Western Europe produced few students of eminence in mathematical science during the middle ages. Some individuals, however, travelled into foreign countries in search of knowledge. Adelard, a monk of Bath, first brought to England a translation of Euclid's Elements from the Arabic. John of Basingstoke, Roger Bacon, Isidorus Hispalensis, Bede, the Venerable, and Alcuin, were great scholars, and did something towards introducing a knowledge of mathematics. Gerbert, the most remarkable man of his age, Leonardo Bonacci of Pisa, Paoli di Dagomari, 1350, Raffaelo Caracci—all these combine to show that the Italians were in possession of the science of algebra long before the rest of western Europe.

The oldest treatise on algebra in the Arabic language was composed by Abu Abdallah Mohammed Ben Musa about A.D. 813. It is highly probably that he derived his knowledge from the Hindus, for the Arabians wrote their figures from *left to right* after the Hindu fashion, while their language is written from right to left. The algebra of Mohammed Ben Musa is elementary, exhibiting fundamental operations, mensuration of triangles, circles, &c., but not extending beyond the solution of simple and quadratic equations. He gives no name or definition of the science, nor does he give a formal explanation of the terms *al jebr* and *mokabalah*, by which he designates certain operations peculiar to the solution of equations, but he repeatedly employs these two terms combined for the name of the entire science.

Al jebr is derived from the Arabic verb *jabar*, which means *to restore something broken*. The word *mokabalah* is a verbal noun from a verb which means to compare two things with one another, and is used mathematically to express a comparison between positive and negative quantities. Thus, as applied to equations *al jebr* meant restoration, and *mokabalah*, reduction, or addition and subtraction of equals on both sides of the equality. The Arabians did not adopt the Hindu notations, they held a less general notion of equations, and their method of solving equations was different from that of the Hindus; for instance, they had no conception of the equation $x^2+px+q=0$, the sum of three positive quantities=0, otherwise than as an absurdity.

Among the writers subsequent to Mohammed Ben Musa may be mentioned Abufaraj, Abu Yusef Alkindi, Ahmed Ben Mohammed, Abu Hanifah, Abulwafa, and Omar Alkhayyania, whose algebra was translated into French in 1851 by Dr. F. Woepcke. It was probably composed about A.D. 1000.

The first algebra printed in Italy was that of Lucas Paciolus, in 1494, with the title "L'Arte Maggiore ditta dal Volgo de la Cosa over Alghebra e Almucabala." After the appearance of this work arithmetic and algebra engaged the attention of learned men both in Italy and in other western countries of Europe, and were considerably advanced and improved, especially in the matter of abbreviations and new and convenient characters. Among eminent Italians we may note Jerome Cardan, who published discoveries in cubic equation 1539; and Nicolas Tartaglia (1500), who made these discoveries. Among the Germans, John Müller; Michael Stifel or Stifelius, who surpassed his predecessors and contemporaries by his "Arithmetica Integra," and led the way to further extensions and improvements; and John Scheubel, professor of mathematics at Tubingen.

Robert Recorde, M.D., composed the first treatise on algebra in the English language, printed 1552. The second part is called "The Whetstone of Witte, containing the extraction of roots, the Cossike practice with the rules of equation, and the workes of surde numbers." It is in the form of a dialogue, and treats of the properties of numbers, square and cube roots of algebra, or cossic numbers, and of the roots of compound algebraic expressions. It employs the notation of Stifelius, and contains rules for the solution of simple and quadratic equations with numerous examples. Recorde was the first to use the terms binomial and residual, and the sign =.

The great names after the time of Recorde are Bombelli of Bologna, 1579, Vieta, Clavius, Thomas Harriot, William Oughtred, Réné Descartes, Francis Schooten of Leyden, Henry Briggs, Pierre de Fermat, Dr. John Wallis of Oxford, 1656, La Grange, Gregory, Dr. Borrow, Sir Isaac Newton, Euler, and Leibnitz.—*Abridged and re-written by the editor from the Notices of Robert Potts, M.A., in his Algebra, London*, 1879.

AN OLD MAGAZINE.

"Whether doth the moon at full and change really affect lunatic people; and if it doth, how, and in what manner doth it work this strange alteration in them?" This is the first query we hit upon in the pages of "Mathematical, Geometrical, and Philosophical Delights." London, 1794.

