zoological division of the earth" is made by "separating the Australian regions from the rest," and that the best natural division of the remainder is effected by cutting off the Neotropical region. We should then have three primary zoological regions, which first Prof. Huxley, and afterwards Mr. Sclater, in his oral lectures on geographical distribution seemed to consider as of nearly equal importance. On this Mr. Wallace remarks that "in isolation and speciality, determined by what they want, as well as by what they possess, the Australian and Neotropical regions are undoubtedly each comparable with the rest of the earth. But in richness and variety of forms they are both very much inferior, and are much more nearly comparable with the separate regions which compose it." After discussing this subject at some length, and disposing shortly of Mr. Allen's system of "circumpolar zones," Mr. Wallace comes to the conclusion that a consideration of all the facts zoological and palæontological, indicates that the great northern division, or *Arctogæa*, is as much more important than either Australia or South America, as its four component parts are less important. He therefore reverts to the six original regions proposed by Mr. Sclater in 1857, as the most workable, and most conveniently adapted for the study of zoological distribution.

Thus much having been settled, Mr. Wallace proceeds to point out the limits of the six great regions, and to indicate the sub-regions into which they may be best divided. As regards the latter part of this task there is much difficulty. It must be confessed that the sub-regions in many cases are as yet only approximately determined, and that those adopted by Mr. Wallace are in several instances open to serious question. For example, "the great central mass of South America, from Venezuela to Paraguay" is constituted in the present work as a single division of the Neotropical region under the name of the "Brazilian Sub-region." But there can be no doubt that within this area there are two, if not three, distinct sub-regions which deserve recognition. The fauna of south-eastern Brazil, so admirably investigated by Prince Max. of Neuweid, Burmeister, Reinhardt, and other well-known naturalists, is very distinct from that of the great Amazonian valley, and the adjacent flats of Guiana and the Orinoco. Many genera are peculiar to each of them, and a whole host of representative species perform similar functions within the respective areas. Herr von Pelzeln's divisions of the Neotropical region, and those employed by Messrs. Sclater and Salvin in their papers published in the Zoological Society's *Proceedings*, are much more natural than those suggested by Mr. Wallace. We fear that in spite of what he says on the subject our author has rather allowed a hankering after uniformity to lead him astray and to induce him to restrict his sub-regions to four in each case.

The chapter on Classification which next follows, and concludes the first portion of the work, contains some very apposite remarks. A natural classification of animals is, as Mr. Wallace observes, of first-rate importance in discussing matters of distribution. But, except in the case of a few groups, we have by no means yet attained to a natural classification of animals, and even as regards these we are, in the opinion of many naturalists, still very far from it. It is only therefore some few of the classes

of animals that are sufficiently known to be useful for the study of distribution. As such Mr. Wallace selects the Vertebrata, the butterflies, and six families of Coleoptera amongst the insects, and the terrestrial and fresh-water land-shells amongst the Mollusca. Of these better-known groups he gives us tables of the arrangement which he proposes to adopt for the illustration of his remarks on their geographical distribution.

(To be continued.)

OUR BOOK SHELF

Notes on Collecting and Preserving Natural History Objects. By J. E. Taylor, E. F. Elwin, Thos. Southwell, Dr. Knaggs, E. C. Rye, J. B. Bridgman, Prof. Ralph Tate, Jas. Britten, Prof. Buckman, Dr. Braithwaite, Worthington G. Smith, Rev. Jas. Crombie, W. H. Grattann. Edited by J. E. Taylor, Ph.D., F.L.S., F.G.S., &c. (London: Hardwicke and Bogue, 1876.)

THIS is a republication of a series of papers from *Science Gossip*; and the names of the respective authors is a sufficient guarantee for the value and accuracy of the information it affords. It is a very useful book to put into the hands of young persons with some taste for natural history but quite ignorant of how to collect and what to observe; since it devotes as much space to the latter branch as to the former, and is thus a more instructive work than its title indicates. The subjects discussed are—geological specimens, bones, birds' eggs, lepidoptera, beetles, hymenoptera, land and fresh-water shells, flowering plants, grasses, mosses, fungi, lichens, and seaweeds. It is a pity that a few other essays were not obtained—on birds, mammals, reptiles, fresh-water fishes, crustacea, spiders, and sea-shells—so as to make the book somewhat more complete as regards "Natural History Objects;" but so far as it goes it is an excellent little work, and is perhaps better adapted to encourage an incipient taste for the study of nature than many more pretentious volumes. The chapters on birds' eggs, butterflies, and beetles, are especially full and interesting; while those on bones and fungi are valuable, as likely to incite the reader to take up the study of these somewhat neglected objects.

