The reality of the influence of this school on Nicholas is clear from the fact that at his death he left a sum of money to be devoted to the foundation of scholarships tenable at the school. In 1417 Nicholas proceeded to Padua, and here he remained for six years, primarily for the study of canon law, but in addition taking up the study of Latin, Greek, Hebrew and Arabic. His stay at Padua is important to us also from the fact that he here developed a friendship with Paolo dal Pozzo Toscanelli. Toscanelli, as we have already pointed out, became famous as a cosmographer, and he is credited with a correspondence with Christopher Columbus the effect of which was supposed to have considerably influenced the great discoverer in undertaking his famous voyages. In this friendship, too, we see a link

with Leonardo da Vinci the importance of which it is difficult to gauge. Toscanelli spent much of his life at Florence, and here Leonardo must have known both him and his work. Moreover, Toscanelli must himself have been in constant correspondence with Cusa, and was indeed called to the latter's deathbed in 1464. Hence it is not unreasonable to suppose that da Vinci must to some extent have been aware of the work and the views of Nicholas of Cusa.

Having graduated at Padua as a Doctor of Canon Law, Nicholas entered the Church in 1425. For the next three years he studied divinity at the University of Cologne, and shortly after he began that career of ecclesiastical diplomacy and affairs which kept him wandering over one part and another of Europe until his death. Associating himself initially with the claims of the Council of Basle (later transferred to Ferrara) as against the powers of the papacy, during which time he wrote his plea for Catholic unity, *De concordantia catholica*, he later withdrew from this standpoint, receiving clerical advancement as a mark of Pope Eugenius IV's appreciation. During this period, too, he wrote his *Reparatis Calendarii* pleading for a reform of the calendar, a work which undoubtedly contributed materially to the institution of the Gregorian Calendar of 1582. For the next few years he was engaged on various missions as Papal Legate, and in 1460 his activities brought him into conflict with Sigismund, Duke of Austria, who, in defiance of the Pope (now Pius II), imprisoned and ill-treated Cusa. From this ill-treatment Nicholas never recovered. He escaped to Rome, and afterwards resumed his wanderings on Church business. He died at Todi in Italy in 1464 in the presence of his old friend Toscanelli.

Such was his life. It is remarkable that amidst all the wanderings he should have found so much time for philosophical and scientific speculation. He was, however, essentially a thoughtful man, and he wrote extensively. The basis of his views was metaphysical. He was profoundly interested in all matters of observation and experiment, but this interest was at all times subservient to the larger metaphysical purpose. Standing in the forefront was his discussion on the movement of bodies, outlined in his *De docta ignorantia*, written between 1439 and 1440. In this work Cusa's main thesis is that "all human knowledge is mere conjecture, and man's wisdom is to recognize his ignorance." The discussion centers round his definition of the finite and the infinite, and pleads for a system of philosophy tending to the unity of all experience. He embraces in this the principle of the union of contraries in the divine unity of

God. Applying these conceptions to the problem of motion, he initiated an attack on the mediaeval standpoint of a fixed earth which, willy nilly, persisted and developed throughout the next two centuries, and led ultimately to the enunciation by Copernicus of his famous system as an hypothesis, to the definite declaration of this system as a conviction by Bruno, and to its final establishment on mathematical grounds as a truism by Newton.

Let us briefly trace his argument. Soul, the spirit, is the universal motor—is moved by God. Movement is therefore a fundamental attribute of existence and matter, united with and impregnated with the world soul, has ceaseless motion—all things move. There can, therefore, be no such thing as a center of the universe, so that the earth itself is not at the center of the universe, and neither is it at rest. "I have long considered that this earth cannot be fixed, but moves as do the other stars," he writes, and in a further note, undiscovered until after his death, he says, "To my mind the earth revolves upon its axis once in a day and night." Cusa never got as far as a heliocentric theory; nor did he abandon the conception of homocentric spheres. Nevertheless in so far as he did attack the Aristotelian doctrine of a fixed earth (a courageous standpoint for a Churchman to take up), he was a true inaugurator of a scientific revolution.

But there was another aspect of this inauguration—the institution of a definite experimental bias in philosophical enquiry. Not only do we find traces of this in his *De docta ignorantia*, but we find it in full swing in the *De staticis experimentis*, the fourth book of a series of papers entitled *Idiotae libri quatuor*. In this work, purporting to be a discussion between two characters, the "Idiot" and the "Orator," the first two books are on "Wisdom," the third on "Mind" and the fourth on "Statical Experiments." In this last work Cusa gives his fundamental ideas on the use of the balance in medicine and in science generally. He quotes Vitruvius, recently rediscovered by Poggio, and gets ideas therefrom for a number of his problems, such as the estimation of the speed of ships, a problem, incidentally, which later fascinated both Leon Battista Alberti and Leonardo da Vinci. Throughout Cusa's contention is that by accurate comparisons by weight, various physical facts and properties are capable of investigation. So he suggests the comparison of waters from different springs, or water from the same spring at different times, of the blood and urine from old and young men, or of the same man in health and in sickness, and so on: suggestions

which led directly to Sanctorius' work on metabolic studies and to Van Helmont's gravimetric analysis of urine. Another suggestion, virtually on plant respiration, constitutes in effect the first biological experiment of modern times, and offers the first formal proof that the air has weight.

So we find in Nicholas of Cusa, in spite of the burden of mediæval theology which he carried throughout his career, the first fifteenth century philosopher with a truly modern outlook. We must neither underestimate the importance of his work nor of his influence. He was the starting point of the Renaissance in science in many a direction. In the world of philosophy he was the forerunner of an illustrious line of thinkers, from Pomponazzi and Ramus to Francis Bacon and Descartes; in his conceptions of the nature of matter he foreshadowed the work of Paracelsus, and so led to the dawn of modern chemistry; and in astronomy he was the first of a line which led through Peurbach and Regiomontanus and Paul of Middleburg to Copernicus and Kepler.

IV. THE BEGINNINGS OF APPLIED SCIENCE: LEONARDO DA VINCI

It is no part of our task in this paper to comment upon the more obvious features of the beginnings of modern science. Detailed references to Copernicus, Kepler, Galileo, Gilbert and the other well-known pioneers of modern science are here superfluous. We have yet, however, to note in some greater detail the repercussions of the forces of progress in scientific thought at the close of the mediæval period upon applied science. We have already remarked upon the fact that in the Renaissance of the intellectual life of Western Europe, science was touched after letters and art. We have now to note that, in the wake of science, the study of mechanism and of mechanical technology generally began to be taken seriously.

From this point of view, as well as from the nature of his contributions to practically every branch of scientific enquiry in his day, the name of Leonardo da Vinci (1452-1519) stands out pre-eminent. Living as he did at the full crest of the wave of the Italian Renaissance, he practically embodied in his being the full expressions of its manifold activities. It is only within comparatively recent years that the vast collection of notes and sketches accumulated by Leonardo da Vinci has been given the attention it deserves. Unfortunately, circumstances were such that after his death they were lost

sight of, and it was only after the lapse of centuries that they once again came to light. This loss was a serious misfortune to science. Leonardo's work was in itself so fruitful and varied, and his outlook on nature was so vastly superior to those about him, that if only those who followed after him could have had access to his writings, and to his many anticipations of later discoveries in different fields of intellectual activity, there is no doubt that the course of scientific history would have been materially different in a number of important directions.

Leonardo very happily combined within himself those excellent qualities which produce both the theorist in science and the technologist who blends his theory with practice, and what is equally important, his practice with theory.

Formal mechanics occupied a large share of his time and thought. In it, as in science generally, we find in Leonardo every evidence of that spirit of independence and experimental enquiry which gave to Galileo, a hundred years after him, the title of "Father of Experimental Science." Galileo deserved this title, but it was accorded him in ignorance of the labors of da Vinci. It neither detracts from his glory nor does injustice to his forerunner, therefore, if we plead for Leonardo the corresponding title of "Grandfather of Experimental Science."

What were his achievements in mechanics, the study to which he lovingly referred as "The paradise of the mathematical sciences"? Virtually, we may say of him that he created the study of dynamics. He knew of the principle of inertia. He tells us that "no body can move of itself, but by the action of some other, and that other is force"; of moving bodies, too, he tells us that "all movement tends to maintenance"; whilst what he knew of the law of reactions is clear from his reference that "an object offers as much resistance to the air as the air does to the object." His study of falling bodies is interesting from several points of view. We may epitomise this philosophy of the falling body by the following quotation: "Why does not the weight remain in its place? . . . Because it has no resistance. Where will it move to? . . . It will move towards the center of the earth. And why by no other line? . . . Because a weight which has no support falls by the shortest road to the lowest point, which is the center of the world. And why does the weight know how to find it by so short a line? . . . Because it does not depend and does not move about in various directions." Here we

get Leonardo's philosophy of the falling body in a nutshell, so to speak.

Not the least interesting of Leonardo's mechanical researches concern themselves with the principle of work. He did not, of course, use the term work. He did, however, appreciate the fact of a value in, and a measure of what we may speak of as the "achievement" of a force. Thus he writes that "if a force carries a weight in a certain time through a definite distance, the same force will carry half the body in the same time through double the path." He recognized, in effect, a definite limit to the results for a given effort, and that this effort was not alone a question of the magnitude of the force, but also of the distance through which it acts. If the one be increased, it can only be at the expense of the other.

Intimately linked up with this principle of work was the age-old myth of perpetual motion. If the principle of work be true, then the achievement of perpetual motion is impossible. On this matter Leonardo had no illusions whatever. There were, however, many contemporary with him who thought otherwise, and with these da Vinci had no patience. "Oh speculators on perpetual motion," he writes, "how many vain projects of like character you have created! Go and be the companions of the searchers after gold." Leonardo's dynamics also included studies of motion down an inclined plane, and the collision of bodies. When, however, we turn to statics, we find an even wider range of scientific activity on the part of our philosopher. We must remember, however, that here he was trading on less virgin soil. The works of Aristotle, Archimedes, Euclid, Hero, Pappus and others during the Greek era, and of Jordanus Nemorarius, Albert of Saxony and others in the Middle Ages, were known to him. On their foundation, however, he built very securely and his notes show clearly and conclusively that he fully understood the lever principle, centers of gravity, pulley systems and their mechanical advantage, and many other important branches of modern statics. We may sum up, in fact, by saying that the theoretical basis of his work in engineering and technology was not only sound but was in extent far beyond his times.

Turning, then, to the technology and engineering of Leonardo da Vinci we may say at once that his notes cover a range which almost beggars description. Designs of almost every conceivable kind of machine required for every conceivable kind of technological process are scattered liberally through his manuscripts. Planing machines, filing machines, polishing machines, grinding machines, lathes,

mechanical hammers, wire-drawing machines, oil presses, screw cutting machines, designs for roller bearings, needle manufacturing machines, spinning machines, machines for rope making and cloth shearing, pumps, cranes, jacks and other lifting gear, water wheels, designs for irrigation and drainage, the cutting of canals, the erection of harbors and docks, and the design of cannons and other weapons and engines of war—all these interested our philosopher and prompted him to write notes and draw sketches and designs.

We will do no more than refer the reader in this connection to some such work as Feldhaus' *Leonardo da Vinci als Technik und Erfinder*."

V. APPLIED SCIENCE: THE SIXTEENTH CENTURY

The era inaugurated by Leonardo da Vinci developed by the sixteenth century into the true beginnings of what we might call "the phase of application." In particular, three writers of this period stand out prominently as pointing the way and as showing the possibilities, namely, Georg Agricola, Jacob Besson, and Agostino Ramelli; and as evidence of the widespread nature of this new spirit, it is significant that these three were respectively a German, a Frenchman, and an Italian. Georg Agricola (Latinized form of Georg Bauer) was a German scholar and scientist whose researches in applied chemistry, mineralogy, geology and in mining technology formed a notable advance beyond the mediaevalism of former writers on these subjects. His books gave a stimulus to both formal and applied science which, taken into conjunction with the writings of Besson and Ramelli, created a wholly new spirit which was to reflect itself in the notable advances and achievements of the century to follow. This new spirit, emanating from Germany, soon became transmitted to France, and here Jacob Besson, who taught Natural Philosophy at Orleans, and Agostino Ramelli, an Italian philosopher of versatile interests who had migrated to Paris, soon came to the fore. Besson's *Theatrum Instrumentorum et Machinarum* was published in 1578, whilst Ramelli's *Le diverse et artificiose machine* was issued ten years later. Both dealt fully and scientifically with the whole subject of the applications of mechanics to mechanisms and machinery, whilst Besson's book included a study of the production and properties of steam. Both works became standards of reference for subsequent writers for a long time.

