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# Blaise Pascal: Mystic and Mathematician.

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THE terms applied to Pascal in the title of this paper are convenient rather than adequate. On his religious side he can hardly be classed with Thomas à Kempis, or Jacob Boehme, or Emmanuel Swedenborg. But I use the term "mystic" in its popular sense, of one who, in religion, is influenced less by logic than by intuition, and relies not upon the guidance of experience, observation, or external authority, so much as upon that of the inner light vouchsafed direct from God. Such mysticism, however, in Pascal's case left room for the intellect; and we must not forget that the famous "Thoughts" represent a mass of material intended to be worked up into a reasoned defence of Christianity.

Again, the term "mathematician" must be taken in its widest connotation, for Pascal's work was concerned with more than one branch of pure mathematics, and he was a great pioneer in natural science.

Mystic and mathematician, in default of more comprehensive epithets, may serve to bring home to us the general characteristics of a mind in many respects unique, the mind of one who has influenced, as few others have done, the course of religious and scientific investigation. Further, the title suggests a line of treatment; and this paper aims merely at giving a general biographical sketch of one whose life and work interest different classes of readers.

## I.

Pascal was born in 1623 and died in 1662. Let us try to bring the dates home to our imagination. When Charles I. ascended the English throne little Blaise was two years old. When the same King perished at Whitehall, Pascal was a rising *savant;* and the rest of his life nearly coincides with the Com-

monwealth period. The "Caroline" Prayer-Book used in church last Sunday was authorized in the year Pascal died. Thus he was contemporary with Archbishop Laud, with Izaak Walton and the "Compleat Angler," with Pearson on the "Creed," with Herrick and his "Daffodils," with Hobbes and his "Leviathan," and with a certain young architect named Christopher Wren,[1] while at the time of Pascal's death there was an undergraduate at Cambridge destined to outshine, in some ways, the French scientist—he was Isaac Newton.

We cross the Channel. Pascal was born in the reign of Louis XIII. and died in that of Louis XIV.—the King who had the longest reign of any European monarch; of that reign of seventy-two years Pascal saw only the first period. His life pretty nearly coincides with the careers of the two Statesmen notorious for their success in promoting absolutism in monarchy; France was governed less by Louis Treize and Quatorze than by Cardinal Richelieu, and then by Cardinal Mazarin. Pascal was twenty at Richelieu's death, and he outlived Mazarin by a year. The era is famous for its brilliant men—and women. Many were the geniuses, the scholars, the poets, the wits, the orators, who flourished in the days of "le Grand Monarque." Pascal was born in the same year as Molière. Another famous dramatist, Corneille, was a personal friend of Pascal's father. So was Racine. La Fontaine and Boileau were contemporaries, and so were the "pulpiteers," Bossuet and Bourdaloue. The great scientist, Descartes, was a friend and a rival.

## II.

Such being the historical *entourage* of Pascal, let us now make his closer personal acquaintance. Stephen Pascal, his father, was a magistrate at Clermont-Ferrand, in Auvergne, now the Puy de Dôme, in the Midlands. He came of a long line of worthy men who had held public office. Pascal's grandfather

[1] Pascal came into touch with Wren under somewhat interesting circumstances, for the latter was a competitor for a prize offered by Pascal and others for the solution of certain mathematical problems.

had been Treasurer of France; and the family had a right to call themselves "de Pascal," but preferred to be "commoners" and not "nobles" in outward style and title.

It was at Clermont on June 19, 1623, that our Mystic and Mathematician first saw the light of day. Why he was named Blaise I cannot discover. St. Blasius is commemorated in February, not in June; and he is the patron saint of the woollen trade. Pascal's mother died when he was only three or four years old; there were two little daughters, one older and one younger than Blaise; and their father decided to relinquish his official post in order to devote himself to his children; this his private means enabled him to do, and when Blaise was seven years old the family removed to Paris.

In considering the life of a famous man it is sometimes useless or profitless to record the doings of his family, particularly if he lived 250 years ago. But in making Pascal's acquaintance we come to know a singularly attractive and gifted family. There is the father, an upright man of ability and education, keenly interested in his children; there are the two girls, remarkable for their beauty and talent; and Blaise, delicate from his birth, but giving such promise of mental power as to be absolutely uncanny in his precocity. It may be feared that Pascal's subsequent ill-health and early death were partly due to the abnormal growth of his mind in early boyhood. Yet his father seems to have been judicious enough, not sending him to school, but directing—and restraining—his studies at home. Blaise was not allowed to begin Latin till he was twelve; Greek was to be added before mathematics could be commenced. But the boy's inborn aptitude was for mathematical studies, and he soon displayed this. An incident recorded of his twelfth year illustrates his bent. Sitting at table he was idly tapping an earthenware dish with a knife, and noticed that the ringing sound thus produced would stop if his finger touched the dish. But why should it stop? Further experiments with dish and knife resulted in a clear little essay on Acoustics—the author aged twelve years.

