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BY

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ORIENTAL ELEMENTS OF CULTURE IN THE OCCIDENT.^a

By DR. GEORG JACOB.

The intimate cultural connection between the ancient peoples since the beginning of history is an undeniable fact. It is almost a truism that original ideas are but exceptions to the overwhelming number of reproduced ones, and yet even learned men are strongly disinclined to acknowledge indebtedness for elements of culture, lest it interfere with the pleasing thought of development within one's own narrow circle. It is but natural to delight in a structure built in the course of many years from the quarries of one's own field, but it is equally true that this sentiment rests on suppositions based on anything but facts. A migrating idea, in the purely ideal sphere at least, could remain the same only under the assumption of perfect identity of national characteristics and entire suspension of development. This not being the case, the variation of the contents of an idea among different peoples is no proof against its modification from without. Nor is it necessary to refute the strange yet common view that the possibility of the construction of an internal development makes the assumption of external influences unnecessary.^b

In the religious field the victorious course of Christianity from East to West is not an isolated phenomenon. Not only did the Mithra cult pursue a similar course, but we continually see religious ideas from the Orient penetrating Occidental culture spheres. It is not difficult to trace to the influence of the old Persian Dualism^c the

^aTransiation, after revision by the author, of *Östliche Kulturelemente im Abendland*. Vortrag, am 4. Februar 1902, zu Erlangen gehalten und nachträglich erweitert von Dr. Georg Jacob, ao. Professor der morgenländischen Sprachen. Berlin: Mayer and Müller, 1902, pp. 24, gr. 800.

^bStave, in *Über den Einfluss des Parsismus auf das Judentum*, Haarlem, 1898, has fallen into both these errors.

^cI was led to these views especially by the comparative study of Persian and Arabic poets. Notice, for instance, the frequency of the epithet *pāk* (clean) in connection with the name of Allāh in Persian poetry and search for Arabic parallels. Many Persian conceptions have survived in Mohammedan writings; thus the later Turkish *Kyrk sual* point to contact with middle Persian sources. On the other hand, old Persian conceptions were later forced into the Koran by connecting them with such words as *sidra* (Sūre 53, 14, 16), *kauthar* (108), *sirāt* (37, 23), *sāhira* (79, 14).

antitheses between God and the devil, between this world and the other world, between clean and unclean, which were but gradually adopted into the monotheistic religions. Old Persian ideas, especially those pertaining to final things, as death, the judgment, and events connected therewith, pervade Christianity, Judaism, and Islam, and through the medium of the former reached even the heathen Icelanders, so that we again meet their ideas point for point in the Edda. We need only think of the world-tree (the *tûbà* of the Mohammedans=*Yggdrasil*), the well containing the miracle-working water at its foot (called *al-Kauthar*, often only *al-haud*, "the cistern"=*Urd's well*), the bridge of heaven (*Avestan chinvat*, Arabic *as-sirât*, old Norse *Bifröst*), but particularly the Dusk of the gods, which agrees in all points with the last judgment as described by Moslem theologians. Here we have the blowing of the horn, known from the Koran, which in the Edda is performed by *Heimdall*, and the wide plain (*ársat al-ârasât*, or *sahra-i-mehscher*=*Wigrid*); the "beast of the earth," which is to come out from a rock fissure near Mecca, corresponds to *Fenris*, and *Daggâl* to the Antichrist and *Loki*. I could enumerate a long list of such parallels.^a For some of their ideas the Persians may have received the first suggestions from the Babylonians, though it is at present the fashion to overestimate the Babylonian influences.^b The world view of the Babylonians still survives in our seven days' week; in fact, only through this world view can the astrology of previous centuries be rightly understood. I have already called attention to it in my initial publication (1887). *Winckler*^c has explained the symbolical number seven and the unlucky number thirteen from Babylonian conceptions. The latter have to the present day exercised a mighty influence upon our economic life, and thus on human culture in general, through the fact that for the ratio of silver to gold the old norm from the mint regulation of Darius remained in force till the fall of silver. *Winckler*^d has shown that this relation represents the time of revolution of the planets corresponding to the two metals, the moon and sun; that is, 27:360 (=1:13 $\frac{1}{3}$).

^aOf the literature bearing on this subject may be mentioned: *Kohut*, Ueber die jüdische Angelogie und Dämonologie in ihrer Abhängigkeit vom Parsismus in *Abhandlungen der Deutschen Morgenländischen Gesellschaft* 4, 1866, and *Was hat die talmudische Eschatologie aus dem Parsismus aufgenommen?* in *Zeitschrift der Deutschen Morgenländischen Gesellschaft* 21, 1867; *Ernst Böklen*, Die Verwandtschaft der jüdisch-christlichen mit der persischen Eschatologie, *Goettingen*, 1902. Compare also *Elard Hugo Meyer*, *Völuspa*, Berlin, 1899.

^bSo, for instance, *Hugo Winckler*, *Die babylonische Kultur in ihren Beziehungen zur unsrigen* (Leipzig, 1902), goes too far when he (p. 22) derives our clock face from the Babylonian double hour. The division in twelve hours rather goes back to the sun clock and is to be explained from the fact that the sun does not shine during the night. So also our bock beer (p. 43) has nothing to do with the signs of the Zodiac, but is due to corruption by popular etymology of *Eimbecker Bier*.

^cOpus cit.

^dIbidem.

Even slight deviations from this norm caused in the nineteenth century the greatest crises. The real relation could only in most recent times prevail against the tradition.

But we can trace the connecting threads still further back. The Buddha legend as "Barlaam and Josaphat" was during the Middle Ages a book of edification to Christians, Jews, and Mohammedans, and at present the Hindu world view is beginning to play a rôle in the Occident through the medium of Schopenhauer^a and the preaching of Buddhism by the theosophical societies.^b

The literature which occupied our youthful minds, and influenced perhaps more than we are aware the development of our taste, originated to a great extent in the Orient, not only the Biblical narratives and the stories of the Thousand and One Nights, but also many of the tales which the uninitiated considers of German origin.^c German lyric poetry, whose creations form an important part of the literary wealth of the people, was during the period of the flourishing of the church hymn predominantly under the influence of the Hebrew Psalter. And in the nineteenth century Hâfiz, less through Goethe's West-Östlichen Diwan than through Bodenstedt's Mirza Schaffy, which was printed in more than a hundred editions, exercised an influence upon our love poetry which can not be overestimated. The magic-lantern theater (*ombres chinoise*), especially cultivated by the Romanticists—magic-lantern plays were written, among others, by Justinus Kerner, and an afterplay to it by Uhland, Chr. Brentano, Achim von Arnim, Count Poggi—came from Italy to Germany in the seventeenth century, but was already flourishing in Egypt in Saladin's time and can be followed up till the eleventh century in east Asia.^d Goethe borrowed the ideas for the prologue of his Faust from the old Hindu theater and the Book of Job.

Recently the court theaters of the most artistic city of Germany did not disdain to borrow from Japan the revolving stage, invented in 1700 by Namiki Schozos, a stage arrangement which with practical purposes combines ideal aims.

The most finished creations of architecture belong to the Middle Ages, as we come more and more to learn. No other style is capable like the Gothic of distributing the masses harmoniously and of transforming heavy masonry into light effects. The horizontal line

^aAn instructive comparison of the systems of this most popular philosopher with the systems of the Hindus is found in Max. F. Hecker's *Schopenhauer und die indische Philosophie*, Köln, 1897.