A further word or two regarding the work of Agricola is perhaps advisable before leaving this subject. Georg Agricola has a two-fold interest for us. First and foremost he was the forerunner of modern metallurgical science and its applications to mining technology. As a secondary consideration, however, he is important as affording to us a check on our judgment as to how far Leonardo's mechanical investigations were of practical utility in his day. Da Vinci wrote no text-book. He left merely his vast accumulation of notes. His notes and drawings give little indication as to the relative extent to which they were merely detached investigations and the extent to which they were practically applied by industry. With Agricola the position is different. He lived his life, after completing his university training early in the sixteenth century, at Joachimsthal on the eastern slope of the Erzgebirge in Bohemia. This was right in the heart of the metal-bearing areas of Central Europe. Here Agricola's main occupation (apart from his professional work as a medical man) was the investigation not only of the conditions of the mining industry, but also of the scientific basis of that industry.

His classical work, *De Re Metallica*, was first published in 1556, and was the main fruit of this study. A very fine English translation of this work by H. C. and L. H. Hoover was published in 1912.

Agricola recorded in great detail in this book all the implements of mechanical appliances used in the best mining practice of the day. Consequently we are able to obtain from it a very clear picture of the extent to which mechanical practice was involved in the sixteenth century.

The main theme in Agricola's work, namely, the study of metallurgy and of mining practice, is dealt with in Book VII of his *De Re Metallica*, from which the following interesting passage is taken. "By tests of this kind, miners can determine with certainty whether ores are contained in the metal or not; or if it has already been indicated that the ore contains one or more metals the tests show whether it is much or little; the miners also ascertain by such tests the method by which the metal can be separated from that part of the ore devoid of it; and further by these tests they determine that part in which there is much metal from that part in which there is little. Unless these tests have been carefully applied before the metals are melted out, ore cannot be smelted without great loss to the owners, for the parts which do not easily melt out in the fire carry the metals off with them or consume them."

We see here a real scientific attack upon an essentially industrial problem. It is not claimed that Agricola was the first assayer. Perhaps one of the most striking attributes to Agricola lies in the statement recently made by an expert metallurgist that "those familiar with the art will be astonished at the small progress made since his time, for in his pages are most of the reagents and most of the critical operations of today.

Why were these writings of Agricola of such importance in the history of industrial science? If we make a broad comparison of the tools, implements, and machinery of industry in the sixteenth century with those of today, the most striking feature of difference lies in the fact that where today they are largely made of metal—iron and steel in one form or another—they were then largely made of wood. Metal was only employed as strengthening pieces and at joints. This is a most vital consideration from the historical standpoint. Wooden machinery and appliances possessed the most obvious limitations. With them production was inevitably both limited and wasteful. Nor were manufacturers of those days unaware of this. They were, however, helpless simply because of the limitations imposed by a lack of knowledge and large-scale metal productions.

Here then lies the great importance of Agricola's work in metallurgical science. By placing on record in text-book form a complete scientific and ordered record of all the processes and principles known to his day underlying the whole range of the mining industries he provided the incentive to further study, and laid the foundations for future development of an industry which constitutes the very life-cord of modern manufacturing processes.

VI. CONCLUSION

We have thus considered some of the broad tendencies in pure and applied science that characterized the passage from mediaeval to modern times, and that made possible the epoch-making contributions of Copernicus, Galileo, Gilbert and others. As a consequence the sixteenth and seventeenth centuries carry us past the Middle Ages through the transition stage and right into what was undoubtedly a brilliant beginning of the modern era of scientific progress. The sixteenth century pioneers of the doctrine of experimental science, Galileo in Italy and William Gilbert in England, had pointed the way. Working along different lines, too, were Rene

Descartes and Francis Bacon, and the tremendous stimulus to scientific research induced in their several ways by those different philosophers saw its reflection in the advent of that remarkable galaxy of seventeenth century scientists who were headed by the illustrious Newton, and who included such famous men as Huyghens, Boyle, Leibnitz, Hooke and Halley. In their hands the tide of discovery became strong and broad and the boundaries of knowledge were rapidly extended. The era of modern science was definitely established.

SOCIAL SCIENCE, SUBJECTIVISM, AND THE ART OF THINKING

BY VICTOR S. YARROS

SEVERAL stimulating books, recently published, revive for much-needed illumination an old question of the utmost importance. The authors, it is true, imagine that the question is new, but that is a small matter. Their mistake discloses lack of familiarity with the works of "some eminent Victorians," but those works did not settle the question, and it demands reopening and reconsideration from the viewpoint of modern psychology and modern sociological generalizations.

The question is this: Is there such a thing as a political, social or economic *science*? Do not our passions, prejudices, interests, fears, hopes, conscious and unconscious, preclude the sort of treatment—rigorous, unbiased, exact, patient—which the term "science" denotes? If not, how does it happen that in the so-called social sciences there is little respect for authority, little unity or harmony, little effort to know what is established and demonstrated, little faith, indeed, in the very possibility of establishing and proving theories or propositions? Why do "practical" men entertain such contempt for the social sciences, and why do we so often hear the objection that this or that proposal is "only theoretical" and will not work? In the true and exact sciences there is no distinction between theoretical and practical truth. There is no scientific truth that is not borne out in practice.

On the other hand, if the so-called social sciences are not sciences at all, what prevents them from being such? Bias, interest, prepossession, tradition? Is it difficult or well-nigh impossible for economists, ethicists, professors of politics and civics, historians, to put aside class, partisan, race and other prejudices? Are all the conclusions of the pseudo sciences named "subjective," questionable, tainted? If so, how can we hope ever to have social sciences?

John A. Hobson, the radical British economist and publicist, in his book entitled *Free Thought in the Social Sciences* faces frankly the difficulties just indicated and urges a change of procedure on the part of the workers in the social sciences. Instead of ignoring bias, of tacitly assuming that it has been somehow exorcised by writers, M. Hobson advises *recognition of inevitable bias* and making proper allowance for it. We should take it for granted, in other words, that an aristocrat will fall a victim to the "aristocratic fallacy"; that a member of the middle class will overrate the virtues of his class and make generalizations that are not justified by the experience of the wage-workers, or the poor farmers and their poorer tenants, of the struggling professional men and impecunious intellectuals; and, finally, that a trade-unionist will be incapable of treating fairly and soberly proposals advanced by employers or by thinkers who take the employer's view of industrial problems. If we do this, we can openly discount the statements made and accept them not at par, but at their actual value. In the end, the hypothesis is, the sum of such duly discounted assertions and affirmations will furnish material for a true science.

Unfortunately, it is easier to propose this method than to apply it. What is a proper discount in any of the cases given for illustration? Will not bias *enter into the determination of the discount*? As a matter of fact, it is simply untrue to say that we have ignored bias and treated it as non-existent. We have always complained of bias, conscious and unconscious, in alleged contributions to social theory by writers closely associated with or dependent upon vested interests. The defense of rent by landlords has always been discounted, as has the defense of high protection by its immediate beneficiaries, or of expropriation of property by "proletarian" economists, or of religious education in schools by clerical and dogmatic theologians.

How, then, are we to arrive at truth in connection with the problems of the social sciences? Common sense is quite ready to give a satisfactory answer. We must hear all sides, weigh all considerations, compare conclusions, and verify and reverify them wherever possible. We must endeavor to "see life steadily and see it whole," and not depend unduly on books. We must watch and interpret tendencies and facts. In addition, there are always, happily, some indisputably disinterested thinkers who rise above class and caste prejudices and reveal a passion for justice and pure truth. The leaders of a reform movement are not necessarily members of the

class or group in whose behalf the movement is planned and carried on. The special pleaders are not necessarily beneficiaries of the institution or practice they seek to defend against the assaults of outsiders. Things social are not as simple as the foe of bias is apt to imagine. Intellectual integrity, imagination, sympathy, love of accuracy and straight thinking have played no unimportant parts in advancing the social sciences and in promoting sound social improvements. The industrial and political reforms of the last fifty years—for example, legal recognition of trade unionism, accident compensation, collective bargaining, the enfranchisement of the working classes and of women, progressive income and inheritance taxation, the initiative and referendum, the direct primary, commission government, the city manager plan, profit-sharing, employe ownership of stock in corporations, and the like, have been conceived and achieved *despite the opposition of prejudiced and interest-blinded groups and factions*. If bias has not been fatal to progress in the past, it cannot be fatal to healthy future progress. Bias may retard wholesome progress, but does not prevent it. In the unceasing conflict of social forces and rival interests, propaganda, misrepresentation, exaggeration, misunderstanding born of suspicion and dislike are severally inevitable, but in the end adjustments and compromises are effected under the direction of reason rather than of emotion.

The real difficulty under which the social sciences labor is the extremely limited opportunity of experimentation and verification which they enjoy. Human life is not a laboratory. Propositions and hypotheses cannot be tested in politics or in economic relations as chemical, physical and other hypotheses are tested. There are object lessons in history and in contemporaneous experience, but it is impossible to prevent divergent interpretations of them. The deepest thinkers have admitted that the baffling complexity of social phenomena enjoin a wholesome suspicion of severe logic and of the geometrical method of demonstration in that realm. Nothing really repeats itself in human life; there are always new factors, subtle and imponderable, that "make a difference" and forbid the confident drawing of parallels. Ancient Greece cannot teach us how to govern the heterogeneous American democracy, spread over a vast continent. The Swiss Referendum somehow does not always work effectively in the United States. Institutions and principles are not eternal, but correlated with, and dependent upon, time, place, char-

acter of the population, educational status, tradition and background. We must reckon with these facts, not blink them.

Compare the fate of discoveries or new theories in the exact sciences with the fate of sociological theories. How was Mendel's theory of heredity established? By controlled observation, experimentation, verification. How was the doctrine of Relativity demonstrated? By sundry careful and painstaking observations and tests. But let the great majority of criminologists advocate the abolition of capital punishment, and what happens? A minority challenges their conclusion and demands the sort and quality of proof that cannot be furnished by social science. Argue that capital punishment is futile, non-deterrent, brutalizing, and you are told that your notions are arbitrary. The facts you offer are rejected as insufficient, or irrelevant, or both. No two states or countries are similar in every respect, and no state or country is static. The opponents of any change insist that "conditions" justify a given law in one case and preclude it in another.

For a century or more economists have argued the question of free trade vs. protection. The majority of the professors of social economies everywhere are free-traders, but the protectionist minority is unconverted and unashamed. Protection still claims its fervent and erudite defenders. Statistics leave these Tories, or heretics, cold. The same figures are often used by both sides to prove diametrically opposite conclusions.

In these circumstances, it is perfectly "human" and natural that the average man, the business man, the self-styled practical man, should turn a deaf ear to academic thinkers whose teachings, if carried into effect, would reduce his profits, lessen his power or affect his prestige. Our consciences are very elastic, and we readily find justifications or excuses for our action or inaction. What better excuse is there than this—that "the doctors disagree"; that the supposed scientific authorities are divided on the question which concerns us and in respect of which this or that school of thought demands of us conduct inimical to our interests and contrary to our inclinations?

Indeed, a recent writer, H. Ward, in a clever and plausible book on "Thobbing"—a term coined by him to denote what has been called "rationalizing," or the formation of opinions and beliefs by so-called reasoning that is not reasoning at all, but the more or less deliberate use of sophistry to justify prejudices and borrowed dogmas—proves to his own satisfaction that even the greatest philoso-

phers and most iconoclastic thinkers seek to palm off, as it were, in the name of reason, personal opinions, born of emotions and desires, for which they furnish little or no evidence worthy of the name. According to Mr. Ward, even the Pragmatists and the Behaviorists are guilty of thobbing: at a certain stage in their respective arguments they lose sight of scientific method, of their own alleged postulates and premises, and advance astonishing conclusions in no wise established by the preceding argument. Mr. Ward is not so naive as to believe that every proposition in the social sciences is capable of rigorous demonstration, but he objects to the tacit assumption that thobbing is a satisfactory substitute for thinking, or that the social sciences are free to dispense with scientific proof to the end of time while claiming to be classed with the real sciences. He would distinguish between thinking and thobbing, and draw a clear, bold line between the two processes. An author of a work on ethics, or economics, or government, might for example, serve notice upon his readers that thinking has ended and thobbing begun at a certain natural division in the argument or exposition! Or, if the author does not know where the line is to be drawn, he might submit his work to a critic and ask him to identify and label the propositions that have only thobbing back of them.

We are brought here, in all seriousness, to consideration of a very different sort of book on some aspects of the problems raised by Messrs. Hobson and Ward. The reference is to Prof. Graham Wallas's much-lauded volume entitled *The Art of Thought*, a volume which has been commended to educators, to psychologists and to would-be reformers of society as a preventive of hasty generalizations and sweeping indictments or wholesale apologies for certain institutions or practices.

Mr. Wallas says many thought-provoking things, and his analysis of the process of thought is useful up to a certain point. But, as we shall see, and as Prof. John Dewey has very candidly shown, Mr. Wallas overlooks a very vital fact and is led by that strange oversight—especially strange in a writer on political and social questions—to commit serious errors.

We do not, according to Mr. Wallas, teach the art of thought in our schools and colleges. Yet thought is an art, and much of it is understandable and teachable. If this supremely important art were properly taught, fewer fallacies would be socially current, the wicked propagandist would meet with more difficulties than he now en-

counters, and the path of the wise and righteous would be correspondingly smoother and freer.

