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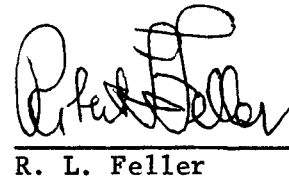
The accompanying translation of the 1829 article by F. Lucanus, in which dammar resin and its use as a picture or retouching varnish are described, has been made available in advance of a monograph being prepared on the history of dammar resin. Scheduled for completion early in 1967, the monograph is intended to bring order to the long-standing errors in the literature which have resulted from the fact that both Dipterocarpaceae and Conifers have been confused as the source of the dammar resin of commerce. Some of the major factors in this story of confusion have already been presented in a publication entitled "What's in a Name: Dammar" (The Crucible, 49, No. 8 (1964), pp. 214, 216, and 218). Copies of the publication from The Crucible and additional copies of the translation of Lucanus' article may be obtained by writing to the Professional Relations Department, Mellon Institute, Pittsburgh, Pennsylvania, 15213.

There are a number of closely related Dipterocarpaceae trees which can supply resins of the "dammar" type that are soluble in turpentine and which form films of appropriate hardness and clarity. The resin that Lucanus described, although similar, may not have been precisely the same type that we find today (to judge from the solubility in alcohol of the particular sample which he describes). His resin may have been one known in his day as "dammar selan", as has been noted in the article which appeared in The Crucible. Samples of this and related resins are currently being sought for comparison with the present-day type of dammar.



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TRANSLATION OF FIRST DESCRIPTION OF

DAMMAR PICTURE VARNISH BY F. LUCANUS IN 1829

Courtesy of

The National Gallery of Art Research Project
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Dammar Resin
Concerning the Properties, Chemical Behavior, and Technical Application

by F. Lucanus[1]

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(1) Translation of Lucanus' publication from Schweigger's J., 55, 60-66 (1829).

Resina Dammar, Motao-Cochin, or Cat's-eye resin entered the market in 1827 through Calcutta and London, and soon excited the attention of scholars and artists there.*

Dammar resin is to be found in Singapore** and usually occurs in somewhat elongated pieces weighing from a quarter to two drams; it is so colorless and transparent that it is not surpassed in these properties by either copal or mastic.

Its specific gravity is 1.060.

It is shiny when fractured, glass-like, and yields an exceedingly white powder; it can be crushed between the teeth but does not soften.

It is odorless and tasteless, melts easily, and scarcely exhibits any noticeable odor, even upon strong heating.

After moistening with strong ethyl alcohol, the surface of the resin becomes sticky.

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* Zeitschrift für Handwerker und Künstler, Dec. 1827, No. 60.

** It is not the same as Dammar puti, which is the same as Dammara alba Rumph. (see Thénard's Handbuch der Chemie, translated by Fechner. Leipzig, 1827, Vol. 4, p. 1400).

A half dissolves in absolute alcohol, approximately a fifth in cold 80% R.[2] alcohol, and a quarter dissolves in hot 80% alcohol. However,

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(2) pC. is probably percent, but the only usage found for R. is Reaumar, the old temperature scale in which the freezing point of water was set at 0° and the boiling point of water at 80°.

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part of this precipitates out upon subsequent cooling. The residue of the resin is a white powder which is soluble in ether and in turpentine.

Dammar resin is completely soluble in turpentine and fatty oils.

Ether dissolves the resin except for a very insignificant part, which is a soft resin.

The solution in alcohol turns litmus red; I could not disclose the presence of a true acid.

The resin melts in boiling concentrated acetic acid without dissolving, rather, clouding or changing only slightly.

The resin becomes brittle when heated moderately with a fourfold quantity of fuming nitric acid, is insoluble in turpentine, partially soluble in ethyl alcohol, and completely soluble in ether.

However, if one part of the resin is heated strongly with four parts of fuming nitric acid and cured until dry without ever becoming cold, then two fifths dissolves in distilled water, from which solution the resin is precipitated with ammonium as white flakes. The residue which is insoluble in distilled water is only partially soluble in ethyl alcohol, but completely soluble in ether.

Dammar resin is dissolved by fuming sulphuric acid without heating the mixture, which assumes a color similar to Orlean,[3] and is then as soluble in ethyl alcohol as in turpentine. By mixing with distilled water, the resin again precipitates as white flakes from the solution in ethyl alcohol without the addition of ammonia.

(3) Orlean is a yellow dyestuff, referred to as anatto, or rocoa.

If the resin is heated considerably with sulphuric acid, then the mixture becomes dark and is soluble in ethyl alcohol.