^bSo, for instance, Th. Schultze, *Der Buddhismus als Religion der Zukunft*, 2d edition, Leipzig.

^cFor example, compare Wilhelm Geiger, *Die kulturgeschichtliche Bedeutung des indischen Altertums* (inaugural address), Erlangen, 1901, p. 8.

^dCompare G. Jacob, *Das Schattentheater in seiner Wanderung vom Morgenland zum Abendland*, Berlin, 1901.

of the antique is something which does not occur in nature, and a violent crossing of it and the flat roof are unæsthetic in the highest degree. The grand development of Gothic architecture is due to the many methods of overarching the columns which made the pointed arch possible. Now where does this element, which enabled our great masters to produce their wonderful creations, first appear as an artistic means of architecture? In the Mosque of Ibn Tulûn, at Cairo, which was erected between 876 and 878; but probably even earlier in the Miqyas (Nilometer), on the Nile island Rôda.^a In art industry our dependence is still more apparent. With all our technical aids we are still far from attaining the noblest productions of the oriental textile industry. This is brought home to us, with regard to the Middle Ages, by the raiment of old German emperors bearing Arabic inscriptions, and with regard to the present time by examining the colors of genuine carpets, or the gloss of genuine Brussa silks. And as in textile industry China gave us silk, so also in ceramics that country taught us to produce the finest material—porcelain. But the influence of oriental art industry reaches far beyond the mere production of material. Every connoisseur of our modern decorative art knows that it owes most of its suggestions to Japan. "At the Paris exposition," the expert, Ad. Fischer, says, "everyone familiar with Japan could have convinced himself that the artists of the various countries often adopted the ideas of some Japanese artist. Thus, for instance, the porcelain factory of Roezendael appropriated the glorious flower and bird sketches of Schigemasa." Fortunately, we have learned at last to give the Eastern patterns a Western surrounding, but one familiar with Japanese art will frequently discern the exotic master even in the creations of modern naturalism, which again lovingly studies our own flora and fauna, for which the classicists lacked perception, so that we are justified in asking whether this whole tendency, which appeals to us as something native, does not after all owe its development to the intelligent study of a foreign culture.^b One who saw the plates of the elegant Vienna edition of Schmoranz, *Altorientalische Glasgefässe*, which appeared in 1898 (e. g., XXIX), will recognize that also this branch of our modern art industry has, in its noblest creations, copied the Orient with greater luck than the antique. This opens wider vistas concerning the influence of the Orient through art industry. Thus Wilhelm Bode^c points out how Venice, which in the fifteenth century reveled in the glory of Oriental carpets, matured the grandest school of colorists in painting, and indeed the

^a Compare Franz-Pascha, *Die Baukunst des Islam*, Darmstadt, 1877, p. 11.

^b A good survey of the character of Japanese art is given by Max Brinkmann, *Kunst und Kunstgewerbe in Japan* (lecture), Hamburg, 1883.

^c *Vorderasiatische Knüpftteppiche*, Leipzig (1902), p. 4.

thought suggests itself that the eyes of the Venetian painters were trained in these surroundings. We leave out of consideration what the antique on its part owed to the Orient and will only refer, concerning the origin of the gem, to the result arrived at by Furtwängler, of Munich, the greatest expert in glyptics:^a

The glyptic is none of the spontaneous arts which arise and flourish everywhere where men attained a certain degree of culture. It seems, closely seen, to have one original home to which all the other cases of its appearance more or less directly go back, that is, Babylonia.

And the gems again remind me of the Oriental origin of the fabulous animals and heraldic emblems;^b the double eagle is, as it is well known, Hittite.

The spirit, the forms, and products of the Orient everywhere pervade and transform our home. Before our windows blossom the tulip, the imperial lily, and the lilac, transmitted to us by the flower-loving Turks, to whom we probably also owe the horse chestnut. The eggs of the hen, a fowl originally from India,^c and the spices and other products of the Tropics have become indispensable necessities for our kitchen. Even the old German millet-pap had to give way to the Arabic coffee. Nay, even our idle pastimes bear the stamp of Moslem custom, for we owe the games of chess, checkers, and playing cards^d to the Mohammedans.

But let us turn our attention from these small matters to more important elements. The idea of phonetic writing, as is well known, had only one source. All the Indo-Germanic alphabets have a common origin in the North Semitic (Phœnician or, more correctly, the Canaanitish-Aramean). That also the South Arabic characters are but secondary forms of it was proven by Lidzbarskil,^e notwithstanding the attempt to reverse the relation. Even the Devanâgarî script with its family goes back to the North Semitic source.^f Wherein

^aAntike Gemmen, vol. 3, 1900, p. 1.

^bEdward Thomas Rogers, Le blason chez les princes musulmans de l'Égypte et de la Syrie: Bulletin de l'Institut égyptien (Séance du 24. déc. 1880) II. Série Caire 1882, pp. 83-131.

^cThe author of the strange book, Rembrandt als Erzieher, had the misfortune to contrast (24th edition, p. 43) the hen, as representative of the beautiful of our native fauna, with the parrot. The exceptions made by the Rembrandt philosopher to the colors of the parrot might also hold good with regard to the roller, which likewise remains a German bird.

^dI have shown in the Zeitschrift der Deutschen Morgenländischen Gesellschaft 53 (1899), 349-350, that the Spanish "naipe"—playing card—is derived from the Arabic laïb, play.

^eDer Ursprung der nord-und südsemitischen Schrift: Ephemeris für semitische Epigraphik, vol. 1, part 2. This methodically masterly treatise should form the starting point for all further investigations in the field.

^fCompare G. Bühler, Indische Palaeographie (Grundriss der indo-arischen Philologie), Strassburg, 1896, p. 17 ff.

consists the cultural value of phonetic or letter writing? It is not, as many assume, in facilitating the reading, for psychophysics has experimentally established the fact that we, no less than the Chinese, read not letters but words. Moreover, anyone can easily convince himself of this by the inability to at once read fluently a sentence in an entirely foreign language.^a

The circumstance that we read words explains the tendency to revert to ideographic writing which we can observe in all cursives and especially in the name *chiffre* whose dissolution into their letter constituents must be foregone. This is the only excuse for the mischief called orthography, which greatly nullifies the use of the invention by compelling us to express the same sound through different signs, as in German *v* and *f* and different sounds through the same sign, etc. Still, even in English, where a different vowel from the one meant is frequently written, letter writing has considerably simplified and facilitated the acquisition of reading, and that means the spread of culture. Its effect also reaches beyond the limits of nationality and age, and, finally, only through it could printing with movable type have become effective. To be sure, our writing is phonetically still far from perfect. The forms should in the first place indicate the articulation, and similar processes, such as modulation and aspiration, should be expressed by the formation of the letters themselves; further development of the sounds is conceivable which would render the writing simpler and more practical.

