

Dugald of the limits of thermal efficiency of gas and oil engines shows that 45 per cent. b.h.p. may be obtained in the near future. Sir Charles Parsons at the same time prepared an estimate of the limiting efficiency of the steam turbine as 28 per cent. Steam, internal-combustion, and gas engineers welcome the free competition with electricity supply, but consider that any attempt to crush out the smaller power units by a great Government scheme will act against the best interests of the country as to both coal conservation and economy in cost.

Sir Dugald also referred to the principle of heating towns by utilising the exhaust steam from steam turbines in central stations, and to Lord Kelvin's proposal to heat rooms by means of reversed Carnot cycle engines. By making full use of our water-power, three million horse-power could be added to the work of the country without consuming any additional coal

### Buddhism in the Pacific.

**A**T a meeting of the Royal Anthropological Institute on Tuesday, May 18, Sir Everard im Thurn, president, in the chair, Sir Henry Howorth read a paper on "Buddhism in the Pacific." The paper discussed the disintegrated distribution of the Polynesian race, and the occurrence, especially in the Hawaian archipelago and that of New Zealand, of two of its factors which are separated by the whole length of the Pacific Ocean, one occurring in the extreme north and the other in the extreme south, and separated by an intervening area occupied largely by Melanesians. The two factors in question agree very closely in language, while they differ materially in the art and form of the objects which they use. Inasmuch as the Maoris almost certainly migrated to their present quarters at the beginning of the fifteenth century, this is the only way to account for the virtual identity of their speech with that of the Hawaiians, and the general character of their ornamental work with that of the Melanesians. The Hawaiians, on the other hand, present us with a series of objects, *i.e.* helmets and cloaks, made of feathers which, in their form and colour, differ entirely from those made by other members of the Polynesian race. They agree in an extraordinary way in colour and form with those of the Reformed Lamaists of Tibet, who, like other Buddhists, were great travellers and evangelists at a time when Chinese and Japanese vessels, as has been so completely proved in recent years, were traversing the Indian Ocean and visiting the whole of the eastern archipelago at least as far as New Guinea, and apparently even reaching New Zealand, where many years ago a very interesting bronze figure was found.

Sir Henry Howorth quoted instances of the drifting and wreckage of Chinese and Japanese vessels on the central and eastern Pacific during the time which has elapsed since Europeans first visited that ocean, and also the tradition of the Sandwich Islanders that several Japanese and Chinese ships had been wrecked among them in early times. It was not wonderful, therefore, that we should find their kings and gods adopting the stately dress used by the Lamas, the colours of which they imitated in feathers. All the details of the helmets exactly equate, while the cloaks are ornamented with patches of red on yellow or yellow on red, just as the Lamaist cloaks are, in the latter case in pursuance of the injunction of their founder that their cloaks must be ragged and patched.

In the interesting discussion which followed the reading of the paper, Dr. Glanvill Corney cited examples, some of which had come under his own

observation, of the drifting of boats with native crews for long distances in the Pacific, and pointed out that the Polynesians were always ready to put out to sea. The Chinese had it on record that Buddhists visited Mexico at a very early date. The similarity shown by the helmets and cloaks of Hawaii and Tibet was very striking, and the explanation offered by Sir Henry Howorth was most probable.

Mr. Ray said that he himself for some years had been of the opinion that certain elements had been carried into Polynesia at least from Malaya, if not from farther—possibly Japan. The characteristic of the Polynesian was that he was very prone to imitate anything which took his fancy, as, for instance, European hats had been imitated. The Cambridge Expedition to the Torres Straits had found a club which was clearly an imitation of a Loyalty Islands club.

Mr. Hocart said that in dealing with the wanderings of the Polynesians too much stress had been laid on drifting, but deliberate purpose should be more emphasised. There was among the Polynesians a distinct passion for finding out new lands.

Dr. Forbes adduced as evidence of early movement Chinese objects which he had seen taken from Peruvian graves which were certainly pre-Inca in date.

Sir Everard im Thurn, in bringing the discussion to a close, said that Buddhist monks might well have accompanied the early voyagers in the Pacific. His attention had recently been directed to the question of the Hawaian helmets, and he wished to point out that the native peoples of the Pacific were very fond of making head-coverings for use on ceremonial occasions. They paid great attention to the ornamental dressing of their hair, and if their hair were not suitable for this purpose they made artificial hair out of grass seed. He himself had brought back from Fiji an example of a native wig used in a ceremonial dance, which was now in the Pitt Rivers Museum at Oxford. It was probable, therefore, in view of this particular tendency, that the Hawaiians would take readily to copying the head-dress of the Buddhists. This particular form of head-dress or helmet was not confined to Hawaii; objects ornamented with men's heads wearing head-dresses like those of Hawaii occurred in Hermit Island, near New Ireland.

### Astronomy at Oxford during the War.

**W**E have recently received from Prof. H. H. Turner, of the Oxford University Observatory, a collection of papers published during the years 1914-19. These for the most part are reprints from the Monthly Notices of the Royal Astronomical Society, and represent researches carried out during this period by Prof. Turner and various members of his staff, including several volunteer workers who have rendered some valuable assistance. It is, of course, impossible adequately to discuss a miscellaneous collection of papers such as this in any detail, but there are several outstanding features of interest which call for special remark.

