

do not mention it, and I agree with Herr Haas that the story is a mere invention.

Of the arrival at Malacca some time in 1547 and of the subsequent conversion by Xavier of three Japanese there can be no doubt, however much we may distrust Pinto's account of his share in bringing about their visit. The chief of the three, Anjiro (Hachiro?) induced Xavier himself to go to Japan, and in 1549 the great apostle of the east landed at Kagoshima, famous some three centuries later for its stout resistance to an English squadron.

Of Xavier's labours I can say little here. He remained two years and some months in Japan, founded three churches and baptized some 800 converts. Herr Haas speaks highly of his labours. But he seems to have been satisfied with mere external observances, and his ignorance of the language must have reduced his dogmatic teaching to its least expression. What would be interesting and instructive to know would be what the Japanese, especially the Buddhists and Confucianist scholars, thought of his doctrines. No hint has come down to us—perhaps they took no thought of a strange religion that seemed of no great importance. The chapters on the social and political conditions of Japan in the sixteenth century are interesting—particularly the account they give of Buddhism and Confucianism, both in themselves and as a setting to Xavier's apostolate.

Herr Haas's style is not unattractive, and in the eulogy of Xavier rises into eloquence. But—to an Englishman at least—many of the sentences, often occupying half a page or more, are both tedious and obscure. A portrait of Xavier taken from an old print is prefixed, which, however, bears little resemblance to that contained in Dr. Murray's "Japan." F. V. D.

CHEMICAL PHILOSOPHY.

Le Mixte et la Combinaison Chimique: Essai sur l'Évolution d'une Idée. By E. Duhem. Pp. 207. (Paris, 1902.) Price fr. 3.50.

FROM the earliest times there have existed two opposed views of the constitution of homogeneous mixtures. According to one view, the mixture was in reality as in appearance homogeneous. The elements composing it disappeared as such and were replaced by an entirely new thing, the mixture, from which, however, by appropriate treatment the original elements might be regenerated. According to the other view, the homogeneity was only apparent, and due to the feebleness of our senses. Each element consisted ultimately of atoms, which in the mixture retained their individual character, being mingled, but in no sense fused.

Prof. Duhem in the present essay, which originally appeared in the *Revue de Philosophie*, follows the fortunes and discusses the scientific evolution of these ideas from the time of Bacon and Descartes to the present day. In a series of interesting chapters, he shows the adaptation of chemical theory to facts as they accumulated, tracing the development of the notions of element, equivalent, substitution, type, valence, isomerism. It is, however, to the last chapters that chemists will probably turn with the greatest interest. In these the author gives a critique of the atomic theory and an account of

chemical mechanics. His point of view may best be given by quotation.

The great achievement of atomic theory is the simple interpretation of the law of multiple proportions. But, the author asks, is the victory decisive? Who can say that this is the only possible explanation?

"When we see with what simplicity and clearness all the principles of modern chemistry may be systematically expounded, though the name and notion of atom are alike absent, and what difficulties and contradictions arise when it is desired to interpret these principles according to the doctrines of the atomists, we cannot help thinking that the sole success of the atomic theory is only an apparent victory and one without a future, that the theory does not show us the true objective basis of the law of multiple proportions, that this basis still remains to be discovered, and finally, in a word, that the evidence of modern chemistry is not in favour of the Epicurean doctrine."

In a foot-note, the author draws attention to the circumstance that what is here said of the law of multiple proportions and its interpretation by atomic hypotheses may be repeated word for word of the crystallographic law of rational indices and its interpretation either by the integrant molecules of Hauy or the space-nets of Bravais.

With regard to the general aspect of physics and chemistry to-day, the author says:—

"Physical science is not a metaphysic. It has no intention to penetrate beyond our perceptions in order to grasp the essence and ultimate nature of the objects of these perceptions. Its end is to construct by means of signs borrowed from the science of numbers and from geometry a symbolic representation of what our senses, aided by instruments, bring to our knowledge. Once constructed, this representation lends itself to reasoning more simply, rapidly and certainly than the purely experimental data for which it was substituted. By this artifice, physics assumes a breadth and precision which it could never have attained without clothing itself in this schematic garment which we call theoretical or mathematical physics. To each element which logical analysis discovers in any physical concept there now corresponds, not a metaphysical reality, but a geometrical or algebraic character of the symbol which is substituted for the concept. For the notion of a chemical substance, for example, there is substituted a chemical formula; the idea of the analogy of two chemical systems is expressed by a series of equalities between the indices which affect certain letters; the idea of derivation by substitution is represented by means of certain lines or 'bonds'; and the dissymmetry of a geometrical figure serves to represent a substance possessed of optical activity."

We can thoroughly recommend the book for the thoughtful consideration of those interested in chemical philosophy.

OUR BOOK SHELF.

Die Internationalen absoluten Masse insbesondere die elektrischen Masse. By Dr. A. von Waltenhofen. Third edition. Pp. xi + 306. (Brunswick: Friedrich Vieweg und Sohn, 1902.) Price 8 marks.

IN preparing the third edition of this book, the author has, by introducing an amount of new matter, nearly equal to the whole of the second edition, sought to make the work, not only a complete study of the international system of units and measurement, and in particular of the electrical units, but also an introduction to the study of electrical