

need not add that the tale of the massacre of the innocents is also found in the Indian legends of Buddha and Krishna.

The story of St. John the Baptist seems to have been inserted into the Gospel for a similar reason. We may say, therefore, that we have no positive evidence that John the Baptist ever met Jesus. His existence as the founder or Jewish head of the sect of the Disciples, and the sect itself, must be granted to be historical. It was a powerful movement before Christ and at the time of St. Paul but lost its strength with the appearance of Christianity. It was so similar to Christianity that it was regarded as a heresy, and we can well understand that the last survivors who would not accept St. Paul's doctrine of the crucified Christ explained their own Christ to be spiritual (πνευματικός) and the Christ of the Christians as only psychical (ψυχικός).

We must remember that "spiritual" (πνευματικός) means a religious life on the highest plane, while the term psychical (ψυχικός) denotes the lower soul life. Where St. Paul in 1 Cor. xv. 44 speaks of the psychical and spiritual body our authorized translation renders the word psychical by "natural." Pneumatic or spiritual means calm and intellectual, while psychic or natural implies being passionate and sensuous or even sensual.

According to the same version Jesus was a psychic Christ, but when at the moment of baptism the Holy Ghost descended upon him the spiritual Christ was united with him and he became the true Christ; but this spiritual Christ departed again before the passion and, according to this interpretation, it was the psychic Christ who was crucified.

EDITOR.

SIR JOHN HERSCHEL ON HINDU MATHEMATICS.¹

[The following extract from Herschel's article "Mathematics" in David Brewster's *Edinburgh Encyclopædia* (Philadelphia, 1832) is reprinted because it contains facts little known and arguments too good to be ignored. At the time when the article appeared, Colebrooke's great translation of the standard Hindu works of Algebra was still fresh in the public mind. (London, 1817.)

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So early as the latter part of the tenth century (A. D. 980) Gerbert, having learned of the Moors in Spain their system of arithmetic, had imparted it to his countrymen the French, whence

¹ Substituting *Hindus* for "Indians," and using the modern spelling of Sanskrit words. I am indebted for a knowledge of this article to the venerable Mary Boole, through my sister, Mrs. F. Eagle.—A. J. E.

it rapidly spread over Europe, and continues in use to the present moment. The Moors and Arabs, by their own unanimous avowal, derived this admirable invention from the Hindus who, there is good reason to believe, were in possession of it at least from the time of Pythagoras. The story of this philosopher's visit to the Brahmins is well known, and a suspicion may be entertained that his time there was better employed than in picking up the ridiculous doctrine of the transmigration of souls. Boetius relates the singular fact of a system of arithmetical characters and numeration employed among the Pythagoreans, which he transcribes, and which bears a striking resemblance, almost amounting to identity, with those now in use, whose origin we know to be Hindu. The discovery (generally so considered) of the property of the right-angled triangle by the same philosopher, is a remarkable coincidence. This was known ten centuries before to the Chinese, if we may credit the respectable testimony of Gaubil. It was well known to the earliest Hindu writers of whom we have any knowledge, and who appear to have derived it from a source of much more remote antiquity. It is scarce conceivable that a *Greek* invention, of such extreme convenience as the decimal arithmetic, should have been treated with such neglect, remaining confined to the knowledge of a few speculative men, till, from being communicated as a mystery, it was at last preserved but as a curiosity; but the aversion of that people to foreign habits will easily account for this, on the supposition of its Hindu origin.

An abstract truth, however, is of no country, and would be received with rapture, from whatever quarter, by men already advanced enough to appreciate its value. We are then strongly inclined to conclude that in the latter as well as in the former instance Pythagoras may have acted only the part of a faithful reporter of foreign knowledge, though the reverse hypothesis, viz., that the first impulse was given to Hindu science at this period by the Greek philosopher, might certainly be maintained.

