

clusion. "The dispute between science *versus* classics in education will not be settled on paper or by discussion. It will be settled, in fact, by the establishment somewhere or other, and in some form or other, of a system of scientific education, the results of which will vindicate themselves. We may argue, and vested interests may resist, but the tendency of things is unmistakable—the sciences will end by conquering their place."

W. R. D.

#### CORRESPONDENCE OF CHRISTIAN HUYGENS.

*Œuvres Complètes de Christiaan Huygens.* Publiées par la Société Hollandaise des Sciences. Tome Deuxième : Correspondance, 1657–59. (La Haye : Martinus Nijhoff, 1889.)

THE second volume of the great edition of Huygens's works, the first volume of which was noticed last year in these pages (*NATURE*, vol. xxxviii. p. 193), has made its appearance with creditable promptitude. The letters included in it range from 1657 to 1659. That they are numerous and elaborate is sufficiently shown by the bulk of their receptacle; their value might be taken on trust from the names of the writers, and can be ascertained by the somewhat laborious process of perusal. This, however, may be curtailed at pleasure by having recourse to a series of admirably-constructed indexes, aided by which, readers, exempted from the ignominious necessity for "skipping," are enabled to find what they want, and neglect what less immediately concerns them.

Scientific correspondence was in those days of far greater importance than it is now. It, in fact, to a great extent, took the place of scientific journalism. There was then no recognized channel of public criticism. The first numbers of the *Philosophical Transactions* and the *Journal des Savans* appeared within a few months of each other in 1655; the *Acta Eruditorum* began to be published at Leipzig only in 1682. The learned formed a cosmopolitan caste, using a cosmopolitan language. They made an audience "fit and few" for each other's communications, and cared little, in general, to address a wider public. Epistolary intercourse assumed, accordingly, proportions and a significance which we find it difficult to realize. From one end of the Continent to the other, workers were, by means of letters nominally private, kept *au courant* of the progress of invention, readers of the course of publication; ideas and criticisms were interchanged; authors were informed of the impression produced by their works; controversies were conducted or commented upon.

In the correspondence now before us, indeed, there is small trace of the *odium scientificum*. Although often obliged to stand on the defensive against unjust attacks upon his originality, Huygens never lost self-control. The *scelerata insania belli* had no place in his calm and reasonable mind. His reticence is strikingly illustrated by the incident of the feigned anagram, left unfinished and mysterious by the earlier letters, but brought to a satisfactory conclusion in the present collection. The bogus claim put forward by Dr. Wallis to the detection of Saturn's first-known satellite, proves, in accordance with

the conjecture emitted by Mr. Maunder in the *Observatory* for last March, to have been an infelicitous practical joke. It enforced, however, a designed moral by rendering palpable the protective inefficacy of cryptographical announcements; and no more was heard (that we are aware) of the entrenchment of discoveries or inventions behind logogryphs. Huygens continued in a state of mystification on the point for above three years, the Savilian Professor's first explanatory letter having miscarried; but he allowed his natural irritation only the vent of a few jottings of a strictly private character.

The publication of Huygens's "*Systema Saturnium*" was the leading event of the period now under consideration. The book was long and eagerly expected, and was received—so far as letters acknowledging the receipt of "complimentary copies" enable us to judge—with a chorus of approbation. Its author, at the age of thirty—Galileo being already dead, and Newton as yet unknown—found himself pre-eminent among the astronomers of Europe. "*Ora ha Giotto il grido.*" Yet the flattering assurances with which he was overwhelmed did not wholly exclude some expressions of misgiving. The physical and mechanical difficulties attending the existence of such a Saturnian system as he described were very great. The hypothesis of a ring was no doubt beautifully ingenious, and accounted for observed phenomena with the utmost neatness and sufficiency; but was it true? Was such an incredible structure, in point of actual and undeniable fact, to be found in the heavens? Such questionings could not but arise, and were only finally set at rest by the predicted complete disappearance of the anomalous appendages as the earth got to the unilluminated side of them towards the end of 1671.

Saturn's ring-system has now so long held a place in astronomical consciousness that it costs an effort of the imagination to conceive the audacity of the first attempt to establish it there. Its author himself did not look for immediate and unqualified assent. All he hoped for was that his mode of accounting for the "bizarre appearances" of the "triple planet" should get an unprejudiced trial. Writing to Slusius in September 1659, he congratulated himself that his hypothesis had not struck him as absurd; and he met the scruples of objectors with a quiet appeal to time. It has not failed to justify his confidence.

An incidental paragraph in the "*Systema Saturnium*" (p. 9), announcing the virtual discovery of the great Orion nebula, appears to have excited little attention. Huygens's correspondents passed it over in silence; he took no trouble to invite their opinions on the subject; nor is there evidence that any of his subsequent observations were directed towards that "gap" (as it were) in the crystalline vault through which the glimmering of empyreal fire was discernible. Still more singularly, Hevelius, although he catalogued the stars, and enumerated fourteen nebulae, did not include among them the Orion "portent," upon which, indeed, he seems never to have had the curiosity to direct his telescope (H. Schultz, *Astr. Nach.*, No. 1585). The first intelligent observer of nebulae was Halley.