An almost incredible proof of his precocity came soon after this. His father had forbidden him mathematics: he would discover mathematics by himself. With chalk or crayon he drew straight lines and made circles, advancing to triangles without knowing any geometrical names or rules. Gradually he built up an original system of geometry, embracing the axioms and definitions and the propositions, up to the thirty-second, of Euclid, Book I.! All this was done in odd moments and secretly, in a play-room assigned to him; and here he was discovered by his father, who, in amazement, rushed off forthwith to tell some scientific friends. These came and examined the self-taught Parisian Euclid; school-books, in which a great deal seemed ABC to him, were procured, and before long Blaise was at work on higher mathematics. For a boy of twelve to "discover" geometry would seem preposterous enough. But there is no reason to doubt the good faith of his father and sisters, in whose memoirs this is recorded; while his subsequent achievements render it less improbable. Further, there is *a priori* no reason why if Euclid could discover such things three centuries before Christ, someone else should not do likewise nineteen centuries later.

A striking proof of Pascal's genius is afforded by a paper on Conic Sections published in Paris in his sixteenth year. Descartes, then at the height of his fame, refused at first to believe that so young a student could have written this—as undoubtedly he did—and it is a pity that professional rivalry should have been roused in the mind of Descartes by an essay which concluded with a modest expression of the writer's diffidence, and an intimation that if his work commended itself to experts, he would endeavour to extend his studies so far as God might bestow strength for the task.

The last few words of the passage seem prophetic of a brilliant career, destined, however, to be characterized by weary days and sleepless nights, and to terminate at the age of thirty-nine.

## III.

But now Pascal and his family fall on evil days for a while. On removing to Paris, Stephen Pascal had invested his money in Government securities. The costly wars needed funds, and Richelieu decided to raise them by materially reducing the rate of interest. The investors objected publicly, and were promptly shut up in the Bastille. Pascal senior would have suffered imprisonment, but managed to avoid arrest by flight, taking refuge in Auvergne, from whence he paid risky surreptitious visits to his family. The children fortunately had good friends in Paris, but it was a sad enough time for them. Deliverance came from an unlikely quarter. The rescuer was little Jacqueline Pascal, a schoolgirl of fourteen, and as Blaise shared in the good fortune which ensued, it will not be unsuitable to tell the story. Jacqueline, or "Jacquette," was a pretty little maiden, very clever in amateur theatricals, and a good reciter. Further, she had a turn for verse, and won a prize in open competition. While her father was in exile, the cause of his misfortune, Richelieu, took it into his head to have some private theatricals; the lady who organized the entertainment invited Jacqueline to take part. The elder sister, Gilberte, demurred, but consented when it was suggested that there might be a chance of intercession on behalf of their exiled father. The eventful evening arrived; the play was a success. The great Cardinal was specially pleased with the acting of one young performer. It was little Jacqueline working for her father's freedom. The tragi-comedy represented by those Parisian maidens was surely transfigured by a daughter's love. On leaving at the close of the play the Cardinal was surprised to find himself listening again to the little performer who had won his approbation; but this time she was appealing to him, in verses of her own composition, for her father's freedom; and a man feared by Kings and potentates was vanquished by a little girl who loved her father. Richelieu told her to write to her father saying there was nothing to fear, and asking him to

call on the Cardinal as soon as he reached Paris. Then Gilberte was introduced, and the kind-hearted lady who had arranged it all put in a word on behalf of Blaise, reminding the great man of the young mathematician's achievements. It is a pleasant little story altogether; and happily Jacqueline's letter to her father has been preserved. Schoolgirls were much the same then as now; she mentions with delight the sweetmeats, lemonade, and all manner of nice things provided in an anteroom after the Cardinal's departure.

His little daughter's letter soon brought Stephen Pascal home. Richelieu was as good as his word, and gave him an official post at Rouen, whither the family removed in 1641. A gap in the home circle was caused by Gilberte's marriage, and Madame Périer accompanied her husband to Clermont, where she had lived as a girl.

A remarkable invention of Blaise Pascal's at this time was due to devotion similar to that which ended his father's exile. The duties of Stephen Pascal involved great labour in calculation; he had to superintend complex arrangements as to revenue and taxation.

