

lb. linseed cake per diem. The treatment should be as liberal as to turn them out to the grass in good condition. In the following summer and autumn, they should be allowed to graze on good pasture, rich in phosphates, so that their growth of bone and substance will not be checked in any way. In winter, they should again receive, in addition to turnips, hay and straw, a little extra concentrated food, such as linseed cake or cotton cake, at the rate of 2 or 3 lb. per day. If, by the treatment they have received, they be large and strong, we may have them in milk between two and three years old.

The following is from a leaflet issued by the Royal Agricultural Society of England:— From the evidence which has recently been brought to the notice of the Society, it is considered desirable to recommend to the special attention of stock-owners, in whose herds abortion has appeared, the system of preventive treatment which is described in the following quotation from the article on Abortion in the Society's Journal, Vol. II., Part IV., 1891, page 738. The plan which Professor Nocard recommends to be used in cow-sheds and premises in which epizootic abortion occurs year by year is the following:—1. Every week the places in which cows are kept must be well cleansed, and especially the part behind the cows, and then disinfected by a strong solution of sulphate of copper (blue vitriol), or a solution of carbolic acid, one to fifty of water. 2. The under part of the tail, the anus, vulva, and parts below of all the cows must be sponged daily with the following lotion which, is a strong poison:—

Rain water or distilled water	..	2	gallons
Corrosive sublimate	..	2½	drachms
Hydrochloric Acid	..	2½	ounces

During the first season of this treatment only a moderate amount of improvement is to be expected, but after the next season abortion will cease entirely. It appears that in some districts no precautions are taken to destroy the foetues after abortion. This should be done *without delay in every case* by burning or burial in quicklime. Lime should also be freely scattered over the ground contaminated with the discharge.

EXPERIMENTS ON THE DURABILITY OF VARIOUS WOODS.

In order to obtain some data on the durability of Indian woods, the Government of India in a Circular dated the 31st October, 1879, ordered these experiments to be started. Specimens of various species were prepared, the size and shape of a metre-guage sleeper being chosen as most suitable. These were placed in the ground of the Imperial Forest School, one-half of each piece being left exposed, the other half under ground: in all 39 pieces were thus treated, most of them having been put down in 1881, and a few subsequently at different times. The soil in which the sleepers were buried was a rich sandy clay, giving, on a rough qualitative analysis made by Instructor Mr. A. F. Gradon:—

Sand	..	35	per cent.
Clay	..	24	"
Organic matter	..	5	"

One by one, the weaker and softer kinds disappeared, under the effects of rot and the attacks of white ants: and in August 1892, just eleven years after the commencement of the experiment, the surviving pieces were dug up by the Deputy Director, Mr. Smythies, in the presence of his class of Forest Utilization, with the following results:—

Three species had their wood still perfectly sound in every respect, both above and below ground. These were (1) the Himalayan Cypress, (*Cupressus torulosa*) 10 years buried; (2) Teak, 9 years buried; and (3) Anjan (*Hardwickia binata*) 7 years buried. Both Deodar and Sissu after 11 years' burial had their heartwood quite sound, but the sapwood has been entirely eaten away by white-ants. Next to these came the two species of Eugenia, Piaman (*Eugenia operculata*) and Jaman (*Eugenia Jambolana*) which lasted well for 9 years but are now beginning to show signs of decay. Sandan (*Ougeinia dalbergioides*) was much the same, as were also Toon (*Cedrela Toona*) and *Albizia procera*. The Toon was almost untouched above ground, but the buried parts were unmistakably traversed by the mycelia of fungi. Sain (*Terminalia tomentosa*) and *Albizia Lebbek* lasted 8 years; *Phyllanthus Emblica*, *Adina cordifolia*, *Cedrela serrata*, *Pinus excelsa* and *Abies Smithiana* remained good for 7 years and then succumbed. *Pinus longifolia* and the three oaks (*Quercus Semecarpifolia*, *incana* and *dilatata*) lasted 6 years. *Aegle Marmelos*, *Stephegyne parvifolia*, *Abies Webbiana* and *Schleichera trijuga* remained good for 5 years. A *Grewia* lasted for four years, while *Lagerströmia parviflora*, *Anogeissus latifolia*, *Acacia arabica*, *Butea frondosa*, *Aesculus indica* and the Mango gave way in 3 years' time. It is as well to place on record that Dehra Dún is the broad valley at the base of the Himalaya, and between it and the Siwaliks, extending from the Jumna to the Ganges. The altitude of the locality is just about 2,100 feet, the climate is moderately cool and the average annual rainfall 73 inches.

The most remarkable thing about these experiments is the durability of the Cypress, a fact which ought to be remembered in planting trees in the hills, for few trees are so easily grown, even down to the plains in the Dún and further still to Saharanpur. The wood is not unlike deodar, but with a quite different strong scent. The tree thrives best on limestone, but is not really very particular and it grows straight and well in close plantations.—*Indian Forester*.

ZOOLOGICAL NOTES FOR AGRICULTURAL STUDENTS.

Next in order after the birds come the Mammals constituting the fifth and last class of vertebrate animals. The general characteristics of mammalia are that respiration is aerial: the lungs are not connected with air-sacs; the heart is four-chambered; the blood warm; the integumentary covering is in the form of hairs, the young are nourished by milk secreted by special glands—the mammary glands; the skull has two condyles.

