the limbs. Of these nails the fourth is 15 mm. long and of a uniform width of 4 mm., ending very bluntly; the fifth is very slightly shorter than the fourth, broad at the base (8 mm.), tapering rapidly to a blunt point, the two together forming an outline rather like that of a goose-mussel (*Lepas*). The nails of the third, second, and first digits, very much smaller, form a series gradually diminishing in size in the order named, and constitute a second row on the inside of the fourth and fifth, by which, as stated, they are completely concealed from view. What corresponds to the palm is the cleft between the two rows of digits.

The hind-limbs are also short, with the soles turned outwards. What appears to be the fifth (anterior) digit is very short, with a short, broad, and strong nail; the fourth is armed with a long (7 mm.) narrow, curved, and sharp claw, while the claws of the third, second, and first are broad, flat, rounded at their points, and joined together by a membrane which extends nearly to their points. On the sole there is a hard, elongated, horny tubercle crossing it transversely.

The tail, 2 cm. long, and 5 mm. wide at the insertion, tapers to 3 mm., and terminates in a knob-like tip.

About 15 mm. in front of the vent (? cloaca) there is a pouch in the integument about 4 mm. wide, with the opening directed backwards and having a depth in a forward direction of from 4-5 mm. The surface of this pouch is devoid of hair, but the bare area is surrounded by thick fawn-coloured fur, with a slightly reddish tint; it is possible, however, that this reddish tint is due wholly or in part to some ferruginous-looking sand which is much mixed up with the fur. The body generally, with the exception of the lower two-thirds of the tail, which is bare, is covered with fur of a rather lighter tint.

With regard to the internal parts, it is unfortunate that the specimen came to us completely eviscerated, and in a bad state of preservation generally; but in a small part of the lower bowel which was left, remains of ants were found. The bowel terminates at a wide vent (? cloaca), and I can find no trace of a separate genital aperture, nor of such openings into the supposed cloaca.

I have not yet had time to examine with minuteness the skeleton, which unfortunately is also considerably damaged, especially about the occipital region; but from a cursory examination of the recently-skinned body, I can note the following points, with, I believe, accuracy:—

Cranium relatively large; no bony orbits; zygomatic arches present; well-developed shoulder-girdles with slender clavicles; pectoral muscles large; pelvis large and strong, with a rather wide symphysis pubis, but no epipubic bones, either actual or rudimentary; ribs, 14; angle of lower jaw markedly inflected.

The teeth are peculiar, and require a more extended description than I can give at present, but the formula appears to be—

$$i \frac{3}{3}, c \frac{1}{1}, m \frac{6}{5} \left(? \frac{p \ 2, m \ 4}{p \ 1, m \ 4} \right)$$

This, however, may require some modification, as just posterior and external to the premolar (or first molar) of the right ramus of the mandible there is a small rudimentary conical tooth, which is not to be found on the opposite side, nor at corresponding positions in the maxilla.

I do not pretend to be a zoological expert, but I cannot help being struck with the resemblance both of the lower jaw and of the general characters of the teeth to the pictures of the jaws of *Amphitherium* as figured in various osteological works. I am now endeavouring to obtain other specimens, and meanwhile am having careful drawings made of the various parts of the present example of what appears to be a remarkably curious and interesting animal even in this land of strange and antique types.

E. C. STIRLING.

The University, Adelaide, South Australia, August 29.

Nomenclature of Determinants.

NATURE of October 4 opens with a review of a book on "Determinants" by two pupils of Prof. Valentin Balbin, whose energy and enthusiasm have done so much for mathematics in the University of Buenos Ayres. In regard to the naming of the various special forms of determinants, your reviewer says:—"The nomenclature adopted in the second book differs in some particulars from that employed by Muir. Thus, our authors do not follow him in substituting 'adjugate' for the

more euphonious and more familiar adjective 'reciprocal,' and they agree with Scott and others in calling those determinants 'orthosymmetrical' which Muir names 'persymmetric.' We think that their name 'determinante *hemisimétrica*' is a distinct improvement on the old 'zero-axial skew determinant,' but . . ."