However this may be, the great question as to the origin of algebra, which has been the cause of so much speculation, seems at length, by the enlightened researches which have of late been made in Hindu literature, nearly decided in favor of that nation. It will be proper to state, as briefly as is consistent with perspicuity, the grounds of this conclusion. The earliest Hindu writer on algebra, of whom any certain or even traditional knowledge has reached us, is the astronomer Aryabhaṭṭa who, from various cir-

cumstances, is concluded to have written so early as the fifth century. It is true, the work of Diophantus takes the precedence of this in point of antiquity by about a hundred years, nor is it at all intended to deprive the Greek author of the merit of independent invention. Indeed the comparison of the state of knowledge in the two countries at the periods we speak of, is decidedly favorable to the independence of their views. By what we know of the Hindu author it appears that he was in possession of a general artifice of a very refined description (called in Sanskrit the *kaṭṭaka*, or "pulveriser") for the resolution of all indeterminate problems of the first degree, and also of the method of resolving equations with several unknown quantities. It is very unlikely that these methods should have arisen at once or been the work of one man, especially as they are delivered incidentally in a work on astronomy. Now, of the latter of them we are not sure that Diophantus had any knowledge, as, although he resolves questions with more than one condition, he always contrives, by some ingenious substitution, to avoid this difficulty. Of the former he was certainly ignorant. His arithmetic, indeed, though full of ingenious artifices for treating particular problems, yet lays down no *general methods* whatever, and indicates a state of knowledge so far inferior to that of the Hindu writer that no supposed communication with India about the third or fourth century would at all account for the phenomena. But there is yet stronger evidence. The *Brahma-siddhānta*, the work of Brahmagupta, a Hindu astronomer at the beginning of the seventh century, contains a general method for the resolution of indeterminate problems of the second degree: an investigation which actually baffled the skill of every modern analyst till the time of La Grange's solution, not excepting the all-inventive Euler himself. This is a matter of a deeper dye.

The Greeks cannot for a moment be thought of as the *authors* of this capital discovery; and centuries of patient thought and many successive efforts of invention must have prepared the way to it in the country where it did originate. It marks the maturity and vigor of mathematical knowledge, while the very work of Brahmagupta, in which it is delivered, contains internal evidence that in his time geometry at least was on the decline. For example, he mentions several properties of quadrilaterals as general which are only true of quadrilaterals inscribed in a circle. The discoverer of these properties (which are of considerable difficulty) could not have been ignorant of this limitation, which enters as an essen-

tial element in their demonstration.² Brahmagupta, then, in this instance retailed, without fully comprehending, the knowledge of his predecessors. When the stationary character of Hindu intellect is taken into the account, we shall see reason to conclude that all we now possess of Hindu science is but part of a system, perhaps of much greater extent, which existed at a very remote period, even antecedent to the earliest dawn of science among the Greeks, and might authorize as well the visits of sages as the curiosity of conquerors.

TEL SUGGESTIONS FOR THE FORMATION OF A UNIVERSAL LANGUAGE.

From very early times thinkers have felt the diversity of languages in the different parts of the world to be a great disadvantage and handicap to the progress of the human race.

So have arisen the legends of the "golden age" when all men, and even the animals, had a common speech, and of the loss of this blessing following the loss of innocence.

Although we do not, perhaps, to-day think that if we could give to all nations a common tongue the world would return to a state of primeval blessedness, there are nevertheless many persons in many lands who feel that such a gift would be an inestimable boon to mankind.

That this is the case is evident from the widespread welcome which has of late years been accorded to such notable attempts in this direction as *Volapük*, *La Langue Bleue* of M. Bollack, *Esperanto*, and its successor *Ido*.

These, despite their simplicity of construction and many other excellent points, either have failed, or probably will fail, to achieve what their inventors hoped for them. And the cause of such failure should most likely be looked for in the fact that their originators have not gone to the root of the matter.

A knowledge of Esperanto or Ido, for instance, is doubtless easily acquired by a European, especially if he has a slight knowl-

²This argument has been overlooked by the author of the two able articles on Hindu algebra in the 42d and 57th numbers of the *Edinburgh Review*. It is of particular force in one instance: the elegant property discovered by Ptolemy and annexed at the end of the sixth book of Simson's edition of Euclid. (Note by Herschel.)