To show just how the art of thought, or of straight, clear, logical thinking, can be taught, Mr. Wallas separates the process of thought into four distinct phases—namely, Preparation, or the period of accumulating knowledge and correctly classifying it; Incubation, the period of deliberate abstention from work on the material obtained and mastered; Illumination, or the period during which ideas, flashes of insight and of new theory appear, and, finally, Verification, a period of uncertain length dependent upon the quality and boldness of the theory or conception tentatively reached.

It scarcely needs saying that Mr. Wallas realizes the impossibility of controlling or teaching either *incubation* or *illumination*. But he rightly holds that we *can* be taught how to gather, digest and classify data, how to demand sufficient and adequate data on any subject under consideration, and how to verify, test and reverify. Since, however, the importance of the incubation and illumination stages is admittedly greater than that of the other two stages, the conclusion emerges that the real art of thought cannot be made a matter of systematic teaching. Mr. Wallas himself affirms that much of the success of original thinkers—a Darwin, a Wallace, an Einstein, a Pasteur, a Koch—is due to their ability to grasp and hold the vague intimations, the adumbrations, the rays of faint light which mark the phase of illumination.

Mr. Wallas' book, however, is open to the deeper criticism candidly passed upon it by Professor Dewey, who, in a notice of that work in *The New Republic*, wrote as follows:

“. . . It is obvious that there is an art of thought with respect to matters of physical science or technology. What is lacking is simply an art of thought with respect to human affairs comparable with that already attained in physical matters. This contrast raises an interesting problem, probably the most important problem which the world now faces. Is there a legitimate possibility of an art of social thought which is one with increase of control, or is the idea a dream? If it is a legitimate possibility, how is it to be realized?

Such a question, however, is in no sense a psychological problem. The development of natural science is not due to the fact that individual thinkers have learned a better intimately personal art of managing their own thoughts. It is due to the formation of an objective technique of instruments and external procedures together with the accumulation of prior results which direct from without

the growth of pertinent problems and fruitful hypotheses. But it is the personal and psychological problem alone with which Mr. Wallas deals. There is no approach to a consideration of the political and economic conditions which stand in social affairs in the way of the development of methods of objective intellectual behavior employing means which almost automatically direct the thoughts of individuals as such."

It is not a sufficient answer to Prof. Dewey's remarks to say that Mr. Wallas was not concerned with objective control of thought that is too prone to err subjectively. It was his business to emphasize the contrast between the position and the authority of the exact sciences with the treatment and lack of authority of the social sciences, and to give some explanation of the disquieting phenomenon. It was his business to ask why the art of thought is so effectively and fruitfully applied in one realm and so poorly and haltingly applied in another.

We find ourselves back at the starting point—at the question whether the part played by bias and prejudice, fear and desire, in the treatment of social, political, economic and moral issues cannot be controlled and diminished.

There are shallow radicals who assert that "capitalism" is the foe of free, disinterested thought and searching, fearless investigation of the themes of the social sciences. Books have been written on the efforts of plutocracy to direct college and university teaching, to suppress new truth because it may undermine monopoly or promote revolutionary tendencies. That such efforts have been and still are occasionally made, no intelligent observer would care to deny. But we have had enough experience with compulsory communism, sovietism, dictatorship of the proletariat, Fascismo, and brutal reaction *sans phrase*, to perceive that bias and resistance to honest, unfettered discussion are by no means the exclusive sins of "capitalism." If we had Socialism or Syndicalism tomorrow, bias would be as rampant and injurious in the social sciences as it is today, or as it was under autocracy and clerical obscurantism.

The question is not of an age or a given social condition. It cannot be solved by artificial "controls." And, to repeat, Mr. Hobson's suggestions in regard to allowances or discounts for bias do not take us far on the way to a solution.

What is to be done, then? In the absence of a specific, we have no choice but to accept the solution of common sense, which, as already pointed out, is this—that we must peg away patiently, hear

all sides, take time for reflection, watch developments, profit by experiments wherever possible, seek guidance in quarters that are apparently free from bias, or as free as is humanly possible. We are bound to believe that in the long run the truth does prevail even in politics and economics, or in international controversies, despite national bias, class bias, religious bias, purse bias, race bias, etc. In thus believing we are not necessarily guilty of "thobbing," for we are able to point to numerous facts and instances in support of our position. After all, Adam Smith did influence very considerably human thought and action, as did Jeremy Bentham, as did Richard Cobden, as did Luther, as did the American Abolitionists, as did other groups and individual thinkers and leaders at various periods of human history, to say nothing of law-givers like Moses, Jesus, Mohammed, Buddha. After all, moral progress is a fact, not a mere theory. Political equality, industrial democracy, humanization of the treatment of the insane, the defectives, and the criminal, exemplify moral and social progress. Restriction of child labor, the shorter work-day, popular education, international arbitration, leagues and courts for the prevention of aggressive warfare—these things, and a hundred others, spell and represent genuine progress. Political economy, sociology, ethics, criminology, history, have done *something*—no one knows how much—to promote those great human improvements. Other factors have aided, no doubt, but ideas have not been futile, have not fallen on deaf ears. There is thus no ground for excessive pessimism concerning the work of the social sciences. They are not without honor and weight in human affairs. They will probably command increasing respect and authority as education spreads, as tradition loses its hold, as we learn to trace the genesis and development of institutions and doctrines, and to discuss every belief in a scientific spirit. Lawmakers and reformers alike will learn to value the opinions and theories of economists and sociologists, and consult them more and more when framing statutes. Democracies will not tolerate the *dictatorships* of experts and scholars, but they will accept *the advice and guidance* of experts in the domain of political and social legislation as they now accept the guidance of engineers, physicians and chemists in certain fields.

And that is all that sensible men can ask or expect. It is quite enough, however, to save democracy and avert either anarchy or absolutism.

If democracy can be saved by discussion, reason, intelligence, tolerant compromise, gradual improvements where needed and justified, as it undoubtedly can, then it follows that western civilization and culture are likewise reclaimable and redeemable. Dr. Oswald Spengler, the erudite German scholar who has taken all knowledge for his province, and who, after surveying the diplomacy, politics, theology, philosophy, economic systems, arts and crafts of the West announces the *decline and fall* of the whole organism of western civilization, seems to have fallen into the error of all fundamentalists and dogmatists. He has overlooked the one distinctive characteristic of modern thought, the characteristic that makes all talk of decay and death futile and unimpressive, namely, its relativity and elasticity. We no longer believe that because this or that institution disappears, or evolves, society is doomed and humanity irretrievably lost. Autocracy is dead; industrial tyranny is dead or dying; religious dogmas and superstitions are dead; morality is being reshaped and provided with new sanctions; the arts are making bizarre and ingenious experiments; but none of these radical movements or accomplished revolutionary facts imperil *the fabric of human culture and civilization*. Dr. Spengler's definitions of culture and civilization are obviously arbitrary. It is really absurd to imagine that Pragmatism in philosophy—a movement, by the way, already considerably modified by critical realism and other schools—or Cezanne and his followers in Art, or Psychoanalysis, or self-determination and autonomy in politics, are symptoms of decay and death.

That is civilization which makes for the full development of human faculty within limits prescribed by reason and the necessity of considering the rights and claims of one's fellowmen. We are slowly building up a moral system, a civilization, worthy of the name. We are socializing the individual and at the same time teaching organized society, or the State, to respect the socialized individual. We are humanizing industry, abolishing unfair privilege, equalizing opportunity, increasing leisure, reducing armaments, restricting warfare, curbing fanatical nationalism, democratizing culture and knowledge. These tendencies *strengthen* a civilization instead of undermining it.

Moreover, the East is imitating the West. China and Japan are borrowing western ideas and institutions. If western civilization were going to the dogs, eastern civilization would accompany it. All humanity is in the same boat, as it were, engaged in the same quest

and adventure. No race of people has a monopoly of virtue, spirituality, science, or art. All races are brothers or sisters of one another. The same thoughts and standards that will "save" the West will save the East, and in exactly the same way. Peace, justice, order, co-operation, education, pursuit of science and the fine arts in freedom—these are the conditions of progress in civilization everywhere and always.

Dr. Spengler unwittingly illustrates in his portentous and formidable work the unscientific character of much of our speculation in the realm of sociology, philosophy, ethics and aesthetics. His premises are widely questioned, while his conclusions do not even necessarily flow from his premises. Mr. Ward would find more thobbing than thinking in Spengler's volumes, while Mr. Hobson and others would find plenty of bias and unconscious prejudice there, as well as personal crotchets and whimsicalities. Well, there is no immediate help for it. The social sciences are not and never will be rigorously exact, and human affairs will always be baffling and perplexing. But time, tide, experience and criticism somehow contrive to separate truth from error, fact from fancy and illusion. We have *some* light, and it shows us both the dim goal and the uneven, thorny path thereto.

THE "PURSUIT OF HAPPINESS"

BY F. W. FITZPATRICK

EVERY American is entitled to it, countless thousands believe in it, and all of us fondly and glibly prattle about it, this pursuit of happiness. Yet, in all the things we believe and are taught, there is nothing sillier, so utterly hopeless and misleading as that "Pursuit."

You may pursue wealth and honors and fame and mayhap achieve them. They may then afford you some gratification, tickle your vanity, enable you to do this or that thing you have wanted to do, or cause you to inflate a bit and parade around as a superior personage, one who has arrived, achieved, conquered, and by his own unaided efforts, one who will receive much adulation, sycophantic flattery. But not Happiness. None of those things make for happiness. Indeed, they often bring in their train unexpected and greater unhappiness, jealousy, added responsibilities and carking cares.

It just so happens that in my many years of rather lively contact with mundane affairs, I have rubbed up against, been intimately acquainted with men of great wealth, exalted position, and vast responsibility, and poor as I am and inconsequential, there isn't a blessed one of them I would trade places with, not for five minutes. Happy? No. Generally most unhappy, careworn and soured on life.

Pursuing Happiness is about the most futile job one can undertake. You never catch-up in that pursuit, never even get in sight of that much desired goal; but paradoxical as it may seem, the moment you give up that pursuit, you begin to stand some chance of realizing what happiness really is and of getting a bit of it.

Pursuit means an intensely selfish desire to acquire, and anything selfish, selfish in the slightest, bars happiness. The two don't mate, are never found together. The former if in control will always

chase the other out, and, if the latter be in control, the former never even approaches.

I am not quibbling upon terms, but I might as well start off by saying that many terms greatly in use are mis-terms, give the wrong impression and should be changed. This Pursuit of Happiness for instance, it is utterly silly as well as misleading. As silly as our understanding of unselfishness. A mother's love is very beautiful and all that, and people rave over it as being so unselfish. Get down to brass tacks, however, and there is nothing quite so selfish. A mother will face death, anything for her child, coddles it, watches over it, and all that. Why? Because it is her's, the apogee of selfishness. If a woman displays this great affection over another child, ah then, that's truly an unselfish devotion most admirable.

Observe how those things work out, too, it is interesting. The woman who is literally crazy over her child, super-affectionate, lavishes it all over him, usually spoils him utterly and he grows up a selfish (inherited at that) unbearable cad who brings great unhappiness upon that doting mother.

So with other great affections, "the Grand Passion" the French rave about. Songs and poems apotheosize the great lover, the crazy lover who cannot live without his dear one, the lad who is ready to climb walls, break fences, and make a general nuisance of himself in the "pursuit" of his loved one. He may achieve her, but it is a selfish desire, his thoughts are all for ego. It will be grand fireworks for a brief while then, invariably, unhappiness and quabbles. Show me two young people who love each other but whose chief thought and consideration is a real desire and intent to make the other happy and I'll bet a good hat on their happiness and a generally cheerful marital atmosphere ever after.

Among nations, in families, in business, everywhere, what is it that causes dissention, fuss, rows, unhappiness? Always and generally only Selfishness. Will the world ever learn that and will our schools ever include a course in fighting selfishness in their curriculums? I wonder.

Forget the pursuit of happiness, forget ego all you can. Think of the other fellow, consider him in whatever you do. Adopt a code of living. Just a short one, "Think about the other fellow." It covers every contingency, works perfectly in every case, every time, does the good old Golden Rule. And one can't think of a place, an occasion, a time or a circumstance where and when that rule of life does not work perfectly. If you foolishly want and can skip

off with another man's wife, just stop and think of the other fellow, how would you feel in his place? Besides, you can be sure if you do "carry on" as planned you are putting our neck into the tightest noose you can imagine; six months and you will wish yourself at the bottom of the lake, yea, or deeper still!

If you have been with friends at home, cards, a good time, a jolly evening and are leaving at eleven or past, your tendency perhaps is to gabble at the door, loud laughter, much good-nighting and so on and start off exhaust wide open and a toot of the horn; just think of the other people in the block or the apartment trying to go to sleep and you will go away quietly, that is, if you mean to be decent. You are on a bus or other public place and want to smoke, you know the smoke and ashes may blow into another fellow's face; stop and think of that and you will refrain from smoking just then, always of course, if you really mean to be decent. On the road, in crowded places, at home, in the office, just think of how what you are going to do is going to effect the other fellow and you will do the right thing, again supposing you are decent at heart. Oh, of course, if you have a congenital quirk and swineish tendencies that you would rather keep than be decent, naturally you will stay swineish all our life. The only relief there can be for society at large is that some day you will croak, and join the other swine in permanent retirement.

