to my friend Dr. W. F. Tolmie, of Victoria, and have just received from him an account verifying in all essential particulars the extract quoted by Mr. Moseley from the *Weekly Oregonian*.

A party of Makaw or Makah Indians of Cape Flattery were returning from a visit to the Songish Indians of the vicinity of Victoria, and camped the first afternoon at Metchosin, on the south shore of Vancouver Island. A young woman having separated herself from the others to bathe, did not return in the evening, and after having searched for her in vain the next morning, the rest of the party were about to continue on their journey, when, on rounding the first point, they saw the body of the woman as if seated on the sandy sea-bottom, with a large octopus attached to it, which, according to the description of Dr. Tolmie's informant, resembled a "fifty-pound flour sack, full." The body was rescued in the manner described in the *Oregonian*, and when brought ashore, still had portions of the arms of the octopus adhering to it.

Dr. Tolmie also mentions the case of an Indian woman at Fort Simpson, who had, many years ago, a narrow escape from a similar death; also that among the Chimsyan Indians traditions of escapes and occasional cases of drowning exist, and further, that among these people a story is current that "A two-masted vessel manned in part or whole by men with obliquely placed eyes and wearing queues (at Milbank Sound, lat. 52°, about seventy years ago) was seized by an enormous squid, whose tentacles had to be chopped with axes ere the craft was clear of it. The ship is said to have been wrecked further south on the coast, in consequence of the evil influence of the monster."

GEORGE M. DAWSON

Geological Survey of Canada, Montreal, January 11

Eucalyptus

IN NATURE, vol. xvii. p. 10, Mr. A. Nicols says he has seen attacks of fever come on in a forest of Eucalyptus; malaria prevails there, he maintains. Does that malaria, the degree of gravity of which he does not describe, seriously compromise health? That is the question. It is probable, notwithstanding the presence of Eucalyptus, that there are yet numerous cases of fever near Lake Fetzara (Algeria), but really of such small importance as to permit, without serious danger to health, the working of the ground or the mines of these districts.

As to mosquitoes, allow me to recall that there exist very many species of these animals which, apart from their common quality of feeding on and tormenting mammals, and especially man, have origins, habitats, evolutions, and habits completely different; some live only in the larval state, others frequent moist ground, and others live, always in the larval state, in fungi. In a country which is far from being tropical and marshy, Newfoundland, the pine woods are infested during the short summer by myriads of mosquitoes, which become a real danger for the rash traveller. It will be understood that all these species do not exist at the same time in the same place, and that at Lake Fetzara the marshes are being profoundly modified, or are disappearing, and the mosquitoes, properly called, are also disappearing. Moreover, if there does not exist in the country, as is probable, any species of mosquito living in the shade of the forest, the country will be rid of these animals, a thing which cannot take place in Australia, where there are species living in the forests. In other words, it is not the Eucalyptus which at Fetzara has caused the mosquitoes to disappear, but rather the absence of the conditions necessary to the life and reproduction of mosquitoes, which have become deficient in consequence of the modification of the soil, brought about by the numerous plantations of Eucalyptus.

DR. CALMY

Saigon, December 19, 1877

Explosive Dust

IN NATURE, vol. xvii. p. 123, I noticed a letter by A. Mackennah on an explosion of malt dust in a grinding machine. This I believe to be not an uncommon occurrence, as I hear there have been three explosions in our mill within a period of four years, and these not due to any such culpable carelessness as allowing a naked flame to approach the heated impalpable dust, but ignited either by a spark from a piece of flint passing through the steel rollers (barley from some localities is invariably accompanied by quantities of small fragments of flint), or from excessive friction on some part of the wood fittings.

The following facts I obtained from the man in charge of our mill at the time of the worst of these explosions, about three years ago:—

They were grinding at the ordinary pace about mid-day with the window open and no gas turned on.

The explosion was quite sudden and the flame sufficient to singe the man's whiskers; the force was so great that the door of the engine-room was blown open, though the only opening between the two rooms was a small hole through which the shafting worked.

Having had several holes bored through the wood lining to allow a free current of air, there has been no explosion since.

The danger of fine impalpable coal dust in collieries is too manifest to need argument based on the action of analogous bodies, but still the above facts may interest some of your readers.