A sidereal phenomenon of another sort, however, attracted considerable attention in the learned *côteries* of Paris and the Hague. Janson's "new star," *in collo Cygni*, was again visible in 1658–59. First seen in 1600 as of the third magnitude, it disappeared from view

in 1621, but was re-detected, in its pristine brightness, by Domenico Cassini at Bologna in 1655. The news seems to have taken no less than three years to filter to the Low Countries. Golius, of Leyden, was one of the first to get hold of it, and he transmitted it to Boulliau, of Paris, who thereupon perceived, plainly enough, a brilliant star shining in the place of a usually telescopic one. As an example of mental inertia comparable to that afforded by Hevelius with regard to the Orion nebula, it is worth noting that the object had caught his eye twelve days previously, but without rousing his attention. He imparted to Huygens his conviction that the Milky Way "provided the material for such generations," among which he included comets; and judiciously wound up his speculations by urging the necessity for continued observation.

His correspondent had anticipated the recommendation. His interest in the "renaissance of the Swan" (as he termed it) is shown by various remarks; but a more formal essay on the subject, alluded to in a letter to the Sicilian astronomer Hodierna, has not been preserved. Huygens considered the star, on November 20, 1659, to have lost none of its lately-acquired brilliancy. Boulliau, however, had already noticed a diminution in *size*, though not in *lustre* (a distinction to which he evidently attached some importance), and on December 12 saw further symptoms of fading in its pale and languid aspect. From the decline which then set in, it has never completely recovered, but has remained, since the abortive maximum of 1665, undistinguished by conspicuous vicissitudes. "P Cygni," as Janson's star is called in modern nomenclature, now betrays peculiarity of constitution only by the bright hydrogen lines photographically discovered by Prof. Pickering in its spectrum.

Huygens's invention of the pendulum clock is a prominent topic in the correspondence before us. He was not without hope of solving, by its means, the ever-recurring problem of longitudes, "if only it would bear transport by sea"—a prudent qualification. Of curves and quadratures, telescopes and lenses, chronometry, meteorology, mechanics, the theory of numbers, much is said, showing the working of thought along these various lines of research. There is scarcely, in fact, a branch of scientific history which is not usefully illustrated by these valuable letters.

A. M. CLERKE.

#### THE ANATOMY OF THE HUMPBACK WHALE.

*The Anatomy of the Humpback Whale (Megaptera longimana).* By John Struthers, M.D. (Edinburgh: 1889.)

THERE is probably no order of Mammals which during the last twenty-five years has been more worked at than the Cetacea. The result has been that we now possess a valuable body of information on both the classification and anatomy of this most interesting group of animals. On the continent of Europe, the names of Eschricht, Reinhardt, Lilljeborg, Van Beneden, and Gervais stand out most prominently as authorities; whilst in this country Sir Richard Owen, Profs. Flower, Struthers, and Turner, Dr. Murie, and Prof. Macalister, have all written valuable memoirs which have added

largely to our knowledge of the whales. Through the combined labours of these anatomists the order has been rescued from the state of confusion into which it had been thrown by some systematic writers, who, by regarding almost every specimen stranded on our coasts as a new species, had introduced a complexity of nomenclature which was most puzzling.

The humpbacked whale, the anatomy of which forms the subject of Prof. Struthers's memoir, is, from its form and structure, one of the most interesting of the occasional visitors to our coasts. The number of specimens the capture of which has been recorded in British waters, prior to that of the specimen dissected by Dr. Struthers, was only three: viz. a female cast ashore near Newcastle in September 1829, and described by the late Dr. George Johnston; another female taken in 1863 in the estuary of the Dee, the skeleton of which is in the Derby Museum, Liverpool; and an adult towed into Wick Bay in March 1871, the skeleton of which was not preserved. This whale is, however, not uncommon in the North Atlantic, more especially off the coasts of Norway and Finmark, and in the seas of Iceland and Spitzbergen.

The specimen described in Prof. Struthers's memoir was seen in the Firth of Tay, in the month of December 1883. It was harpooned, but broke away from its captors, was ultimately found floating dead off Bervie, and was towed into Stonehaven Harbour on January 8, 1884. It is fortunate that it fell into the hands of so competent an anatomist and so enthusiastic a cetologist as the Aberdeen Professor. Thanks to his untiring energy and industry, he has furnished us with a monograph on the external characters, the skeletal anatomy, the muscular anatomy of the pectoral limbs, and the connections of the pelvic bones and rudimentary hind limbs of this animal, far more precise and detailed than had been given by any previous anatomist. He has added also greatly to the value of his description by instituting a comparison between the skeleton of Megaptera and that of *Balenoptera musculus*. The memoir will have to be studied by all cetologists who wish to have an exact knowledge of the anatomy of this great baleen whale.

#### OUR BOOK SHELF.

*First Mathematical Course.* Blackie's "Science Text-Books." (London: Blackie and Son, 1889.)

THIS little work, comprising arithmetic, algebra (as far as simple equations), and the first book of Euclid, is adapted to the requirements of the examinations of the Science and Art Department in mathematics (Subject V.), first stage. The more elementary parts of arithmetic have been briefly treated, as the pupil will have most probably reached fractions, but great attention has been paid to the examples, which are both numerous and judiciously chosen. The algebraical part is completed up to and includes simultaneous equations, and here, as in the arithmetical part, we have a great number of well-arranged examples, including those set for this stage in previous examinations. Part III. consists of the first book of Euclid with exercises on the various propositions. Preceding the answers to the examples is an appendix containing specimen examination papers set by the above-named Department. Teachers, who require a great number of easy examples on these three branches of mathematics, will find this book very useful.