We make a few extracts, to exhibit the character of the work done a hundred years ago in a magazine which ranged over the whole Cambridge course of pure and mixed mathematics. A great portion of the problems lie beyond the limits likely to be interesting to the majority of our readers. We therefore cull only a few quaint and a few short examples.

Query 16 by Philo: It is well-known from repeated observations, that in hot weather when the sun has shined for several days successively, the effect of the burning glass is much weaker than when the sun shines immediately after a shower. Required the reason of the phenomenon.

SOLUTION—From experience it is well known, that heat exhales from the earth a prodigious number of sulphureous homogeneous particles, which by their gravity float in the atmosphere, absorb and prevent the incorporating rays from falling parallel, or with such great coalescence upon the mirror. When immediately after a shower, the rain precipitating the sulphureous particles purges the air of its absorbing matter, so that the numerous converging rays fall parallel upon the mirror, and are driven against the combustible body, with an incredible, superlative, inflammable force.

69. Given $x+y\times\sqrt[3]{z}=1775$,
and $xyz=28336$,
also $x^3y^2z+x^2y^3\times\sqrt[3]{z^4}=178149848800$, where x represents the year, y the month, and z the day of the month wherein I was born.

SOLUTION—Divide the third equation by the product of the first and second and you will have $xy=3542$, and by the second $xy=28336\div z$; these values of xy being equated z is found=8; now z being known the first and second equations become $x+2y=1775$, and $xy=3542$, whence by subtracting 8 times the latter from the square of the former and extracting the root we get $x-2y=1767$, hence by addition and subtraction $x=1771$, and $y=2$, consequently I was born February 8th, 1771.

84. By J. P. O. Sullivan, Esq.: From the following equations be pleased to try—If you can find x equal four times y.

$x+y^3+x\div y=144$, and $x^2+y^2+x^5\div y^2=4608$.

At a village in Yorkshire, on the brink of the Swale,
Where cowslips and violets their sweet odours exhale,
Dwells a maid of real beauty, and wisdom refined;
She's the pride of her sex—and the hope of my mind.
From the equations below, learned gents, pray unfold,
The name of this fair one whom I prize above gold.

(1) $\frac{1}{2}(w+x)+yz=79$.
(2) $\frac{1}{2}(x+y)+zw=90$.
(3) $\frac{1}{2}(w+z)+xy=22$.
(4) $\frac{1}{2}(y+z)+wx=24$.

Where w, x, y, and z shew the letters in the alphabet composing her name. Thus Mr. T. Keith wrote an equation "to his mistress's eyebrow." We leave our readers to verify the solution, which covers more than a page of the *Delights*, and makes "Ward the name of this beautiful lady."

The editor, Mr. Thomas Whiting, Master of Keppel-House Seminary, in his remarks to correspondents announces: "No. 11 will be published on July 10th, 1798, and all letters for its use must come to hand before the *First of January*, and they must be franked or post-paid, or they will not be received."

PROBLEMS.—(SELECTED.)

1. A and B engage to reap a field for \$90. A could reap it in 9 days, and they agree to finish it in 5 days, in consequence of which they were obliged to get C to help them for the last two days, and B received \$3.75 less than he otherwise would have done. In what time could B or C reap the field? *Ans.* B, 15 days; C 18 days.

2. Find the amount of 1 cent at 6%, compound interest, from the Birth of Christ to January 1st, 1882, say 1881 years.

Given log. 1.06 = ·02530586526.

Ans \$3984130,000,000,000,000,000,000,000,000,000,000,000,000,000

3. If 30 acres of grass pasture 40 horses 50 days, and 60 acres 70 horses 80 days, how long will 90 acres support 100 horses, the grass growing uniformly all the time. *Ans.* 100 days.

4. With the interest already due on a certain mortgage and that which will arise while the work proceeds, I can exactly pay the wages of 15 men for 11 months, or 31 men for 5 months, wages being uniform. Find how long I could engage 9 men on the same plan. *Ans.* 20 months.

5. Given $(x+y)(1+xy+x^2y+xy^2+x^2y^2)+xy=a$ . . . . (1)
$xy(x+y)(x+y+xy)(x+y+xy+x^2y+xy^2)=b$ . . . . (2)
to find x and y.