

HOW PRINTING CAME

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IT would be difficult to overestimate the importance of the revolution wrought by printing in intellectual life. It has been said that its invention divided the modern era from the Middle Ages. This opinion is supported by all historians, who agree in celebrating typography as a discovery of incalculable significance, as an immense benefit, as a fountain of youth perpetuating the world's thought, like an arch-saint of humanity, or, to use the expression of a workman poet, like a conqueror who has sprung full-grown from the earth with thirty soldiers.

By reviewing the primitive means previously used to record things past, or to allow thought to circulate from one point to another, we reach an understanding of the importance of the printing press to civilization. It is well known, how in ancient Peru, messages were transmitted by a system of cords, the knots and colors of which had a conventional meaning. Knots of one kind or another and notches on a piece of wood, served among primitive people the world over, as a means of silent communication.

Next, a man set in line, one beside the other, a sun, a house, a cow, a war-chariot, thus explaining by the succession of the figures as well as by their attitude, a series of facts and ideas. This was a great step forward, though the pictures were no better than a boy would draw with chalk on a wall. Then came a new step towards the invention of writing. The sign, already modified and shortened, that, for example, which represented the plan of a house, two squares, one on top of the other, came to represent a sound. Among the Hebrews and Phoenicians this was called Beth, the symbol which has become the letter B. Similar transpositions were made with other signs as the alphabet was gradually built up. Man had passed from ideographic writing to phonetic writing.

When syllables were finally separated into vowels and consonants it was a great day, for it marked a true social revolution. With some thirty signs, it was possible to represent the principle articulations of a human word. The effect was analogous to that which the printer was to produce some centuries later, for printing also separated and rendered movable characters intended to represent different sounds.

Rather than following further the various forms which the alphabet was to take with different people, let us describe the widely diverse materials on which men wrote, for it was due to the development of the proper writing materials that printing was made possible.

Sun-baked bricks were used among the Assyrians; stone and bronze on which official inscriptions were carved; flat bones of cows, sheep, camels; bits of polished wood; tablets colored with wax; animals' hides dried and colored. These last were an ancient specialty of the city of Pergama, whose name survives in our word parchment. The word vellum recalls the fact that a veal calf furnished the very choicest material for parchment-making.

At this time papyrus was employed in Egypt. This vegetable tissue was so fine and flexible that we have kept the word paper from it. Before the Christian era, outside the limits of the universe known to the ancients, China and Japan, countries which had outstripped Europe, understood how to make an excellent paper, either with rags or linen or cotton, or with the bark of certain trees, which were cultivated for the purpose, on which they were already printing newspapers and paper money.

The book existed even then, but in a different form from that to which we are accustomed. The manuscripts were strips written on one side only, which were twisted around a roll. They looked very much like our music rolls for player pianos. During the Middle Ages, when many things which had been put down by the Greeks and Romans were undergoing modifications, missals, antiphonaries and religious books slowly underwent a change. They became square in shape and were made up of leaves written on both sides, which were bound together and placed between two pieces of wood, leather, or metal. They were often heavy and cumbersome and dangerous to move as they weighed many pounds and could easily break or crush the limbs of anyone upon whom they fell.

· People who owned several books usually kept them chained to

great turn-tables, pretending that they were protecting them from thieves, in this way; but borrowers were a good deal more to be feared. In 1515, at Venice, it was estimated that, in the library founded by Cardinal Bessarion, some four hundred of the eight hundred volumes were lacking, having been borrowed and not returned. So there is nothing to be astonished about in the story that Louis XI, King of France, when borrowing an Arabic book from the faculty of medicine in Paris, was obliged to leave a silver goblet and, in addition, security from one of his courtiers.

During the same period, the instruments used by copyists and writers were improved. The goose-quill was substituted for the brush, the reed, or the stylus. Black ink came to have preference; red ink was reserved for book titles and chapter headings, and the makers of rubrics, whose business it was to color and ornament letters, formed a section apart from the writers. The illuminators were, as we would say to-day illustrators, many of them designers and miniaturists of great skill. Wood engravings completed the manuscripts, many of which were works of art, worthy of places in royal, imperial, and papal libraries.

The change of greatest importance produced during this period was the popularization of paper. It came from the depth of Asia and spread after the crusaders through the countries that border the Mediterranean. Moorish Spain was the chief center of manufacture in Europe, and the most ancient European specimens are preserved in the Escorial.

We must not forget that all the work was done by hand, except in paper mills run by water-power. Copying a manuscript occupied several men for several months, and after all this labor, one had merely a single copy. It is known that a work on ecclesiastical law, entitled *Les Canons de Gratien*, took twenty-one months of assiduous labor in copying. At that rate it would have taken 5,250 years to make an edition of 3000 copies. Prices corresponded with the labor involved and in consequence, the book was a luxury for the great lord and the prelate. This state of affairs, however, was to change entirely.

