

potency in unlimited quantity could not be sanctioned in food. The other exception, milk, is obviously also upon a different level; the fact that it forms the staple diet of invalids and children renders it especially important that it should be as pure as possible. It was, further, quite apparent from the evidence that the milk supply of London could be adequately maintained without preservatives, and, further, that these substances tended to mask uncleanly dairying. For the prohibition of colouring matter in milk there seems less reason. Annatto is admittedly harmless, and if the recommendations of the Milk Standardising Committee be adopted the fat standard will be uniform, and hence the colour will no longer be, at any rate in this regard, deceptive. Anything which improves the appearance of food, without it is harmful or done with direct intent to defraud in the physiological sense, that is to mask an actual nutritive deficiency, should be encouraged in that by pleasing the senses we can often help the digestion and, further, often save actual waste, as people will not eat what does not look nice.

This brings us to one point upon which, apparently, the Committee do not agree, viz., the use of copper sulphate for rendering preserved vegetables and fruits permanently green. Three members of the Committee recommend the prohibition of this practice, but Prof. Tunnicliffe is of the opinion that the amount of copper should be restricted to half a grain per pound and declared. The difference seems to be one of general principle *versus* specific fact. The Committee regard the addition of a substance to food which in certain quantities is undoubtedly poisonous to be undesirable in any quantity. It appears, however, that it is very questionable whether the copper compound actually present in the green peas is poisonous. Prof. Tunnicliffe's experiments show clearly that only a relatively small moiety of the copper is absorbed, or at any rate remains in the human system, when it is ingested in the form in which it occurs in preserved peas. These results are practically identical with those obtained by Brandl in the German Gesundheitsamt. People have taken peas greened with copper for almost half a century and no case of chronic or acute copper poisoning has so far been traced to this cause. We cannot agree that evidence of the injurious effect of copper would be difficult to obtain; copper chemically is one of the easiest substances to detect, and physiologically it produces well-marked and fairly characteristic symptoms. Had copper poisoning from coppered peas occurred, we think it would not have escaped detection. It is at any rate to be hoped that we shall not be consigned everlastingly to brown peas without further investigation.

Some surprise may perhaps be felt that salicylic acid was not prohibited, as this substance is undoubtedly possessed of active medicinal properties; it is, however, stringently controlled, only one grain per pound or per pint being allowed. This substance is a very active antiseptic, and is especially useful in jam making and temperance beverages. The complete sterilisation of jam is very apt to break up delicate fruits which it is certainly a pleasure to have whole. Many experiments have been made with salicylic acid, and in the quantities recommended by the Committee it seems quite harmless.

The appendices to the report will be full of interest to the expert; they comprise reports on very complete physiological experiments handed in by Prof. Tunnicliffe, being his own work in collaboration with Dr. Rosenheim and others, also reports of visits to Ireland and Denmark and many other invaluable reference data.

The work of the Committee must certainly be designated as thorough in the extreme, and their recommendations as eminently sensible. In particular we consider the suggestion as an excellent one that machinery should be provided either by the Local Government Board or by the formation of a separate Board of Reference for

exercising control over the use of preservatives and colouring matters in food. It is sincerely to be hoped that legislation on the lines of the report will not be delayed; the necessity for it is urgent, as anyone can see who follows the conflicting decisions given in the law courts under the present Sale of Food and Drugs Act.

PRZEWALSKIS HORSE AT WOBURN ABBEY.

A PERIOD of twenty years has elapsed since Poliakoff described an apparently new species of wild horse obtained by the late Colonel Przewalski in the deserts of Mongolia, under the name of *Equus przewalskii*. Although only a single example was then obtained, much interest attached to the discovery, as the animal appeared from the description to be in several respects intermediate between the domesticated horse and the wild asses, or, at any rate, the Asiatic representatives of the latter. For a long period nothing more was heard of the animal, and zoologists were uncertain whether they had to do with a real species or a hybrid, or possibly with one of the feral or wild representatives of the common horse. Within the last few years, however, other specimens—some alive—were received in Russia, and one skin was sent to the Paris Museum. Although no very detailed or well-illustrated description of them has hitherto appeared, these specimens appeared to demonstrate that Przewalski's horse was entitled to rank as a distinct species.