Try this thinking of the other fellow for a while. By and by you will find that you not only refrain, abstain from doing things that will hurt or bother him, but you will find yourself going out of our way to share things with him, helping him—intelligently.

I emphasize intelligently, for there is much harm done in the world with unintelligent, promiscuous, vicarious, and a lot of other charities, where the giving is done generally to salve the giver's feelings, to advertise himself, boom his candidacy for something or other; all selfish giving for giving sake. Too often it not only isn't worth a hoot to the giver but is harmful to the recipient, pauperizes him, helps him lose initiative, a desire to help himself and all that.

But a little intelligent sharing with the other fellow is helpful in our education. Even to giving one's coat away if the need be urgent and the other's best interest served. Mark you, however, it can't be with the thought of "Here my good fellow, take my coat, I have several better ones at home," or "How generous I am, for am I not giving that poor sick man my coat!" You still have the ego complex if that sort of thought pops up first. But if, spontane-

ously the thought jumps at you: "Why, you poor chap, you are cold and hungry and sick, here take this coat, you need it more than I and besides, I can perhaps get another some how," why, bless you, you are right on the road to Happiness. You are not pursuing it; it is coming graciously, serenely and of its own motivation to you!

Keep on working at it, the elimination of selfishness, whenever you feel it or find it tear it out; learn to control emotions, desires, to be in complete mastery of yourself, not with the assurance of the braggart, a false front, but with becoming modesty and a real desire to please, and you have taken another big step. Oh, no, I am not preaching a holy anchorite form of life, fasting, long hours of prayer, flagellations and all that sort of flub-dub, a holiness with which I have scant patience. What I have in mind is the forming of enough strength of character to keep you from becoming mere creatures, victims, slaves of habits that may and can become pernicious.

For instance, do you men want to smoke? Well, smoking in moderation is not bad nor harmful; smoking an old pipe or smoking cigars or cigarettes one after the other all day is bad, destructive and silly. I know a chap who has the idea down fine. He smokes but one cigar a day after dinner, in the evening. Now then, if he just goes naturally and easily about it, gets his cigar and lights it casually, well and good, but if he hurries to the box, is anxious for that smoke, then, bang, there is no smoke that day. Do you get it?

Mentioning holiness suggests another detail of selfishness I haven't a blamed bit of use for, the monk or nun in cloistered seclusion, praying long hours, mortifying the flesh and so on. It is supreme selfishness, praying and fasting for all the world, yes, but the thought is uppermost that it all certainly redounds to the salvation of their own little souls. My hat is off to the nun or monk out teaching in the slums, off preaching to the savages, taking no end of chances upon his or her own self all for the greater glory of God and the betterment of the world as they see it. There is a difference.

Well, with some sympathy for other people, real unselfishness, the soft pedalling of ego, then the reasonable control of one's self, his emotions and appetites, one has gone a long way, he has two points in his favor. Next, he should cultivate a love of work as against the most natural human weakness for ease, a laziness that grows if given half a chance and makes slothful, useless, parasites of us. And last but not least he will find the other three points helping him toward attaining the fourth, a complete mastery of one's also most natural tendency (aided and abetted by every condition, exam-

ple, temptation of today) toward a constantly increasing yearning for pleasure. A great majority of our youth of today lives but to enjoy one continued round of pleasure so called, parties, outings, theatres, a continuous performance.

Things of that sort pall upon one rapidly, they surfeit, and new amusements must be devised to replace them. It is a constant striving for new emotions, "a new place to dine," an obsession, a restless round of foolish stuff that softens the mind, weakens the will, absorbs every waking moment, unnerves one for anything else and eats one up. It is often called a "nervous breakdown"—seldom from overwork!

With these four controls of one's mental operations at work one soon finds himself enjoying not a fatuous, complacent, foolish self-satisfaction, but a gracious sense of content, a taste of happiness, that grows with the years of effort and soon becomes real life and gives one that Peace and Happiness that truly passeth understanding, secure and lasting and that no pursuit has ever yet come within a thousand miles of achieving.

ARE YOU TRAINING YOUR SYNAPSE?

BY CLARA STEVENS

WHAT is your mental portrait of yourself twenty years hence? Shut your eyes and let desire paint the picture? A pleasing one, so painted. Can it become a reality? Can the roseate colors laid on by desire stand the midday glare of fact? If you are not now realizing your early ambitions, it is possible to give them a substance so that in two decades—or one—that portrait of yourself shall be informed with the breath of life?

The answer may lie in your understanding of a lightning-quick process that takes place many times during the day in your own brain.

Here is the switchboard where the connections are made that result in our characteristic acts. One of the five sense-organs, say, the ear, is the transmitter. The "wire" is the auditory nerve which carries the impression to "central," a certain set of nerve cells in the upper brain. When the number gleams, figuratively speaking, connection is made with a cell of another set known as association, a second "exchange." This in turn connects with a cell of a third group called motor cells. And when thus received, the impulse passes from it into the spinal cord and discharges into the nerves and muscles of the body, resulting in action.

The vital point is, *what* connections are made on that switchboard, for as many are possible in your brain "central" as in that of the New York telephone company—indeed, infinitely more. Therefore, to understand the process is to realize the importance of consciously and intelligently *directing* your connections. On such directing depends the fulfilment of your desires.

But before taking up the details of the process, it will be well to consider the nature of the cell, or neuron, itself. It is our inheritance from our first ancestor, the one-celled amoeba. In contrast to this early progenitor, the human brain alone, to say nothing of the entire body, contains over nine billion neurons. Each is made up of a central nucleus, or body, which supplies nutrition to its

extensions. Of these, the receiving end is called the dendrite, also the "brush end," from its several little filaments. The other is the axon, and acts in response to the impression received by the dendrite and transmitted through the cell body. These billions of nerve cells fall, as has been indicated, into three groups.

When, then, an impression is made on one of the five senses—suppose a soldier hears the command to charge a machine-gun nest—and it has traveled through the, in this case, auditory, nerve and into the first, or receiving, neuron in the brain, the point of interest is, which one of the many association, or second, group will receive it. From each of these many the tiny filaments of its brush-end are extended to catch the impulse. Which one of the second group will be the first to do so will be determined by previous response or by the power of the individual's directing will—or sometimes by even so material a fact as the nutrition supplied or withheld by its cell body. Through the association neuron that has been first stimulated the impulse passes, as in the receiving cell, and again discharges into the microscopic space between it and the numerous motor neurons, each, as in the other cases supplied with its airy branching dendrites to receive the message. And again the vital point is to be determined: which motor neuron will first respond? On that depends whether the soldier will go forward or turn and run.

The latter would be the natural, instinctive response, for to avoid danger, to retreat from probable death or pain, is one of the promptings inherited from our animal ancestors. Had the recruit had no previous training or been reared without any traditions of bravery or duty, he would obey the natural instinct. That is, of the association and the motor neurons only the one in each case which was responsive to fear would receive the impulse.

But when he was being drilled, his will had directed the path of the "current"—if we may so call it—from the receiving cell through the proper association and motor neurons. This directing had then been comparatively easy, for there was no danger present to cause a contrary instinctive impulse directed by fear; and whether he had enlisted or been drafted, his intelligence had accepted the conditions of warfare and was, at first, actively controlling his responses.

Try to visualize the path of that first current; and for the sake of visualization imagine a glowing line as it passes from the nerve in the ear up to the receiving nerve cell in the brain—through its dendrite, cell-body, axon. Then where? For space has been reached.

All about in this space are the dendrites of the various neurons

of the association group. By some mystical means—it seems mystical—the will is able to direct the current into a certain one. Across the space a connection has been established. And this connection, once made, is called the synapse, being, as its name implies, the potential tie between the two neurons. Again the glowing line appears running from dendrite to axon, and once more into a certain cell, now of the motor set, runs the impulse. Another synapse is established. The impulse is transmitted properly, and the soldier advances to make an imaginary charge.

Repeat the visualization of the process when the command is heard the second time. You can fancy the dendrite of the cell in the association set which had before received the current now a little more stimulated than any of the others. Through the synapse, then, flashes the impulse into this one. And from it likewise across the synapse to the cell in the motor group which had carried the first impulse.

When this same "path" has been used several times, the concentration of the soldier's will is no longer necessary. More and more certainly the synapse acts. More and more readily the "educated" dendrites receive. When therefore he is in action on the battlefield his trained nerve-cells carry him forward, even to danger, the inhibition of fear being nullified by the power of the habitual responses.

Indeed, so strong is this power that it operates even when the occasion has passed. This fact is well illustrated by the story, now hoary with age, of an old soldier, long discharged, who was going along the street carrying parcels of provisions, when he heard someone shout "Attention!" Instantly the veteran let fall his burdens and assumed the soldier's proper position, while his potatoes rolled into the street.

When you first tried to drive your automobile you doubtless felt like a feeble infant before a powerful throbbing monster which you would never be able to control. Rather did it seem the master, a diabolical one at that, maliciously awaiting the best moment to tear wildly off and carry you with it to destruction. Again and again you attempted its mastery, and slowly gained, though at each new beginning feeling afresh your helplessness. And then all at once you were in full control. You were conscious of your power. You confidently grasped the wheel, started the motor, released the brake, and rolled purring down the street. Your persistent direction of the impulse in the desired path had trained the proper synapses.

In his *Back to Methuselah*, George Bernard Shaw, developing his thesis of creative evolution, sets forth this formula: "To imagine, to desire, to will, to create." Taking as example the efforts of the cyclist learning to ride, the author asserts that with repeated effort, new tissue for accomplishing the feat is actually created. What seems more probable to the student of psychology is that instead of the formation of new tissue, there has been the forcing of new connections, or synapses, in the association and motor areas by the determination of the cyclist to master the machine. Only a small portion of our higher nerve cells, so psychologists tell us, are as yet made use of; hence new connections are practically unlimited.

The conception is dynamic. One tingles with its exhilaration. What may not each of us achieve? What future may not each secure for himself if he but earnestly wills it? If success is possible in the case of the cyclist or the automobile driver—as we well know it is—then it is also possible in ours in accomplishing whatever subjective result we desire—provided that desire is sufficiently intense. Again quoting Shaw: "If the weight lifter, under the trivial stimulus of an athletic competition, can't 'put up a muscle,' it seems reasonable to believe that an equally earnest and convinced philosopher could 'put up a brain'."

Perhaps you find yourself at the age of forty engaged in a work which is uncongenial and unsatisfying. You are, suppose, a bank teller or head of a department in some industry; receiving a fair salary, living in moderate comfort, able to lay by a little for old age—a position that is safe and sure. And yet it fails to satisfy your inner desires.

You sometimes think of your college days when you were stirred by intriguing speculations of scientific achievements or philosophical conclusions, by the imaginative appeal of real literature, by the wide view of life in the study of history and sociology, by the keen pleasure in mastering a passage of Latin or French. Now you spend your days over figures which have become mere symbols of dullness, over accounts and transactions which are devoid of any imagination or possibilities of subjective interest. This life of yours, you reflect, this something to which in your youth you looked forward as vivid and moving, is passing in a humdrum fashion while some of your best faculties lie dormant. What vocation would make use of that almost sleeping other self—of those long unused synapses?

Gradually your thoughts, thus stirring, may turn to the newspaper or magazine field, where your intellectual nature shall find

more exercise. Then, if you become seriously interested, you must by your will power establish new synapses: a more difficult matter than at twenty, but quite within the bounds of your ability.

The news of a powerful peace pact consummated at Locarno thrills the world. Your eye nerve or ear nerve carries the impression to the same receiving cell as it would have done a year ago. But now your new interest directs consciously the current into a new association, and thence into a new motor cell. Instead of the impression passing into a weak motor neuron, as formerly, expressing itself simply in an exclamation of satisfaction or only a thought reaction of fresh hope for peace, it is now forced through the new synapse into a stronger mental response. The post-war situation in Europe, the years—long enmity between the French and the Germans, their racial characteristics, the fears and ambitions of those closely crowded European nationalists—all these connections and many more must be studied. Your earlier fund of ideas is drawn upon. The new facts must be ascertained in detail and assembled in an orderly, emphatic manner, and finally the physical act of setting forth the whole affair by writing or dictation must be accomplished.

Consider the innumerable hitherto unused—or long unused—synapses which this act has opened. A new mental life has begun. New territory in the brain has been developed. Each stimulation in the region conduces to response by other cells. And if these connections continue to be made frequently and with intensity, they will eventually become habitual, making themselves without your consciousness of special effort.