Coming from various directions, as is usually the case, there was a confluence of inventions, progressive discoveries; not a sudden leap from one system to another, but a slow series of transitory states. Modification of rag-paper was one of the conditions which made printing possible. The perfection of wood-engraving was

another. You find the word "printer" used in the Low Countries and in Linoges, for example, before there was any notion of printed books. Engraved plates, whose designs stood out in relief, and, when moistened with ink, could be transferred to paper, were used for playing cards, and by a similar process, whole images, with a line of verse on a single plate, were applied to the paper at a stroke. This is what one calls tabular or xylographic printing. It seems to have existed in Korea several centuries before the Christian era.

But the decisive discovery was the separation of the letters, which had hitherto marched in company; the creation of movable characters, first in wood, then in metal; and the means of aligning them as the words might require and of forcing them against the paper in a press, which was an imitation of the wine-press, cider-press, or oil-press.

From the time when printing actually began, in the middle of the fifteenth century, it was greeted with cries of anger and of enthusiasm. It was cursed by the army of copyists, whom it ruined; but by the rest of the population it was praised and celebrated as the art of arts and the science of sciences, a marvel more divine than human.

During its early existence it was thus the object of contradictory sentiments. Under its two essential forms it bore upon the past, present, and the future. Before everything else, it was the conservator of all that had been done and thought by generations past. It perpetuates the work of great minds that have passed on; it assures us that the phases through which human civilization has passed will continue to be known; it gives the half-blotted documents which have come down to us through the ages a life without limit.

Printing is no less useful to science. Thanks to it, the treasures of experience heaped up by our ancestors run no risk of being lost. Truth once acquired is ours forever. Thanks to it, humanity may be compared to a single man, who lives and grows without ceasing. It is the mother-invention of modern times, because it led to the birth of other inventions by scattering knowledge of what was already known.

That grand popularizer, the printing press, has reproduced by millions copies of the works of literature, the chants and legends of religion, the dreams of poets, the meditations of philosophers; all those products of human genius which constitute the delight and consolation of the educated, which people the solitude and fill the

silence with voices for the reader shut up in his study ; which charm, exalt, and inspire those newly come to the intellectual world.

The opponents of printing may be classified in three groups. First, the copyists and illuminators whose means of livelihood it took away. Second, the political and religious authorities whose power over the people it diminished and threatened. Lastly, the monarchs and the ruling classes whose "divine right" it finally overthrew.

Industrial progress sweeps on, like a regiment of shock-troops over the bodies of those who fall in the trenches . The exasperation of all those who are sacrificed is translated into outcry, indignation, and calumny. The first printers were called sorcerers, and children of the devil. As proof, it was pointed out that these printed copies which came from their mysterious workshops appeared with incredible speed and were exactly identical with one another. Would that be possible without infernal aid?

The theologians were prompt to take action. The bitter fight between the book and the church is the same as that between science and faith. It is the irreducible opposition of two methods ; the one which accepts nothing that cannot be proved and which desires free investigation of the truth ; and the other which proceeds by way of affirmations incapable of demonstration and which assumes to impose them in the name of divine authority incarnate in a holy text, a council, or a man.

There is no reason for being surprised if, in every country, the books and those who printed them, were exposed to interdiction, persecution, and the stake. They threatened to destroy, if not the spirit of religion, at least the blind belief in miracles and dogmas, which the contradiction of texts and the very diversity of the religions themselves, rendered suspicious to every reader endowed with reason and critical sense. Printing was a powerful worker for free thought, and their histories are closely linked. This is its honor, but a perilous honor, for which it has many times paid the price.

Kings and statesmen were not behind the prelates in feeling the menace. Urged on at first by ecclesiastical bodies, then stirred by a wish to defend themselves, they subjected the new art to rules, restrictions, censorship, and severe inflictions, among which were fines, imprisonments, and death. The booklet, pamphlet and newspapers when they were invented, were many times made to feel the judgment of the courts or the arbitrary will of governments. The

freedom of the press, often proclaimed, always incomplete, and always attacked, never reached its fullness except in rare moments during revolutionary epochs. Even then it was strangled, and in the calmest times has been able to maintain a legal existence only after heroic battles.

Truly enough, the press was many times used by scheming politicians, unprincipled scandal-mongers and other dishonorable people for purposes which brought printing into disrepute. People were disgusted by licentious novels, by monstrous books which dishonored literature, by the corrupting placards which covered the walls, and by the alluring drawings which attracted the eye and were a cynical invitation to debauchery. They protested against the flood of ink, which was too much like a river of mud. But must we condemn a thing because it may sink into abuse? If this were true, no human invention would escape. Must we abandon love because it can descend to a brutal and voluptuous appetite; or liberty because it can become license; or work because it ends in exhaustion; or life because it is full of sorrow and suffering?

Printing is an instrument of indefinite progress, which can, without any doubt, be turned from its true and beneficent function, but which, properly guided, has produced and will still produce that which will cheer and guide men, that which will render them masters of nature and of themselves, juster, better, and happier.