

accommodate which the order Palaeodictyoptera has been formed. It is not for me to here enter into an examination of the materials included in this so-called order. It will suffice to say that not one of them could be suspected of being lepidopterous.

The point at issue is, did anthophilous insects (and therefore flowers also) exist during the carboniferous epoch? According to my views we are without evidence of their existence.

I decline any further discussion on this subject until Mr. Wallace has examined the fossil, or has obtained evidence of its peculiarities from some one in whose judgment he has more confidence than he apparently has in mine.

Lewisham, April 25

R. McLACHLAN

Captain Cook's Accuracy

IN NATURE, vol. xix. p. 408, there is an article entitled "Captain Cook's Accuracy," which I think reflects unjustly upon the late Admiral Wilkes, U.S.N. As a specimen of Wilkes's inaccuracy the writer of the article cites first the discrepancy in the position of Turtle Island, the south-easternmost of the Fiji group, Cook and Wilkes differing more than 30' of longitude. The narrative of the U.S. Exploring Expedition was written on board ship during the progress of the work, and was placed by Wilkes in the hands of the printer immediately upon his return, in order that the general results might be known without delay. The astronomical positions were given as they were recorded at the time, and were not corrected for final chronometric errors and rates, which were carefully ascertained while the charts were being prepared for publication. A comparison of the narrative with the atlas, published subsequently, will exhibit differences of longitude almost throughout.

On the general chart of the Pacific, sheet III., which is on a very small scale, so that a slight inaccuracy of the draughtsman or engraver will cause a difference of several minutes, Turtle Island will be found to be in about $178^{\circ} 22'$ W. long., but the special plan of the island (vol. 2, p. 94, of the Atlas) places it in lat. $19^{\circ} 47'$ S., and long. $178^{\circ} 16'$ W., while Capt. Denham, R.N., in 1856, places it in $19^{\circ} 49'$ S., and $178^{\circ} 14' 42''$ W., where it is at present shown on the British Admiralty Charts. The difference of latitude is about $1' 45''$; that of longitude, $1' 36''$; differences which might readily be accounted for by different points of observation having been used. The difference in the outline is not very material.

As Cook placed the Island in 178° W., he was fifteen minutes in error; while Wilkes differs from the latest surveys about a minute and a half. Capt. Worth, of H.M.S. *Calypso*, in 1848, placed the island in $178^{\circ} 8'$ W., differing seven miles from the subsequent survey by Capt. Denham, the position by the latter being now borne on the British Admiralty chart, yet the former authority is quoted to prove the inaccuracy of Wilkes's work.

Findlay, judging from what he says upon this subject, consulted Wilkes's book, instead of his chart, which was published subsequently. The second example of Wilkes's inaccuracy, cited by the writer, is that he found from a position which he occupied at Savaii, a trend of coast differing from that as shown by Wilkes's chart, but it is a question whether he was not mistaken in the identity of the point occupied by him. The waters of the Samoan group are, so far as we know, navigated safely and almost exclusively with Wilkes's charts.

The third and last example is concerning Quiros Island (Swain's Island). The facts in this case are that the boats of the exploring expedition did not effect a landing on the island at all; efforts were made to do so, but were unavailing on account of the surf, so that it is quite impossible that they could report the existence of a lagoon hid from their view by a wooded strip of land even if only a quarter of a mile in width.

In criticising the work of such explorers as Cook, Vancouver, and Wilkes, it should be borne in mind that the expeditions which they commanded were for exploring rather than surveying purposes, and it is rather a matter of surprise that they should have come so near the truth when we consider the crude materials with which they had to work.

Hydrographic Office, U.S. Navy,
Washington, D.C., April 11

S. R. FRANKLIN
Captain U.S.N. and
Hydrographer

Sense of Force and Sense of Temperature

"J. T. B.'s" "discovery" of the distinction between muscular sensations—or, as he styles them, the "sense of force," whatever

that may mean—and the sensation of temperature, has been long anticipated by Alexander Bain in his work on "The Senses and the Intellect."

Again, your correspondent's illustrations of the distinction he draws between absolute and relative muscular sensations and sensations of temperature are wholly illusory. How can it be said that a letter-sorter enjoys and improves absolute sensations of weight? Surely his sensations enable him to determine not "absolute weight" (whatever that may be), but the weights of particular letters relative to certain standards, according to which relation the postage is charged. These sensations enable him to say that certain letters are over, and others under, an ounce in weight, and thus they are in fact relative, not absolute, as "J. T. B." seems to suppose.

