EXPERIMENTS

ON THE BARK OF THE

COCCOLOBA UVIFERA.

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ALTHOUGH kino has been, for a considerable time, well known as an article of the materia medica, there still remains some uncertainty respecting its origin. It is indeed generally supposed, that there are three substances, somewhat different from each other, to which this name is applied. The one which has been the longest known, and is perhaps the most frequently met with, comes from Africa; but we are entirely ignorant from what plant it is derived. A second species is said to be extracted from the Eucalyptus resinifera of New South Wales; while a third variety, which is brought from the West Indies, has by some writers been ascribed to the coccoloba uvifera, and by others to the mahogany *. Having obtained a quantity of the bark of the coccoloba uvifera from a friend in

* Duncan's Ed. Disp. 292; Thomson's Lond. Disp. 213; Murray's Mat. Med. 2. 304; Nicholson's Journ. 6. 232.

the West Indies, on whose accuracy I could implicitly depend, I embraced the opportunity of examining its properties, and comparing the extract formed from it with the kino usually employed in medicine.

The bark appeared to have been taken from branches of from one to two inches in diameter, and was partially rolled up, much after the manner of the common Peruvian bark. No part of it was more than one twentieth of an inch in thickness, and some specimens considerably thinner. It was lined with a fine reddish brown cuticle, while the rest of the bark was of a light yellowish brown colour. The external surface was clean, and nearly free from any protuberances, but in many parts it was marked with slight longitudinal furrows. When cut transversely, the external part of the bark, for about one quarter of its thickness, exhibited a coarser texture than the remainder, and could not be reduced to an equally fine powder. It had scarcely any smell; when chewed and kept for some time in the mouth, it produced a moderate degree of bitterness and astringency, with a slight mixture of an aromatic flavor.

A portion of the bark reduced to fine powder, from which a little of the coarser part had been separated, was mixed with 40 times its weight of water, and kept for an hour at the heat of 200°. A light brown fluid was formed, which was filtered

while warm. Although at first it was only slightly opake, it became completely muddy upon cooling, and remained so after being kept at rest for some days, but it was rendered nearly clear by filtration. Fourteen successive infusions were made with the same powder, when it appeared that all the matter was removed which water was capable of dissolving. The second infusion, like the first, was opake, but the 13 remaining infusions were nearly, or quite transparent. By the application of heat the opake infusions were rendered transparent, but they became opake again as they cooled. The opacity was equally produced whether they were exposed to the atmosphere, or entirely excluded from it. After being kept for some time, all the infusions became mouldy, the quantity of mould being of course greater in the earlier ones. The water was found to have dissolved .42 of the powder; the residue was of a redder colour, and of a more spongy texture than before the experiment. The infusion seemed to retain its transparency until all the water was evaporated; the extract was hard and brittle, and of a very deep reddish brown colour. It was softened by heat, and reduced to a half melted state. From what was observed during the evaporation of the infusion, it seems that water has the power of retaining in solution almost an indefinite quantity of the extract, although when heated with the bark, it will not originally take up more than one sixtieth of its weight of soluble matter.

When the coccoloba bark was added to water, and no heat applied, the effect was considerably less; a transparent light brown fluid was produced, after remaining several weeks in contact; the process of moulding seemed, however, to be more rapid in this, than in the infusion made with heat.

A portion of the powder was digested with 60 times its weight of alcohol: the fluid at first assumed a dull olive colour, and gradually became more brown; the brown colour was increased by applying a gentle heat, but it still retained a considerable tinge of green. The fluid was then separated from the powder, and it gradually acquired a reddish brown colour, without any mixture of olive. The powder after being subjected to the action of the alcohol, was found to have lost exactly half its weight; the residue was not very different in its appearance from the entire powder, except that it was rather more dry and fibrous.

The warm infusion, after being filtered, and while it was still recent, was subjected to the action of different re-agents, and by way of comparison, similar experiments were performed on an infusion of kino. The kino that I employed was the species commonly used in medicine, and which appeared to agree nearly with the description of the variety that is brought from Africa *. By being heated

* Thomson's Lond. Disp. 213.

with water the greatest part of it was dissolved, but after the addition of several successive portions of water, a little remained which was no longer capable of being acted on: this undissolved part was dark-coloured, hard, and gritty. The infusion became opake as it cooled, but by filtration it was rendered nearly transparent. Its colour was very different from the infusion of the coccoloba, the latter being brown with a tinge of red, while the kino was red with a slight tinge of brown. The re-agents employed were, 1. jelly prepared from isinglass, 2. muriate of tin, 3. oxysulphate of iron, 4. superacetate of lead, 5. tartarized antimony, 6. lime water, 7. sulphuric acid, and 8. subcarbonate of potash; the saline bodies were all in the state of saturated solution. The results were as follow:

COCCOLOBA.	KINO.
1. Copious, light brown, flocculent precipitate.	Precipitate less copious, and of a reddish colour.
2. Copious light brown precipitate.	Precipitate much less copious, and of a light buff-colour.
3. Copious black precipitate.	Copious precipitate of a dull olive colour.
4. Copious precipitate, of a grayish colour.	Precipitate less copious.
5. Copious gray precipitate.	No effect produced.
6. Considerable gray precipitate.	Precipitate much less copious.
7. Copious whitish precipitate.	Precipitate much less copious.
8. Brown precipitate in moderate quantity.	No precipitate; the red colour deepened and brightened.

The tincture of the coccoloba bark was not affected by the addition of water. Jelly and the oxysulphate of iron threw down precipitates nearly similar to those from the watery infusion, but the muriate of tin had no effect. A quantity of the tincture was slowly evaporated, and a residuum was obtained which was brittle, and of a browner colour than the extract from the infusion. It appeared to be scarcely soluble in cold water, but in hot water the greatest part was dissolved; the solution became muddy as it cooled, it was rendered transparent by heat, and again grew opake when the heat was withdrawn. It was then filtered, and an infusion was obtained which was nearly transparent, and of a light brown colour. The tincture of kino being treated in the same manner, a residuum was obtained, which was of a deep red colour, and of a more friable texture than the kino itself. This residuum was, for the most part, readily soluble in hot water, although a small portion of a black substance remained undissolved. This part was soluble in alcohol; and the solution was not precipitated by water. Comparative experiments were then made upon these two infusions, by adding to each of them the same eight re-agents as in the former instance; the effects were nearly similar to those mentioned above.

A portion of the residuum of the coccoloba, after the action of water upon it, was then digested in 40 times its weight of alcohol, and a light olive

tincture was produced, which gradually acquired a shade of brown. By this operation, the powder lost about one eighth of its weight. When the converse of this experiment was tried, i. e. when the residuum of the tincture was digested in water, scarcely any effect was produced, the infusion was slightly tinged by the oxysulphate of iron, and a very minute precipitate was produced by jelly.

From the above experiments we may conclude, that the extract of coccoloba is a substance of the same nature with the kino used in medicine; but that it differs from it so far as to show, that they are not derived from the same plant. They are very similar in their external appearance and physical properties; but there is an obvious difference in the colour, both of the infusion and tincture. The effect of the re-agents is also different; jelly producing a brown precipitate with coccoloba, and a reddish one with kino; iron a black precipitate with coccoloba, and an olive-coloured one with kino. The effects of lime and sulphuric acid are much less with kino than with the coccoloba: there is no precipitate thrown down either by antimony or the subcarbonate of potash from kino, while the effect upon the coccoloba is very considerable. The soluble part of the coccoloba bark seems to consist principally of tan, which is in all respects similar to the tan of the gall nut; while the tan of which kino is chiefly composed, resembles that of rhatany, and the substance which is artificially pro-

cured by Mr. Hatchett's process. The tan of the coccoloba bark is accompanied, as is usually the case, with gallic acid, and it likewise exhibits those properties which have been ascribed to the presence of a specific vegetable product called extractive; but the existence of this I think has not been distinctly proved *. The substance procured by evaporating the watery infusion, is in part rendered insoluble by the process, and the same would appear to be the case with kino, as it is probable that kino is formed by evaporation from an infusion or decoction. Its appearance indicates that it has undergone this kind of operation, and I am not acquainted with any instance in which a substance, composed principally of tan, naturally exudes from a plant.

That part of the coccoloba which is soluble in alcohol, and not soluble in water, was examined by evaporating the tincture formed from the aqueous residue of the bark. By the evaporation, a substance was left, the greatest part of which was of a greenish brown colour, and along with it a little reddish matter. Its odour was fragrant, something like that of the balsam of tolu. Water that had been digested upon it produced only a slight effect with isinglass, and the oxysulphate of iron. Neither the tincture of this substance, nor of the entire extract of coccoloba were precipitated by water.

* See Nicholson's Journ. 24. 215—222.

The substance left, after digesting in water the residue obtained by evaporating the tincture of the recent bark, was very similar, in its colour, odour, and consistence, to that procured above: it approaches to the nature of the resinous balsam, but its solution in alcohol is not precipitated by water, although it is not itself soluble in that fluid.

The following may be regarded as an approximation to the analysis of the bark of the coccoloba:

Woody matter -	50
Tan - - -	41
Balsamic substance -	9
	100