Now, as I have gone on a definite principle in the selection of the technical terms used in my book, and as I believe that this principle is one which receives very general approval among students of science, I shall be glad if you will allow me to direct attention to it. It is that, unless very strong reasons to the contrary can be adduced, the first name given to a scientific object or concept should not be departed from.¹ In more aphoristic form, the multiplication of synonyms is a great evil. Judged by this principle, the terms "adjugate," "persymmetric," and "skew" deserve the place I have given them. "Adjugate," as applied to a determinant, was a generation old before "reciprocal" was proposed; and—what is no mean additional recommendation—it carries with it the sanction of the highly-honoured names of Gauss and Cauchy. To outweigh these claims there is very little to be said for the rival word. It is not more appropriate; indeed, the kind of connection to be indicated does not involve the idea of reciprocity at all. It is true, as your reviewer says, that "reciprocal" is a more familiar word; but the use of a familiar word in a new and therefore unfamiliar sense is surely not to be commended. In regard to "persymmetric," similar language may be employed. It was proposed by Sylvester, and was in use for years by him and others before "orthosymmetric" made its appearance. The latter is not an etymological mongrel, but it is also not one whit more appropriate than the word it seeks to supplant, and it is the unfortunate parent of the monster "doppelt-orthosymmetrisch." It never was heard in England until 1880, and I regret that my friend Mr. Scott should have seen cause to introduce it. As for the third word, "skew," the arguments in its favour are still stronger. The determinant in question was called "skew" in English and "gauche" in French, by Cayley, as far back as 1846; and these words, and their German and Italian equivalents, are to be found employed in scores of original memoirs by the highest mathematicians. "Hemisymmetric" is but of yesterday, and, so far as I know, has never been used by any mathematician of note.

Is it merely a proof of the decadence of our insularity to find a welcome given by Englishmen to terms of foreign coinage which have been wantonly proposed to displace the original words of Cayley and Sylvester? and what does it prove to find Germans, who at first derided the tropical luxuriance of Sylvester's nomenclature, now out-Heroding Herod without having Sylvester's exulting accompaniment of tropical luxuriance of ideas?

Your reviewer's protest against Dostor's introduction of "multiple determinants" I cordially support, and only wish that he had taken space to show the numerous absurdities connected therewith.

THOMAS MUIR.

Beechcroft, Bothwell, N.B.

A Shadow and a Halo.

"E. W. P." may see the phenomenon he describes any sunshiny morning or bright moonlight night, when the dew is heavy on the grass. The halo being caused by reflection at a small angle of the sun or moonlight from the wet surfaces of the blades of grass, enhanced by contrast with the dark shadow (and having nothing to do with moist air), its brightness would no doubt be increased by the foreshortening and consequent apparent compression of the reflecting surfaces on the slope. The neighbourhood of a high hedge would diminish it by lessening radiation, and the consequent cooling of the grass and deposition of dew upon it.

NATURE naturally takes no account of moral analogies, of which Nature herself is full. Else one might note that a man never sees a halo round his own head unless he turns his back to the light.

B. W. S.

Hampstead Heath, October 6.

OFTEN and often in walking or riding over the chalk downs of Wiltshire or Hertfordshire I have observed a bright halo surrounding the shadow of my head. This is usually cast by sun

¹ The introduction of "continuant" may seem to do violence to this principle; but the letter referred to by your reviewer will show the opposite.

or moon in bright clear weather, and extends with a radius of about three times the shadow's diameter around the head alone. It is probably due to diffraction of light-waves, an explanation of which at length may be read in Glazebrook's "Optics" and in other text-books. But your correspondent omits the most extraordinary character of the phenomenon. It is a curious fact that any man can see the light around the shadow of his own head, but *never* about the shadow of another. Few people notice this halo, but when once pointed out to them, they tell me they frequently observe it. It is particularly clear when thrown across a valley from one ridge to another on the opposite side. I have puzzled over this spectral brightness for five years, and never found an explanation of the fact that no one can see anyone's halo but his own. I have delayed writing to NATURE until cause and effect could both be given, but they are not forthcoming.

Another curious appearance is a rainbow thrown by sunlight on black sound ice, probably due to polarization by crystals. On the one occasion when I saw it on a pond, I had no time to observe details. Has anyone seen the like? A. S. EVE.

Marlborough College.

Nesting Habit of the House Sparrow.

I SHOULD be glad to know if any of your correspondents have noticed a nesting habit of the house sparrow (*Passer domesticus*) which I have very frequently observed in this part of New Zealand. In many of the deep cuttings in our roads and in the cliffs upon our river-banks, where the formation is a light pumiceous sand, these birds are in the habit of burrowing holes similar to those of the sand-martin (*Hirundo riparia*). In some cases I have found these burrows by measurement to be as much as 6 feet in depth.

Can this be a recently acquired habit, and will it not have an influence upon the anatomical development of the bird?

Waihou, Auckland, N.Z., September 5. G. L. GRANT.

Sonorous Sands.

