

mixed with putty, without injury. They thrive on the linseed oil used in the manufacture of this most unsavoury side-dish and the whitening which forms the other ingredient of "pâté de putty" seems to neutralise the evil effects of the lead. The bearings of these facts are important from a sanitary point of view, as Prof. Storer shows that the effects of mice eating away the packing of valves, of drains, and closets is an immediate frustration of the best efforts of plumbers and sanitary engineers to keep human habitations free from sewer gas. Not content with mice, the Professor tried similar experiments upon rats, when it was found that "rats when kept upon a rather short allowance of oats, ate putty freely. Finally "the surviving rat was fed with 'plain putty' for a day or two, after which he received and ate (poor wretch) each day for two days a ball of putty made with a mixture of equal parts of slaked lime and whitening. He was next given a ball of putty made from a mixture of one part of oxide of zinc and three parts of whitening, together with $2\frac{1}{2}$ grammes of oats, and although he ate very little of the ball he died soon afterwards." The chief result of these experiments appears to be the injury rats and mice may do to houses and the curious protecting effect of whitening as an antidote to such active poisons as red and white lead and carbonate of baryta. Experiments upon the germination of weed seeds and a special instance of the resistance of clover seeds to water form two very interesting notes bearing directly upon well-known phenomena often ascribed by the ignorant to spontaneity of growth. The extraordinary irregularity of periods necessary for the germination of certain weed seeds is very clearly shown. "Of 400 seeds of shepherd's purse (*Capsella bursa pastoris*) three germinated on the fifth day and three on the seventh day, then none until the 145th day, when four germinated. Seven seeds germinated on the 1173rd day, or after an interval of about three years and two months—in all 18 $\frac{3}{4}$ per cent. to that date." Many similar cases are cited. Another article is upon "cherry stones eaten by domestic pigeons," which appears unpromising, but is rendered interesting by this versatile observer. Prof. Storer is evidently a man who is not likely to allow any natural phenomenon to pass unnoticed.

JOHN WRIGHTSON

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

Clifford's Common Sense of the Exact Sciences

It does not seem to me necessary to reply to the charges made against Clifford by Prof. Tait in your issue of June 11—charges which, when freed from "mystery and insinuation," amount to accusations of plagiarism and inaccuracy—for Clifford's reputation is unlikely to be in any way affected by what Prof. Tait may write. But I do feel it necessary to make a remark on the last paragraph of his review. He therein accuses me of "mystery and insinuation," weapons which should not be employed in connection with Clifford's name. He does not do me the scant justice of publishing the footnote on which he passes these strictures. That footnote runs as follows:—

"A still more serious delay seems likely to attend the publication of the second part (*kinetic*) of Clifford's 'Elements of Dynamic,' the manuscript of which was left in a completed state. I venture to think the delay a calamity to the mathematical world."

When I wrote the footnote, I knew—

(1) That the manuscript was in existence, a fact with which any one who had examined the bibliography attached to the mathematical works must have been acquainted.

(2) That this manuscript, unlike that of the "exact sciences," had not at that time found a publisher, and therefore was more likely to be seriously delayed.

(3) That the mathematical world had been so far forgetful of its own interests as to raise no demand for its publication.

My note was written with the express purpose of recalling the attention of those who valued Clifford's work to the existence of this manuscript, in order that a general demand for its publication might produce a publisher. Those who find "mystery or insinuation" in this, or in whom this can "strike a jarring chord," must be singularly constituted individuals. The note had on the face of it an obvious purpose; that purpose, I am happy to know, it has to some extent helped to accomplish.

University College, June 12

K. P.

ON "K. P.'s" note, which has been communicated to me by the courtesy of the editor, I desire to make one or two remarks.

In writing my notice of Clifford's book I endeavoured to state clearly the impression which its perusal had produced in my own mind, and to say a few fitting words as to the special qualifications of the author. I must have sadly failed in this endeavour if in what I have written there can be found either mystery or insinuation, still more so if there can be found "accusations of plagiarism and inaccuracy." But of course even an Act of Parliament has to be construed after the letter, the declared intention of its framers notwithstanding. On reperusing my notice, however, I still think that it expresses what I meant to say, and that it cannot bear the construction put on it by "K. P."

The remarks I made on the foot-note to the Preface accurately described the impression which it produced on me, and which I am sure it is likely to produce on the majority of thoughtful readers. So strongly did I feel this impression that, when I finally returned my notice for press, I specially requested the editor to try to obtain for me an elucidation of the mystery. This has been—in part at least—supplied by Mr. Tucker's note.