Our so-called moral acts are the same as those we term mental or intellectual. Physiology takes no account of such distinctions. Along the identical paths, through the same gray matter and silvery fibres run the impressions, to produce the same reactions, whether prompted by ordinary practical motives, our worldly ambitions, or our ideals. To force ourselves to say Yes when No would have saved us from embarrassment or worse, to give ten dollars to a poverty-stricken mother instead of spending it for a new hat, to show tolerance rather than bigotry, to sacrifice interest for principle—all such idealistic acts can be made into habits through the first controlled synaptical connections.

The tremendous significance, then, of directed and repeated control of the brain switchboard connections becomes evident. If the stimulus of the sense organ be slight, that neuron will first be stirred

which has acted before, for it will "remember" the sensation and know what it means. But a stronger stimulus will, by the increased force of the current, open many synapses. Thus, it is vitally important that clearness of judgment and firmness of purpose shall provide a correspondingly strong impulse to direct it through the synapse *most* appropriate; otherwise it will pass into one opened by instinct, or least obstructed, or one used before, any one of which may be highly undesirable reactions. And the connection once made, it will tend to repeat itself when the same receiving cell is again stimulated. Pillsbury says, "The synapse is the point where action leaves its impress upon the nervous system, and it is here that learning has its effect."

Here also, then, lies the basis of habit, for efficiency or for failure; the basis of character and destiny. No need of a recording angel to set down our shortcomings against us. The mystic synapse is recorder; and avenger as well. Its use renders it all-powerful, as ally or as foe. Its neglect bars the future way for either temptation on the one hand or profitable deeds on the other. We can only act and think in the future as we have habituated the synapse in the past.

This physiological fact thus makes possible the realization of our dearest ambitions, so far as our subjective lives are concerned. We perchance have often sighed with Omar:

"Ah Love! Could you and I with Him conspire
To grasp this sorry Scheme of Things entire,
Would not we shatter it to bits—and then
Remould it nearer to the Heart's Desire!"

In the training of our synapses we can mould our own selves to our Heart's Desire, and in so doing make an enormous difference in the Scheme of Things.

THE SOLIPSISM OF RELIGION

BY T. B. STORK

YES: Solipsism, that word of dread, despised and set aside until restored to its proper place, rehabilitated by the great bishop in his *Principles of Knowledge*. For Bishop Berkeley showed beyond all criticism that the doctrine of Solipsism was in the intellectual world when properly qualified the only philosophically sound position. The knowledge of himself and of his own internal state is all the indubitable knowledge vouchsafed man, all else is inference, conjecture, more or less assured. Descartes recognized the truth of the doctrine in his *Cogito ergo sum* that certified to a man his own existence by the only trustworthy evidence, his own consciousness.

Just as in the intellectual world so in the spiritual world—perhaps we should say *a fortiori*—are we shut in upon ourselves. All we really know is the condition of our own soul.

And is not that all we are required to know?

A failure to recognize this truth of Solipsism and its equally important qualification is at the root of all the intellectual difficulties of religious discussions. For Berkeley not only announced that all we know certainly is our internal state of consciousness, but he added the qualification that we can know nothing else with equal certainty, the certainty demanded by philosophy. The endless and fruitless discussions of God's dealing with men, of the inconsistencies of nominal Christians, of the thousand and one external facts that seem contradictory of our ethical notions of right and wrong all ignore this great and fundamental truth. For religion is not a matter of external happenings but of internal conditions, of the state of the soul. It might be said to be a matter of feeling, if that word "feeling" were not so vague and indefinite in its significance. It is this that constitutes what I have called the Solipsism of religion, the exclusive subjective nature of it which makes it so peculiarly and exclusively the man's inner self that no facts, no reasoning about it is pos-

sible, for reasoning always involves comparison, the passing of judgment which in such a case is impossible. The inner state of one man cannot be compared or judged by the inner state of the other. This is not to say that there is no relation between the state of the soul and external facts. The goodness of God, his nature, his love toward men, the existence of good and evil, the coming of Christ, his mission and message, all these facts concern the soul but its salvation is wrought not by the bare facts but by the soul's realization of the facts, by their reaction on the soul.

In religion, therefore, all attention is to be fixed on the condition of the soul, and this is refractory to any rationalizing treatment. The final test is not, do I correctly interpret God's acts, do I understand the why and wherefore of the transactions of God and can I reconcile them with the ethical standard which I hold, but this and only this, have I a certain inward peace with God and man, a state that I cannot define in intellectual terms, but only know by experiencing it.

Nor is this a peculiar characteristic of religion alone. It applies to all those moods or phases of the self which for want of a better term we call feelings, love, terror, happiness, misery, sorrow, vague indefinite expressions for states which defy reasoning or discussion but which we know immediately and with a reality that seems at the time the only reality possible to us.

The attempt to describe them in words puts us to all sorts of circumlocation. We say of the soul's state that it is reconciled with God, that it has attained peace, happiness, that God has taken up his abode in it.

Metaphor and symbolical language are our only refuge when we come to deal with our feelings which are truly mysteries to our intellectual comprehension, indescribable in any terms known to it. They are states of the Ego, they are the Ego itself for the time of their presence. How can such a state as Happiness or Love or Terror be expressed in words? They are untranslatable, to know them you must be them.

This becomes very evident when we examine the effort that has been made to express certain feelings. Such efforts are utterly inadequate to convey to one who has not experienced them any notion of what is meant. Take for example the feeling of love, how many poets have dealt with it, turned it this way and that, embroidered it with their fancies, striven to express all the reality and the joy of it, yet how plain it is that all they succeed in doing is to deal with

its external symptoms, kisses, caresses, beautiful thoughts of the beloved object which are only the outward manifestations just as virtuous actions, kind deeds are the outward manifestations of the saved soul.

Strive we never so hard we can never break into that sacred temple of the soul sealed to all but its indweller, the arcana of its secrets impossible of revelation to any stranger. Shut up within that impenetrable sanctuary the man can neither unfold its mysteries to another or open its gates to the entrance of his own reason. This is *a fortiori* true of that mystery of mysteries, religion and salvation.

Above all it cannot be reasoned about or told in words. It must be experienced to be known. So the Scriptures darkly hint when they tell us: "If any man will do his will he shall know of the doctrine." John vii. 17. It is a matter of personal experience.

This is not to say that there are no external facts which produce the states of the Ego, create fear, love, terror, salvation, nor that the external facts are not like all other similar facts subject to our reasoning faculties, cannot be examined, studied, criticized, their truth, their relation to other facts reasoned about. But no external facts can of themselves work these changes of condition in the soul. It is only when they are absorbed, assimilated in some inexplicable way that these conditions of love, terror, of salvation are created.

If it be conceded, as indeed it must, that salvation is a matter of the soul's condition indescribable but very real producing a happiness, a peace that many testify is utterly beyond words and if the external facts simply hold a relation to that state by reason of their assimilation in some inexplicable way so that they are made part of the soul by faith and belief it might be possible to put a hypothetical question very difficult to answer. Suppose this state of the soul to be established, a state established through belief, realization of certain external facts, and suppose again that it appeared these facts had no existence outside of the soul what if any would be the effect on that state of the soul: would that happiness, that peace and content previously established be destroyed by something entirely outside the soul and its beliefs and faith? Or would not the cry of Job uttered with a sublime ignoring of all external facts be the answer? "Though He slay me yet will I trust in Him." Job xiii. 15.

That state of soul once established is impervious to the assaults of external facts. It has become independent, taken up to a higher plane of faith and belief beyond and superior to all facts.

It may be said that this is a species of Agnosticism. On the contrary it is only drawing a sharp line of demarcation between what we know and what we are forbidden to know. It is by overstepping that line that all our difficulties regarding religion arise, our doubts about miracles, our questioning of God's government of the world, his failure to punish the wicked, his permitting all the evil which we see in the world and which conceding his omnipotence can only exist by his sufferance.

Once recognize the limitations of our intellectual powers and of our ethical perceptions and all these difficulties disappear. Clever thinkers studying the Universe and God's government thereof assume that whatever they behold must measure up to their understanding of it, that a world incomprehensible to their understanding is an impossible world. To exist reasonably it must be capable of an explanation to an intelligence like theirs, or as an able expositor Lord Chalmwood has put it, it ought at least to be "explained to a gentleman like me."

This is of course to assume first that we understand intellectually the transactions we contemplate and secondly that our ethical sense is adequate to pass a competent ethical judgment on them when understood. We must understand God's ultimate aims and purposes and we must be endowed with a knowledge of ethical principles applicable to his acts. It is not agnostic to say that our knowledge is strictly limited, our minds incapable of thinking beyond our practical needs.

In like manner on its ethical side our minds are not endowed with a knowledge of ethical principles except such as are adapted to our practical requirements, guides for our conduct toward God and our fellow man, but which only bewilder us when taxed beyond these requirements. Our ethical shortcomings parallel our intellectual shortcomings. A brief review of our intellectual limitations which in many ways seem to parallel our ethical limitations may enable us to see this more clearly. It was Kant who for all time defined in his *Critique of Pure Reason* these limitations, expounding the solipsism of the reason in all its strength and weakness; for he was the first to explain the certainty and the reason for the certainty of synthetic judgments *a priori* so that without empirical knowledge without and before experience we were perfectly sure of certain indubitable truths such for example as that a straight line is the shortest distance between two points. At the same time he showed the superior quality of such truth over truth

derived by induction from experience. Going a step further he gave distinct warning in his antinomies of the imbecilities of our thinking, our inability either to think a first Cause or a world beginning without a Cause, our inability to think God as free or as determined, etc., etc. These were Kant's important gifts to Philosophy.

As a further hint regarding our intellectual limitations there might be suggested the difficulty of thinking the fourth dimension of space—if there be such a thing—the relativity theory of Einstein, the possibility adverted to by John Stuart Mill of thinking twice two made five. We are given the power to know and to think necessary and appropriate for our work in the world. We have a practical intellect fitted to enable us to do what lies before us, but when we would apply it to spiritual matters to the soul of man to the Universe of God and his ways we find ourselves launching out upon an unknown sea without chart or compass. We are lost and bewildered for our minds are unequal to the adventure. We see before us looming large and threatening the "No trespass" sign which Kant erected when he laid down his Antinomies. Applying the same course of reasoning to the corresponding ethical sense we can readily see how it, too, is limited to the necessities of our life; indeed even for these it sometimes proves inadequate. We need not go to the volumes of Mediaeval Casuistry with their multitude of doubtful cases, Angelus, Pacificus, Amortis's Dictionary of Cases of Conscience, etc. One very common and often cited question will suffice. Reference is made to the problem whether it is ethically right in some circumstances to tell a lie, when for example an intending murderer or robber asks the road his prospective victim took. Is a lie then permissible? Or suppose an ill patient to whom the truth would be fatal, shall the physician speak it or lie?

If he cannot formulate an opinion in such a case with an assurance of its ethical rightness that will gain the assent of all or even a majority of mankind, how can we pass an ethical opinion upon God's government of a Universe so vast that it takes light thousands of years to travel from one end to the other? Only the other day a prohibition advocate presumably a good conscientious man admitted and justified his use of bribery and lies to further the cause of prohibition. If our ethical sense is so uncertain, so inadequate to a clear cut positive decision in such comparatively simple cases, is it not rank presumption for our "intellectuals" to think it

adequate for these deeper more complex questions that concern God and His Universe?

Suppose by way of experiment we make the actual trial of applying our human rules of ethics to God's conduct, not in a broad discursive way, but with some of the specific rules that are ours, say the ten commandments, those most concise rules of human conduct. Could anything be more fantastic and absurd than to cite the rule against stealing or covetousness or killing as applying to the Almighty power that has made and owns all things? If then it is inapplicable very obviously in this detailed way, is it not fair to presume that our attempt to apply our ethical rules to God's conduct in larger matters is equally inappropriate. How can we pronounce God unjust or cruel because according to our ideas of the world He might make a world free from suffering, exempt from sin with all men happy, all living creatures dwelling in peace and harmony with each other. Such a judgment assumes two things: first, that we fully understand intellectually the problem we study; secondly that our human ethical sense is adequate to it.

If intellectually we are limited in our thinking by natural inability is it to be wondered at that ethically we are even more limited that just as our minds are not gifted with the power to think God and his Universe in all its completeness, so our souls are not endowed with ethical sense to measure and judge God's government of the world.

For centuries men have struggled with this difficulty, from the time in fact when first men began to think, they were having these perplexing thoughts, were asking why God did not punish the wicked, why He permitted the righteous to suffer, why in His Almighty power He did not banish sin, create a perfectly happy world without pain or suffering, in fine why He did not comply in all his acts with the requirements of that ethical sense with which man was endowed. The inspired writings are filled with complaints of the inability of man to understand God's ways, His dealings with man. The great book of Job has this for its theme expressed in that exclamation: "Canst thou by searching find out God?" Job xi. 7. After its long discussion it leaves the tremendous question unanswered and unanswerable. St. Paul has added his testimony: "How unsearchable are His judgments and His ways past finding out." Romans xi. 33, and the great author of Isaiah: "For my thoughts are not your thoughts . . . so are my ways higher than your ways and my thoughts than your thoughts," Isaiah lv. 8-9.

