Gold-coloured Teeth of Sheep.

IN a paper "On Dental Encrustations and the So-called 'Gold-plating' of Sheep's Teeth," published in the Proceedings of the Linnean Society of New South Wales (August 25, 1920), Mr. Thos. Steel gives an account of the so-called "gold-plating" and encrustations on the teeth of sheep and other animals. He states that the popular idea is so strong that the jaws of sheep are still taken from time to time to the Sydney Mint with the object of selling them for the gold supposed to be present.

Mr. Steel refers to papers published in the Proceedings of the Royal Society of New South Wales and of the Sydney Section of the Society of Chemical Industry in 1905, in which Prof. Liversidge showed that the encrustation is due to tartar deposited from the saliva in thin films. The golden colour and appearance are proved to be due to the reflection of light from the overlapping of the thin films, and in composition the deposit consists of impure calcium phosphate and organic matter, and not of iron pyrites, as confidently asserted by correspondents in NATURE (vol. xcix., 1917, pp. 264, 284, 290, and 306, and vol. c., 1917, p. 106), to account for which various "fantastic" explanations are given. Prof. Liversidge stated that the deposit can be easily separated in thin flakes like mica with the point of a penknife, or even a pin, and that if a flake held on the point of a pin be placed in a match- or candle-flame it blackens, inflames, and leaves a white fusible residue; hence neither a knowledge of chemistry nor the use of any chemical apparatus is necessary to prove the absence of gold and of iron pyrites.

Mr. Steel has unearthed a forgotten statement by the late Dr. George Bennett in his "Wanderings of a Naturalist" (1834, p. 294) that the yellow "metallic substance" sometimes found on the teeth of sheep, oxen, and kangaroos, and frequently mistaken for gold, is simply tartar deposited from the saliva. Dr. Bennett quotes an analysis of the ordinary deposit on human teeth by Berzelius, who obtained results very similar to those of Mr. Steel. Mr. Steel had exceptional opportunities for obtaining large quantities of the coating, and was able to make quantitative analyses of the encrustations from the teeth of sheep, oxen, horses, etc., taken from the stocks of bones passing through a large bone-charcoal factory in Sydney; from other sources he obtained sufficient material from the teeth of the camel, dromedary, rhinoceros, and even man. They consist mainly of calcium phosphate, with small amounts of magnesia, carbon dioxide, a little sand, from 16·20 per cent. to 24·65 per cent. of organic matter, and from 3·85 per cent. to 11·65 per cent. of water. Mr. Steel gives a table of the percentage composition of the encrustation from the teeth of man, sheep, ox, camel, dromedary, and rhinoceros and, for comparison, the analyses of the cement layer (crusta petrosa) of the teeth of the babirussa, ox, and camel. He points out the very interesting fact that the tartar has much the same composition as mammalian bone.

The rhinoceros and babirussa encrustations differ from the others by containing very little calcium phosphate, although in lustrous flakes like that of the sheep and ox; in man it is chalky-looking without the metallic or nacreous lustre.

The coating may vary from a thin film to a quarter of an inch in thickness; the black coating common on the teeth of sheep and oxen has the same composition as the "metallic" deposits. The teeth of carnivora and rodents are usually very clean except when old, and so are those of pigs; those of snakes, lizards, and fish are free from deposit; it is present on the teeth of the crocodile and killer-whale, and also on teeth of the tapir, eland, bison, bears, and most of the Australian marsupials, including the fossil marsupial teeth from the Wellington Cave, New South Wales. Mr. Steel refers to the huge projecting teeth observed by Miklouho-Maclay in natives of Taui or Admiralty Islands (NATURE, vol. xvi., 1877, p. 251), due to an enormous deposit of tartar caused by chewing betel-nut and lime; the percentage of lime found in it by Salkowski was more than 45 per cent. (*Nehr. Berlin. Ges. Anthrop.*, 1881, p. 219).

The investigation shows a large amount of very careful and painstaking work, and should be of interest to anatomists and dentists, especially as the alleged occurrence of gold or pyrites on teeth has been reported again and again for centuries, and will probably continue to be so reported from time to time.

The History of Metamorphic Insects.

REFERENCE has been made in NATURE to most of the series of remarkable entomological papers which Dr. R. J. Tillyard has communicated during the last few years to the Linnean Society of New South Wales, and which have been published in that society's Proceedings (vols. xli.–xliv.). These papers are worthy of the most careful attention of students of insects, because the author combines the power of intensive research into details of structure with a true instinct for those details that are of real importance in the elucidation of relationships, and with a broad morphological outlook on the group under consideration. He has the faith—which many of our younger naturalists, shut in to the study of the inheritance of varietal and specific characters, lack—that a knowledge of the phylogeny of large systematic groups is attainable, but he realises that such knowledge can come only through a careful comparison of recent adult and immature with extinct forms. Thus his evolutionary speculations are raised on surer foundations than those which contented many of his predecessors.

Attention may be especially directed to Dr. Tillyard's exposition of the wing-venation of the group of orders which he terms the "Panorpoid complex" (Proc. Linn. Soc., N.S.W., vol. xliv., part 3, 1919), this group comprising the Neuroptera (Planipennia and Megaloptera), Mecoptera, Trichoptera, Lepidoptera, and Diptera, together with three extinct (Permian or Triassic) orders, the Paramecoptera, Protomecoptera, and Paratrichoptera, the types of which were described by the author from Australian fossils. Wing-venation has been generally regarded as a trustworthy guide to the affinities of the families and orders of insects, but entomologists lacked a reasonable morphological interpretation of the complicated array of facts until Comstock and Needham showed how the correspondence of the main series of longitudinal nervures could be traced through members of various orders, the detection of homologies being greatly facilitated by a study of the tracheal tubes which provisionally mark out the venation in the nymphal or pupal wing. Dr. Tillyard adopts generally the Comstock homologies and nomenclature, but his opportunities of studying archaic