Whether "R.," who writes in NATURE of this week, be really a "(so-called) metaphysician" or no, he certainly expresses himself in the language of that school; for he mildly characterises as "not sufficiently guarded" the statement that a figure, obtained in a certain way, will be a cube:—whereas it obviously may be any rectangular parallelepiped whose edges are commensurable. But I did not blame Clifford for having made this statement; I merely said that it "ought not to have escaped correction." Perhaps even that expression is too strong. I have lately learned by experience that over-zeal on the part of a press-reader may sometimes render abortive the most sedulous care on the part of an author. Over and over again I have had proof-sheets, marked "*press*," returned to me with a learned query at the phrase "feet per second, per second"; and in one or two instances the supposed blunder has been rectified after all in spite of me.

June 26

P. G. TAIT

Recurrence of Markings on Jupiter

IN connection with my remarks on this subject (NATURE, xxxii., p. 31), and the suggestive coincidences which appear amongst certain drawings obtained in about the years 1857 and 1859, 1870 and 1872, and 1885, as to large elliptical markings in the southern hemisphere of Jupiter, I would further add that in about 1843 a remarkably large spot was visible, which may possibly be connected with the phenomena of more recent occurrence. Prof. Piazzi Smyth mentions in the *Observatory*, vol. iii., p. 450, that, in consulting some old observations preserved in the note-books of the Rev. H. C. Key, he found "a view of Jupiter, with not only the dark belts admirably drawn, but between them, in stronger black colour, a long oval spot. This spot, too, was so precisely the shape and size of the red spot which has of late been attracting the surprised attention of observers, that I could not but jump to the almost self-evident conclusion of their both referring to the same body, appearance, or phenomenon." The drawing alluded to was made on June 4, 1843, and Mr. Key described it as a "horizontal black spot in the light space between the two principal belts." In Chambers' "Descriptive Astronomy" (2nd ed., p. 107) it is stated, "In 1843 a very large black spot was observed by Mr. Dawes," and this object is doubtless identical with that figured by Mr. Key. It will be important to compare the observations and to learn whether these spots were situated in approximately the same latitude as the red spot of our own time.

The latter has been growing much darker and more conspicuous during the last few months, and it seems very probable that this object may resume a good deal of its former prominence during the opposition of 1886. With my 10-inch reflector, power 252, I recorded the spot as passing the central meridian of Jupiter on June 26, 1885, at 7h. 59m., and to-night, June 28, at 9h. 37m. A comparison of these times with the earliest I obtained during the present apparition (1884, September 21, 18h. 28m.) shows that in the interim of 279d. 15h. 9m. the spot has completed 676 rotations with a mean period of 9h. 55m. 39^{os}., which is almost identical with the periods found during the two previous oppositions—viz. 9h. 55m. 39^{is}. But I am hoping to obtain another observation of the spot before the planet leaves us for the season.

W. F. DENNING

Bristol, June 28

Occurrence of "Torpedo Marmorata" off the Coast of Cornwall

AMONG the fishes included in the British fauna, but whose title to this designation has been considered but doubtfully proved, is the *Torpedo marmorata*, or a form having the spiracles fringed at their edges. It is true that Pennant figures this species, but he omits to mention whether his example was from the British seas or brought from the French coast by Walsh; and subsequent authors on ichthyology are not sufficiently precise in their descriptions to enable one to judge of which form they are adverting to. All the specimens which I have seen in the various British museums have been of the cramp fish, with smooth-edged spiracles, *T. nobiliana*. On June 26 an example of *T. marmorata* was trawled in Mevagissey Bay, and obtained by Mr. Matthias Dunn, who most kindly sent it at once to me, and it arrived at Cheltenham on the evening of the 27th. It was a female, quite fresh, and weighed 3 lb. 10 oz.; its length was 17½ inches, and its breadth across the disk 12 inches. It contained two ova in an early stage of development.

FRANCIS DAY

Cheltenham, June 27

Composite Portraits

It is always desirable to guard new discoveries and inventions by explicit investigation of the nature of the facts discovered and the mode of action of the invention.

The system of composite portraits ingeniously invented by Mr. Galton rightly attracts much attention, and those who have had their interest excited by Mr. Galton's curious portraits of thieves, ruffians, and consumptives, will be interested further by the portrait of American scientific men in NATURE, vol. xxxii. p. 176.

