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

Australasian forms of the Neuroptera and Mecoptera, both in the adult and pupal stages, have enabled him to suggest amendments which may be expected to win general acceptance. His insistence on the importance of the earliest pupal tracheation, and on the recognition of the longitudinal nervures by the presence of characteristic strong bristles (the *macrotrichia*), which are absent on the cross-nervules, and the scars of which can be distinguished in fossil wings, is particularly weighty.

The three extinct orders mentioned above are regarded by Dr. Tillyard as arising collaterally with the Mecoptera and Neuroptera in Permian times, one Permian fossil (Permochorista) from the coal-beds of New South Wales being definitely referred to the Mecoptera, and another (Belmontia) from the same beds to the new order Paramecoptera (see Proc. Linn. Soc., N.S.W., vol. xliv., part 2, 1919); while Protopsychopsis and Archepsychops from the Upper Trias of Queensland are classed with the planipennian Neuroptera, the Lower Triassic Triadosialis—a European (German) fossil—standing near the base of the megalopteroid group. The extinct Paramecoptera are believed by Dr. Tillyard to be ancestral to both the Trichoptera and the Lepidoptera, while Upper Triassic fossils from Queensland (Aristopsyche, etc.) belonging to the Paratrichoptera suggest that this latter order gave rise to the Diptera (see *t.c.*, part 1, 1919).

From this summary it will be realised that all the principal orders of metabolous insects (the Endopterygota of Sharp), with the exception of the Coleoptera and the Hymenoptera, are brought into a series of reasonably probable relationships. Even if later discoveries may compel some modifications in the details of Dr. Tillyard's genealogical scheme, it seems impossible to doubt that he is on the track of real affinities, and that the other two great metamorphic orders, the beetles and the Hymenoptera, will ultimately be shown to have such relationship to this "Panorpoid complex" that the whole endopterygote assemblage cannot but be regarded as forming a natural monophyletic group. G. H. C.

Oil in Western Sinai.

By H. B. MILNER.

THE opening up of a new petroliferous region in any country is usually a matter of more than ordinary interest, not only to oil technologists, but also to the general business public. In Western Sinai we recognise one of the latest developments of oilfield enterprise, and from our knowledge of the Egyptian fields (to which this new region is geologically similar), as well as from the data published by the Petroleum Research Expedition of Egypt in a Preliminary General Report on Western Sinai (Cairo: Government Press, 1920), the prospects in this part of the peninsula would seem to be exceedingly promising.

For some time past it has been known from surface and other indications that the tract of country stretching southwards from Suez along the western coast of Sinai is petroliferous in many places, but it has remained for Dr. Hume and his staff of geologists to carry out the necessary geological investigations in elucidation of the structure of the country and for the selection of the most favourable localities for drilling test wells.

The actual belt of country examined lies between Suez and El Tor, a distance of about 220 km. along the coast. Of the various localities at which oil indications are promising those of Abu Durba and Gebel Tanka seem to be pre-eminent, and in the former instance a well-site has already been fixed; in the Gebel Tanka area there are three separate oil prospects which have received attention, and two sites for deep test wells are indicated at present.

With regard to the relative geological positions of the various oil horizons within the belt, from the information supplied in the report it is evident that there are at least two of these, an upper situate between the Middle Eocene limestones and Lower Miocene marls and a lower occurring at the junction of the Cretaceous beds with the underlying Nubian sandstones. In the Gebel Tanka area both the upper and lower horizons are present, but drilling to the lower oil-bearing strata is advocated, as the Eocene limestones are not deemed here to be profitable commercially. In the Abu Durba area only the lower horizon is present, but drilling would not be to such a depth as in the former case, as the Tertiary beds are absent.

Tectonically, so far as present evidence shows, two definite systems of folding have been established within this region, one known as the Hammam Faraûn-Useit anticline and the other as the Gebel Araba anticline. The former is the more important feature from the oil point of view, since many of the reported indications (including those of the Gebel Tanka area) are associated with it. The latter is more doubtful in this respect, as the surface indications are less numerous, but it is evident that with progress in mapping a great deal more information will be obtained which should define the system with more precision, and thus indicate the chances of future exploration for oil in the sediments affected thereby.

Not only has the Petroleum Research Expedition done valuable work in reporting on the oil potentialities of this region; it has also made an important contribution to our geological knowledge of Western Sinai which, even if the oil prospect prove unfavourable, well warrants the survey made. Two other reports of the expedition (Bulletins 3 and 4) deal in greater detail with the oil occurrences at Gebel Tanka and Gebel Nezzazat (Sinai), and should be read in conjunction with the general report (Bulletin 2) described above.

Genetics of Cereals.

SINCE the well-known experiments of Biffen, in which the rust resistance of wheat to *Puccinia glumarum* was shown to behave as a simple Mendelian recessive character, numerous amplifying investigations have taken place. In Swedish experiments Nilsson-Ehle obtained less regular results, finding usually a lack of dominance and segregation in indefinite ratios. In the meantime, extensive studies have been made of the black stem-rust, *Puccinia graminis tritici*, which causes enormous losses in American wheat crops. It has been shown that numerous biologic forms of this fungus exist