The invention of the letter alphabet which we owe to the practical sense of the Semites, and which was not essentially modified through the Classical and Christian Germanic culture periods, is such an important achievement that its historical aspect is worth consideration. To the spread of the Semitic alphabet in the regions known as its home, the find of Tell-el-Amarna furnishes the furthest limit in time, for as it proves that cuneiform writing was then in such exclusive use in Canaan that even the Canaanitish glosses are expressed in this cumbersome script, a Semitic consonantal writing could hardly have existed there prior to 1400 B. C.^b The close relationship between the writing of the Moabite Stone (840 B. C.) and the old-Aramean monuments of Senjirili (eighth century B. C.) seems to establish a common origin which we can not well push back beyond the eleventh century B. C. I see, therefore, no cogent chronological arguments against the recently asserted hypothesis of the immigration

^aThe Greek *ἀναγιννώσκειν* (properly, to recognize again) expresses, therefore, more correctly the process than the Latin "legere" and the German "lesen," which represent only the elementary phase of reading if legere suggests the collecting of the single letters and *ἀναγιννώσκειν* the recognizing of whole words.

^bCompare Lidzbarski, *op. cit.*



of the alphabet into Palestine with the Philistines from Crete.^a As regards the inscriptions discovered by Evans^b in Crete, even if, as asserted, they contained the mother script of the Canaanitish alphabet, and the clay tablet archives of Cnossus, from which the decipherment will probably have to start as soon as they are completely published, went back beyond the fourteenth century B. C.,^c still we have in the Orient much older systems of writing, besides it is far from settled that the question is here of a purely letter alphabet. The very number 93 of the pictographs discussed by Evans is against this assumption. H. Kluge,^d who reads them as Greek characters, had to employ arbitrary identifications of different signs in order to reduce their number. Of the many improbabilities of this attempt at decipherment may be mentioned the assumption that the original vowels became Semitic laryngeal signs, while the opposite development appears as the only natural one. Furthermore, according to the original forms assumed by him for the Cretan lineal signs, they should have something in common with the later Greek writing in contrast to the Canaanitish, but on the contrary the dependence of the Greek forms on the Canaanitish has been proven with great acumen by Lidzbarski. The testimony of the ancients themselves that the letters of Cadmus went back to an Oriental hero would have little weight if it had not a strong support in the unmistakably Semitic names of the Greek characters.

In the Middle Ages another scarcely less grand achievement of the human mind was transmitted by the Saracenes to the Occident—the Arabic system of numerals. To estimate the importance of reducing to a consistent system the position value of the signs which rest on the invention of the Zero, we must recall the utter impossibility of calculating a logarithmic table with Greek or Roman numerals, and the absolute necessity of this auxiliary for all modern mathematical sciences. Even the simplest arithmetical operations, as division, could not possibly be carried on with the antique numerals, and it requires, indeed, a kind of fanaticism to prefer, even at present, on title pages such modes of writing as CIOIOCCCLXXXVIII, etc., instead of 1888.

The form of the Arabic ciphers exhibit in many directions remarkable relations. There was, of course, many attempts to refer them to an Occidental origin, but these attempts are to be taken still less seriously than those concerning letter script. The graphic evolution of the Arabic numerals from the Roman, defended with much skill by

^a A. Fries, Die neuesten Forschungen über den Ursprung des semitischen Alphabets, Zeitschrift des Deutschen Palästina Vereins, xxii, 1899, 118–126.

^b Arthur J. Evans, Primitive Pictographs and a pre-Phoenician script from Crete and the Peloponnese: The Journal of Hellenic Studies, xiv, London, 1894, pp. 270–372; Further Discoveries of Cretan and Ægean Script, *ibid.*, xvii, 1897, pp. 327–395.

^c Athenæum, May 19, 1900, p. 634.

^d Die Schrift der Mykenier, Cöthen, 1897.



Sédillot,^a is a mere play of fancy and can not be followed up historically, unless one should introduce as an argument for it the iii of the rock inscription of the tenth century at Tôr, near the Gulf Suez, written in Roman fashion immediately before the Arabic numerals.^b On the other hand that the Divânî or Siyaqat ciphers, which show some similarities to the common Arabic numerals, arose from the abbreviated Arabic numerals, was already correctly recognized by De Sacy.^c Nevertheless the Indian origin of the Arabic numerals, acknowledged by the Arabs themselves, can now be considered as absolutely certain.

Prinsep's view,^d that the numerals of India developed from the initial letters of the corresponding numbers, does not take into account the possibility of accidental similarity between simple signs. As regards India ciphers 1-3, the formation through the corresponding number of strokes would at first suggest itself,^e but foreign influence is probable. But our first task, laying aside conjectures, should be to collect all the data on the ciphers.^f Woeypke's^g assumption of a migration of the Indian ciphers during the second or third century to Alexandria is wholly improbable, and also devoid of any proof. Alexandria had no need for foreign numerals, and the India system, being at that time still without the symbol 0 (zero), had no material advantages over the antique. Rather, in their course to the west, we first meet the India numerals among the Arabs, the earliest documentary proof being furnished by the Fayum Papyrus, No. 798, of the Vienna collection of 260 A. H. (= 873-74 A. D.).^h The west Arabic rather than the east

^a Sur l'origine de nos chiffres, lettre de M. L. Am. Sédillot à M. le prince Balthasar Boncompagni. Extrait des Atti dell' Accademia pontificia de' Nuovi Lincei, Tomo xviii—Anno xviii Sessione Va del 2 Aprile, 1865, Rome, 1865, especially p. 6.

^b Compare Zeitschr. der Deutsch. Morgenl. Gesellsch. 50, 1896, p. 90.

^c Grammaire Arabe, 2d ed., vol. 1, Paris, 1831, p. 91 and plate viii. Examples of the Siyaqat numerals are also found in the proceedings of the International Congress of Orientalists at Vienna, 1888, Semitic Section, pl. ii. Turkish MSS. of the Library of the Deutsche Morgenl. Gesellsch., No. 5, of the old catalogue (II, p. 39). The photograph of another Turkish document with Siakat ciphers, the original of which is in the Ethnographical Museum at Munich, was sent me a few days ago by Dr. Buchner. Count Eberhard von Mülinen, who first called my attention to this script and who kindly placed at my disposal some modern examples of it, refers me to Ismail Ghalib bin Edhem, Takvim-i-meskukat-i-seldschukijje, Constantinople, 1309, p. 56.

^d Journal of the Asiatic Society of Bengal, vol. vii, part 1, Calcutta, 1838, p. 348 ff.

^e Compare Bühler, Indische Palaeographie, pl. ix.

^f I refer to Euting's synopsis of the Aramean ciphers in his Nabatäische Inschriften, p. 96-97; Lidzbarski, Handbuch der nordsemitischen Epigraphik, p. 198 ff.; Gotthold Gundermann, Die Zahlzeichen, Giessen, 1899; on the evolution of cipher writing in India, Bühler, Indische Palaeographie, pl. ix.

^g Mémoire sur la propagation des chiffres indiens: Journal Asiatique, Série vi, Tome 1, 1863.

^h Comp. Karabacek, Führer durch die Ausstellung (Papyrus Erzherzog Rainer), pp. 216-217; for later proofs id. in Wiener Zeitschrift für die Kunde der Morgenlandes, xi, 1897, p. 13.

Arabic numerals resemble ours as well as those of India, because they have more faithfully preserved the old Arabic forms. The history of writing offers in this respect a parallel, since the Maghrib alphabet stands in many respects much nearer the Cufic than does the Neskhî. The ciphers of a Shiraz manuscript of the tenth century^a shows the transition of the older Islamic forms into those at present in use in the East.