The same remarks apply to "J. T. B.'s" assertion that "the sense of temperature may also be rendered absolute to a certain extent," and to his illustration of the plumber who judges whether the heat of the soldering-bolt is adequate for his purpose. Here again the sensations are, in truth, purely relative, any inference drawn from them being based upon a comparison of present and previous sensations and present and previous experience of their results.

A. K. R.

Mark Lane, April 23

Mr. Preston on General Temperature-Equilibrium

MY attention has been arrested by Mr. S. Tolver Preston's paper on general temperature-equilibrium in NATURE, vol. xix. p. 460, and by a letter from him in a later number (p. 555), pointing out a trifling literary ambiguity in it. As this implies that the paper is otherwise correct, you will perhaps allow me to protest, and to state that it is full of confusion of reasoning and of unsoundness.

I do not know how many sins against dynamics could be discovered by careful examination, but at least two pervade it throughout, viz. (1), the assumption that the simple relationship which exists between the movements and the temperatures of molecules of matter exists also between the movements and the temperatures of masses of matter; (2) the assumption that gaseous molecules (simple or compound) whose bond is chemical affinity differ mechanically from masses of matter (stellar or otherwise) in size and weight only, whereas they really differ in a multitude of other ways, and notably in elasticity; and from this difference alone it would be easy to show that the analogy in the paper is fanciful, and its reasonings and conclusions invalid, but I respect your space.

In conclusion I would say that I am not writing against the hypothesis of temperature-equilibrium itself. It may or may not be true. All I assert is, that this paper gives no real information about it.

WM. MUIR

133, Upper Thames Street, E.C., April 26

The Migration of Birds

IT was because Prof. Newton mentioned such distances as six, seven, and ten miles (*vide* NATURE, vol. xix. p. 434), in connection with the flight of migratory birds, that I brought forward the matter of temperature, and the latter still appears to me to have as much bearing on the question, as has the density of the atmosphere.

The intense frost on Christmas eve, 1861, was said to have killed a large number of thrushes, blackbirds, &c., in Scotland. Near Edinburgh, where the thermometer registered about -4° F. during the night, many dead birds were found. These deaths resulted from cold, not from starvation, for the weather was open until within a few days of Christmas day. Now, if a frost of this severity has such an effect on bird-life, surely it must be conceded that temperatures from -25° to -100° F.—those that would reign between six and ten miles' elevation, with surface temperature of $+80^{\circ}$ F.—would slay the hardiest migrant.

There is a great difference between the elevation required to view a distant sea horizon, and an equally distant mountain-top. For instance, to obtain a sea-horizon of 300 miles, you must mount nearly twelve miles; but from an altitude of four miles, the summit of a mountain 20,000 feet high (less than 4 miles) would be visible, though its base lay 300 miles off. Similarly, if an elevation of 5,000 feet only be granted to the haze that constitutes the loom of land, birds flying two miles high will have a circle of vision, for the land indication, of over 200 miles radius. Under such circumstances, if the journey is 1,000 miles in length, a deviation of some 12° on either side of the true direction of flight

can be made by migrating birds, without leading them out of view of their destination. With shorter journeys it is evident the error of flight may be largely increased without endangering the safety of the migrants.

Migratory birds that are strictly nocturnal cannot cross any very great expanse of barren ocean, hence, unless their error of flight is large, and the land they wing their way to small, there is not much fear of their losing themselves. Moreover, if they do go wrong, dawn must assuredly bring back their powers of vision.

E. H. PRINGLE

Beckenham, April 27

An Observatory of Newton's?

THERE is a tradition associated with a domed building, now covered with ivy, situate on Stamford Hill, that it was once employed as an observatory by Sir Isaac Newton. Can any of your readers give any information upon the subject? Immediately beneath the revolving dome there is a well-shaped excavation (now partially filled with water) in which is an extinguisher-shaped stand, supposed to be of iron; this may have formed part of the base of a telescope, but no information upon the subject can be obtained from the local inhabitants.

CHARLES COPPOCK

Grosvenor Road, Highbury New Park, N., April 23

Waterton's Wanderings—Goat-suckers

ONE would like further information respecting the "nocturnal flies" which settle on the udders of cows or goats, and may be seen on moonlight nights. Many lepidoptera and coleoptera and a few hymenoptera are nocturnal, but are not known to adopt the habit described. Of the true flies, diptera, are any nocturnal?