Still, without making a visit to Paris or Moscow, English naturalists had no opportunity of satisfying themselves by actual inspection as to the distinctness of this interesting animal, and the figures hitherto published left several important features in obscurity. The acquisition by the Duke of Bedford of a drove of twelve fine colts (imported by Mr. C. Hagenbeck, of Hamburg) has brought this unsatisfactory state of affairs to a close, and it is now possible to study the characters of the species (in an immature state) with some approach to exactness.

The colts at Woburn Abbey, which were foaled last spring or summer, are about the size of Shetland ponies; and, if we may judge by the absence of "legginess" in their build, do not seem likely to grow very large. In general appearance they are much more like ponies than donkeys, the ears being short and the tails haired to within a comparatively short distance of the root, although there appears to be a certain amount of individual variation in this respect. Eleven out of the twelve have, however, white muzzles, which communicate to the head a somewhat asinine appearance. All are in their winter (or ? first) coats, which are of a dun colour, with the front of the legs dark brown or black, the mane and tail being also black. The mane is at present upright, but exhibits a slight tendency to fall over, which may increase with age; and there does not seem, at least in most cases, to be a distinct forelock. Most of the colts show no dorsal stripe, although in one or two there is a short one on the rump. There is no trace of a shoulder-stripe, or of dark barrings on the legs. Both fore and hind legs have callosities. So far as I can recollect, the underparts are lighter than the back. In young animals the true form of the hoofs is not fully developed, but I think the hoofs of these colts are of the relatively large size characteristic of the horse and the Asiatic wild ass.

The Woburn colts render it quite certain that *Equus przewalskii* is a true species and not a hybrid. It is equally clear that it is perfectly distinct from the kiang and all other races of the Asiatic wild ass.

The only other animal with which Przewalski's horse could be identical is the tarpan, or wild (or feral) horse of the Kirghiz steppe, which, as I am informed, is now extinct. Tarpan are, however, described by Pallas as

having a distinct dorsal stripe on the otherwise dun back, and a well-developed forelock, while the muzzle, with the exception of the nose¹ (which is whitish), is said to be black, and the tail, which appears to be haired to the root, is rather short and bushy in winter. Moreover, the colour of the tail and mane is said to be reddish-brown. Nothing is stated with regard to the front of the legs being black.

So far as can be determined from this description, the tarpan appears identical with *Equus caballus* (of which it is probably the ancestral form), which is certainly not the case with *E. przewalskii*.

But another important point arises in connection with the animal under consideration. Naturalists commonly divide the existing species of *Equus* into two groups, the one containing only the horse, and the other the asses and zebras. Przewalski's horse will, however, clearly find a place in the former group, and as this animal approximates in some respects to the kiang, which differs from the African wild asses by its shorter ears, larger hoofs (especially the front pair) and absence of a shoulder-stripe and bars on the legs, I am inclined to think that the horse, Przewalski's horse, and the kiang (Asiatic wild ass) form one natural group, and the African wild ass, quagga and zebras a second. This arrangement will harmonise with distribution much better than the old one.

Taking the tarpan as the wild representative of the horse, it will be noticed that all three members of the first group agree in the general absence of the shoulder-stripe and of dark markings on the legs. And the question then arises, how is it that certain domesticated horses (especially dun-coloured ponies in the Punjab) show both these markings? Can it be owing to a cross with the African ass, or is it due to reversion to the common ancestor of the equine genus? R. L.

TYCHO BRAHE'S OBSERVATORY.

IT was mentioned in a recent article on the tercentenary of Tycho Brahe's death (p. 6) that an account of excavations made in the island of Hveen has been published by Prof. Charlier, of Lund.² As Tycho's observatory has thus again attracted attention, it may not be out of place to give a short description of it as it was three hundred years ago, and of the very few remains of it now brought to light.