F. E. L.

Burton-on-Trent, January 22

Dendritic Gold

WILL one of my fellow-readers of NATURE be good enough to inform me, through its columns, with the name and publisher of such a work on mineralogy (short, if possible) as will give me the best information on the subject of the dendritic gold existing in sandstones in New Zealand, as reported in the *Proceedings* of the Wellington Society (NATURE, vol. xvi. p. 567).

It is my wish specially to know the colour of such dendrites, the geologic age of the rock containing them, and, if possible, to obtain a satisfactory account of their origin, as hitherto I have believed that metals take this form solely by deposition from solution.

I ask this in the interest of friends in South Africa (in addition to the personal desire for knowledge), where, in many parts of the Transvaal, gold "prospects" can be obtained, though usually in quantities unprofitably small, in nearly every case there being no quartz from which it could have been derived; at least so said my informants, old Australians.

Black dendrites I have noticed between the (once) horizontal strata of sandstone boulders in the Kimberley diamond mine, but was unable, at the time, to decide their nature.

R.

DEMONSTRATION OF CURRENTS ORIGINATED BY THE VOICE IN BELL'S TELEPHONE

IF two wires, A and B, be respectively connected with the two binding screws, R and S, of a telephone, and the other ends of the wires be connected with a Thompson's reflecting galvanometer, the following experiments can be made:—

1. On pressing in the iron disc a deflection is produced on the scale, say, from right to left.

2. On reversing the wires so that A is connected with S and B with R, and repeating Experiment 1, a deflection is produced in the opposite direction, *i.e.* from left to right.

3. Shouting or singing produces no deflection.

If a Lippmann's capillary electrometer be substituted for the galvanometer, the following results are obtained:—

4. If Experiments 1 and 2 be repeated, similar movements are observed, *i.e.* in one case the mercury column moves to the point of the capillary tube, in the other away from it.

5. If the gamut be loudly sung up, note by note, to the sound *ah*, one note is found to give a movement of the mercury column, about ten times as great as that observed in Experiment 4, towards the point of the tube. The octaves, especially the higher ones, and some harmonics of this note yield similar results. (It is this note which tetanises a nerve muscle preparation as observed by Fick, &c.)

6. If the wires be reversed and the same note sung, a movement of the mercury column is seen as large as that in Experiment 5, but in the *same* direction. *So that reversing the wires does not alter the direction as indicated by the electrometer.*

7. If the primary wire of a Du Bois Reymond's coil be placed in the circuit of a telephone, and the wires from the secondary circuit coupled with the electrometer, the note mentioned above produces the same movement as in Experiments 5 and 6, when the secondary coil is about

8 cm. from the primary. *Reverse the wires in the secondary circuit, reverse the wires in the primary circuit, how you please, the mercury always moves towards the point of the capillary.*

8. Shouting or singing (excepting the above-mentioned note) produces no visible effect under the conditions mentioned in Experiments 5, 6, and 7.

9. If the secondary coil be now moved close up, so as to cover as completely as possible the primary, talking to the telephone with the ordinary voice, *i.e.* with moderate strength and at any pitch, produces a definite movement of the mercury column for each word, some sounds of course giving more movement than others, *but the movement is always towards the end of the capillary.* Singing the note mentioned in Experiments 5, 6, and 7 loudly, produces a movement too large to be measured with the electrometer.

Reversing the poles of the magnet in the telephone does not alter the results of Experiments 5, 6, 7, and 9.

On mentioning the above results to Dr. Burdon Sanderson, he suggested that the apparently anomalous behaviour of the electrometer might be accounted for, by supposing that the mercury moved *quicker* when a current passed towards the point of the capillary than when it flowed in the opposite direction; so that if a succession of rapidly alternating currents be passed through the instrument, the mercury will always move towards the point of the capillary, the movement away from the point being masked by the sluggishness of the instrument in that direction. That this explanation is the correct one is proved by the following experiment:—The current from two Grove's cells is sent through a metal reed vibrating 100 times a second, the contact being made and broken at each vibration, the primary wire of a Du Bois Reymond's induction-coil is also included in the circuit; on connecting the electrometer with the secondary coil placed at an appropriate distance the mercury always moves to the point of the tube whatever be the direction of the current.