The calculating machine was Blaise Pascal's gift to his father, an *ad hoc* invention. There is probably no contrivance now existing more wonderful in its way than this. In England a somewhat similar machine was invented by Babbage (died 1871), but its place is now taken by the logarithmic tables. Pascal's invention never "caught on," because of its complexity and its costliness; and it is to be regretted that the inventor's already feeble health suffered by the work and worry attending its construction. His sister affirms that from the age of eighteen Pascal never passed a day without suffering, whether from acute neuralgia or from dyspepsia. When about twenty-three he had a severe stroke of paralysis, and although he enjoyed brief intervals of bodily health, Pascal was really an invalid all his life; many, most, of his achievements were wrought when either mind or body was wracked with pain.

## IV.

Some five years passed by quietly at Rouen, when a new epoch began for the Pascal family. The cause was trivial enough in itself. Pascal *père* slipped on the ice and hurt his foot badly. During his enforced idleness he was visited by two Rouen gentlemen, who were physicians not only for the body but the soul. They were eager adherents of Jansenism. This remarkable school of thought, named after Cornelius Jansen, Bishop of Ypres (died 1638), laid great stress upon the need of Divine grace, and upon the blessing of utter dependence on God. Paul, Augustine, Luther, Jansen; you trace the same leading conceptions in each. But the Jansenists were not Protestants. They were loyal members of the Gallican Church, and they leavened it with wholesome truth and the spirit of true devotion.

The Pascals were led by their Jansenist friends to see a new beauty and to realize a new power in the Christian faith. They soon became adherents of the Jansenists, especially of those with whom Blaise and Jacqueline Pascal were afterwards associated at Port-Royal. Blaise especially became inspired with a new enthusiasm. He began now to study Theology, and to read the writings of those who sought to cultivate the inner spiritual faculty. Our mathematician was by way of becoming a mystic.

But it is possible to commune with the unseen and yet be fully awake to the concerns of the visible world. It is during the time of his residence at Rouen that we meet with those achievements in science which would alone have given Pascal enduring fame. The earliest of these is a series of experiments relating to the pressure of the atmosphere. The barometer is largely due to the knowledge he thus gained. Torricelli, the pupil of Galileo, had, up to the time of his death, been investigating the subject; and he published certain theories which death prevented him from verifying. Pascal took up the problem at this point. He filled glass tubes with mercury and other

liquids, noting the variation of height at different altitudes; the mercury sank in the tube when taken to higher ground, atmospheric pressure sustaining it on lower ground; the column of mercury was lower at the top of a mountain than at its base. The hills near Rouen did not satisfy Pascal, and his experiments were elaborated on the mountain of Puy de Dôme, near his old home; his health would not permit of his carrying them on personally, and it was his brother-in-law, Monsieur Périer, who successfully demonstrated the truth of what Pascal asserted as to atmospheric pressure and its measurement.

About this time (1647-1648) Pascal was obliged to take great care of his health. He consulted the best doctors at Paris, who, in accordance with the ideas then prevailing, cupped and leeched him copiously, draining his system of what it needed most. Descartes had advised him, on the contrary, to "lie abed and drink beef tea." In 1649 he is staying at Clermont with the Périers. Next year we find him in Paris again. Then, in 1651, occurred the breaking-up of the home, for Stephen Pascal died. Blaise was twenty-eight, Jacqueline two years younger, a beautiful and accomplished woman. Of late years Jacqueline had felt increasingly wishful to renounce the world and enter the convent of Port-Royal, whose abbess was the saintly Angélique Arnauld; but devotion to her father had kept her at home. Now almost immediately she went to Port-Royal.

Blaise was now alone, and alone in Paris. It is at this juncture that some doubt arises as to his manner of life. Judging from his sister's memoirs, he became dissipated, forgetting the aims and desires of the old days at Rouen. But Jacqueline was a nun; ordinary amusements might appear to her perilous. There seems no real reason for supposing that Pascal was intemperate or dissolute. But he did mingle in the merry society of Paris; and it was in this way that he formed his strong and lasting friendship with the Duc de Roannez. He is said to have fallen in love with this nobleman's sister; but whether he feared to declare himself, or whether having

done so he found his love unrequited, cannot now be known. His essay on Love is probably due to this affair. It is a beautiful, lofty discourse, that of a good man who had a reverential regard for a good woman. Pascal never married. Possibly his disappointment strengthened him spiritually, and prepared him for the step he was erelong to take in following his sister's example and joining the Port-Royalists.