Tycho's magnificent buildings were destroyed less than twenty-two years after his death. In 1623 a mason was paid for 60,000 bricks "which he had pulled down and renovated from the old castle," and they were used to build a new dwelling-house at a little distance, which in its turn has disappeared within the last hundred years. Apparently the peasants of the island helped themselves to bricks and stones as much as they liked, as part of the foundation-stone (laid by Tycho's friend the French envoy, Charles de Danzay) was recently discovered in the wall of an outhouse of a farm on the east coast of the island, still showing part of the Latin inscription and the date 1576 August 8. When Picard was sent over by the Paris Academy, in 1671, to determine the geographical position of Uraniborg, only the foundations of the house and the greater part of the ramparts surrounding it were still intact, while on the

¹ The expression "nose" is a little ambiguous, but the figures do not show a white muzzle like that of *E. przewalskii*.

² "Utgräfningsarna af Tycho Brahe's observatorier på ön Hveen sommaren 1901." Beskrifna af C. V. L. Charlier. 20 pp., 4to, with 3 plates. (Lund, 1901.)

site of the observatory only a slight hollow in the ground was noticeable. Picard did not trouble himself about making excavations, and apparently everything was left undisturbed until 1823, when the clergyman of the island, Ekdahl, made careful excavations. At Uraniborg he found the deep well which was under Tycho's kitchen and still supplies the neighbourhood with excellent water, while parts of the foundation-walls and some slight remains of the laboratory (in the basement of the house) were also unearthed. These must have been covered over again, as nothing was visible on this spot until the present year, when the same trifling ruins of Tycho's beautiful residence were again laid bare; but as nothing of any scientific interest was found, we may at once pass to the underground observatory, of which much more distinct traces still remain.

Uraniborg, the stately residence of Tycho Brahe, was finished in 1580 and contained four observing rooms, two at the north and two at the south end of the building. But already a year or two later a large meridian quadrant was erected in one of the sitting-rooms, and very soon, as the work increased, it was found that even with this addition to the equipment more instruments were wanted. In 1584 an observatory was therefore built on a low hill

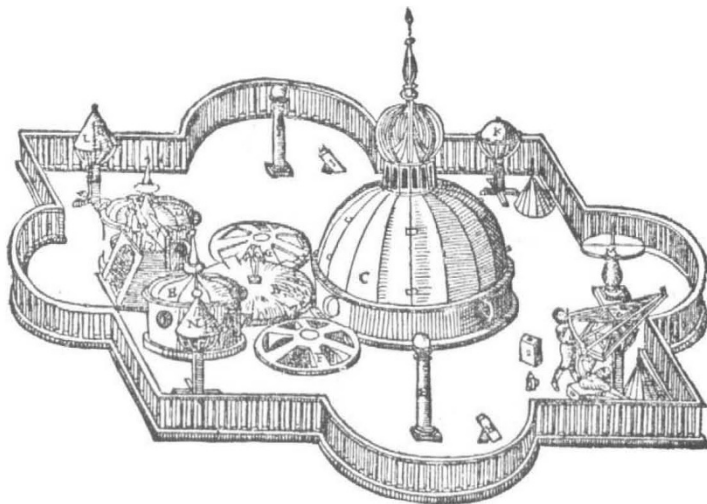


FIG. 1.—Stjerneborg Observatory, seen from the west.

about a hundred feet south of the south corner of the enclosure of Uraniborg and slightly to the east. This observatory, of which we here give a view from the west and a plan,¹ was called *Stellæburgum* (Danish, *Stjerneborg*); in it the instruments were placed in three subterranean rooms (C, G and F on the plan), of which only the roofs rose above the ground, so that they were well protected from the wind. The entrance was to the north, and in the centre was a study, lighted by four small windows just above the ground, and which could be heated by a stove in a recess (at P), while off it there was an alcove with a bed where Tycho could rest during cloudy intervals. In 1585 two other rooms for instruments (D and E) were added, but the floors of these were almost on the level of the ground, probably because he had found it inconvenient not to be able to observe stars near the horizon from the three underground rooms. The whole was surrounded by a low wooden paling, forming a square with sides 57 feet long, with semicircular bends at the middle of each side of 20 feet diameter, and stone piers were placed inside the

¹ Taken from the writer's book, "Tycho Brahe," by permission of Messrs. A. and C. Black.