The *non-placental* mammals (in which no connection is established between the fetus and the mother) are represented only by two orders, viz., *monotremata* and *marsupialia*. The first contains only two genera, both belonging to Australia, viz., the Duck mole (*Ornithorhynchus*) and the Porcupine Ant-eater (*Echidna*). The order *marsupialia*, so named owing to its members possessing a "marsupium" or pouch in which the young are carried, includes the kangaroo, opossums, bandicoots and wombats. The order *Edentata* is the lowest of the *placental* mammals. The name is hardly a correct one, since it is only in two genera that there are absolutely no teeth, though the development of the teeth is very imperfect in all. The toes of the edentates are furnished with long and powerful claws, and the skin often covered with bony plates or horny scales. In this order are included the sloths, ant-eaters and armadillos.

Sirenia and *Cetacea* constitute the fourth and fifth orders of mammalia. The first-mentioned includes the Dugongs and Manatees, while the order *Cetacea* comprises the whales, dolphins and porpoises. The members of both orders are characterised by a powerful caudal fin which differs from that of the fishes in being placed horizontally, and in being a huge expansion of the integuments not supported by bony rays; the hind limbs are wholly wanting, and the anterior limbs are converted into swimming paddles or "flippers." In the *Cetacea* the nostrils are placed at the top of the head, constituting the so-called "blow-holes" or "spiracles." The body of the *Sirenians* is covered with scattered bristles, but that the *Cetaceans* is generally completely hairless. The head of the latter is as a rule of disproportionally large size, and is not separated from the body by any distinct constriction or neck. The skin of the Greenland whale is underlaid by a thick layer of subcutaneous fat which varies from eight to fifteen inches in thickness, and is known as the "blubber." The blubber serves partly to give buoyancy to the body, but more especially to protect the animal against extreme cold. It is the blubber which is the chief object of the whale fishery, as it yields the whale oil of commerce. In the lateral depressions of the whale's palate occur an enormous number of horny plates, constituting what is known as the "baleen" plates, from which the whale bone of commerce is derived. The porpoise, too, is often killed for the sake of its oil. Order VI.—*Ungulata*.—The order of the Ungulate or hoofed animals is one of the largest and most important of all the divisions of the mammalia. The following are the characteristics of the order:—All the four limbs are present, and that portion of the toe which touches the ground is always encased in a greatly expanded nail constituting a hoof. There are always two sets of enamelled teeth, and the molar teeth are massive, with broad crowns, adopted for grinding vegetable substances; no clavicles are present.

In accordance with the number of the digits, the order *Ungulata* is divided into two primary sections: the *Perissodactyla*, in which the toes or hoofs are odd in number (one or three), and the *Artiodactyla*, in which the toes are even in number (two or four).

GUANOS.

The term guano is properly applied only to the dung of birds and some other animals; but the name has been erroneously used to describe various other mixtures and preparations that are in no way entitled to be so called.

Peruvian guano may be described as a general manure composed of the excrements of fish-eating birds, and containing nitrogenous compounds, phosphates, and potash.

High-class Peruvian guano is rich in nitrogenous matter, a large proportion of which is soluble. As formerly exported it was capable of yielding from 8 to 12 per cent of ammonia, part of which was derived from ammonia salts, and part (less than 1 per cent) from nitrates. Phosphates were low, seldom exceeding 30 per cent, but from one-quarter to one-half of the phosphates were soluble. The amount of potash was usually from 3 to 5 per cent. It cannot be now had of this quality.

Low-class Peruvian guano, as now offered in the market, is comparatively poor in nitrogenous matter, yielding from 3 to 5 per cent of ammonia. The phosphates are correspondingly high, viz., from 30 to 50 per cent, but the proportion of soluble phosphate is much smaller than in high-class Peruvian guano. Potash occurs to a very small extent, viz., about 1 to 3 per cent.

Low-class guanos are formed originally from high-class guanos, by the washing out of soluble constituents by rain, &c., and their composition varies greatly according to the amount of washing they have undergone.

Genuine Peruvian guano frequently contains a large proportion of stony insoluble matter. It ought to be riddled before purchasing.

Fortified Peruvian Guanos, also called by various names, such as improved, equalized, &c. Such guanos are mixtures, with low-class Peruvian guano for a basis. Sulphate of ammonia is added, and perhaps also other nitrogenous matter, to bring them up to the guaranteed analysis, say from 8 to 10 per cent ammonia.

Dissolved Peruvian Guano.—That is usually Peruvian guano dissolved in sulphuric acid, and fortified with sulphate of ammonia so as to make a strong, active manure.

Ichaboe Guano.—A true guano, but of recent formation. It is very rich in nitrogenous matter, which yields from 10 to 16 per cent of ammonia, but a large part of the nitrogenous matter is in the form of feathers, which are insoluble and of low manurial value, otherwise it resembles high-class Peruvian guano. The total phosphates vary from 18 to 30 per cent, of which from a fourth to a half is usually soluble. There is seldom as much as 2 per cent potash present.

Other commercial guanos are the Patagonian (2 to 3 per cent ammonia and 30 to 35 per cent of phosphate), Bolivian guano (2 to 8 per cent ammonia and 20 to 50 per cent of phosphate), and Maldiv Islands guano (a trace of ammonia and 70 to 75 per cent of phosphate).

Fish Guano.—Derived from fish-curing yards, and consisting of the heads and offal of fish, dried and ground. Properly speaking, it is not a guano.

High-class fish guano contains nitrogenous matter, yielding from 10 to 12 per cent of ammonia, but it is in the form of insoluble albuminous compounds, which only slowly de