But before speaking of this it may be well to mention the scientific work which occupied Pascal in 1652-1653. He was the pioneer—nay, the founder—of modern hydrostatics and pneumatics. His discoveries in the former science were epoch-making. Pascal's "Hydrostatic Law of the Equality of Pressures" is beautifully simple, and capable of numberless applications. "Pressure exerted on any mass of liquid is transmitted undiminished in every direction, acting with the same force on all equal surfaces and at right angles to those surfaces." Thus the piston of 1 square inch pushed against the mass of water with a force of 30 pounds will push outward a piston of 4 square inches with a pressure of 120 pounds. Hence all the appliances of hydraulics—presses, lifts, organ-bellows, and so on.

## V.

A story of Pascal, too striking to be passed over, though not strongly enough attested to be received as absolutely reliable, helps us to understand his withdrawal to Port-Royal. When driving across one of the bridges over the Seine the horses took fright, and jumped clean over the low parapet. Fortunately the traces broke, and, as the horses fell into the river, the carriage, with Pascal in it, remained hanging on the very edge of the bridge. Such a narrow escape would be likely to deepen serious impressions, and to strengthen any existing desire for a life of meditation and prayer. At all events, from that time, 1654, Pascal's one great aim was to cultivate a spirit of devotion, to restrain the flesh, to bring every thought into subjection, and to live, move, and have his being amidst high

and holy thoughts and ways and works. The last eight years of his life are inseparably connected with Port-Royal.

Port-Royal is a village about eighteen miles from Paris. The old Abbey was occupied by the famous sisterhood which Jacqueline Pascal had joined. The community was probably the most enlightened and earnest in France. At an old farm-house away from the village dwelt the brothers, as remote, it may be remarked, from the Convent as if they were leagues off. They wore ordinary lay dress, but their life was not that of ordinary lay folk. From 3 a.m. until night they prayed and studied, and worked on the farm, meeting for worship in the little village church. This kind of life developed rapidly the mystic in Pascal, more especially as he became an ascetic, practising the most painful austerities. The brothers had no rules about fasting; certainly Pascal needed none to make him fast, and, not contented by undue abstention from food, he mortified the flesh by wearing an iron-spiked belt next his skin. One cannot but regret that Pascal now became so morbid, so introspective, so visionary. But *Est modus in rebus* could never have been his motto in anything, whether scientific or spiritual. His mysticism, like his science, attained to lofty heights. Of this a remarkable illustration is afforded by the "Amulet," as Condorcet appropriately called it. The Amulet was a written paper, folded up in a piece of parchment inscribed with the same words, and found, after Pascal's death, stitched in his clothing. It seems odd to reflect that the words upon it were penned by the same hand that wrote books on Conics and Hydrostatics.

"The year of grace 1654.
Monday, 23 November, day of St. Clement, Pope & Martyr, & others in the Martyrology.
Vigil of St. Chrysogonus, Martyr, & others.
From about half-past ten, evening, to about half-past twelve, midnight.

FIRE.

God of Abraham, God of Isaac, God of Jacob,
Not of Philosophers and Scientists.
Certainty. Certainty. Sentiment. Joy. Peace.
God of Jesus Christ.

*My God and your God.
Thy God will be my God.
Oblivion of the world & of all save God.
He is found only by the ways taught in the Gospel.
Grandeur of the human soul.
Righteous Father, the world hath not known Thee, but I have known Thee.
Joy, joy, joy, tears of joy.
I am separated from Him.
*They have forsaken Me, the fountain of living water.
My God will you forsake Me?
O may I not be separated from Him eternally!
This is life eternal that they know Thee, the only true God, & Him whom Thou hast sent, J. C.
Jesus Christ. Jesus Christ.
I am separated from Him; I have fled from, renounced, crucified Him.
O that I may never be separated from Him!
He is only retained by the ways taught in the Gospel.
Renunciation, total & sweet.
etc."

The document is in French except for the lines marked (*), which are in Latin. The most natural explanation of it would perhaps be that it is the record of a vision Pascal believed he had seen about the date of his entering Port-Royal. In moments of doubt and depression he would touch the little packet and be reminded of the glory he had beheld.

Another indication of Pascal's religious outlook at this period is afforded by the remarkable incident of the Miracle of the Holy Thorn. His niece, Marguerite Périer, a pupil at Port-Royal School, was suffering from an optical disease. A complete cure was effected, so it was affirmed, by the application of a supposed relic—a thorn from the crown of Jesus. This occurrence rather suggests certain happenings at Lourdes. The Abbess of Port-Royal, Angélique Arnauld, appears to have been somewhat sceptical. Pascal regarded it as an indisputable miracle, and was extremely impressed by it. Certainly the incident had great results. It stayed the hands of the Jesuits who wished to injure Port-Royal, and it suggested to Pascal the idea of writing a Defence of the Faith. This he did not live long enough to accomplish, but the material from which it was to be constructed is represented by the famous "Thoughts."

