which Mr. Kraus bases a second argument, is to my mind of no significance. The benitoite and the natrolite matrix in which it occurs are clearly secondary and must have been formed from percolating solutions. Even if it be assumed that these solutions were also basic it by no means follows that the titanium which they contained would take the part of a base, on the contrary it is more probable that it would take the part of an acid. Associated with the benitoite are two other titanium-containing minerals, namely, titanite and a mineral to which the name carlosite was given, but which we have since shown to be identical with neptunite. All three minerals are found in the natrolite matrix and appear to have been formed contemporaneously. There is good reason for supposing that titanium takes the part of a base in both titanite and neptunite and it is not probable that a third mineral formed under similar conditions would differ in this respect.

There is on the contrary much to be said in favor of the formula suggested by Mr. Louderback. The properties of the element titanium, when in this degree of oxidation, are clearly those of a very weak acid. The entire lack of a definite compound of titanium and silicon, in view of the frequent occurrence of both oxides in the same formation, is striking. If benitoite is a double metasilicate of barium and titanium it is most remarkable that the proper conditions for the formation of both its constituent single salts have nowhere prevailed.

A cursory examination of the literature shows that many of the compounds in which titanium is supposed to take the part of a base have not been isolated in pure form, nor has their structural formula been satisfactorily determined. They are in all probability analogous to certain complex acids, such as those which phosphoric acid forms with the acids of the chromium group of elements rather than to simple salts.

Titanium is more closely related to silicon than to the more basic zirconium. Like the former element it shows a decided tendency to combine with itself and form complex molecules, and the substitution of one element for the other in such a chain would not seem unreasonable. Further, there is nothing unreasonable in the formation of compounds containing such a relatively large percentage of acidic elements if the acidic elements represented are very weak in their properties and the basic elements are very strong in theirs; the compound borax furnishes a good illustration.

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Appointments in American Universities

To the Editor of Science: As a Scot, called some years ago to teach in an American university, I am much interested in Dr. S. J. Meltzer's communication, printed in Science of August 7, especially as two of the gentlemen to whom he refers are countrymen of my own. However, my purpose is not to traverse his protest, which seems to me well taken. Dr. Meltzer's letter involves a much larger question. I think that those of us who have to make recommendations for vacancies must have felt often that here, at least, we stand badly in need of a clearing-house. Why should not each great department of inquiry have its own bureau of information, to bring men and places together? Our present methods are largely haphazard, especially with reference to the less important appointments, whence the more important must be filled some day. One hears of vacancies after they have been settled; and one's knowledge of available appointees, especially of the younger men, is far from complete. Here is an opportunity for Science and similar publications to ventilate a need, with a view to common action.

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Scientific Books

Musée Ostéologique. Étude de la Faune Quaternaire. Ostéométrie des Mammifères. Par Edmond Hue Médecin Vétérinaire, Membre de la Société Préhistorique de France. Album de 186 planches contenant vi + 50, pl. 93. Deuxième Fascicule, pl. 2,187 figures. Premier Fascicule, pp.

94–186. Royal 8vo. Schleicher Frères, Éditeurs. Paris. 1907.

The existence in Europe of hundreds of Quaternary and prehistoric stations yielding copious remains of men and animals occasions the desire on the part of the archeologist to study for himself the bones which he may have exhumed from grotto or lake dwelling. Hitherto, in order to identify these remains he has had to take them to some museum having a large osteological collection, or to search through the literature for illustrations of particular groups, or to have recourse to the general works of Cuvier and of DeBlainville, which are not always accessible and which were designed rather for the morphologist than for the archeologist.

To facilitate the identification of such collections M. Hue has placed in the hands of the student this veritable "Musée Ostéologique" containing no less than 2,187 original figures of mammalian bones. The drawings have been very skillfully and accurately made from nature by the author himself, the mechanical form and the arrangement of the book are excellent, and the price (24 fr.) is moderate. Forty-one recent mammals are represented, including the principal types whose ancestors are found in the Quaternary of Europe. The work is divided into three parts. Part I. treats of osteometrical methods, Part II. figures the cranium and dentition, Part III. the limb bones.

In Part I. the author endeavors to put the osteometry of the mammalia upon a practical basis. Hitherto, he thinks, the measurements given in different works upon Quaternary mammals are too frequently unsatisfactory because each author has followed his own system of measurements. Owing to the fragmentary character of most Quaternary crania and limb bones, the important longitudinal and transverse diameters are often unattainable, and the effective comparison of any two similar fragments is limited by the number of exactly corresponding measurements given. Hence the justification for multiplying measurements and for the present effort to standardize the mensuration of the mammalian skeleton in general.

For this purpose the well-established measurements and ratios of physical anthropology are not sufficient. Measurements and ratios applicable to all mammals are needed, and, by reason of the divergence in type, additional standard measurements for each order.

