

Dublin. Together with an introduction to the Study of Physical Chemistry, by Sir WILLIAM RAMSAY, K.C.B., F.R.S. Pp. lxi + 381. London, Longmans, Green and Co. 1908.

The term stoichiometry which originally was applied to the calculation of chemical equivalents has been extended by Ostwald to include not only the determination of atomic and molecular weights, but the study of the properties of solids, liquids, gases and solutions as well. It is in this broader sense that the author uses the word in the title of the present volume, which may be regarded as the most satisfactory of this admirable series of texts which we owe to Professor Ramsay.

Unfortunately many of the text-books which appear nowadays are characterized by a sort of inbreeding, each one reading like a re-assortment of the stereotyped pages of its predecessors. This fault the author has avoided to a remarkable degree. The interest of the reader is held not only by the refreshing novelty of the treatment but also by the introduction of much comparatively unfamiliar material and many new tables and figures. If a criticism were to be made it would be that the author's zeal in the exposition of experimental results has caused him to neglect those fundamental thermodynamic considerations which would have added much to the symmetry and logical completeness of his work.

Never has a simple experiment, carried out with the highest accuracy and scientific honesty, been rewarded by more signal consequences than Lord Raleigh's determination of the density of nitrogen. The continued study of the small discrepancies which he found, and which might have been glossed over by a less critical observer, have led directly on the one hand to the discovery of the five new elements of the argon family, and on the other to the complete revision of our accepted table of atomic weights. The work of D. Berthelot, Guye and others has established the complete validity, at very small gas pressures, of the principle of Avogadro, and has enabled them by physico-chemical means

alone to determine the atomic weights of a considerable number of elements with an accuracy which rivals that attained in the most refined chemical analyses. How this method has led to a notable amendment of Stas's value for the atomic weight of nitrogen, and thence indirectly to a modification of many other important atomic weights, is fully described by the author. He discusses also some of the more important determinations which have been made by chemical means and shows the futility in such cases of the calculation of the so-called probable error, a point which he might well emphasize more strongly.

In the chapters on liquids, the critical state, and liquid mixtures Professor Young deals with subjects to which his life has been devoted. The reader expects therefore a comprehensive and stimulating treatment and he is not disappointed.

The introduction to physical chemistry by Professor Ramsay which is included in this book has already appeared in another volume of the series. It is a very compact statement, along conventional lines, of the historical development of chemical theory. The reviewer notes one paragraph, on solubility, page xxxv, which may be very misleading to a beginner.

GILBERT N. LEWIS

Behind the Scenes with the Mediums. By DAVID P. ABBOTT. Chicago, The Open Court Publishing Co. 1906. 8vo, pp. 328.

To the psychologist or layman interested in the *modus operandi* of deception, this pains-taking book by Mr. Abbott will prove as invaluable as it is interesting. It brings home with renewed emphasis the technical expertness that goes into the performances of the modern mystifier, particularly of the type that appeals to the spiritualistic or other prepossessions of the sitters. It emphasizes equally how unevenly matched must be this mystifier and the ordinary or even the extraordinary investigator who interprets his inability to discover how the effect is produced into a warrant for the belief that something defying natural experience has been witnessed. In the face of such manifold and complex procedures, the assurance of even the sincere

and observant that their watchfulness precluded any such varieties of deceit appears most feeble. When one considers the difficulty of describing in proper sequence and with sufficient detail an ordinary procedure, the impossibility of deciphering a performance studiously devised to conceal every item of its real purpose becomes glaringly evident.

The largest amount of ingenuity seems to have been expended in the devising of tricks that shall reveal knowledge apparently out of range of the performer's sphere of influence. The reading of sealed billets is a favorite device and is endlessly variable in procedure, running the gamut of manifolding paper, chemically revealed impressions, the substitution of prepared messages, the intrusion of confederates, concealed speaking tubes and telephones, and codes of signals of some measure of resourcefulness, to say nothing of prepared "blue books" of gossip information for each town visited and the helpful *esprit de corps* of the profession. At times there is a skillful service of simple physical principles with an appropriate translation into the mystifying terminology. A clever device by which any one of a series of pendulums will begin to respond by taps against the sides of the glass in which it is suspended, is managed by the performer's giving an impact to the table upon which the glasses stand and timing his gentle pushes with the period of the pendulum designated. The pendulums are all made of slightly different lengths; and with a little practise the right one is set going, to the perplexity of the sitters. Even an ordinary magnet embedded in a plaster hand is sufficient to serve as the medium of "thought vibrations," while telescopic projecting rods that disturb furniture ten feet off become the proof for the moving of objects without contact. Such are the things undreamt of in the philosophy which our forefathers designated "natural" and which in these practical generations ministers to the needs of so varied interests as physics, parlor entertainments, and a belief in the survival of materializing and materialized spirits.