Pascal's "Penseés" are not suggestive of holy thorns or amulets. They are the beliefs of one who was a philosopher, a scientist, and a childlike—but not childish—believer. The main theme is man's insignificance in contrast with his Divine origin and destiny. The "Thoughts" are by no means exclusively religious, but it is those on religion which give the work its great value. They emphasize the truth that "we walk by faith, not by sight"; God is "not the God of *savants*" as the Amulet has it. Reason is powerless to find Him. Faith can, however, succeed where reason fails, and faith is necessary to the complete development of man's dignity.

The "Thoughts" have suffered, more than most books, from garbled quotation. For a long time after Pascal's death they were used in support of contradictory *theses;* and it is important to read them in a modern edition such as that of Havet.

The "Provincial Letters" are entertaining even to-day, although they deal with a controversy now extinct. A brother of the Abbess of Port-Royal had incurred the censure of the Sorbonne at Paris for defending the principles of the Jansenists. Pascal determined to wage literary war with the Sorbonne in general and the Jesuits in particular, who were in an overwhelming majority there and everywhere else in France at that time. The Jansenists had to face much bitter opposition, and their views were stigmatized as heretical. Pascal wrote a series of letters which reversed the situation completely. They were eighteen in number, and were written at first anonymously, later on under a pseudonym. The identity of the author was not generally known until after his death.

One or two examples will illustrate the way in which Pascal satirized Jesuitical casuistry and tactics. Jean D'Alba makes off with his employer's best pewter pots. When apprehended he ably defends the theft by quoting from casuistical manuals in his master's library. Or again, a man sets out with the intention of restoring some money he has been unrighteously keeping. On his way he calls at a book-shop. Is there any new

book of interest? Yes, a fresh work on casuistry by a Jesuit Professor. The man glances at it, notices what is said as to the lawful keeping of unlawful gains, and on the strength of this opinion changes his mind, and goes home without restoring the money to its rightful owner!

The "doctrine of intention" is effectively satirized. The Jesuits affirmed that if Mass were being celebrated at two altars in the same church, one Mass beginning at the first words of the service, the other Mass beginning at the middle, a worshipper might hear Mass in half-time by giving his attention to both priests at once. This idea is developed *ad absurdum.* One priest could be at this point, another at that, so that if you have enough priests and altars, it can be easily arranged for you to hear the whole Mass in one moment. Such a saving of time for the faithful when in a hurry!

The "Provincial Letters" are often eloquent with scorn and indignation, but more often still they are written in a tone of cultured banter. Ridicule is a potent weapon, and Pascal used it to the full as the champion of Jansenist against Jesuit.

## VI.

Our regret at Pascal's early death is tempered by the thought that it meant relief from acute and protracted physical suffering, and that it did not occur until he had achieved far more than some of the greatest of mankind have accomplished in a lifetime twice as long. The old proverb, "He whom the gods love dies young," has never been better verified.

Two thoughts seem uppermost as we take leave of Blaise Pascal.

The first is the thought of his versatility. Has any man ever had a wider range of activity? To take down from the shelf volume after volume of his complete works and merely to glance through them is to receive a bewildering impression. Now the author is a scientist, now a philosopher, now a preacher, now a satirist. "Everything by turns"—but we cannot add

"and nothing long." To the very end, for instance, the mathematician is in evidence, as his works on the Cycloid and the Arithmetical Triangle testify. He touched life and thought at many points and *nihil tetigit quod non ornavit.* To this day are we indebted directly to Pascal for his scientific discoveries and appliances; and even that familiar object, the wildly-careering omnibus, owes its origin and name to a businesslike enterprise on the part of Pascal in conjunction with his friend, the Duc de Roannez.

The second thought is the significance of his religious outlook. Pascal is one of the many distinguished scientists who have held to, and have been held by, their faith. It is curious to speculate as to what camp in the religious world Pascal would join if he were living now. Would he be banned as a Modernist, and would he make the Vatican uncomfortable with a further series of "Provincial Letters"? Certainly he would find some brother scientists willing to aid him in contending earnestly for the Christian faith. It is not easy to picture him as an unbeliever. Some of us might feel that he was too inclined to keep faith and reason in separate compartments, but we should not have cause to complain that he did not keep the door ajar between them.