important chemical processes discovered and patented on the Continent which are not filed in our Patent Office, and which are so long in finding their way into the current literature that they are apt to be overlooked. Chemists who have occasion to consult the admirable series of tables by Schultz and Julius cannot but look with admiration—even if tinged with envy—at the brilliant series of discoveries which have emanated from the laboratories of German universities, technical schools, and factories. This is the fruit of technical education in the true sense ; no system of cramming for an examination, no method of orthodox "test-tubing," not even the "recreative institute" line of technical training, which is so much in vogue at the present time, will enable us to recover our lost position in this or in any other branch of chemical technology.

R. MELDOLA.

RAM BRAMHA SÁNYÁL ON THE MANAGEMENT OF ANIMALS IN CAPTIVITY.

A Handbook on the Management of Animals in Captivity in Lower Bengal. By Ram Bramha Sányál, Superintendent of the Zoological Garden, Calcutta. (Calcutta, 1892.)

CONSIDERING the number of zoological gardens in Europe, and their long establishment, it is singular that it should have been left to the superintendent of a zoological garden at Calcutta, and to a native of India withal, to produce the first practical handbook on the management of animals in captivity. The author, who, we believe, is a member of the "Brahma Somaj," and one of the very few natives of British India that have exhibited any taste for natural history, has been for some years superintendent of the Zoological Garden at Calcutta, an excellent institution mainly kept up by the Government of Bengal, but under the control of a committee of the subscribers. This committee, at the suggestion of Sir Steuart Bayley, the Lieutenant-Governor of Bengal, came to the conclusion that, after thirteen years' experience of the management of animals, it might be possible to produce a handbook on the subject which "would be of interest to the scientific world," and at the same time "of great use to nobles and other persons who, on a smaller scale, keep a collection of animals in captivity."

Such was the origin of the present volume, which has been prepared by Babu Ram Bramha Sányál, on a plan drawn up by a sub-committee appointed for the purpose, and has been supervised by Mr. C. E. Buckland, C.S., who was at one time honorary secretary to the Calcutta Garden, and is now a member of the Council of the Zoological Society of London. It is certainly a work of considerable interest. In the first place it has the merit of giving us a complete classified list of all the mammals and birds that have been kept alive in the Calcutta Garden. These are, of course, mostly species of British India—241 of the class of mammals, and 402 birds—but there are a good many exotic forms among the birds. In the second place large numbers of notes on the treatment of the animals in health and in sickness, on their length of life in captivity, and generally on their habits as observed in confinement are introduced, which, although in some cases of an apparently trifling nature, are well worthy of study by those who are engaged in the custody of living animals. It is evident that the author has kept a regular journal, and has recorded his experiences very minutely. In a case of a fight between a lioness and a tiger, which were by some accident allowed to pass into the same compartment of the Carnivora house, the tiger was completely victorious and killed the lioness. The longest period during which a tiger has lived in the Calcutta Gardens is fourteen years. It is curious that the Lesser Fruit-bat of Bengal (*Cynopterus marginatus*) "does not appear to bear captivity well." A nearly allied African species (*C. collaris*) has completely established itself in our Regent's Park Garden, and has bred abundantly for the last twenty years. On January 30, 1889, a young rhinoceros was born in the Calcutta Gardens, "the second recorded instance" of this mammal having bred in captivity. Interesting details are given of this event. The parents were a male Sumatran rhinoceros and a female of the northern form of the same species, which has been separated as *Rhinoceros lasiotis*. The highest bliss of these animals, as the Babu points out, is to "lie undisturbed in a muddy hollow," besmeared with liquid dirt.

In 1886 the Calcutta Garden obtained from Dar-es-Salam, in Eastern Africa, a young hippopotamus, but it did not live for more than eighteen months. Probably its voyage from Zanzibar to Calcutta "in an ordinary box without water" materially affected its health, as the hippopotamus, if properly treated, does exceedingly well in captivity.

The authorities of the Calcutta Garden have not yet succeeded in keeping the pangolin alive for any lengthened period. The same has been the case in our Zoological Gardens, where, although several examples of this Edentate have been received, not one has survived many weeks. This is curious, as both the American ant-eater (*Myrmecophaga*) and the African ant-bear (*Orycteropus*) maintain excellent health in captivity. It is suggested that the difficulty of obtaining a supply of their proper food—the *termites*—is the cause of this failure. At the same time, when supplies of this insect have been placed within reach the Pangolin has been "known to take no notice of them." We cannot therefore suppose that the true solution of this difficulty has yet been hit upon. It may be stated that in a similar manner ant-eaters kept in this country will not eat ants, but thoroughly enjoy raw meat when minced up small in a sausage machine.

The second part of the handbook contains a list of the birds exhibited in the Calcutta Garden, and corresponding observations upon them, but naturally there is not so much to be said on this branch of the subject. Among the more interesting species of this order we notice the fine large Laughing-thrush of the Himalayas (*Garrulax leucolophus*), the gold-fronted chloropsis (*Chloropsis aurifrons*), several sorts of drongo (*Dicruridæ*), Gould's ouzel (*Merula gouldi*), and the pheasant-tailed jacana (*Hydrophasianus chirurgus*), all birds which are rarely, if ever, seen in European aviaries. On the whole we must allow that this volume is a remarkable production, considering the circumstances under which it has been prepared, and that its author deserves great credit for the pains bestowed on its composition, and for much valuable information contained in it.