Antinomies which might run somewhat in this wise:

Perhaps some Kant of the future may formulate the Ethical

Thesis

God is merciful; not willing that any should perish. He gave His son to save men.

Antithesis

God is just: out of Christ a consuming fire. He has created and maintains a world full of sin and misery.

Are we then to suppose that all the rules of our thinking, of our ethics are simply makeshifts, true for us but possessing no eternal universal truth? We cannot answer this question; but we know that God and the world exist although we cannot think intelligently how they came to exist, and that therefore there must be some intelligible account of how they exist or came to exist and so of the rules of ethics we are obliged to suppose that there is a satisfactory principle which, if we could comprehend it, would fully explain all the contradictions which distress us by reason of our limited apprehension of ethical principles when we contemplate God's dealing with the world.

There may be and probably there is a Universal Complete law of ethics and of thought of which our knowledge is only a part, a partial limited knowledge restricted to the practical requirements of our life here.

Just as our intellect cannot construe the Universe, cannot think it as either eternal or as having a beginning in time, cannot think of a first Cause or the absence of one and yet we feel that somewhere there is a higher intelligence than ours that reconciles all these contradictions that does think these truly and clearly so there must be some moral sense higher than ours that construes the right and wrong of the Universe without contradiction.

The foregoing considerations lead us not to a blank agnosticism but to certain positive and as it seems to me valuable conclusions exhibiting not only what we do not and cannot in the nature of things expect to know, but what we do know and the high assurance with which we do know what we know. We know our salvation by that mysterious knowledge vouchsafed to a man in his own soul incommunicable to others, unspeakable but sure beyond all possibility of doubt as no other knowledge is sure. It is an immediate

consciousness that surpasses all other certainties so that to doubt it is to doubt one's own existence.

It is a matter of immediate apprehension requiring no proof, no reasoning to establish itself, impossible of doubt, impervious to reason, superior in quality to all other degrees of knowledge, standing on the same plane as Descartes' *Cogito Ergo Sum*. Expressed in the language of Scripture it tells us that each man has the proof within himself. "He that believeth in the Son of God hath the witness in himself." I John v. 10. Or as elsewhere: The Kingdom of God is within you.

This is not to say that a man saves himself any more than it says that he is saved by some external mechanical operation that plucks him in spite of himself to safety and salvation. Neither of them is a true statement by itself any more than that a man thinks by himself. To think there must be the external stimulus without which there would be no thinking. The external stimulus does not create thinking, but it is the occasion of it. So with the coming of salvation to the soul, there must be the external impulse to be followed by the spiritual reaction, the transformation, which is sometimes called Conversion. This is a Divine work, dependent upon the man in one sense, yet independent of him in another. But the evidence of it, the assurance is only for the man's own private individual soul. No one has this knowledge but himself. He has this assurance within himself and if the question be asked: May he not be mistaken, be deceiving himself? we find ourselves confronted with that impassable barrier, our intellectual impotence. We cannot inquire into this any more than we can inquire into the validity of our thinking. We must accept both as given, just as we are compelled to think twice two make four. We cannot question the truth of it or consider the possibility whether under different laws of thought twice two might make five as John Stuart Mill suggests.

We are thus led to the positive conclusion that we have no means of knowing, still less of passing judgment on the spiritual conditions of others. Our business is with our own souls and for that we have ample power, but beyond that we are unable and have no occasion to go.

We are also made aware of the absurdity—to give it no harsher name—of men undertaking to conceive God intellectually or to apply ethical measure to his acts. We behold the spectacle of certain "intellectuals" suffering keen spiritual distress because God permits wars, because so many cruel and wicked deeds in their

judgment are perpetually occurring in God's world so that their moral sense is shocked and their faith and belief in God's love and goodness is shaken. How can they believe in a God who does or suffers such things to be done. Are men therefore never to use their reasoning powers with respect to God and his world? Far from it, it is not with too much reasoning but with too little that the fault lies. If the "intellectuals" would vigorously press their reasoning to its legitimate conclusions no difficulty would arise, for then it would be evident what the limits of their reasoning powers were and it would appear that all their distress was due not to their reasoning but to their lack of reasoning.

Thus Solipsism is the answer to that subtle propaganda against religion which is so much in evidence just now, a propaganda delicately suggested in novels and essays portraying the weakness and absurdity of many Christians, their inconsistencies, their hypocrisies, their subtle combination of God and Mammon. All these are no concern of the individual soul. It is not called upon to justify or condemn or to pass any judgment on them, nor is it affected by the truth or falsity of the accusations. Wholly independent, separate, each soul to its own Master standeth or falleth.

ENVIRONMENT AND CHARACTER

BY HARDIN T. MCCLELLAND

OCCASIONALLY we find our lives grown narrowed and miserable with the weary monotony of mediocre and mercenary days. We feel oppressed and broken; and our faculties, so long left hungry and athirst, are parched and atrophied, feeble and forlorn. Our captive souls are rendered crude and stupid, and seem no more alert to sense the scruples of nobility and regeneration. This condition is always housed about the negative pole of our spirit's vital current where strength is lost and no recharging function is performed. It is the broken rudder on our private yachts and sets our souls adrift to meet whatever fate may happen to befall. A tragedy indeed is put upon the stage of Life to play with Death's dramatic score; and those who foolishly rehearse the lines or neglect their proper study will still be required to take part in the actual and ultimate presentation.

This is a figure on the daily dial of Man's Triune Transfiguration; that great heroic venture where he needs must exercise in proper function every power and faculty of his being, where head and heart and hand must work in noble unison and not desert the job nor run counter to each other. Great jubilees oftener entertained than those attending passage through the quarter-century gate, the supreme felicity of new horizons opening up, the sacred moment of spiritual insight into things divine—all these cheer and animate that goodly company of days which mark the slow progress of man's redemption from bestiality to beatitude. It is more often narrow selfishness and pleasure-seeking than actual sin or mischief which lose man his title to ineffable Paradise; tribulation and dependency more often than shallow pastimes, swallow up the feeble soul that falls into folly's fen while blindly groping among the dismal grottoes of the cynic's petty world; umbrage and fault-finding, more often than any actual peccadillo, make up the proprium of the pessimist.

Many careers and many people seeking careers have suffered irrevocable loss through sheer ignorance of Life's spiritual alphabet. They shallowly think that matter and mind make up the Cosmos and of the two, so far as they are concerned, matter offers the more immediate and tangible explanation of life's strange paradox. Beyond this they seek little excuse for being here at all, laying all the burden of apology on those more adept at sophist alibis and casuistic justification. Both they and their mercenary apologists are wise worldlings perhaps, but weak morally and given more to ephemeral gain or fleeting pleasure than to heroic sacrifice and deeds of spiritual valor. They little dream that God's World, the great Universe beyond their petty rhyomistic circle, is more lovely and profound, a vaster empire of things immortal and divine, a joyous panorama never clearly visioned except through generous service, clear-minded aims and loyal devotion to maintaining righteousness. Few people know from any actual experience that the human soul has a divine heritage and potentiality. They seem quite unmindful of any fancy for innocence and joy, quite estranged from any far-reaching decision for the Good-of-All, ready enough to take an imbecile pleasure in foolish pastimes, but never so much as half alive to what God intended them to be. No wonder then that the crude tasks of bare livelihood, the bludgeonings of chance or the arbitrary prestige of more or less precarious circumstance, so easily dominate their lives and leave them only a few idle hours every day in which to grasp desperately after this or that narcotic under whose soothing influence they can forget their misery for a while. And no sober man, I hope, doubts for a minute that *all* our narcotics and anaesthetics are innocent chemical products. Pleasure-seeking, luxury, idleness, gossip, unearned livelihood and all the other false credentials of hedonism are fully as deadly and soul-destroying as the dope-habit.

In view of this situation I feel sorry for the prattling parvenu who knows no world but that of barren daily toil, his feeble intellect counselling nothing but some desperate manner of release, who acts and thinks in little lugubrious circles around his private individual peg, unseeing and uncaring for the vaster Universe beyond. There is an eternal antithesis, often bordering on the rigid terms of conflict, between the fool and the sage, the debauchee and the saint, between those whose whole practice and program of life is hedonistic and those who would rather seek their happiness in attending to worthier causes whether or not they minister to private

ends. Although the immediate psychological terms of this conflict should properly be read in the way environment affects character (or the way man's inward life meets external conditions, as the case may be, for some people do and some don't admit that the environment is there first so far as each one of us is individually concerned), many writers choose to vary the terminology, calling the two members by such terms as modern civilization versus personal culture, worldliness versus spirituality, industrialism versus romanticism, or public success as against private happiness. But howsoever we label the chief applications of the conflict, the various theatres of war so to speak, the essential distinction and opposition of forces behind the scene of carnage is the same regardless of how we describe or analyze them. The truly elect are those who see this distinction, this vital antithesis, and have the courage and energy and intelligence to champion its proper decision, knowing only too honestly well that the noblest in human life can be achieved only through a mortal conflict between man's environment and man's character—a cultural *combat a outrance*, indeed! And woe be unto the man who fails to conquer *some* part at least of his environment, for his grasp of life is of a certainty feeble and insignificant.

Let us look at these two perennial adversaries a little more closely. Environment is just those surrounding conditions and influences which tend to cause a person to act or grow a certain way. In its largest proportion it may be primarily one's work, one's home life, companions or neighbors, and all that these may do or say to affect, either directly or indirectly, one's manner of living, thinking and moral tendency; the influence of prenatal prayers, astrological signs and karmic destinies usually being in very minor proportion, even with many of those who hold them paramount in the decisions of human fate. It is proverbial that a poor or adverse environment is one of the foul obstacles to soul development, while a congenial and righteous environment has a beneficent value which is seldom given its proper estimate and credit. Wherever you find a person turning adverse external circumstance to noble advantage you will also find a person who is already well developed in virtue and power of character. He has will and genius sufficient for the fight, and the despotism of circumstance cannot bear him down.

By synecdoche from aversion and affection in our emotional nature we have come to give environment a dual analysis, saying that it is made up of both adverse and benign characteristics, that it has both evil and noble tendencies which qualify accordingly the

human character that is exposed to one or the other system of influences. Under the first aspect it may be the discouraging drudgery of a misfit occupation; it may be an atmosphere of pride, vexation, wrangling and selfishness at home; mischievous or slothful companions; envious, slanderous or belligerent neighbors; or whatnot of a thousand other despicable and enervating items of negative and baneful influence. These are among the most noxious, although by no means the most subtle or deadly, of the Devil's tools of moral destruction; they alone could account for the major portion of our criminals and social misfits. But fortunately there is a certain sort of environment which has a more agreeable pattern. It is so constituted as to exercise a more pure and benign influence on all whom its affections can reach. But I recognize that its modes are invariably the opposites of those which characterize adverse surroundings. A benign atmosphere is a more economical condition of life than one which is angular and malevolent, and it certainly accommodates that rare peace of mind which is so essential to happiness. However, we seldom find our surroundings totally of one or the other disposition; outside of chemistry and theology there seems to be no pure quality of either good or bad tendency. Instead (and to take an instance in a popular subject) we find that "romance is dead after the honeymoon is over" because neither environment nor human nature can hold a smiling face when adverse situations arise. It is also noteworthy that the romantic and utilitarian moralists just about match one for one in their analysis of human motives, and that the artistic and the domestic viewpoints just about balance in the numerous arguments, criticisms and replies grouped together in Elinor Glyn's symposium on love and marriage conducted by the *Photoplay* magazine four years ago. Such is a fair sample of our conception of environment; for in married life I believe that nearly every phase of dual characteristic may be found, and nearly every one of these will match with some similar phase in the general environment of everyone's life.

Character, on the other hand, is that inner frame which keeps a man erect and true in face of ridicule and jealousy, petty rivalries and hate, and supports him against external adversity so that he is not shaken by the mad stampede of wickedness or the panic-stricken mob in open revolt. It means that there has been a positive development of the inner life, that the harder and more durable mettle of wisdom and virtue has been fused among the meeker atoms of one's soul and it is rendered more astute and noble thereby. Quite

unlike environment, character has no dual aspect. It either is or is not. A person either has character or lacks character, that is all we can say. There are, however, certain degrees of nobility or strength of character, just as there are certain degrees of merit and default in one's conduct or environment. Thus a person's character may be such a measure of the divine as to be sympathetic and consoling, durable and exemplary, and yet run more to private retirement than public anxiety. Such a one may be almost wholly given over to the all-suffering patience of helpfulness and generosity, and yet feel duty-bound to withdraw betimes to the quiet hermitage of far-off dreams and visions of the overworld. And again, one's character may be finely tuned and hence be easily put into discord by the jar of private passion and the warp of public mediocrity or debauchery. Many a saint and hero has had to wage fully as stern a war within as without: very few of us for that matter are so fortunate as to have our private economy so efficiently arranged that no conflict or perturbing influence ever reaches our spirit's tranquil refuge.