In earlier times the zero was represented by a point; the circular form is secondary. R. Hoernle^b believes he recognizes the beginning of this sign in India in the fragments of an Indian arithmetic recently discovered, which he would ascribe to the third or fourth century A. D., and in which the point is also still employed for the unknown quantity. If it must be admitted that there is no inscriptional evidence for the zero before the eighth century, still there are indications of its existence in India even in previous centuries. I also believe that there is another series of phenomena connected with the history of the development of the zero which until now have not been considered under this aspect. The Greek philologists used at first to mark passages which they considered as not genuine by a horizontal line called *ὀβελός*. In the Hexapla of Origen the *ὀβελός* appears in various forms without any addition, as hypolemniscus with a point underneath, as lemniscus with two points, one above and the other underneath the line. As these signs are used promiscuously, those provided with points probably did not originate with Origen himself, but represent attempts at explanation by the scribes. The connection between the obelos points and the canceling point, which writers of different languages of the Orient and Occident place over letters which we would erase, is evident. In Latin this process was already in the fifth century in vogue.^c As regards Greek,^d Syriac, Armenian, I can only assert the fact without being able to fix the date of its beginning. In the Hebrew Old Testament, too, our texts mark every letter to be canceled by a point over it (compare, for instance, Genesis xvi, 5), and if an entire word should not be read the point is repeated over every letter of it (compare, for instance, Genesis xxxiii, 4). In Psalm xxvii, 3, is even found a mark corresponding to the lemniscus; that is, points above and under every letter. The mentioning of these points in the Talmud^e shows that they are older than the Masoretic vowel

^a Reproduced by Woepeke, op. cit., p. 75, column 4.

^b On the Bakhshali manuscript, in the Proceedings of the VIIth International Congress of Orientalists at Vienna, 1886, Aryan section, pp. 131-132. Compare also M. Haberlandt, *Zur Geschichte der Null*. Oesterreichische Monatschrift für den Orient, Wien, 1890, vol. 16, pp. 158-160.

^c Maurice Prou, *Manuel de Paléographie latine et française du vi^e au xvii^e siècle*, Paris, o. J. S., 151.

^d Compare Gardthausen, *Griechische Palaeographie*, Leipzig, 1879, pp. 278-279.

^e *Der Babylonische Talmud übersetzt von Wünsche*, 1, Halbband, Leipzig, 1886, p. 6.

system which the Talmud does not yet know. The circle (circellus) is met with in the Old Testament canon when the reading of the text is supplanted by a Masoretic marginal correction, which appears in our editions as a footnote. A small circle with negating force is also known to the Arabic popular script which arose in the period of the Omeyyads. The well-known Arabic sign of vowellessness, called sukûn or jezma, is perhaps not an unimportant connecting link in the history of the zero. It differs, it is true, from the other cases in so far that it negates the vowel, not the consonant, but Nöldeke, in his *Geschichte des Qorâns*, page 316, has also adduced an instance of the latter; in the Cufic codex, Wetzstein, n. s., No. 5, a yellow zero appears as a canceling mark of a consonant.^a In addition to the paleographical witnesses come also historical ones.

In a poem composed by a Bedouin during an expedition to Cyprus under the Calif Al-Walid Ibn Yazid (125-26 A. H. = 743 A. D.),^b the author deprecated the sea voyage, which he would gladly exchange for a camel's ride, resigning wages and heavenly reward to others—if he had but firm land beneath his feet, he would at once desert: "Verily," he exclaims, "my name at the roll call will receive a circle." Positive evidence for the existence of the zero sign in the Occident and its Latin name *cifra* can be shown only since the twelfth century.^c In the sixteenth century a division of meaning takes place so that the word in the form of "Zero" preserved the old signification of null (zero), while in that of "chiffre," cipher, it was used for any numeral.^d While I readily agree with Krumbacher that the word *sipos*, which twice made its appearance in the Occident, can only be ψῆφος (*psephos*) I know of no phonetic Arabic parallel to the derivation of *sifr* from ψηφο(φο)ρία (*psephophoria*). *Sifr* occurs in the meaning of "empty," even in pre-Islamic time.^e We shall therefore have to accept the old explanation^f that Arabic *sifr* in the meaning of zero is a translation of the corresponding Indian *sunya*.^g As in the case of the sign for no value, so also from the Orient comes the sign for the unknown value. Here, too, most desperate attempts were made to show its derivation from

^a We employ the canceling points at an erased word and they refer then to the erasure.

^b Nöldeke, *Delectus veterum carminum Arabicorum*, p. 62, Wellhausen. *Die Kämpfe der Araber mit den Römern in der Zeit der Umajjiden*, p. 32.

^c Comp. Karl Krumbacher, *Wohher stammt das Wort Ziffer (chiffre)?* in *Psichari, Études de philologie néo-grecque (Bibliothèque de l'École des hautes études)*, 92 Paris, 1892, p. 347.

^d Krumbacher, *op. cit.*, p. 348.

^e Comp. Hälil, ed. Schulthess, 31, 9, comp. also *safira 'l-witâbu*. *Imruulquais*, Ahlwardt 7, 3, *Ibn al-Athir*, i, p. 379.

^f Woepecke, *op. cit.*, p. 522.

^g A good survey of this question is given by Hermann Schubert, *Zählen und Zahl: Virchow-Holtzendorff'sche Vorträge, Neue Folge, 2d series, part 13, Hamburg, 1887.*

the antique culture sphere, and each theory had adherents. Thus, according to Prouhet, whom C. Henry still praises^a for his "ingenious" idea, we must believe that our X was the Roman sign for 1,000, viz, ∞ (=CIC), for one says: "He eats for 4," etc. One would expect that mathematicians, and especially arithmeticians, would be a little more precise in handling numbers and not write 1,000 for any other number. Lagarde, as is well known, has proven^b that the X of the mathematicians is an abbreviation of the Arabic word shei, "a thing," "something," which as early as the eleventh century was used to designate the unknown, and which in the then prevailing Western transcription was rendered by xei and still appears in this form in Pedro de Alcalá.

We have thus seen that two of the most important foundations of our culture, the alphabet and the ciphers, were gifts of the East. In order to obtain a more definite judgment of the share of the Orient and Occident in civilizing humanity, let us now turn to those discoveries and inventions which have contributed most to the mighty mental progress of the last centuries.

We begin to outgrow the ideals of so-called Humanism. Our age is in transition from classicism to universalism. Mental achievements are never formed from cloud mists, but need a concrete basis. The broad foundation of our modern world view is the result of familiarity with the spirit of foreign civilizations, and these could enter into our horizon only after the invention of the compass, which made navigation on the ocean possible. The magnet needle was known to the Chinese even in the beginning of the second century A. D., the most important evidence of this fact being given in Klaproth's famous letter to Alexander von Humboldt. Sur l'invention de la bussole,^c Ibn 'Adhârî quotes an Arabic verse of 854 A. D., in which the qaramîf (=calamita) is mentioned in a connection which would imply its referring to the ship's compass.^d

The work of civilization needs periods of peace. These we owe to the improvement of our military affairs, which have made war more terrible, but also less frequent. This, again, was made possible only

^a *Revue archéologique*, Nouvelle Série, vol. 38, p. 5.

