

and Archdeacon Maples (he was then), both of whom had travelled a good deal in Africa—Maples more especially—and had seen something of the habits of lions.

Bishop Smythies defended the former theory; Archdeacon Maples—a most talented and entertaining man—the latter, saying he had known instances of lions killing porcupines, and adding that he believed the porcupine to be specially endowed with the power to propel his quills into his assailant when so attacked.

At this juncture, Bishop Smythies generally lost patience and declined to continue the argument.

Had Bishop Smythies lived, it would have interested him, as it may interest some of NATURE's readers, to know that in March last, at the Salt Stream, two days' march N.W. of Kibwezi, I shot a fine old lion in whose left fore-paw were deeply buried the tips of three porcupine quills.

These are in my possession at the present time: the longest measures exactly 1 inch; another is almost as long, and measures $\frac{3}{4}$ of an inch. How long he had been afflicted with these painful appendages I could not say—months at any rate, or may be years; since the paw was not inflamed, and from constant friction and pressure in using it the cartilage surrounding the quills had become callous.

There is no immediate reason for supposing that in this case the lion killed the porcupine acting on the impulse of inordinate hunger: the Salt Stream country teems with game—such as rhinoceros, zebra, hartebeeste, gnu, gazelles, and ostriches; it is also just such a country for cover as lions habitually frequent, and *à* frequent in numbers, as may be judged from the fact that in two days I saw them on three occasions.

Leopards, I was already aware, prey freely on porcupines. But this is the first instance which has occurred—in my own experience—of a lion's doing so. RICHARD CRAWSHAY.

Neugia, Kitwi, British East Africa, February 6.

Precipitation of Gold by Charcoal.

IN your "Notes" this week, the use of charcoal as a precipitant for gold from solutions is mentioned as being pretty largely applied in Australia, and that the cause of precipitation is not understood.

I venture to put it this way: that by some process, accelerated no doubt by surrounding physical changes, there is formed within the charcoal carbon monoxide (and also carbon dioxide), which is a precipitant for gold. The difficulty of ridding charcoal of oxygen without chemical combination is well known.

I may mention that I am now using carbon monoxide as an industrial precipitating agent in gold-winning.

JAMES C. RICHARDSON.

19 Claremont Square, London, March 29.

It is an old idea that carbon monoxide is the real agent in the precipitation of gold from solutions of the chloride by means of charcoal. An objection to Mr. Richardson's suggestion, that the same view may be taken in the case of cyanide solutions, lies in the fact that, according to my own experiments, carbon monoxide does not appear to precipitate gold under ordinary conditions from these solutions.

The main objection, however, to all the theories put forward to account for the precipitation of gold by charcoal is that they are not supported by the results of any published experiments.

THE WRITER OF THE NOTE.

Instincts of Wasps.

PERHAPS it may interest your reviewer of Dr. and Mrs. Peckham's work "On the Instincts and Habits of the Solitary Wasps," to learn that one of the main results in question has been already arrived at in a paper by the late Prof. Schiff, of Geneva, in *Mémoires de la Soc. de Physique et d'Histoire naturelle de Genève*, vol. xxviii., 1882-3. I quote the following passage, as in some way complementary to the observations of Dr. Peckham:

"D'ailleurs, un examen microscopique approfondi du système, nerveux des animaux intoxiqués par les guêpes n'a pas révélé la moindre lésion dans les nerfs et les ganglions de ces animaux."

Freiburg, Badenia, March 18. DAVID WETTERHAN.

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CORUNDUM AND ITS USES.¹

THE three works cited below give much new and valuable information concerning the mode of occurrence, the processes of mining, and the uses of corundum. As the mineral is of growing economic value, and is every day finding fresh applications in the arts, it seems desirable to call attention to some of the facts which are for the first time made accessible to the public in these works. We may exclude from view, for our present purposes, the clear and brightly coloured varieties of corundum, so much prized as gem-stones (ruby, sapphire, &c.), and also the composite material known as emery. The latter substance should be regarded not as a mineral, but as a rock—one in which the mineral corundum is a predominant constituent, though always mixed with magnetite, tourmaline, and many other minerals.

Among the works of which the titles are given below, precedence may be fairly conceded to that which deals with Indian corundum. Corundum is a distinctively Indian mineral; its name is of Indian origin, and its recognition as a distinct mineral species was the result of the study of Indian specimens. The plan, now adopted by the Director of the Geological Survey of India, of republishing the "Manual of Economic Geology" in a series of separate memoirs, each dealing with a particular mineral, or group of minerals, is one which must commend itself to every one as being calculated to furnish us with the most complete and exact information from the pens of the best qualified authorities. It is fortunate that the writing of the memoir on corundum has fallen into the hands of so competent a mineralogist and geologist as Mr. Holland.

The first nine pages of the memoir are devoted to a condensed, but very clear and exact, account of the mineralogical characters of corundum. The next ten pages contain an admirable discussion of the geological relations of corundum. Mr. Holland's studies of the famous corundum-yielding rocks of Southern India have furnished him with much fresh material bearing on the mode of occurrence and association of the mineral. In the work before us only a brief sketch can be given of these, and of the theoretical questions upon which they throw much new light. It is to be hoped that the present memoir will be followed by detailed accounts of the geology of Salem and other districts in Southern India, where Mr. Holland and several of his colleagues have had the opportunity of re-examining the rocks made known to us by the travels of Leschenault de la Tour, and the petrographical researches of Prof. Lacroix.

The larger portion of the memoir is occupied by detailed accounts of the exact distribution of corundum throughout the Indian Empire, and a discussion of the uses of corundum. In this latter part of the work much valuable information, carefully collected from a number of trustworthy sources, has been brought together; and the reader cannot fail to find much that is new, and also has important bearings on the economic uses and the manufacture of the various varieties of corundum as known in the markets of the world.

While the corundum of India has been sought for from the earliest times for use in grinding gems, and other purposes in which abrasive materials of the greatest hardness are required, the rich deposits of the same mineral in the Eastern United States have only been worked for similar purposes during the last twenty years.

¹ "A Manual of the Geology of India.—Economic Geology." By the late Prof. V. Ball, C.B., LL.D., F.R.S. Second edition revised in parts. Part I. Corundum. By T. H. Holland, A.R.C.S., F.G.S. (Calcutta, 1898.)

² "Mineral Resources of the United States: Seventeenth Annual Report of the U.S. Geological Survey: Corundum Deposits of the Southern Appalachian Regions." By J. A. Holmes. (Washington, D.C., 1896.)

³ "Economic Geology of Eastern Ontario: Corundum and other Minerals." By Willet G. Miller. Report of the Bureau of Mines. Vol. vii. Pl. 3. (Toronto, 1898.)