In the first place, a considerable number of the papers is devoted to an important research of Prof. Turner's on "A Proposal for the Comparison of the Stellar Magnitude Scales of the Different Observatories taking Part in the Astrographic Catalogue." This was first outlined at Paris in 1909, the proposal being: "That the number of images recorded under each unit of the magnitude scale be counted and tabulated." The chief objects in view were to detect systematic errors of scale at the various collaborating observatories, and to test Prof. Kapteyn's conclusion that the Galaxy is relatively richer in faint

stars than the remaining parts of the sky—a theory upon which some doubt had been cast by earlier work of this nature. The method, although of extreme simplicity, has certainly proved efficient for the first of these objects, and various systematic errors of scale have been clearly exhibited. With regard to the second object, an examination of the ratio of the number of faint stars to bright in the various regions investigated appeared at first to negative Prof. Kapteyn's conclusion; but, although this ratio was not found to vary with galactic latitude, certain changes were detected in different parts of the sky. Prof. Turner has thus been led to the interesting conclusion that regions of "obscuration" exist which tend to obliterate the fainter stars, and these regions appear to form a spiral in the heavens, the central line of which is approximately given by the equation

$$\alpha + 3.66\delta = 247^\circ,$$

where  $\alpha$  denotes right ascension and  $\delta$  declination. There appears to be a fairly sharp boundary to this "spiral of obscuration" on the side of smaller R.A. in the northern hemisphere, and on the side of greater R.A. in the southern hemisphere.

Another very valuable piece of work is represented by a series of papers on "Baxendell's Observations of Variable Stars," edited by Prof. Turner and Miss M. A. Blagg. A very considerable amount of painstaking work must have been expended on this task of revising and editing Baxendell's observations of some twenty-three long-period variables. The greater part of the work appears to have been done by Miss Blagg, and the result as a whole is certainly a most valuable contribution to the study of this particular branch of astronomy. In connection with this subject we may also mention two papers by Prof. Turner "On the Classification of Long-period Variables," in which the alternative classifications of the author and of the Rev. T. E. R. Phillips are discussed and compared at some length. Both methods are considered to be useful, and a suggestion is made that some stars might pass from one of Phillips's groups to the other during the course of their evolution. This latter idea is more fully discussed in the particular case of W Cygni, which appears to be changing from Phillips's Group I. to Group II.

There are many other shorter papers of considerable interest, but these are too numerous to be noted here individually. The whole collection pays ample tribute to the energy and resource with which work has been carried out at the observatory during the trying period of the last few years. Apart from the many difficulties directly resulting from the war, there have been other troubles with which the staff has had to contend. In particular, we regret to note the decease of the caretaker, Mr. J. Mullis, who had been with the observatory since its erection in 1874. There is at present no second assistant or resident computer, and Prof. Turner and his staff must certainly be congratulated on the way in which the work has been carried on in the face of these and numerous other difficulties.

D. L. E.

### The Alligator Pear.

THE cultivation of the Avocado or alligator pear is the subject of articles by Mr. W. G. Freeman and others in the Bulletin of the Department of Agriculture, Trinidad and Tobago (vol. xviii., part 3). The Avocado (*Persea gratissima*), a member of the family Lauraceæ, is a pear-shaped fruit with a large central stone, the amount of covering flesh varying considerably according as the kind is good or poor.

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It is one of the most important of the fruits which have become widely distributed since the discovery of the New World. It is probably a native of tropical America, and was introduced at an early date into the West Indies, where it is now naturalised. Sir Hans Sloane, in his "History of Jamaica" (1707-25), gives a long description of the tree and its fruit, and Dr. Patrick Browne (1756) is eloquent on the flavour of the latter and the esteem in which it is held. The edible portion of the fruit varies from a little under one-half to more than three-quarters of the weight of the whole, according to the thickness of the rind and the relative size of the seed. Its food-value is mainly due to its high fat content, which in some varieties approaches that of the olive, and is especially high in the fruit grown in Florida and California.

Although so long cultivated in the West Indies, yet little attention has been given until recently to the selection and propagation of good varieties. It is an extremely variable plant, and the method of selecting seeds from trees bearing the best fruit and of high productiveness gives uncertain results, as the varieties do not come true from seed. But by budding or grafting from good varieties these may be fixed, and by this means poor trees will be converted into good varieties. Mr. Freeman suggests the probability of a seedless Avocado being obtained, as occasional seedless fruits have been reported from the United States and Honolulu. The Avocado needs no very special care in cultivation, and does very well on the poor soil of parts of the northern range in Trinidad. Budding has been practised at the St. Clair Experiment Station for the last four years, and the curator, Mr. R. O. Williams, gives details of the operation. The method is the same as that generally adopted for roses and citrus. The full-grown tree is fairly free from insect pests, but the plant is more susceptible in early stages and when recently budded. Mr. F. W. Urich describes the various insect pests and means for combating them. A more serious disease which attacks the fruit is the so-called anthracnose, very closely related to the fungus which causes anthracnose of the mango. In the case of fruits packed for export this disease causes complete rotting of the whole consignment. Repeated sprayings with Bordeaux mixture are necessary to prevent its development.

### The Improvement of Grassland.<sup>1</sup>

IT is too often the case that grassland is left to take care of itself, and that no steps are taken for its improvement. Even where manuring is carried out it is usually confined to occasional dressings of farmyard manure; little or no use is made of artificial fertilisers, and the beneficial effects of lime upon the herbage are far less widely known than they should be. The consequence is that much of the finest pasture and meadow land in the country is carrying only a second- or third-rate herbage simply from lack of knowledge of the most effective treatments to bring about improvement. For the education of public opinion in this respect nothing is more useful than demonstration plots, and the Ministry of Agriculture and Fisheries has issued a most valuable and comprehensive pamphlet outlining schemes of experiments suitable for this purpose. The schemes intended for farmers are simple in character and direct and practical in their object, while those drawn up for the agricultural colleges and institutes deal with experiments requiring considerable attention and supervision.

<sup>1</sup> "The Improvement of Grassland: Suggestions for Demonstrations and Experiments." Miscellaneous Publications No. 25. Ministry of Agriculture and Fisheries.