^b Woher stammt das X der Mathematiker: Mittheilungen, Göttingen, 1884, vol. I., pp. 134-137.

^c Paris, 1834 (abbreviated in German by A. Wittstein, Leipzig, 1885).

^d *Comp. Al-Bajânu' l-mughrib*, ed. Dozy, Leiden, 1849-1851, vol. ii, p. 97; comp. p. 39 of the glossary. See also *Journal Asiatique*, vi, 11 (1868), p. 174 ff.; Steinschneider, *Intorno ad alcuni passi d'opere del medio evo relativi alla calamita*, Roma, 1871.—A. Schück (*Hat Europa den Kompass über Arabien oder hat ihn Arabien von Europa erhalten?*: *Ausland*, 65, 1892) is not acquainted with the important testimony of Ibn 'Adhârî, although it was to be found in E. Wiedemann, *Über die Naturwissenschaften bei den Arabern*, p. 20, and thus arrived at wrong conclusions, as the earliest Arabic information known to him dates from the thirteenth century.

by the invention of gunpowder, which gave to the intellectual element the sole mastery in warfare. The a priori conviction of many that only the Greeks or Romans could have invented gunpowder led to a dire confusion in this question. Combustibles like naphtha, etc., to which class also Greek fire belongs, were in use in the armies of the Califs^a and were confounded with explosives. Marcus Graecus, who had a receipt for making gunpowder from saltpeter, coal, and sulphur, being credited to the ninth century, while he actually wrote about 1250, and this under Arabic influence. The monk Berthold Schwarz is naturally a counterpart to the pretended inventor of the compass, Flavio Gioja, the historical facts about both being in doubt. In any case, their lives are placed in a time when the inventions which they are said to have made had long been known. Those who would reconcile this discrepancy try to reserve for these men some improvement which they might have applied, but as a rule with little success. A critical sifting of the evidence begins only with Romocki's excellent history of explosives,^b followed by a summarizing lecture by Dr. Edmund O. von Lippmann at Halle.^c Both specialists arrived at the same conclusion, that saltpeter was first known in China, but not before about the middle of the twelfth century. We have old Chinese accounts of the brave and successful defense of the Chinese city of Pian-king (K'ai-fung) on the Lower Hwang-ho against the Mongols under Ogotai in 1232.^d Here we first find explosives, blasting bodies, and rockets employed by the Chinese against the enemy. Of their form we get an idea from the cuts in Chinese fire books. In the thirteenth century the Arabs became acquainted with saltpeter, through China, for they designate it as thelg as-Sîn (Chinese snow), and the rockets as sahm Khatât (Chinese arrow). In the fire book of Hasan ar-Rammâh (Paris National Library, de Slane's catalogue No. 2825 ff.), which originated between 1275 and 1295, saltpeter already forms the "basis of fireworks" (Romocki). The same Hasan ar-Rammâh for the first time describes a torpedo as baida takhrug wa-tah-ruq (an egg which comes forth burning) with a cut in one of the Paris manuscripts, reproduced by Romocki, p. 71.^e

More important for us, however, than the compass and gunpowder

^a Comp. on their naphtha division my Arabischer Berichterstatter, 3d ed., p. 66-67.

^b S. J. von Romocki, Geschichte der Explosivstoffe: I. Geschichte der Sprengstoffchemie, der Sprengtechnik und des Torpedowesens bis zum Beginn der neuesten Zeit, Berlin, 1895.

^c Zur Geschichte des Schiesspulvers und der Feuerwaffen, Zeitschrift für Naturwissenschaft, vol. 71, 1898, pp. 295-364.

^d Fully translated by Stanislas Julien in Reinaud et Favé, Du feu grégeois, des feux de guerre et des origines de la poudre à canon chez les Arabes, les Persans et les Chinois: Journal Asiatique, octobre 1849, p. 284 ff., reprinted by Romocki, p. 45 ff.

^e Comp. also Max Jähns, Handbuch einer Geschichte des Kriegswesens, Leipzig, 1880, p. 518 ff.; Geschichte der Kriegswissenschaften, München, 1889, i, pp. 179-182.

was another invention, I mean that of printing, on which in recent years new light has been shed, especially through the finds in Egypt. If printing now appears to us as the greatest achievement of civilization, the merit of the invention rests less on the fundamental idea than on two preliminary conditions which rendered it possible to be turned to account, and without which the process would have remained unpractical, namely, the manufacture of a cheap writing material and the phonetic system of writing by which the entire fund of language can be represented through two dozen signs. We shall see how the Orient can claim in all these elements a considerable share of glory. In the first place, as regards the fundamental idea of printing, it can hardly be called a feat of genius, for the idea already existed in the use of ancient seal signs and mint stamps. The Babylonians who, as is well known, used clay as writing material, knew a method of multiplying texts analogous to book printing. We have old oriental seal cylinders^a covered with longer or shorter texts that were impressed in soft clay as the cylinders rolled over it. Writing materials of classical antiquity were too costly to make the general application of this process feasible. The art died out until East Asia solved the problem of material in a way before unsurpassed. As recently as 1875 Wattenbach, in the second edition of his *Schriftwesen im Mittelalter* (p. 114), said: "Paper * * * wraps its origin in thick darkness which will probably never be dissipated." How strangely this sentence now reads since the history of paper has come to be perhaps more unfolded to us than the history of any other ancient invention. We owe this progress above all to the fortunate circumstance that the greater part of the papyrus find in the Fayum came into the hands of investigators at Vienna who understood it well enough to make a scientific use of it, while the part which strayed to Berlin has contributed nothing to the numerous and surprising results gained in Vienna.

Ancient civilized nations at first used for writing materials what nature produced in a condition already suited to that purpose. So the Chinese formerly employed bamboo, as we can infer from the composition of some of the characters of their ideographic writings.^b The employment of color contrast must also be considered as a step forward, for at first the signs were merely scratched, as was the custom of our ancestors. I surmise that the invention of the pit (or

^aSee Furtwängler, *Antike Gemmen*, vol. 1, plate 1; vol. 3, p. 1 ff. Illustrations are found, for instance, in Hommel's *Geschichte Babyioniens und Assyriens*. Before the coming of scarabs into use this form of seal prevailed also in Egypt. Furtwängler, *op. cit.* See Dyroff, *Führer durch das Königliche Antiquarium in München*, p. 109.

^bComp. for the following Friedrich Hirth, *Die Erfindung des Papiers in China*: T'oung Pao, Leiden, 1890, vol. i, p. i ff, reprinted, without Chinese types, in his *Chinesische Studien*, vol. i, p. 259 ff.



brush of rat's hair, which the Chinese still use instead of the pen) is connected through Mōng-T'ien (died 209 B. C.)^a with the appearance of a softer writing material which, according to Chinese accounts found in Hirth, was, even in pre-Christian time, made from silk scraps. About 100 A. D. Ts'ai Lun, the director of the imperial manufactory of arms, made his immortal invention. Finding silk too expensive and bamboo unhandy, he devised a new writing material and manufactured paper out of bark, hemp, rags, and fish nets. It is well known that paper can be obtained from various plant fibers by freeing them from foreign substances, vigorously stirring when in a moist condition and drying in thin layers. The older processes show a similarity to the manufacture of felt, except that felt is made from raw animal materials while the paper industry uses vegetable fiber. As felt manufacture was particularly at home among the East-Turkish nomads, it may be supposed that the suggestion for the preparation of paper came from them to China, the more so as we first of all hear of raw animal materials (silk scraps). The most important source on Ts'ai Lun is his biography in the annals of the later Han, which treats of the period of 25-220 A. D. The great importance of the new invention was already recognized in his lifetime, and succeeding years did not forget his merit. In 105 A. D. Ts'ai Lun was officially praised by a cabinet order, and his house and the stone on which he stamped his paper were for many centuries considered as celebrated sights.