A. R. W.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

The Harris Cubit of Karnak

As the measures of this cubit hitherto published are more or less incomplete, the following series may be worth attention.

For permission to examine this relic, I am indebted to Dr. Birch, under whose care it is placed in the British Museum; and who, with his usual courtesy, gave every facility for its measurement.

The readings were taken by laying this wooden cubit on a brass standard scale, divided to tenths of an inch and to millimetres, with its divided face at right angles to that of the scale. Two observers then read the values of the divisions in both inches and metres, giving four readings in all, at about 66° F. The standard scale has since been kindly verified by Mr. H. W. Chisholm, Warden of the Standards, and its error is not of such an amount as to affect the figures here given; it is now in the Loan Collection of Scientific Apparatus (200), the sole representative at South Kensington of Kater's standards.

The readings were mapped on divided paper, and the mean result for each line carefully estimated, with its probable error, by the two observers: and though the following readings of the divisions are of course far from the limit of attainable accuracy, yet as their errors are but a small fraction of those of the gradua-

tions of the cubit, farther accuracy would be nearly useless, especially in view of the width and deficient symmetry of the dividing lines.

The zero point of the series is adjusted so as to fit the normal scale of equal spaces deduced from it, with equal errors + and —, on the series of palms.

		British Inches.	
		Cubit Divisions.	Normal Scale.
End of rod	...	—'026	'000
		2'952	2'956
		5'911	5'913
		8'873	8'869
		11'820	11'826
		14'779	14'785
Palms	...	17'735	17'739
		20'702	20'695
		23'665	23'652
		26'605	26'608
		29'582	29'565
		32'516	32'521
		35'481	35'477
Digit	...	36'195	36'217
Condyle	...	36'922	36'956
Digit	...	37'694	37'695
Palm	...	38'417	38'434
Condyle	...	39'910	39'912
End of rod	...	41'402	41'390

The average probable error of these determinations of each line (omitting the ends) is '0008 inch, so that it may be called 1 on the last place of figures here given.

The total length of the rod is 41'428 with a probable error of $\pm$ '0025. Sir Gardner Wilkinson (and Queipo from him?) states it as 41'30; John Taylor, 41'46; and Col. Sir Henry James, 41'398. Thus the above determination falls between these three authorities, and is in fact about reached by the probable error of the mean of them.

Besides the total length of the rod, the divisions must be considered as giving a value for the cubit. Leaving, therefore, for separate consideration the lesser subdivisions and ends, we will look only to the series of palms. As these were probably copied mechanically from another standard, and were apparently not produced by stepping lengths on the rod, we should ascertain the mean value they give for a Normal scale, and their errors from it. This carefully computed from these palm divisions is 41'390 for the cubit, or 2'956 for each palm; and the average error of the palm divisions is '007 (the maximum error is '018), so the probable error of this value for the mean cubit is about '002. This average error of $\frac{1}{50}$ inch is rather large, but not worse than would probably be made at the present time in such work. By having a standard scale for comparison, hand dividing may be done on a still longer rod with a quarter of the error of this cubit, or even less; but as a mason's measure, this cubit is at least as accurate as modern examples.

The digit divisions are remarkable; the two last fit the Normal scale as accurately as the palms, but in making the divisions 36'195 and 36'922, the scale has apparently slipped away from that end of the rod about '028; and thus these have an average — error of that amount. The ends appear to have been left rather long, perhaps to allow for wear, being '026 and '011 too long respectively, giving an average surplus of '019. This may be intentional, or may result from being copied from a longer standard than the subdivided prototype, or may be merely an error. In any case, the tolerable equality of the surplus at each end, seems to show that the subdividing was from another standard, and not by stepping successive distances, as the difference is only $\frac{1}{3000}$ of the total length.

