advantage of being free from inquilines, and the larva is known to deposit its waste products outside the gall.

The presence of tannase in the larvæ of the gall-producer throws new light on the points raised in the above-mentioned correspondence in NATURE. It has been shown by Küstenmacher (1895), Magnus (1914), and others, that the larva lives on the plant by the production of diastase and invertase. This is counteracted on the part of the plant by an increase of tannin (thus, the oak tree contains from 5 to 10 per cent tannin, whereas oak galls contain as much as 60 per cent), which is known to precipitate both these enzymes. The decisive action, however, remains to the larva, since tannase destroys gallotannin. The accumulation of gallic acid thus produced is also effectively disposed of by the larva, as previously shown by me (1919), when I found that dryophantin (the red colouring matter of the pea-gall) is a glucoside of purpurogallin, an oxidation product of gallic acid.

These observations, which may be represented as follows:

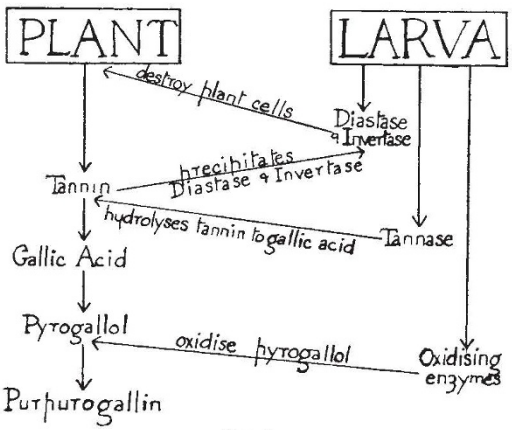

FIG. 1.

suggest that the interrelationship between the gall-producer and the plant is therefore parasitic, the initial action of the larva being counteracted by tannin production on the part of the plant.

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The Original Mode of Constructing a Voltaic Pile.

A SHORT time ago I had occasion to turn up a number of papers in *Nicholson's Journal* on early electro-chemical research in England. I was puzzled to find there certain statements regarding Volta's pile which, at first sight, seemed directly at variance with modern views.

Nicholson and Carlisle, after constructing a pile "of seventeen half-crowns with a like number of pieces of zinc and of pasteboard soaked in salt water", showed by the aid of Bennet's electrometer that the silver end of the pile "was in the minus and the zinc end in the plus state".

At first, I believed this to be a mistake in the text, but the same statement was found in the early papers of other workers; for example, William Cruickshank, Colonel Haldane, and Humphry Davy. Davy and Cruickshank each state that hydrogen and metals (or alkalis) are disengaged at the "zinc wire", that is, the wire connected to the zinc plate, and oxygen and acids at the "silver wire".

Being at a loss to account for these statements—all consistent but apparently contrary to fact—I made a silver-zinc pile, arranging twenty shillings and twenty discs of zinc in series as shown, each pair being separated by blotting paper (Fig. 1).

(This is the arrangement given in most text-books of physics and is analogous to Volta's arrangement of pairs of plates in his "couronne de tasses".)

The pile gave an appreciable current when soaked in brine and behaved quite normally, liberating iodine from potassium iodide at the end of a wire joined to the silver. The apparent inconsistency was explained by a further reference to Nicholson's paper. His description of the construction of the pile is as follows:

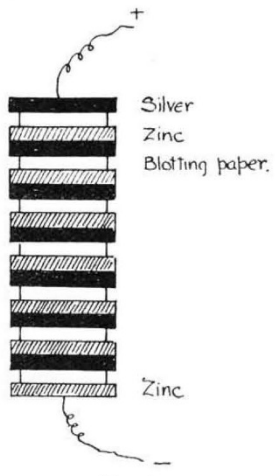

FIG. 1.

"Take any number of plates of copper, or which is better, of silver, and an equal number of tin, or which is better, of zinc, and a like number of discs or pieces of card or leather, or any porous substance capable of retaining moisture. Let these last be soaked in pure water, or which is better, salt water or alkaline lees. The silver or copper may be pieces of money. Build up a pile of these pieces; namely, a piece of silver, a piece of zinc, and a piece of wet card; and so forth in the same order till the whole number intended to be made use of is builded up" (page 179 *Nicholson's Journal*, July 1800).

The arrangement of the discs is as shown in Fig. 2. Apart from a negligible contact potential difference between the two end pairs of plates, the voltage of this pile will be the same as the one represented in Fig. 1. In other words, the extreme silver and zinc plates of the series A and B (Fig. 2) are practically useless and merely conduct the current to or from the next plates. The wire connected to the silver plate will thus have the same potential as the next zinc plate, which is negatively charged, while the 'zinc wire' will have the same potential as the next silver plate (positively charged). This construction was evidently the outcome of the theory of Volta, who regarded the points of contact of the pairs of plates as the main source of the electrical energy.

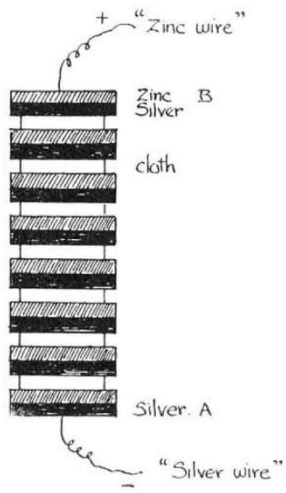

FIG. 2.

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Colours of Inorganic Salts.

PROF. SAHA'S suggestion (NATURE of Feb. 1, p. 163) that colour in inorganic compounds depends upon the existence of an electronic state of the metal ion separated from the ground state by about 18,000 wave-numbers finds some support at least from work which has been begun here upon the general problem