² Nothing less than a reading of the volume will convey an adequate sense of the versatility

of device, yet in individual cases of the poverty of resource and obviousness of deception that make up the professional equipment of the medium. Such reading is eminently to be recommended, and is nowhere to be found in more convincing form than in Mr. Abbott's narrative. The very directness and simplicity of the story argues its singleness of purpose; which is the matter-of-fact enlightenment of the *modus operandi*. This in turn is doubly convincing by the fact that Mr. Abbott himself has tried and tested that whereof he speaks, has produced the effects described, has gained the confidence of the mediums, who have in some cases adopted the devices of Mr. Abbott's performances (which it is needless to state were given merely as effects by natural means to be explained by the sitters as their judgments dictated), and has cultivated for years the field in which he is expert. It is for these reasons that the practical value of the book, both as a record, and as a rationalizing instrument, is quite sufficient to deserve a word of appreciation on the part of those interested in spreading the gospel of common sense and sound science.

The psychological aspects of deception are not specifically treated, but appear conspicuously between the lines. The mental physiognomy of the species "medium" stands revealed in recognizable though variable features. It presents usually a somewhat bourgeois, coarse, temperament, attracted by the ready gullibility of the clientele and the get-rich-quick instincts of the adventurer, and with this combines a variable stock in trade in a commanding presence, an insinuating manner, a shrewd observation, a bold finesse, or a real even if somewhat criminal interest in playing the game and winning. A medium who actually bullied his sitters to provide the proper moment for picking their pockets (to extract a letter or other document to obtain name and address) is thus described: "The medium was a very large and powerful man . . . at one time he had been a pugilist. After this he became a minister of the Gospel, finally taking up the profession of a spirit medium, as this was more lucrative for one of his talents and personal appearance." In

other social circles the type may appear thus. "There is a lady medium in Omaha who is the wife of a prominent citizen. She is afflicted, being nearly blind. This lady, in her seances, produces large quantities of cut flowers, which she claims to materialize from their 'astral forms.' Most persons would think that a lady of her standing, and afflicted in the manner she is, would not deceive." The flowers are real flowers, and the medium allows ladies to examine her clothing to see that no flowers are concealed about her person. Yet no one pays attention to a confederate under whose ample skirts the "astral" flowers take shelter until needed, nor is the public aware of regular consignments of flowers to the medium from "a greenhouse in Council Bluffs." As to the psychology of the sitters, it is doubtless complex and divisible into many types. In the main it is not the performance that convinces against protest and despite intellectual antagonism; but rather that prepossession finds support in seeming mystery and flies to evils that it knows not of. The most common trait is the assurance that in the case observed there really was no room for trickery or malobservation. Why such assurance should be so common a trait it is not easy to explain. One wishes for such persons the attitude attributed (possibly without due warrant) to Sir Walter Scott: when asked whether he believed in ghosts, he is said to have replied, "No! I have seen too many of them."

J. J.

A UNIQUE COLLECTION OF PERIDOTITE

STATE MINERALOGIST J. F. WHITLACK, of Little Rock, Ark., has recently arranged and placed on exhibition at the Bureau of Mines, Manufactures and Agriculture, a unique collection of peridotite which is attracting much attention.

The collection contains specimens of the peculiar peridotite breccia from the three well-known American localities, those of Arkansas, Kentucky and New York, arranged side by side with similar rock and concentrates from the most noted of the African mines, indicating more forcibly than could a lengthy

description the extremely close resemblance between the rocks of these widely separated localities. So close is the resemblance between the peridotites from these various localities, as shown by the specimens both rough and polished, that it is almost impossible to distinguish between them.

The rock is a dark green, almost black, porphyritic mass composed largely of grains and crystals of olivene. The tendency of this mineral to alteration is well known, and specimens of the alteration products—the green and yellow serpentinous earths from the various localities—are also shown. These earthy products are interesting economically as well as scientifically, for it is by washing and screening them that the heavy concentrates are obtained from which the diamond and other gems are subsequently sorted. The collection thus shows the various stages through which the rock passes from practically the fresh unweathered condition through the partly altered peridotites into the softer green and yellow earths to the concentrate of pebbles and gems. Besides the much prized diamond the latter includes the light green olivene, bright red garnet and deep blue diopside crystals. The last named has not as yet been recognized in the Arkansas deposits.

To the scientist the problem of explaining how these gems come to be locked up in this peculiar volcanic material is of greater interest than the question of securing them, and it is hoped that a study of the conditions at some of these localities may explain the perplexing problem. At several of the occurrences the diamondiferous peridotite penetrates beds of shales rich in carbon, hence it has been suggested that the diamond, which is merely crystallized carbon, owes its presence to the fact that the heated material forced its way as a partially liquid mass through the adjoining carbon-bearing shales, absorbing some of their carbon which later crystallized from the cooling magma as the diamond. This plausible hypothesis would no doubt still be regarded as the true explanation were it not for the fact that at several of the diamond mines no carbon shales are known, hence the diamond could not have been derived from