To the Vienna orientalist, Hammer-Purgstall, belongs the merit of having first brought to light from Islamic sources the important account of the spread of Chinese paper by way of Samarkand to the West;^b the precise date was established by Karabacek.^c The most important source, Tha'âlibî's Latâif al-ma'ârif,^d relates of the paper industry of Samarkand, which superseded papyrus and parchment, that it was transplanted thither by Chinese prisoners of war, captured by Ziyâd, son of Sâlih. There is a parallel account in Qazwîni's *Âthâr al-bilâd*.^e Karabacek's somewhat free translation seems to me to have much obscured the meaning of the *ittakhadha*. I should render the quotation from Qazwîni: "The author of Kingdoms and Traveling-routes relates that prisoners of war from China were transplanted to Samarkand, among whom were some who understood the manufacture of paper and choose it," etc. The reference here is evi-

^a I am indebted for this precise date to Professor Hirth, of Munich, whom I consulted in some cases about the transcribing of Chinese names.

^b *Zeitschr. der Deutschen morgenl. Gesellsch.*, vol. viii, 1854, p. 529.

^c Comp. for the following Karabacek, *Das arabische Papier*, reprint from the second and third volumes of the *Mittheilungen aus der Sammlung der Papyrus Erzherzog Rainer*, Vienna, 1887, and *Neue Quellen zur Papyrusgeschichte* by the same, reprint from the fourth volume of the *Mittheilungen*, Wien, 1888.

^d Edition of De Jong, p. 126.

^e Edition of Wüstenfeld, p. 360.

dently to the Mukataba, or right of slaves to buy their liberty, for as infidel prisoners of war were by Islamic law retained as serfs until they could accumulate the necessary ransom, they had to be given an opportunity for carrying on a trade. In the present case some of the Chinese paper makers chose the paper industry. The enterprise was successful and became a permanent acquisition for Samarkand. Ziyâd Ibn Sâlih is therefore not to be considered a genius in economics who wished to turn the skill of the foreigners into the service of his own state. From both Arabic and Chinese sources, which agree even as regards the month, we learn that Ziyâd gained a great victory over the Turkish princes, who were waging war against each other, and the auxiliaries sent by the Chinese Emperor under the command of the Korean Kao Hsien-fa in July of 751. Only on this occasion could those prisoners of war have come to Samarkand.

The Barmecide Al Fadl Ibn Yahya, brother of the grand vizier Ga'far who is known from the Thousand and One Nights, had as governor of Khurâsân opportunities to become acquainted with the Samarkand paper and transplanted this industry, as is related by Ibn Khaldûn under the reign of Hârûn-ar-Rashîd, between 794 and 795 to Baghdâd. By this step the Barmecide acquired great praise for himself, the city of the Califs having taken the lead in paper manufactories that spread into all Islamic countries, as far as Spain. The Museum Erzherzog Rainer possesses two Arabic letters on rag paper (Nos. 917 and 918) of about 800 A. D., which are probably two specimens of the Bagdad paper factory a few years after its establishment. The excavations of M. A. Stein in Chinese Turkestan may have brought to light still older paper samples.^a By a chronological sifting of the Fayum documents, the gradual use of paper in place of papyrus can be distinctly followed, and in the middle of the tenth century the latter is entirely superseded. At the beginning of the eleventh century we first meet in the Fustât bazar with packing paper^b in place of the coarse papyrus of which Pliny, xiii, 23, says: *Nam emporica inutilis scribendo involucris chartarum segestriumque mercibus usum præbet, ideo a mercatoribus cognominata.*

In agreement with the account of Fihrist (p. 21) that the Khurâsân paper was made of linen, Wiesner's microscopic investigations have proved that cotton paper was not the predecessor of linen paper, as was formerly thought, but had never existed.^c

For the further spread of paper in the Occident we have only Wat-

^a So far only the preliminary report, London, 1901, is accessible to me.

^b Comp. Karabacek, *Das arabische Papier*, p. 37. Perhaps the Egyptian document finds come from such packing paper stores for which the numerous documents of a private character would speak.

^c J. Wiesner, *Die Faijûmer und Uschmûneiner Papiere: Mittheilungen aus der Sammlung Erzherzog Rainer*, vols. 2 and 3, Wien, pp. 179-260.

tenbach's compilation^a from which it is difficult to obtain a clear view. Still, according to the data given by him, it seems that paper production came from the Arabs to Southern Europe in the twelfth century and in the fourteenth to Germany (p. 145). How thoroughly the invention, the history of which we have just sketched, now pervades all our relations in life is shown among other things by the cognomen of "paper age" given to our time. Borrowings of civilization have also their traces in the language. And indeed our paper measures, "quire" and "ream," go back to old-Arabic time. "Ream" is the Arabic *rezma*, "package," which passed into Spanish as *resma*, into Italian as *risma*, into German as *ries*, into French as *rame*. For "quire" the French say "*main de papier*," the Russian "*dyest bumagi*." *Dest* is the Persian word for hand and in Arabic also denotes a pan^b and a measure.^c On the other hand, for the material itself the languages of the Occident did not receive a new word but transferred the Egyptian designation of the older writing material to the new descendant which in common with the former is of vegetable nature, just as the name "pen" was inherited by the more perfect steel writing instrument.

Like the art of paper making, so also that of printing wandered from the Orient to the Occident in the form of fabric printing (*Zengdruck*). Nobody has thus far made a study of this industry in China; in fact, there is a general dearth of workers in the field of sinology. It is well known of the Dayaks of Borneo that they first cut the designs of their tattooings in wood, then, with the aid of a pigment, impressed it on the skin and performed the operation after this pattern.^d We possess Egyptian fabric prints of the sixth century. What is perhaps the oldest sample comes, it is true, from the tomb of St. Cæsarius at Arles, but is very probably of Egyptian origin^e and is preserved in the Germanic Museum at Nuremberg.^f This same institution possesses a valuable collection of fabric prints of the sixth and seventh centuries, which Dr. Forrer, of Strasburg, excavated at Ikhmim, in Upper Egypt; also two fabric print models from the same place. A shred reproduced by Forrer^g seems to represent the beginnings of the art in the Occident and dates, according to him, from the Carolingian

^a *Schriftwesen im Mittelalter*, 3d edition, Leipzig, 1891.

^b Comp. Fleischer, *De glossis Habichtianis*, Lipsiæ, 1836, pp. 13-14, und *Les voyages de Sindebad le Marin*, ed. Machuel, 2d éd. Alger, 1884, p. 13 of the Arabic text.