I NOTICE a letter from my friend Mr. A. R. Hunt in your issue of last week, and add a line to say that the sand which our common friend, the late Admiral Bedford, gave him was, *probably*, of my collecting.

I found that the sand in Studland Bay is sonorous, during a visit to Swanage, in 1869, and was, for many years, in such constant communication with the late Admiral Bedford, exchanging notes and specimens, that I think I must have given him the sonorous sand in question, though I cannot remember the circumstance.

Anyway, there is no doubt that the dry sands of Studland Bay are powerfully sonorous. Walking with my son and a young friend of his across the bay in July 1869, we all amused ourselves by kicking the musical dust before us, the two younger pairs of heels getting quite a volume of sound out of the performance. D. PIDGEON.

Holmwood, Putney Hill, October 6.

A Shell Collector's Difficulty.

IF Mr. Layard will discard "tightly-corked tubes" altogether, and keep his minute shells in open-ended sections of glass tube, lightly closed, at top and bottom, with cotton-wool, he will have no more trouble from "milky efflorescence," which will not form in presence of the "thorough draft" he will thus establish in his cabinet. D. PIDGEON.

Holmwood, Putney Hill, October 13.

Yorkshire Geological and Polytechnic Society.

IN accordance with a request made by the Council of the Yorkshire Geological and Polytechnic Society, I am compiling a history of the past fifty years' work of the Society, and including in it biographical notices of some of its principal members. Amongst the latter was the Rev. W. Thorp, who for several years held the office of Honorary Secretary, and took great interest in the Society. He was at one time vicar of Womersley, and afterwards removed to Misson. Unfortunately I can obtain no records of his life. Can any of your readers assist me? Any information will be gratefully received and duly acknowledged. I believe Mr. Thorp died about 1857.

Chevinedge, Halifax, October 15. JAMES W. DAVIS.

MODERN VIEWS OF ELECTRICITY.¹

PART IV.—RADIATION.

XI.

WE have next to consider what happens when electrical waves encounter an obstacle.

Mechanism of Electric Radiation.

In forming a mental image of an electrical wave, we have to note that three distinct directions are involved. There is (1) the direction of propagation—the line of advance of the waves; (2) the direction of the electric displacements, at right angles to this; and (3) the direction of the magnetic axis, at right angles to each of the other two.

One may get a rough mechanical idea of the process of electrical radiation (at any rate in a plane) by means of the cog-wheel system already used in Part III. Imagine a series of elastic wheels, in one plane, all geared together, and let one of them be made to twist to and fro on its axis; from it, as centre, the disturbance will spread out in all directions, each wheel being made to oscillate similarly and to transmit its oscillation to the next. Looking at what is happening at a distance from the source, we shall see the pulses travelling from left to right; the electrical displacement, such as it is, being up and down; and the oscillating axes of the wheels being to and fro, or at right angles to the plane containing the wheels. The electric displacement is small, because the positive and negative wheels gearing into one another move almost equally, and accordingly there is the merest temporary balance of one above the other, due to the elastic "give" of the wheels. The magnetic oscillations, on the other hand, are all in one sense, the positive wheels rotating one way and the negative the other: all act together, and so the magnetic oscillation is a more conspicuous fact than the electric oscillation. Hence it is often spoken of as electro-magnetic radiation rather than as electric radiation. But the energy of the electrostatic strain is just as great as that of the electro-magnetic motion; in fact the energy alternates from the potential to the kinetic form, or *vice versa*, at every quarter swing, just like every other case of vibration.

Prof. Fitzgerald, of Dublin, has devised a model of the ether, which by help of a little artificiality represents the two kinds of displacement—the electric and magnetic—very simply and clearly.

His wheels are separated from one another by a certain space, and are geared together by elastic bands. They thus turn all in one direction, and no mention need be made of positive and negative electricity as separate entities.

FIG. 43.—Fitzgerald's Ether Model. A set of brass wheels connected by common elastic bands. If the bands are taken off any region, it becomes a perfect conductor, into which disturbances cannot penetrate.

But, the wheels being massive, a rotatory disturbance given to one takes time to spread through the series, at a pace depending on the elasticity of the bands and the inertia of the wheels; and during the period of acceleration one side of every elastic is stretched, while the other side is relaxed and therefore thickened. This thickening of the elastics goes on in one direction, and corresponds to an electric displacement in that direction; the direction being perpendicular both to the direction of advance of the disturbance and to the axes of the wheels. A row of wheels corresponds to a section of a wave-front; the

¹ Continued from p. 479.