F. J. M. PAGE

Physiological Laboratory, University College,
London, February 2

NOTE.—On February 4 Prof. Graham Bell kindly placed at my disposal a telephone much more powerful than any of those I had previously used. On speaking to this instrument, the electrometer being in the circuit, movements of the mercury column as considerable as those in Experiment 9 were observed.—F. J. M. P.

CHEMISTRY AND ALGEBRA

IT may not be wholly without interest to some of the readers of NATURE to be made acquainted with an analogy that has recently forcibly impressed me between branches of human knowledge apparently so dissimilar as modern chemistry and modern algebra. I have found it of great utility in explaining to non-mathematicians the nature of the investigations which algebraists are at present busily at work upon to make out the so-called *Grundformen* or irreducible forms appurtenant to binary quantics taken singly or in systems, and I have also found that it may be used as an instrument of investigation in purely algebraical inquiries. So much is this the case that I hardly ever take up Dr. Frankland's exceedingly valuable "Notes for Chemical Students," which are drawn up exclusively on the basis of Kekulé's exquisite conception of *valence*, without deriving suggestions for new researches in the theory of algebraical forms. I will confine myself to a statement of the grounds of the analogy, referring those who may feel an interest in the subject and are desirous for further information about it to a memoir which I have written upon it for the new *American Journal of Pure and Applied Mathematics*, the first number of which will appear early in February.

The analogy is between atoms and *binary* quantics exclusively.

I compare every binary quantic with a chemical atom. The number of factors (or rays, as they may be regarded by an obvious geometrical interpretation) in a binary quantic is the analogue of the number of *bonds*, or the *valence*, as it is termed, of a chemical atom.

Thus a linear form may be regarded as a monad atom, a quadratic form as a duad, a cubic form as a triad, and so on.

An invariant of a system of binary quantics of various degrees is the analogue of a chemical substance composed of atoms of corresponding *valences*. The order of such invariant in each set of coefficients is the same as the number of atoms of the corresponding *valence* in the chemical compound.

A co-variant is the analogue of an (organic or inorganic) compound radical. The orders in the several sets of coefficients corresponding, as for invariants, to the respective valences of the atoms, the free valence of the compound radical then becomes identical with the degree of the co-variant in the variables.

The weight of an invariant is identical with the number of the bonds in the chemicograph of the analogous chemical substance, and the weight of the leading term (or basic differentiant) of a co-variant is the same as the number of bonds in the chemicograph of the analogous compound radical. Every invariant and covariant thus becomes expressible by a *graph* precisely identical with a Kekuléan diagram or chemicograph. But not every chemicograph is an algebraical one. I show that by an application of the algebraical law of reciprocity every algebraical graph of a given invariant will represent the constitution in terms of the roots of a quantic of a type reciprocal to that of the given invariant of an invariant belonging to that reciprocal type. I give a rule for the geometrical multiplication of graphs, *i.e.* for constructing a *graph* to the product of in- or co-variants whose separate graphs are given. I have also ventured upon a hypothesis which, whilst in nowise interfering with existing chemicographical constructions, accounts for the seeming anomaly of the isolated existence as "monad molecules" of mercury, zinc, and arsenic—and gives a rational explanation of the "mutual saturation of bonds."

I have thus been led to see more clearly than ever I did before the existence of a common ground to the new mechanism, the new chemistry, and the new algebra. Underlying all these is the theory of pure colligation, which applies undistinguishably to the three great theories, all initiated within the last third of a century or thereabouts by Eisenstein, Kekulé, and Peaucellier.

Baltimore, January 1 J. J. SYLVESTER

PALMEN ON THE MORPHOLOGY OF THE TRACHEAL SYSTEM

DR. PALMEN, of Helsingfors, has recently published an interesting memoir on the tracheal system of insects. He observes that although the gills of certain aquatic larvæ are attached to the skin very near to the points at which the spiracles open in the mature insects, and though spiracles and gills do not co-exist in the same segment, yet the point of attachment of the gills never exactly coincides with the position of the future spiracle. Moreover, he shows that even during the larval condition, although the spiracles are not open, the structure of the stigmatic duct is present, and indeed that it opens temporarily at each moult, to permit the inner tracheal membrane to be cast, after which it closes again. In fact, then, he urges, the gills and spiracles do not correspond exactly, either in number or in position, and there can therefore be between them no genetic connection. He concludes that the insects with open trachea are not derived from ancestors provided with gills,