^c Comp., for instance, *Ibn at-Tiqtaqâ*, ed. Ahlwardt, p. 131; *faakala ma'ahu destam mina' l-khubzi's samidhi*, he ate a dest of cracknels; in the Stambul Karagöz print, "*Karagözün aktor olmasy*," is read, p. 8, "*bir desta kiât*," a dest of paper.

^d See Heinrich Schurtz, *Urgeschichte der Kultur*, p. 397, and the illustration of a tattooing stamp on p. 398.

^e Comp. R. Forrer, *Les Imprimeurs des Tissus*, Strasbourg, 1898, p. 9.

^f No. 1088 in Hampe's *Katalog der Gewebesammlung des Germanischen Nationalmuseums*, 1. part, Nuremberg, 1896.

^g *Die Kunst des Zeugdrucks*, Strassburg, 1898, plate iii, No. 1.

period. In the succeeding centuries it was Germany that assiduously cultivated fabric printing in the Occident.^a

Printing on paper arose in China as a consequence of paper invention. As early as 175 A. D. the text of the Chinese classics was posted on the outer walls of the university and impressions were taken of it. At the end of the sixth century printing was carried on in China with wooden plates, for at that time the remnants of the classical books were cut in wood by order of the founder of the Sui dynasty.^b At an early period the Chinese invention migrated to Japan. On the beginnings of Japanese printing Satow gives a thorough study. We learn from it that in 764 the Japanese Empress Shô-toku ordered a million of small wooden pagodas, each containing an imprint of a passage from the Buddhist book *Vimala nirbhasa Sûtra*, to be distributed among the Buddhist temples and monasteries. The carrying out of this command was brought to an end in 770. A number of these pagodas have been rediscovered in the Horyu monastery at Yamato. They contain on long rolled-up strips Sanskrit texts, but in Chinese characters. Facsimiles so far exist only in Japanese works.^c We also possess metal printing plates of the year 816, with Chinese signs in relief.^d Hirth found a book offered for sale in China which was printed from plates in 1054 A. D., containing poems by a poet of the Sung dynasty, with a portrait of the author in woodcut.^e For the succeeding centuries information on book printing in East Asia becomes more and more abundant.

Although the geographer Ritter pointed out the antiquity of the art of book printing in the monasteries of the Lamas,^f no headway, it seems, has been made in fixing the dates of the old Tibetan prints, as the persons mentioned in them as the printers or patrons are otherwise unknown. According to the history of Buddhism in Mongolia, translated by Huth,^g the first Tibetan copy of the *Kanjur* and *Tanjur* was

^aIn addition to the literature mentioned above, compare on calico printing Forrer, *Die Zeugdrucke der byzantinischen, romanischen, gotischen und späteren Kunstepochen*, Strassburg, 1894; Karabacek, *Führer durch die Ausstellung (Papyrus Erzherzog Rainer)*, Wien, 1894, pp. 228, 229.

^bSatow, *On the early history of printing in Japan: Transactions of the Asiatic Society of Japan*, vol. x, Yokohama, 1882, p. 48ff.

^cKwanko *zattshô und Kokoku shobatsu*.

^dReproduced in *Shiuko zisshiu*, vol. i.

^eF. H., *Old Chinese books: Journal of the China branch of the Royal Asiatic Society for the year 1885, New Series*, vol. xx, Shanghai, 1886, p. 53.

^f*Erdkunde*, 2d part, 2 book; *Asien*, vol. 1, 2d ed., Berlin, 1832, pp. 744-745.

^g*Jigs-med nam-ink'a aus dem Tibetischen herausgegeben, übersetzt und erläutert von Georg Huth*, ii, Strassburg, 1896, p. 165; comp. Köppen, *Die Religion des Buddha*, ii, p. 277: "Tibet is, like Germany and China, a land of books. Much is being printed there and it has been so a long time back, for the printing press has been known to the inhabitants of the snow kingdom perhaps since the T'ang dynasty under which it was invented in China, but certainly since the Mongol period—that is, at least two centuries before it was known to the Europeans."



printed in Tibet during the reign of the Mongol King Pôyant'ô Khân (1311-1319). It contains the account of a pious man who emigrated to Mongolia and there became priest of the ruler mentioned above. "He sent from Mongolia a large quantity of perquisites for the printing of the bKa-gyur and the bsTan-gyur, but particularly a small box full of Chinese blacking. The Lama rejoiced over it. Bloghsal of dBus and others printed with the plates thus sent the bKa-gyur and the bsTan-gyur at T'ugs-k'u and recommended the placing of these copies in the Manyughosha temple at sNar-t'an. After that the copies of the Kagyur and Tan-gyur became very abundant."

Of the further spread of printing in the Occident nothing was known until a few years ago. On the other hand, it was well known that the Islamic Orient for a long time opposed the introduction of the printing press. Their opposition was founded on the apprehension—not officially acknowledged—that the hogs' bristles, which the Mohammedans always suspect in the brushes used for the cleaning of the types, might touch in the type the name of Allah. Even at present the Koran is not being printed in the Orient, and lithography is generally given the preference, and the Moslem prints by reason of the imperfect cleaning of the types are much inferior to those of the Jesuits in Beyrout. In Constantinople a printing establishment came in existence only in 1727 in consequence of a hatt-i-sherîf of the Sultan Ahmed III.^a The accounts of the Euclid in Arabic, supposed to have been printed in the sixteenth century at Constantinople,^b rests, as I have been able to ascertain in the library of the Deutsche Morgenländische Gesellschaft, on an erroneous interpretation of the statements on the last leaf of a folio edition at Rome in 1594.

Great, therefore, was the surprise when the Fayum find brought to light thirty Arabic plate prints from Egypt belonging to the tenth Christian century, two of them perhaps even to the ninth century.^c In the excellent Führer durch die Ausstellung (guide to the exhibit) Karabacek declares, page 247, that "they are, as regards the cut of the forms and the process of printing, perfectly identical with the Chinese." But I must contradict him when he goes on to say, "Thus our collection preserves the oldest prints in the world so far known," for, as I have shown above, older Japanese prints were then known. The

^aOf the prints of this oldest Turkish press the University Library at Erlangen possesses a description of America under the title of "Tarikh al-Hind al-gharbi al-musammâ bi-hadith-i-new, Rama'an, 1142 A. H.," the Library of the Deutsche Morgenländische Gesellschaft Nazmizade's Turkish translation of Ibn 'Arabschâh's Tarikh-i-Timur of the same year, as, also, Hadji Khalifa's Taqwim at-tawârikh of 1146 A. H., and I personally have the Grammaire Turque of 1730 A. D.

^bDibbin, *Ædes Althorpianæ*, vol. 1, London, 1822, p. 127: "Euclides. Arabicé. Constantinop., 1588. A beautiful large copy of a very uncommon edition." * * *

Comp. Graesse, *Trésor*, ii, p. 515.

^cComp. *Österreichische Monatsschrift für den Orient*, vol. 16, 1890, p. 167.

Arabic documents at Vienna are partly printed black on white, partly white on black; No. 929 is printed in red. In one case (No. 941) there are Coptic characters in addition to the Arabic. They are without any value as regards their contents. A printed piece of the Koran, reproduced by Karabacek in the Führer, page 248, shows that the Mohammedans were not then prejudiced in this respect.