The resin does not fulminate when ground together with iodine, even if it becomes warm.

The resin is not altered by treatment with liquid caustic ammonium.[4]

(4) Ammonium hydroxide?

Thirty parts of resin, boiled with caustic potash liquor, shows a weight increment of five parts. The decanted liquor contains no dissolved resin. This potash-containing solid was boiled for some time with water, yet only a small part of it ever dissolved, and a residue of twenty parts remained which did not dissolve in water.

I dissolved only a little resin in turpentine, and boiled the whole of it in potash lye. After the turpentine was boiled off, a resin soap was formed which was completely soluble in water, and from which only the resin was precipitated in combination with the metal oxide by the metal salts. Ether and turpentine decompose this combination, since they dissolve the resin from it again.

By dry distillation, sixty grains of dammar resin yield:

a.) Three grains of aqueous acetic acid, which saturates two drops of caustic ammonium liquor.

b.) forty-five grains of volatile oil, which is soluble in equal parts of ether and a fifth part of ethyl alcohol of 80% R.[2], does not fulminate with iodine, and produces a deep red in litmus paper.

If this oil is agitated with potash liquor, or distilled over potash, then litmus is no longer reddened by it. However, it possesses the same odor which it had before, and thus this acid* (probably pyro-acid) was not the principle which conferred the odor to the oil.

c.) After the oil has passed off, a yellowish solid resin sublimes in the neck of the retort. It is soluble in ether, turpentine, and ethyl alcohol, but not in potash lye, and weighs about eight grains. The solution of this resin in ethyl alcohol is yellowish and very opalescent, and displays a variety of colors in a very thin state, like the extract of horse chesnut rind. This resin appears to be the third of those species which Unverdorben prepared by dry distillation.**

d.) Seven grains of carboniferous residue remain in the retort.

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* See Unverdorben in Thenard's Chemie 5, Vol. 1, p. 434.

** See Thenard's Chemie 5, Vol. I, p. 435.

According to Bonastre,* the sub-resins, which are not usually soluble in boiling ethyl alcohol and ether, should possess the property of subliming, if they are free of volatile oils and acids.

Ether dissolves 59 out of 60 parts of dammar resin; absolute alcohol dissolves half. I separated a quantity of resin into two parts by digestion with absolute ethy alcohol, and called A the part dissolved in ethyl alcohol, and B the part which was insoluble in ethyl alcohol.

The dry distillation of 40 parts of A yields 30 parts of volatile oil, including two parts of aqueous acid. Barely a trace of resin appeared in the neck of the retort opposite the distillation end. Eight parts of carboniferous residue remained.

Of 32 parts of B I obtained, 3 parts of aqueous material which did not redden litmus, then 2 parts which reddened it; further, 13 parts of volatile oil were obtained, and finally 6 parts of resin which deposited in the neck of the retort. This behaved just like the resin which I had obtained from the crude dammar.

Seven parts of carboniferous residue remained.

Since 60 parts produce eight parts of dammar resin by dry distillation, essentially only a trace coming from A and an unequally large amount from B, both together add up to 7 parts of resin product from a total of 62 parts; Bonastre's theory is indeed acceptable.

The technical aspects of dammar resin also deserve attention. Two parts of it dissolved in two and a half parts of turpentine by shaking

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* See Trommsdorff's Journal, p. 155 and p. 172 of Vol. 8.

yield an excellent varnish for paintings, drawings, lithographs, etc., whose serviceability far surpasses that of mastic. A light application of dammar varnish bestows an extraordinary clarity upon paintings, which is much more durable than that of mastic varnish, since the dry, hardened dammar varnish withstands external attack with greater certainty. Dammar varnish is not easily attacked by alcohol, so that paintings treated with alcohol during cleaning present less of a problem, particularly since dammar varnish can again be softened and removed with linseed oil and turpentine.

In order to determine whether dammar varnish might be less subject to post-yellowing than that of mastic, I set out dammar and mastic at the same temperature in different containers.

The mastic was yellowish when hardly fused; the dammar resin first assumed a trace of color after which it commenced to dry. Now, since heat and exposure to light produce post-yellowing of mastic, I believe that this bad condition need not be feared in dammar resin, inasmuch as it is sufficient to spread the dammar varnish thinly, while the thicker layers of mastic plainly will post-yellow more rapidly.

Dammar resin appears to be very good as a retouching varnish, since it forms a clear solution in all proportions with poppy-seed oil when heated, without additions of turpentine.

Halberstadt, May, 1829.