No one is much inspired by taudry, cheap or vulgar example; nor are we much enthused by vicarious realizations of ambitions similar to our own if they are achieved only through some form of falsehood and selfish aggression. No good art can be produced even on an amateurish scale except on terms of regular effort, quiet leisure and congeniality of artistic surroundings. Mere patience or fortitude to undergo all sorts of unpleasant conditions and experiences is not enough; there must also be genius and inspiration, original conception and intelligent expression. On this point witness MacDowell up in the New Hampshire hills composing his "Woodland Sketches," with pines and hemlocks, wild rose and artemisia, departed Indians and contemporary trappers blended into romantic melody. Witness Sidonie Springer, the German war-time artist, whose strange paintings were recently exhibited at Munich. Among them were powerful canvas sermons on the vandalism and brutality of man, two portrayals especially depicting first ("An Unmarried Mother") despondency's only solace drinking the Cup of Death, and second ("Uprooted") showing humanity floundering through the darkening fog, torn away from its foundations of morality and culture by the error, viciousness and sorrow of war.

Therefore, in view of these and many other composite items, I like to think of environment and character as not always in mutual revolt, although they may very often appear at mortal grips with

each other. In any event, however, they make up no sham dilemma for each is a hard and incorrigible element in the constitution of the world. They can in some few fortunate souls be made somewhat reciprocal and complementary in aim, each seeking to advance and ennoble the other. Hence, whether or not we can count ourselves blessed by such good fortune, we have not really lived in vain if, after surviving the wreck of circumstance and woe, we turn and lend a hand to those still struggling to cast off the yoke of error and spiritual limitation. That is to occasionally *be* what the untrammelled spirit of man has always aimed to become: a force of character that is strong enough to weather the worldly storm, and forward-looking enough to anticipate and prepare for the morrow's Dawn.

THE CROCODILES OF TUBIGAN

BY GEORGE BALLARD BOWERS

TRIBAL hatreds in the Philippines frequently culminate in feuds with arson and murders, as it happened in Samar ten years ago while I commanded the local garrisons there. The incident concerns Tubigan, that ancient village of a hundred souls, perched high on the bluff overlooking the Sulat river where it empties into the Pacific.

Ten years before a party of Tagalog fisher-folk had found the waters of the Samar coast such an excellent fishing ground that then, and there, they decided to locate permanently, selecting for their future home the flat across the river from Tubigan. The natives resented the presence of the newcomers for two reasons, their tribe and occupation; the Samar people were Visayans and farmers, the new arrivals, Tagalogs and fishermen, whose thrift created jealousy.

But there arose a more serious cause of trouble—the crocodiles: the Tagalogs had hardly established their homes before the river fairly swarmed with them. The fisher folk accustomed to dangerous water creatures, built fences and barricades in the river where they bathed, or filled their water jars, in safety. No Tagalog ever fell prey to the huge reptiles always waiting for fish culls from the catch, or to act as scavengers along the river.

Sometimes the weather kept the fishing boats in for weeks, then hunger drove the crocodiles to the nearest food supply, the pigs, goats and dogs of the Visayan farmers, that came down to the river to drink, that supply failing, the women and children carelessly bathing or washing on the bamboo rafts.

Each year, during the period of coastal storms, numerous pigs, goats and dogs, and several Visayans, fell prey to the crocodiles, a condition said not to have existed prior to the arrival of the Tagalogs; the crocodiles, in the meantime, had become accustomed to

feeding at Tubigan instead of hunting far up the river in the holes abounding in fish.

When I went to Samar I found a report from the garrison nearest Tubigan giving the details of two recent raids, and of a third brewing. The Visayan farmers had killed three Tagalogs and burned a number of their houses, while the Tagalogs had retaliated with an equal number of assassinations, and only awaited an opportunity to even up the arson score. Soon after, as if to aggravate the situation, a crocodile caught and devoured the small son of the Visayan headman.

The destruction of the crocodiles, the real cause of the trouble, would appear to be the most simple solution. While that method might be acceptable to the average American mind, it is not so reasonable to the peasant Filipino, that was made plain to me when I failed to prevent a third raid after I had personally intervened to forestall it. To avoid another was the problem for me to solve.

I notified Lieutenant Bruner, commanding the garrison nearest Tubigan, to arrange for a joint conference with the warring factions that we might put an end to the feud that had kept that part of the coast in a turmoil for years. The conference did not prove successful in any particular, only one faction appeared, the Visayan farmers. Their spokesman stated their viewpoint briefly:

"Senor, mi commandante," he began, addressing me in his sonorous dialect, "before the hated fisher folk came we rarely saw a crocodile near our village. While many lived far upstream, they never molested us as do those now living at the foot of the bluff."

"Why should these be more ferocious than those upstream?" The man hesitated before answering my question.

"Because those of which I spoke came with the Tagalogs, they harbor the souls of their ancestors, evil spirits, hating Visayans." His tone betrayed a note of surprise, surprised that I had displayed ignorance of that which he considered a fact of common knowledge.

"Kill them," I suggested.

"Kill them? Kill them?" he appeared horrified. "Surely, thou knowest that man can not war upon the spirits, be they good or evil, that against the spirits men have no defense? Spirits can not be killed."

"What, then, dost thou suggest?"

"Mi commandante, we ask that the Tagalogs be moved away from here, with them will go their ancestral spirits that inhabit the crocodiles."

"But I shall have the crocodiles killed; I shall set my soldiers to destroy them." I was becoming exasperated. The speeches appeared to be silly.

"No, no, that must not be. My people will, in the end, be made to pay. Please do not carry out your plan." Then, as reminding me of some fact admitted, he went on, "The spirits know all. They would know that thou hadst ordered the slaying for us. You would only compel the spirits to transfer to new bodies, that would anger them the more."

His speech was amazing, it left no opening for a reply.

Lieutenant Bruner smiled, self-satisfied:

"Now, sir, you see what I have been up against. The man is sincere and believed every word he uttered."

"Let's kill the crocodiles notwithstanding."

"No, sir, I doubt the wisdom of that. You might provoke an uprising. We must find some other way out."

"Why not see the Tagalogs?"

"I fear that would be a waste of time, sir. I sounded them out sometime ago. Yes, after second consideration, I think it would be better to see them, after that, I shall offer a plan."

The conference with the Tagalog headman brought us no nearer a solution than before. To every question I put to him he had the same reply, a shrug and *Quien sabe?* Who knows?

"Lieutenant Bruner, I'm through. What's the plan?"

"I left my plan under guard near the beach, sir. It's to be a surprise."

I did not urge him to reveal his secret. It was after four o'clock, so we took a boroto a mile down the river where we had left our camp luggage. While a servant prepared supper the lieutenant went back to the villages. He returned to camp after an hour, his face bore a broad smile. I felt that he wanted me to inquire the cause of his good humor. I did.

"I went back there to tell those people that you had ordered me to arrest every man who had ever participated in a raid, that tonight would be the big night."

"Did they believe you?"

"Certainly."

"Anyway there will not be a person in either village tonight. They've gone before now."

"That's just why I told 'em." He was laughing heartily.

I resented both his manner and the air of secrecy. I felt that

he was trying to "rub it in." I had failed, I knew. I didn't know Bruner very well so I decided to feign a little interest, a trifle more than matter of fact, enough to be polite.

Finally, Bruner announced that it was time to start. The night was as dark as a dungeon. During our wait for nightfall, he had procured a large canoe which he had manned with four soldiers. In the bottom of the canoe I saw a box covered with an old rice sack. I wondered what it contained, the soldiers appeared to handle it so gingerly.

We reached the Tagalog village, not a soul could be found. As no sound came from the bluff, Bruner suggested that the Visayans, too, had decamped.

"Just as I had hoped," he muttered. "We're going to do business now. "He ordered the men to row to a bayou just beyond the fisher village. The bayou was the home of the crocodiles. We were able to determine its location by the bordering trees.

At the end of the bayou the lieutenant uncovered the box in the center of the craft, exposing a dozen two-quart coffee cans. This done he instructed the men to row back toward camp. We had gone but a few feet when he applied his cigarette to a fuse protruding from the coffee can and tossed the can into the muddy water behind us. There was a blurb and a column of water shot ten feet into the air, this was repeated five times in the bayou, the six cans left were dropped into the main stream at the foot of the bluff. We returned to camp to await the outgoing tide that, like a millrace, would soon hurry back to sea. By ebb-tide the moon had made the night as light as day, so clear that one could distinguish from the river bank, any floating object no larger than a hand.

Within an hour after the tide had started to ebb, the crocodiles of the bayou and river were going to sea, they floated out, their yellow bellies glinting in the moonlight, the depth-bombs had done their deadly work. The cause of the feud of Tubigan had been removed forever.

JOURNAL *of* PHILOSOPHY

This periodical is the organ of active philosophical discussion in the United States. There is no similar journal in the field of scientific philosophy. It is issued fortnightly and permits the quick publication of short contributions, prompt reviews and timely discussions.

THE CONTENTS OF RECENT NUMBERS INCLUDE:

- Frances Herbert Bradley. BRAND BLANSHARD.
"Things." GEORGE S. FULLERTON.
The Insurgence Against Reason.
 MORRIS R. COHEN.
The Meaning of Value. JOHN DEWEY.
The Logic of Intermediate Steps.
 H. L. HOLLINGWORTH.
The Material World—Snark or Boojum?
 HAROLD CHAPMAN BROWN.
-

*Edited by Professors F. J. E. Woodbridge,
W. T. Bush, and H. W. Schneider,
of Columbia University*

515 WEST 116TH STREET, NEW YORK

\$4 a Year, 26 Numbers

20 Cents a Copy

The Mathematical Theory of Limits

By J. G. LEATHEM

Bell's Advanced Mathematical Series

A general outline of the theory of limits which brings together the elements of this fundamental subject in one volume. It will greatly facilitate the study of infinite series and the infinitesimal calculus.

Cloth, Price \$4.50

Carus Mathematical Monographs

First Monograph

CALCULUS OF VARIATIONS

By Gilbert Ames Bliss, University of Chicago

"The main purpose of this series is the diffusion of mathematics and formal thought as contributing to exact knowledge and clear thinking, not only for mathematicians, but for other scientists and the public at large. We heartily recommend the book, either as a text or for private reading."—Science.

Cloth, Price \$2.00

Second Monograph

ANALYTIC FUNCTIONS OF A COMPLEX VARIABLE

By David Raymond Curtiss, Northwestern University

What is attempted here is a presentation of fundamental principles with sufficient details of proof and discussion to avoid the style of a mere summary or synopsis.

Cloth, Price \$2.00

Pluralist Philosophies of England and America

By JEAN WAHL

"Professor Wahl may be congratulated on his mastery of one of the most important issues in philosophy, and on the skill with which he supplements previous discussions of pluralism with suggestive and original views of his own."—Boston Evening Transcript.

Cloth, Price \$3.00

THE OPEN COURT PUBLISHING COMPANY

122 South Michigan Avenue

Chicago, Illinois

AMERICAN MATHEMATICAL SOCIETY PUBLICATIONS

- Mathematical Papers of the Chicago Congress, 1893. Price, \$4.00; to members of the Society, \$3.50.
- Evanston Colloquium Lectures, 1893. By Felix Klein. Price, \$1.25; to members, 85 cents.
- Boston Colloquium Lectures, 1903. By H. S. White, F. S. Woods, and E. B. Van Vleck. Price, \$2.75; to members, \$2.25.
- Princeton Colloquium Lectures, 1909. By G. A. Bliss and Edward Kasner. Price, \$2.50; to members, \$2.00.
- Madison Colloquium Lectures, 1913. By L. E. Dickson and W. F. Osgood. Price, \$2.50; to members, \$2.00.
- Cambridge Colloquium Lectures, 1916. Part I. By G. C. Evans. Price, \$2.00; to members, \$1.50. Part II. By Oswald Veblen. Price, \$2.00; to members, \$1.50. Parts I-II, bound together, in cloth, \$3.50; to members, \$3.00.

Orders may be addressed to the Society at 501 W. 116th St. New York City, or to Bowes and Bowes, 1 Trinity St., Cambridge, England; Hirschwaldsche Buchhandlung, Unter den Linden 68, Berlin N. W. 7, Germany; Libreria Giovanni Bardi, Piazza Madama 19-20, Rome, Italy.

THE OPEN COURT PUBLISHING COMPANY
122 South Michigan Avenue CHICAGO ILL.

The Geometry of Rene Descartes

Translated from the French and Latin

By DAVID EUGENE SMITH and MARCIA L. LATHAM

This epoch-making work of Descartes is the first printed treatise that ever appeared on Analytic Geometry.

The great renaissance of mathematics in the Seventeenth Century contains stars of the first magnitude of which *La Geometrie of Descartes* and *Principia* of Newton are the most famous.

The publishers were fortunate in securing a copy of the first French edition printed in Paris in June, 1637, and a facsimile of this edition accompanies the English translation page for page.

It is an important contribution to the history of mathematics which is rapidly gaining recognition as the foundation of exact science.

Fully Illustrated with Geometrical Drawings, Figures and Formulae.