In Queipo's Metrology the value of each palm of this example of the cubit is stated to the millionth of a metre, two places farther than really measured, as they are merely reduced from English inches and hundredths, with an occasional half-hundredth. These values are all about $\frac{1}{3000}$ too short (their sum being 41'3, as Sir Gardner Wilkinson's statement), but otherwise they agree closely with the series given above; and their mean difference from it (when corrected for their general shortness) is '011, or but little more than the hundredth of an inch to which they were originally read.

If from the other eight or nine examples of the Karnak cubit the mean cubit was deduced from the subdivisions, and the internal errors of it thus obtained, we should have more knowledge of the accuracy of the earliest known civilisation, a datum of much interest from a scientific and historical point of view. A

similar examination of the measures of classical and mediæval times, including our ancient national standards of all kinds, would also give an idea of the accuracy which in various ages, and for various purposes, has been considered to be the utmost requisite; a maximum datum very different to that obtainable from other remains, which only show the amount of accuracy usually employed. As a chapter of the history of science, now so much considered, this subject should not be longer neglected.

Bromley, Kent

W. M. FLINDERS PETRIE

The Chemical Society

THE article which appears in NATURE, vol. xiv. p. 125, on the Organisation of the Profession of Chemistry throws doubt on the expediency of effecting the proposed organisation through the instrumentality of a society which has solely occupied itself with the extension and diffusion of knowledge, viz., the Chemical Society. It farther proposes that as it would be a wide departure from the functions which the Chemical Society has hitherto performed to undertake the appointment of a Board of Examiners, the Universities of Oxford, Cambridge, and London should be asked to co-operate in the matter, being already formed examining bodies, which would probably command and deserve greater confidence than a board nominated by a newly formed Institute, or even by the Chemical Society.

On these remarks I beg to offer the following comments:—

1. The Chemical Society never has promoted the acquisition of such knowledge and skill as are necessary for the discharge of such duties as a professional chemist is required to undertake.

2. If the Chemical Society has performed all other functions but this—the fact is no argument against it appointing a Board of Examiners, or of conferring some distinction on those who are capable of acting in the service of the public as chemists; indeed, if this may conduce to the “general advancement of chemical science,” the Society, by not taking such steps, is scarcely fulfilling the duties for which it was originally founded, and by opposing any such scheme it may actually retard the progress of chemistry in this country.

3. The writer of the article is apparently unaware of the fact that it would be very difficult to make any examination answer the purpose of testing a man's skill and technical as well as scientific knowledge in a satisfactory manner. An organisation scheme has been designed by a few gentlemen in conjunction with myself, so as to obviate examination as far as possible, or, in other words, to extend the examination over a period of six years. Those of us who are teachers in medical schools, and particularly those who at times have had to take to “coaching” for a livelihood, see the defects of a system which entirely depends upon examination as a test of qualification. Certainly no University examination would have the confidence of professional chemists. There are many business details besides granting certificates of competency which an organisation of chemists would be obliged to undertake, as, for instance, imposing such observances on the members as would tend to suppress objectionable practices which are somewhat too common at the present time.

The *Chemical News* for June 9 contains a sketch of an organisation scheme, and the conditions of admission for original members are there set forth. If the Chemical Society as a body agrees to accept such a scheme, by all means let it do so, but it does not appear clear whether the qualified Fellows of the Society could constitute a separate body, managing their own affairs, within the Society, without the interference of other Fellows not of the same class.

British chemists are now in request all over the world, Japan, India, China, Canada, and California, and some mark of distinction as “chemists” which those who go abroad might carry with them would be valuable to them and enhance the value of the science in this country.

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Lectures on Meteorology

IN these days of the rapid development of the standard sciences, and the multiplication of their offshoots into considerable sections nearly as big as their originators, it may not be inappropriate to represent the claims of meteorology for a separate existence apart from others. As geology and mineralogy have been developed out of the natural history of former times, so it may obviously be suggested that meteorology might be detached from natural philosophy with which it has been