Selecting the skull and lower jaws of the dog as a representative mammal, the author establishes, defines and illustrates (Pl. 1–7) a long series of paired points, between which measurements may be taken in normal mammalian skulls.

The author then takes up the different orders in turn and establishes similar paired points, which are especially characteristic in the Carnivora, Rodents, Ruminants, Equidæ and Suidæ. Standard measurements for the dental system are then established and the subject of cranial indices is discussed and illustrated. The mensuration of the limb bones and vertebræ is similarly treated (pp. 28–50, pl. 8–21).

In the third part (pl. 79–186) the limb bones are figured in the same systematic manner, the Ruminants again being very fully represented. As all the drawings of each part, *e. g.*, the humerus, are brought together, one can very quickly identify a specimen by glancing over a few plates. On the other hand, one can readily follow up the osteology of a single form by consulting the alphabetical table of species. The smaller crania and practically all the teeth are represented as of the natural size, the larger objects are always given in some convenient scale and centimeter scales are given in many of the plates.

The reviewer has gone over the plates with some care, but has not noticed any material errors, though it can scarcely be hoped that none are there. On the contrary, the many admirable features of the work become very apparent. For instance, the roots as well as the crowns of the teeth are represented, a feature more or less neglected even in the best odontographies. The grouping of the same part in different animals, and the representation of each object in orthogonal projection, bring out the underlying family resemblances and differences, accentuating diagnostic characters which would not be

noticed ordinarily except through long familiarity with the bones themselves.

M. Hue's drawings serve to emphasize the fact that the text-books of osteology and mammalogy have failed to make the most of the characters offered by the scapula, humerus, femur and other limb bones, although such characters are very important to the fossil bone hunter in the field, and also sometimes give indications of affinity between two forms whose skulls and dentition have become widely divergent. In this connection, in view of the sharp ordinal and family differences in the tarsus and especially the astragalus, it is rather curious that the author devotes so many plates to the tibia and fibula, which are usually less clearly distinctive, and yet only figures the tarsus of two forms, the dog and the reindeer.

In conclusion, M. Hue may be assured that his work will be of use not only to the archeologist, but also, and to a considerable degree, to the student of mammalian osteology. The work, of course, covers only a rather limited fauna, but its method and example are alike valuable. It would greatly widen the general intelligibility of osteology if the skeletal parts of all the more important genera of mammals, both living and fossil, could be represented in plates similar to those of M. Hue, but arranged historically, *i. e.*, according to the best views of their evolutional sequence. This would naturally be a large undertaking, but no bigger for the twentieth century than DeBlainville's Osteographie was for the first half of the nineteenth century.

William K. Gregory

Essai sur la Valeur Antitoxique de l'Aliment Complet et Incomplet. By A. LeRenard. Paris, J. Mersch. 1907. 8vo; pp. 211.

It is seldom that a work appears which has more interest for general physiology than the present one. Starting with a study of the toxic action of copper salts upon *Penicillium glaucum,* the author has incepted a series of illuminating experiments upon the ability of the different essential nutrient elements to function as antitoxic agents. The action of the various salts and ions was tested in all combinations possible, always in the presence of a suitable source of carbon.

While the idea of an antidoting action between elements is not new, it has never before been so extensively investigated as an antagonistic relation between foods and poisons.

The author presents a lengthy review of literature upon the general subject of toxicity and antidoting action, but unfortunately devotes little attention to the work which has been done since 1900. It is to be especially regretted that the discussion does not include the investigations upon the antidoting action of physiologically balanced solutions by Loew, Loeb, Osterhout, Duggar, Benecke and others.

The chapter on the general biology and physiology of *Penicillium glaucum* gathers up and coordinates much of the modern and early work upon this classical and oft-investigated fungus. The chapter upon the physiological rôle of the essential nutrients seems conspicuously brief in comparison with the treatment accorded other subjects of like importance. Nitrogen, potassium and phosphorus receive a brief elementary treatment; the other mineral elements are very briefly dismissed.

The author's extended discussion of the nature of toxicity contains numerous points of special interest for the student of physiology, a few of which deserve mention in passing. He emphasizes the necessity for distinguishing between injurious effects due to the osmotic strength of the solution and those actually due to poisons, especially since the former may be brought about by non-toxic substances.

Following the classification of Chassevant and Richet, which distinguishes between antigenetic and antibiotic concentrations of the toxic agent, LeRenard distinguishes the antiauxic and antibiotic concentrations of copper for *Penicillium glaucum.* The antiauxic concentration is defined as the one which allows the fungus spore to germinate and produce some sort of a germ tube, but does not allow the development of the same into a thallus. It is admitted that antiauxic effects may also be produced by a paucity of nutrients. By diminishing the amount of poison, a sufficiently weak concentration is finally reached