Price, cloth, \$4.00

THE OPEN COURT PUBLISHING COMPANY

122 South Michigan Avenue

Chicago, Illinois

The Mechanical Investigations of Leonardo Da Vinci

By IVOR B. HART

The author's primary object is to make a detailed study of the nature and value of Leonardo's contributions to the study of aeronautics. The study of flight, however, is linked up with that of mechanics, and so the whole field of his work in mechanics generally has been surveyed.

The section of Leonardo's aeronautical work is quite new and is the most complete of its kind. The translation of his manuscript, *On the Flight of Birds* is the only translation of any complete manuscript by Leonardo in English. The paragraphs on Flying Machines are especially interesting.

Illustrated edition. Pages, 240. Boards, \$4.00.

OPEN COURT PUBLISHING COMPANY

CHICAGO

LONDON

Second Edition Now Ready

EXPERIENCE and NATURE

The Paul Carus Foundation Letters

BY

JOHN DEWEY, Columbia University

PRESS NOTES

" . . . Professor Dewey has done more than any other thinker of our time to enrich philosophy with new insights into mental activities, with enlarged ways of interpreting what we call truth, and with fruitful applications of it to human problems. —*Boston Evening Transcript.*"

"It is quite impossible in a short review adequately to discuss chapters as profound and as searching as these. One can only recommend to those who are interested in philosophy a volume which will need no recommendation to those acquainted with Professor Dewey's work." —*The Independent*"

" . . . how the author's peculiar philosophy could be more skilfully and more aptly insinuated into the reader's mind is difficult to conceive." —*The Saturday Review*"

PRICE \$3.00

THE OPEN COURT PUBLISHING COMPANY

122, South Michigan Avenue

Chicago, Illinois

FORMAL LOGIC

By AUGUSTUS DEMORGAN

This reprint of the famous book first printed in 1847 will be welcomed by the students of logic and the history of logical doctrine. The editor, A. E. Taylor, professor of Moral Philosophy at Edinburgh, has provided an accurate text of this classical work which has become almost inaccessible to those who are unable to avail themselves of large libraries.

The chapters on probabilities and fallacies are among the more popular of the contents which follows:

- Chapter I. First Notions.
- Chapter II. On Objects, Ideas, and Names.
- Chapter III. On the Abstract Form of the Proposition.
- Chapter IV. On Propositions.
- Chapter V. On the Syllogism.
- Chapter VI. On the Syllogism.
- Chapter VII. On the Aristotelian Syllogism.
- Chapter VIII. On the Numerically Definite Syllogism.
- Chapter IX. On Probability.
- Chapter X. On Probable Inference
- Chapter XI. On Induction.
- Chapter XII. On Old Logical Terms.
- Chapter XIII. On Fallacies.
- Chapter XIV. On the Verbal Description of the Syllogism.

Appendix I. Account of a Controversy Between the Author of this Work and Sir William Hamilton of Edinburgh, and final reply to the latter.

Appendix II. On Some Forms of Inference differing from those of the Aristotelians.

Cloth, Pages 392, Price \$3.50

A BUDGET OF PARADOXES

By AUGUSTUS DEMORGAN

Revised and Edited by David Eugene Smith, with Full Bibliographical Notes and Index

"Delicious bits of satire of the nineteenth century. . . . An amazing work."—Review of Reviews.

Cloth, two volumes; Price \$5.00 a set

THE OPEN COURT PUBLISHING COMPANY

122 S. Michigan Avenue

CHICAGO, ILLINOIS

HUMANISM

By Curtis W. Reese

THE AUTHOR SAYS:

"Significant and unmistakable signs appear in increasing number on the widening horizon of the religious life. In content, outlook, and purpose, religion is being humanized. The chief and avowed purpose of religion is coming to be the building of personality and the shaping of institutions to this end.

"Consequently, the terminology of religion is changing. The nomenclature of the old theology, which connotes the submission rather than the expansion of personality, is found to be utterly inadequate to express and serve humanistic religion. In many churches are to be found sermons, prayers, hymns, and benedictions couched in the language of science, psychology, and social well-being.

"Temples, synagogues, and churches are examining their technical equipment and practice. Methods of organization and execution long familiar in the business world are being found effective in institutional religious procedure. Religion is being organized for greater human usefulness. The institutions of religion are forging their way into positions of social, moral, and spiritual leadership, where they rightfully belong.

"In my opinion the world can never get along without religion; but it wants a religion whose impulses, worths, and ideals are suitable to the needs of each new age. Hence the reconstruction of religious content is constantly necessary. The present age is pre-eminently humanistic in its point of view. Consequently religion needs humanizing."

Cloth; 85 pages; Price, \$1.00

THE OPEN COURT PUBLISHING COMPANY

122 S. MICHIGAN AVENUE

CHICAGO

ILLINOIS

BELL'S ADVANCED MATHEMATICAL SERIES

A First Course in Nomography. By S. BRODETSKY (Reader in Applied Mathematics at Leeds University). Pages, 135. 64 illustrations. Price, \$3.00.

Graphical methods of calculation are becoming ever more important in all branches of engineering. The object of this book is to explain what nomograms are, and how they can be constructed and used.

Projective Vector Algebra. By L. SILBERSTEIN (Lecturer in Mathematical Physics, University of Rome). Pp., 78. Cloth, \$1.75.

An algebra of vectors based upon the axioms of order and of connection, and independent of the axioms of congruence and of parallels, is the subtitle of this book. Some of the conclusions derivable from the subject may be helpful to readers interested in the degree of soundness of the foundations of the modern theory of relativity.

A First Course in Statistics. By D. CARADOG JONES (formerly Lecturer in Mathematics, Durham University). Pp., 268. Cloth, \$3.75.

Some acquaintance with the proper treatment of statistics has become in the highest degree necessary for investigation in any field—biological, economical or medical. "The constancy of great numbers," one of the fundamental principles of the theory of statistics, makes it almost a science of prophecy.

An Elementary Treatise on Differential Equations and Their Application. By H. T. PIAGGIO, M.A., Professor of Mathematics, University College, Nottingham, Pp. 242. \$3.50.

The theory of Differential Equation is an important branch of modern mathematics. The object of this book is to give an account of the central parts of the subject in as simple a form as possible. Differential Equations arise from many problems in algebra, geometry, mechanics, physics and chemistry.

Elementary Vector Analysis with Application to Geometry and Physics. By C. E. WEATHERBURN, Ormond College, University of Melbourne. Pages, 184. Cloth, \$3.50.

A simple exposition of elementary analysis. Vector analysis is intended essentially for three-dimensional calculations, and its greatest service is rendered in the domains of mechanics and mathematical physics.

Weatherburn's Advanced Vector Analysis. Cloth, \$3.50.

The first four chapters of the present volume contain all the advanced vector analysis that is ordinarily required. The remaining portion of the book dealing with applications of the above theory, forms a fairly complete introduction to Mathematical Physics. An historical introduction to the subject is given in the author's Elementary Vector Analysis.

THE OPEN COURT PUBLISHING COMPANY

122 S. Michigan Avenue

CHICAGO, ILLINOIS

The Relation Between Science and Theology

By C. Stuart Gager

Director of the Botanical Gardens, Brooklyn, New York

Cloth, \$1.00. Pp. 100



The layman who is interested in the present important discussion between church and school will find in this small book a clear statement of the mental attitude of scientific men and their method of thought and work by which they conduct their investigations and arrive at their conclusions.



THE OPEN COURT PUBLISHING COMPANY

CHICAGO

122 S. Michigan Ave.

ILLINOIS

THE BHAGAVAD GITA

or

Song of the Blessed One

(India's Favorite Bible)

Edited and Interpreted by FRANKLIN EDGERTON
(University of Pennsylvania)

All Hindu philosophy has a practical aim. It seeks the truth, but not the truth for its own sake. It is truth as a means of human salvation that is its object. In other words, all Hindu philosophy is religious in basis. To the Hindu Mind, "the truth shall make you free." Otherwise there is no virtue in it. This is quite as true of the later systems as of the early and less systematic speculations. To all of them knowledge is a means to an end.

Pages, 150; boards, \$1.00

THE OPEN COURT PUBLISHING COMPANY

122 S. Michigan Avenue

CHICAGO, ILLINOIS

Jesus and Our Generation

By CHARLES W. GILKEY

A new interpretation of the personality of Jesus is presented in the publication of the Barrows Lectures for 1925 by Dr. Charles W. Gilkey. These lectures were delivered in the six greatest student centers in India and were made possible by the Barrows Foundation, designed to present "in a friendly, temperate, and conciliatory way the truths of Christianity to the scholarly and thoughtful people of India." Few men in America are as popular before student groups as Doctor Gilkey. Placed in a pre-eminent position among the twenty-five most popular preachers of America by a recent voting of thousands of his associates, Doctor Gilkey is certain to find a very wide audience. \$2.00, postpaid \$2.10.

Christian Salvation

By GEORGE CROSS

"Salvation" has been spoken of glibly by many who appreciate but little what is meant. Doctor Cross shows that it is more than a maudlin term of an ineffective evangelism. He deals with his subject historically and advances his discussion from a Christian point of view with a consideration of such practical problems as "Sin and Forgiveness," "Meaning of Guilt," "The Basis of the Hope of a Life after Death." \$2.50, postpaid \$2.60.

Young People's Project

By ERWIN J. SHAVER

These projects comprise the best type of material now available with which to challenge young people to think through the problems of the Christian life. Six separate programs are provided to develop growth in character through purposeful and co-operative experience. A leader's guide is provided without charge for those who use the projects. The titles are: *A Christian's Life-Work*, *A Christian's Recreation*, *A Christian's Attitude Toward the Press*, *Christian World Builders*, *Christian Young People and World Friendships*, *Young People and the Church*. Postpaid, 55 cents each.

Right Living

By MAURICE J. NEUBERG

A discussion course for seventh and eighth grade boys and girls. In this book the author has gathered nearly a thousand problems or life-situations which early adolescents face. The most prominent and crucial of these are presented here to the boys and girls in a manner and vocabulary adapted to their interests and needs. Biblical studies, references to general literature, and games and other character-building activities for motivating the studies are suggested. Cloth, \$1.25; paper, 75 cents; teacher's manual, 75 cents. Postage 10 cents extra.

THE UNIVERSITY OF CHICAGO PRESS

5832 Ellis Avenue

Chicago, Illinois

Publishers: WILLIAMS & NORGATE, London—WILLIAMS & WILKINS CO., Baltimore—
FELIX ALCAN, Paris—Akad. Verlagbuchhandlung, Leipzig—NICOLA ZANICHELLI,
Bologna—RUIZ HERMANOS, Madrid—RENASCENCA PORTUGUESA, Porto
—THE MARUZEN COMPANY, Tokyo.

“SCIENTIA”

INTERNATIONAL REVIEW OF SCIENTIFIC SYNTHESIS

Published every month (each number containing 100 to 120 pages)

Editor: EUGENIO RIGNANO

IS THE ONLY REVIEW the contributors to which are really international.

IS THE ONLY REVIEW that has a really world-wide circulation.

IS THE ONLY REVIEW of scientific synthesis and unification that deals with the fundamental questions of all sciences: the history of the sciences, mathematics, astronomy, geology, physics, chemistry, biology, psychology and sociology.

IS THE ONLY REVIEW of general science that by its articles on statistics, demography, ethnography, economics, law, history of religions and sociology in general—all of a general, summary and synthetical character—makes itself a necessity to all thorough students of the social sciences.

IS THE ONLY REVIEW that among its contributors can boast of the most illustrious men of science in the whole world. A list of more than 350 of these is given in each number.

The articles are published in the language of their authors, and every number has a supplement containing the French translation of all the articles that are not French. The review is thus completely accessible to those who know only French. (Write for a gratis specimen number to the General Secretary of “Scientia,” Milan, sending 1 sh. in stamps of your country, merely to cover postal expenses).

SUBSCRIPTION: \$10.00, Post free

Office: Via A. Bertani, 14-Milan (26

General Secretary: DR. PAOLO BONETTI.

SCIENCE PROGRESS

A QUARTERLY REVIEW OF SCIENTIFIC
THOUGHT, WORK, AND AFFAIRS

Edited by Lieut.-Col. Sir RONALD ROSS

K.C.B., K.C.M.G., F.R.S., N.L., D.Sc., LL.D., M.D., F.R.C.S.

Published at the beginning of JANUARY, APRIL, JULY, OCTOBER

Each number consists of about 192 pages, contributed by authorities in their respective subjects. Illustrated. 6s net. Annual Subscription, including postage, 25s, 6d.

SCIENCE PROGRESS owes its origin to an endeavor to found a scientific journal containing original papers and summaries of the present state of knowledge in all branches of science. The necessity for such a journal is to be found in the fact that with the specialization which necessarily accompanies the modern development of scientific thought and work, it is increasingly difficult for even the professional man of science to keep in touch with the trend of thought and the progress achieved in subjects other than those in which his immediate interests lie. This difficulty is felt by teachers and students in colleges and schools, and by the general educated public interested in scientific questions. SCIENCE PROGRESS claims to have filled this want.

JOHN MURRAY

Albemarle Street

London, W-1