HENRY H. HIGGINS

A STATUE TO CAPTAIN COOK

THE Australians have found a hero worthy of their worship, and Capt. Cook has at length found an English-speaking people eager to take occasion to honour the memory and the work of one of the greatest of Englishmen. The mystery of the reticence of our wealthy but unwieldy Geographical Society on the occurrence of the centenary of Cook's death, still remains unsolved; they did not even send a representative to Paris, to the amazement of the enthusiastic French geographers; was the weather too rough for the gallant admiral who we believe volunteered to the indifferent Council to go to the Paris meeting? We are glad for the credit of the nation that it has not been left entirely to the foreigner to recognise the greatness of one of England's greatest navigators and discoverers. Our readers may remember that some time since a statue of Cook adorned Waterloo Place, near the Athenæum Club. The statue was admitted to have been exceedingly happy in conception, and successful in execution; it is supposed to represent the great navigator coming within the loom of the east Australian coast, which he first saw near Cape Howe, to the south of Sydney. It was for this city that the statue was designed, and it was to inaugurate the work of Mr. Woolner, that on February 25 last one of the greatest demonstrations took place that has been witnessed in Australia since the first shipload of convicts was landed at Botany Bay. When we said that Australia had found a hero, perhaps we spoke too widely, for only New South Wales as represented by Sydney, seems to have joined in the demonstration to commemorate the centenary of Cook's tragic end and the unveiling of his statue. It seems to us a great thing for a people to have a worthy national hero, and since the days when Abraham begat Isaac, and probably long before, every nation of any note has had its hero or demigod in whom all the national virtues have been embodied. The Australians have the making of a great people among them, and while they have a right to count our gods as theirs, still no doubt they would like to have a Hengist of their own to mark a new starting-point in their

history. Happily, as we have said, they have found a worthy one—one whose character is in every respect worthy of their admiration, and the principles of whose conduct, if adopted and acted upon, will help to make of them a really great people. However desirable we may think the federation of our Australian colonies to be, any advocacy of it in these pages would be out of place. Still we cannot but think that it would have been a good thing in many ways—a good thing for the colonies themselves, and conducive to cordiality among them—had they all united to do honour to one so worthy of honour in all respects, and to whom, in a sense, they are indebted for their very existence.

Nothing could have been more successful than the gathering in Sydney on February 25, to assist at the unveiling of the statue by Sir Hercules Robinson. It was a universal holiday. Probably there were not much less than 100,000 people gathered in and around Hyde Park at the time of the opening ceremony—people of all classes who had voluntarily given up their work or business for the day, apparently, to a large extent, from genuine enthusiasm towards the man who first landed near the site of what in a few years has become one of the finest cities in the world. The statue seems to have given universal satisfaction, and the enthusiasm reached its height when Sir Hercules Robinson unveiled it at the conclusion of a solid and suitable speech. In his address the Governor traced in a sympathetic manner the career of the hero whom they had gathered to honour, from his birth as a peasant's son, till his unfortunate murder at Hawaii. Sir Hercules does not, however, seem to be well up in the latest evidence with regard to Cook's death, and seems, as of old, to have attributed it to mere savagery, whereas it seems pretty clearly ascertained that it was a blunder on the part of the poor natives. We have so recently written on the character and work of Cook, that it is unnecessary again to go over the same ground. Sir Hercules very happily, we think, read the moral of Cook's life to the people of Sydney. He was a man who eagerly pursued knowledge as his scanty opportunities afforded: who valued science, and endeavoured to do all his work by its light and guidance; who treated those under his command with the greatest consideration, and exercised the utmost tenderness and humanity towards the natives of the various islands with which he had any dealings. "Such a statue is creditable to ourselves," Sir Hercules justly concluded, "as marking our admiration of the character and services of the man, and our gratitude for the benefits which his discoveries have conferred, not only on Australia, but also on the world at large. . . . There is scarcely a lad born in this country who has not within his reach educational advantages superior to those which were available to the poor Yorkshire peasant boy, and I hope that the history of his early life may not be thrown away upon the young, but that many a child in the future will learn at the foot of this statue how a faithful, patient, cheerful attention to the details of daily duty, however monotonous and commonplace, will bring its own reward, and may perchance, as in the case of James Cook, leave behind a noble and imperishable memory."

While we regard it as right and proper that this fine statue should have been erected in Sydney to Cook, we think, moreover, the people of New South Wales would only be carrying out the work of Cook if they took some step to obtain a more thorough knowledge of these Pacific islands and seas, for a knowledge of which Cook did so much. We recently referred to the lecture given them by Dr. McLucho Maclay on the want of a zoological station at Sydney; and we would suggest that the people of Sydney, helped by the other Australian cities, should carry out the work they have so well begun, by founding an institution, that under proper guidance would add immensely to our knowledge of the life of these interesting