But in using this system as an instrument of discovery it must not be hastily assumed that by its means true averages are secured. At least, they cannot be averages in every respect. Take, for example, the hair. The outer limit is determined by the greatest extent to which the hair has spread outwards on the plate in a number of sitters sufficient visibly to affect it—say three or four. But the inner limit is, in the same way, determined by the limit in the three or four in whom it stretched farthest in. Thus the result must be to give far more than the average amount of hair when the portrait is compounded from a great number of sitters.

As regards the nose, the eyes being the fixed starting-points, the root of the nose will be nearly a fixed point in the photograph; but the tip is limited by shading, and three or four short noses will be sufficient to determine where the tip is to be.

Again, the eyes being fixed points marked on the ground glass of the camera, and breadth between the eyes being different in different persons, it follows that those who have the eyes near together will be photographed on a larger scale than the rest. This enlargement will broaden the composite result. But the tip of the nose, like the tips of the really long noses, will be lost in the dark upper lips of others.

Proof that I am to an important extent correct in these remarks is to be found in your page of American portraits. They present a very remarkable non-American appearance about the nostrils, a vertical elongation accounted for by what I have pointed out. Also the ears are large and vague, the position of the ear relatively to the eye being variable; and there is a more than average breadth of face in three out of the four portraits.

I do not wish to detract from the value of these portraits, rightly understood, but assuredly they give prominence to certain

types of face when these are mixed with others—namely, to broad faces with short noses, long lips, large ears, and a superabundance of hair—and it may be useful that attention be attracted to this.

It will be seen that composite portraiture is not suitable for anatomical objects whose generic characters are to be recorded in explicit statement. But for that and many other purposes, a trustworthy though more laborious and less elegant substitute may be found by determining the mean positions of a number of fixed points in figures accurately obtained.

JOHN CLELAND

Ocular Images and After-Images

MR. NEWALL'S experiment with the glowing match I have been in the habit of performing with my cigar or cigarette, and I have become familiar with the lurid ghost he describes, but the point that first interested me is one not mentioned in his letter, and has reference to the primary serpentine image. This I find to consist of a dark red head and a bright yellowish-red body—the light viewed at rest being of a mean tint, as if, owing to difference in rate of telegraphy, it underwent a process of analysis in its movement over the retina.

I have paid considerable attention to the dying phases of powerful retinal impressions, such as result from too bold a gaze at the sun or his vicar, the paraffin lamp, and am convinced that there is more to record than a mere fading away of a patch of colour. On careful scrutiny the patch is seen to be bordered with a series of coloured bands, which each in turn overspreads it; the order of succession being, unlike that of the primary image in the above experiment, towards the red.

I submit this for confirmation, being conscious that the region of these observations is so largely dominated by memory and imagination as to render it difficult at times to distinguish the psychical from the physiological.

W. M. LAURIN

June 25

A Query as to Swallows

DURING a recent stay in Suffolk I found a belief prevalent there that swallows lay in necessary stores for their autumn migration by packing small flies under the feathers beneath the wings. My informant told me that he had shot a swallow once in order to ascertain whether this was actually the case; and that he had, as he expected, found many small flies beneath the down. Knowing how liable swallows are to parasitic invasions, I asked of what kind the flies were, and was told "Little gnats, and such like." Is this opinion to be found elsewhere, and is there any ground for it?

E. H.

THE COMPOUND LOCOMOTIVE

VERY soon after the compound working of steam in marine and stationary engines became an accomplished fact, and the great saving of fuel thereby was apparent, the question of applying the compound principle to the locomotive attracted the attention of the locomotive engineers of this and other countries. At first it was received with very little favour, which is evident even at the present time, there being only two locomotive engineers in this country who are now either trying it experimentally or have it permanently in use on the lines under their control. This has been mostly caused by the idea that the additional gear necessary for the compound working with two or more cylinders would render the engines more liable to break down. Again it was thought, with very good reason, that such engines would have great difficulty at starting, for the reason that during the first revolution of the driving wheels all the power necessary to start the engine would have to be generated in the high-pressure cylinder. This difficulty was soon surmounted in engines fitted with only two cylinders working compound, by the addition of an arrangement by which the engine could be worked as an ordinary locomotive at the commencement, and when fairly started the compound arrangement could then be applied.

The usual arrangement adopted in the early trials of compound locomotives consisted of two outside cylinders of different sizes; the steam having passed through the