The historical continuity of printing can not be proven with the same certainty as that of the use of paper. Still, to show that the knowledge of printing on paper remained alive in the Orient, the following witnesses can be adduced. According to Karabacek, who refers to Abû Shâma's *Kitâb ar-raudatain*,^a the compulsory bank notes, each of one dinar, issued in 1147 in northern Syria, were produced by plate printing, and in the paper money printing bureau established in 1293 A. D. at Tebriz the work was carried on after Chinese patterns.^b Furthermore, the Persian historian Rashîd-ed-dîn (died 1318 A. D.) gives a description of the Chinese process of printing.^c We learn from this description the interesting fact that at that time editions of a certain number of copies were not printed, but the plates were kept under lock in the libraries. Anyone who wished to buy a book went thither and had an impression made. The cultural value of the edition should not be underestimated. Thus, for instance, the importance of book printing for the Reformation would have been much impaired by the old Chinese process of multiplying.

As long as paper had to be imported into the Occident it could not be cheap, because of limited means of communication in the Middle Ages. From Wattenbach^d we learn that in Germany, at least, the use of paper became more general only after the fourteenth century. After paper production was established in the Occident we observe here, as among the Chinese and the Arabs, that printing followed in its train.^e

The step from printing from plates to that with movable types was, with our phonetic system of only two dozen signs, still less a feat of genius than the invention of the printing process at large. In the *Wegweiser durch das Germanische Museum*, Nuremberg, 1901, page 147, the following passage occurs: "In recent time some think they

^a Printed at Cairo 1287 A. H. = 1870-71 A. D.

^b Comp. Karabacek, *Neue Entdeckungen zur Geschichte des Papiers und Druckes: Österreichische Monatsschrift für den Orient*, vol. 16, 1890, pp. 169-170.

^c Comp. M. J. Klaproth, *Lettre à M. le Baron A. de Humboldt sur l'invention de la boussole*, Paris, 1834, pp. 131-132.

^d *Schriftwesen im Mittelalter*, 3d ed., p. 149.

^e Comp. T. O. Weigel und A. Zestermann, *Die Anfänge der Druckerkunst*, 2 volumes, Leipzig, 1866; *Katalog frühester Erzeugnisse der Druckerkunst der T. O. Weigel'schen Sammlung*, Leipzig, 1872; A. Essenwein, *Älteste Druckerzeugnisse im Germanischen Museum: Anzeiger für die Kunde der deutschen Vorzeit*, Nuremberg, 1872, columns 241-248; W. L. Schreiber, *Vorstufen der Typographie: Gutenberg-Festschrift*, Leipzig, 1900, p. 30 ff.



have found proofs that the Romans of the later periods of the Empire were acquainted with the art of printing with movable types, or that at least attempts in that direction were then made." I could find no light on this paragraph which is apt to stir up the emotion of the visitors. The statement is made in such a timid manner that one suspects it could stand the test no better than the analogous assertions discussed above. But it is true that Gutenberg was not the first in the Occident to conceive the idea of printing with movable types, for initials, prefixed letters, seem to have been early in use,^a and the Dominican, Conrad Forster, born at Ansbach, was employing movable types at Nuremberg between 1437 and 1457 in bindings, copies of which are still extant at Leipzig, Nuremberg, and Würzburg.^b Chinese sources name as the inventor of printing with movable types of clay the smith Pi-Shōng between 1041 and 1049 A. D.^c Though we have no positive indications of a migration of this art to the West, still there recently came to light books in East Asia which had been printed with movable types long before Gutenberg. The oldest east Asiatic print from types which Satow personally examined dates from the period between 1317 and 1324; whether it is of Korean origin or Chinese can not be decided with certainty.^d In a supplement to his study just referred to Satow describes Korean books printed from metal types,^e which furnishes another proof for the priority of printing from types in East Asia. One of these, printed in 1409, contains, in an epilogue, an important contribution to the history of type printing, for in it the King of Korea relates how, having recognized the inadequacy of printing from wood plates, he had for the preservation of literature ordered the manufacture of copper types at his personal expense and that of his court and not at the expense of his subjects. The memorable epilogue, which is dated between December 14, 1403, and January 12, 1404, closes with prayers for the future prosperity of the undertaking. Still, even this most important of all human inventions could not thrive in its own home, since the Chinese ideographic writing required such a large mass of type material that it almost outweighed the advantages of the innovation. Only through our Semitic phonetic alphabet could the idea become the factor in civilization that it now represents.

^a Schreiber, Gutenberg-Festschrift, pp. 67-68; Wattenbach, op. cit., p. 269.

^b Comp. Franz Falk, Der Stempeldruck vor Gutenberg und Stempeldrucke in Deutschland; Gutenberg-Festschrift, pp. 73-79.

^c Comp. Stanislas Julien, Documents sur l'art d'imprimer à l'aide de planches en bois, de planches en pierre et de types mobiles, inventé en Chine longtemps avant que l'Europe en fit usage; extraits des livres chinois; Journal Asiatique, iv, 9, Paris, 1847, p. 511ff. = Comptes rendus des séances de l'Académie des Sciences, Tome 21, Paris, 1847, p. 1005ff. (The Chinese types are given in the Journal Asiatique only.)

^d Comp. Transactions of the Asiatic Society of Japan X Yokohama, 1882, p. 63.

^e Further notes on movable types in Korea and early Japanese printed books, *ibid.*, pp. 252-259.

If we now pass in review the preceding disquisitions and recall all the great world-transforming consequences of those achievements which we, without question, owe to the Orient, we shall have to acknowledge that they form the presuppositions of a very important part of our mental life. Of course, our civilization is for all that no more oriental than antique. Each people lives its own life of culture; only impulses come from the outside. To gain a right estimate of their importance we must not allow ourselves to be misled by enthusiastic phrases, but, standing on the solid ground of facts, investigate how far the effect of the impulses reach, particularly whether they touch only a caste or the mass. While Hellenism did not reach the people—a Greek name in a popular song would at once characterize it as not genuine^a—but continues its existence chiefly within certain scholastic circles, the usefulness of the compass, apart from indirect ways, directly benefits the entire seafaring population, and the advantages of explosives are appreciated by every soldier, while writing and printing may be considered as the common property of all mankind.

We do not cultivate the languages of the Orient because of the mighty influence of its people over the Occident in centuries past, but because we hope from these studies there may come even greater benefits in the future. As Humanism once meant a considerable widening of the mental horizon, so it means at present for our state of civilization an artificial narrowing, having crystalized into a cold classicism^b and, according to the well-known law of human development, resembling in many respects the old scholasticism which it once conquered. But we expect, analogous to the Humanists, that our science, after removal of certain external obstacles which of late have hindered its progress, will have the mission, in union with other sciences which are more and more being developed from decade to decade, to deliver mankind from a one-sided world view and to give it back the understanding for the beautiful in all its manifoldness.

^a Entirely erroneous is the theory propounded at present that popular poetry arises solely from the more or less learned class. Where is the art form of the drawing-room from which, for instance, the popular ditties ("Schnaderhüpfel") could have developed? There is only so much truth in this theory that no hard and fast lines can be drawn between both, and that they frequently influence one another, though the really good comes more often from below than from above.

^b The enrichment through subjective assimilation of foreign elements is the latest phase of development which is as yet in its beginning.



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