perfectly clear, and, even where violently agitated, no precipitate makes its appearance. At the end of twenty-four hours, the fluid is still clear, although I have once or twice, when the solution was concentrated, observed a few needle-shaped crystals of the base at the bottom of the fluid.

Acetate of cinchonine, in moderately diluted solution, begins to deposit small crystals of the base almost immediately after the sub-acetate is added, and the quantity goes on increasing for some hours. Agitation produces an immediate precipitate.

Quinine is not deposited from its acetate, even on standing during the night, provided the solution be dilute; but if concentrated and briskly shaken, small tufts are occasionally thrown down after standing for some hours.

Morphine and thebaine are not thrown down from solutions of their acetates, even after standing; and codeine, as might be anticipated from its solubility in water, is entirely unaffected. On the other hand, narcotine, papaverine, and narcine are instantaneously precipitated as bulky powders.

These facts indicate the importance of a more minute attention being paid to the deportment of the vegetable alkaloids with sub-acetate of lead. We observe that in the case of the two cinchona and the two nux vomica alkaloids, the difference is very marked, and the reaction might be used as a means of separation, and possibly also of purification. Most of the substances found in vegetable extracts, such as gum, &c., are precipitated by subacetate of lead; and in the case of the stronger bases, it might be possible to effect purification by extracting with acetic acid, and precipitating with the subacetate. The strong base would then remain in solution along with excess of lead, which being precipitated with sulphuretted hydrogen, would carry down colouring matters, and leave a pure acetate in solution. I have not attempted to put this process into practice, but recommend a trial of it to those chemists who are engaged with the examination of the natural alkaloids.

2. On the Colouring Matter of Persian Berries. By Mr John Gellatly, assistant to Dr Anderson, Glasgow.

Two varieties of the seeds of the *Rhamnus tinctoria* are found in commerce, known by the names of Persian and Turkish berries. The

former are said to be gathered before being fully ripe, and are carefully preserved; the latter have remained much longer on the branches, and are brown and shrivelled. Kane has examined both varieties, and finds in the former a substance which he names Chrysorhamnine, soluble in alcohol and ether, and crystallizing from the latter in minute silky needles of a brilliant yellow colour. This substance is replaced in the ripe berry by another, which he names Xanthorhamnine, of a much less beautiful yellow, and not crystallizable; this change is effected also by boiling the chrysorhamnine for a few minutes with water. Xanthorhamnine is easily soluble in alcohol and water, but quite insoluble in ether.

The Persian berries which the author examined yielded to ether no chrysorhamnine, but with alcohol they gave a considerable quantity of a pale yellow substance in fine crystals, which was believed to be Kane's xanthorhamnine, although that chemist did not obtain it crystalline.

It is prepared by digesting the coarsely-ground berries for a short time with boiling methylated spirit, filtering and expressing the residue. The fluid is left for several days, to deposit a dark-coloured resin, and then poured off and set aside. In about ten days, it is converted into a yellow semi-solid mass. This is pressed and recrystallized several times from alcohol; when nearly pure, the crystals appear as the solution cools.

Xanthorhamnine appears in tufts of dense silky needles, of a pale yellow colour, and nearly tasteless. Readily soluble in cold and warm water. It dissolves also in alcohol, and very readily when hot. It is quite insoluble even in boiling ether. The analysis of three separate preparations, dried at 212° , gave results somewhat different from Kane's; and, guided by the products of decomposition detailed in the paper, the author proposes for the substance the formula $C_{46}H_{28}O_{28}$, which agrees with his experiments, as shown by the subjoined comparison—

Carbon	52.43	52.24	51.82	51.91	52.27	C_{46}	276
Hydrogen	5.85	5.58	5.74	5.95	5.30	H_{28}	28
Oxygen	...	...	...	...	42.43	O_{28}	224
					100.00		528

The air-dried substance contains 10 atoms more water, giving the formula $C_{46}H_{28}O_{28}, 10HO$.

A compound, prepared by adding neutral acetate of lead to an alcoholic solution of the colouring matter, keeping the latter in excess, approaches the formula $C_{46}H_{28}O_{28}, 2PbO, 8HO$.

When xanthorhamnine is boiled with weak sulphuric acid, it is resolved into grape sugar and a yellow powder, which the author proposed to name Rhamnetine; showing the colouring matter to be a glucoside. In the proportion of its constituents, its softish, nearly tasteless crystals, and insolubility in ether, it agrees with these bodies generally.

The composition of rhamnetine agreed closely with the formula $C_{22}H_{10}O_{10}$. It is almost entirely insoluble in water, alcohol, and ether; alkalies dissolve it, and acids reprecipitate it from an alkaline solution. The ammoniacal solution precipitates metallic salts.

On adding the formula of rhamnetine to that of grape sugar, we have xanthorhamnine *plus* 6 atoms of water.

Quantitative determinations of the rhamnetine and glucose give results agreeing with this equation.

If the formula given by Kane for chrysorhamnine be doubled, we have the formula of xanthorhamnine *minus* 6 atoms of water—

3. Account of some Experiments on Radiant Heat. By B. Stewart, Esq. Communicated by Professor Forbes.

The object of these experiments was to compare together the radiations from the polished surfaces of different bodies, all having the temperature of 212° . In order to heat the bodies, a tin box was used, double-sided and double-bottomed, or a box within a box. Water being kept boiling in the interval, the interior chamber was found to have a temperature of nearly 212° ; and on the bottom of this chamber the bodies to be experimented on were placed. When being used these were taken out of the chamber and placed before the sentient pile of a thermo-multiplier, the galvanometer needle connected with which was immediately deviated from its zero position. The extent of the first swing of this needle was taken to denote the quantity of heat that fell upon the pile, and this deviation