NOTES ON SOME TASMANIAN EUCALYPTS,

by

J. H. Maiden, F.L.S.

(Government Botanist of New South Wales, and Director of the Botanic Gardens, Sydney).

Corresponding Member.

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In "A Research on the Eucalypts of Tasmania and their Essential Oils," (1) Messrs. Baker and Smith have made frequent reference to my work, and some observations are necessary. They have given undue prominence to a paper by me in these Proceedings for 1902, sometimes ignoring that in two of my works (*Critical Revision of the Genus Eucalyptus* and *Forest Flora of New South Wales*) additional knowledge has enabled me to modify opinions in the earlier paper considerably. I emphasise the point that an author can claim to be judged by his latest utterance on a given subject.

The store of laboriously acquired details, as incorporated in the above works, has brought difficultly accessible descriptions and specimens under the notice of those interested, and it would be well if my readers would make it their business to directly consult the evidence in regard to Tasmanian species thus brought together.

The paper of the joint authors to which I have referred owes much of its value to determinations of the composition of various oils; further, there is much reference to determinations of species on grounds which have no direct reference to those substances. It will be desirable to investigate some of the principles which underlie the relations of essential oils and the species which yield them.

Accessory characters (e.g., those based on oils) cannot obviously be other than variable, yet Messrs. Baker and Smith in another place (2) say that the constituents have been fixed and constant . . . . "their botanical characters show a marked constancy . . . . " "the chemical and botanical peculiarities must also have been fixed primarily." The present writer has not seen this pro-

(1) These *Papers and Proceedings*, 1912, p. 139.

(2) *Proc. Roy. Soc. N.S.W.* xxxv., 122 (1901).

nouncement modified, although direct reference to it in the present paper is but scant. Speaking of *E. globulus*, Labill., the authors remark, "Its botanical and chemical "characters never seem to alter, whatever hemisphere it "may be planted in" (p. 154).

In another place (3) I have pointed out that mannas, kinos, oils, etc., are non-essential but accessory or adaptive characters, and examination of them can simply be looked upon as aid to diagnosis.

One of the functions of volatile oils is assumed to be protection of the plant against the attacks of animals. This is certainly not operative against opossums and native bears, but it certainly is as regards herbivora introduced by the white man.

Every grower of plants for the distiller of essential oils, e.g., those of Mitcham, England, knows that there may be variation in the crop in two adjoining fields. The champagne grower also knows this well. Different parts of the Orange tree (leaves, flowers, fruit) produce oils with different odours. I have elsewhere dwelt on these points, (4) giving numerous additional instances of the variation of accessory characters, and these need not be repeated here.

The *Gardeners' Chronicle* recalls that Comes has stated that if a plant, which in its wild state was of therapeutic value, be cultivated for several generations on manured or irrigated soil, it becomes in time quite useless, owing to the disappearance of the active principles. (5)

The interpretation of qualitative and quantitative results of oil distillations is of great value to enable us to understand the relations of the species of this complex genus, and also to check, if necessary, determinations arrived at on taxonomic evidence. The present writer was the first to lay down a plant for the distillation of Eucalyptus leaves, in order that the products of each species might be rigorously kept apart, and also the first to insist, at least as regards this genus, that every product of it, leaves, flowers, fruits, oils, mannas, kinos, barks, timbers, should be considered in all their interrelations, so that the relative values of the differing entities we at present record as species, might be appraised.

The only thing fixed in Eucalyptus is the taxonomic type of each species, and, unfortunately, since Australia and Tasmania were in the early days looked upon as mere

(3) *Proc. Roy. Soc. N.S.W.* XXXVI., 336 (1902).

(4) *Critical Revision genus Eucalyptus*, i., 248.

(5) *Pharm. Journ.*, p. 587, 4th November, 1911.

collecting grounds for the private and public museums of Europe, in some cases the types have been lost. Even where they are available, the material is often of the scantiest description, and in such cases we have sometimes had to adopt a convention that such and such a tree, whose identity has been definitely ascertained, shall be looked upon as the type. It is in the search for types, in the endeavour to place the nomenclature of species upon a settled foundation, that the botanist, with the limitations of the material available to him, has often made mistakes, which would in many cases have been impossible had adequate material been available. All branches of natural history afford similar illustrations of tentative efforts made with imperfect material.

In this connection it may be well to be reminded of the pronouncement of the immortal Hooker: (6)

"I need hardly remark, that the very different opinions "entertained by botanists as to what amount and constancy of "difference between many forms of plants should constitute a "species, renders all such comparisons vague; and I may add "that no two or more botanists can ascertain the comparative "value of their opinions except they have *exactly* the same "materials to work with. It is too often forgotten that in the "sciences of observation what are called negative facts and "evidence are worthless as compared with positive."

As to whether a certain plant is deemed to be a species or a variety is not of the greatest importance. Those who look upon a certain plant as a distinct entity have it in common that they are agreed that it is distinct, and this is really important; those who look upon one as a variety of another go further, and indicate affinity; this may be a valuable opinion.

It is to be borne in mind that a changed environment induces morphological changes in a plant. Thus when *E. regnans* grows in grassy bottoms, its trunk is mainly smooth, but as it creeps up the hill-sides its height of rough bark extends up the trunk. Of course species-formation is going on every day, and eventually plants may vary sufficiently from, say, the *regnans* type for one to say they have arrived at the stage when they are specifically different.

The position seems to be something like this:—

1. Taxonomy is the science of the systematic arrangement of plants based on morphological characters.

2. There is no evidence that we may have two plants, precisely similar in morphological characters, which are not specifically identical.

(6) Hooker's *Introd. Flora of Tas.*, xxx.

3. Apparently close similarities of different plants may arise from:—

(a) A difference not easy to detect with the naked eye, and error in stating they are the same may be classed under the heading of "error of experiment," or "error of instrument." I do not know of any such case, for very close similarities (not identities) are found to involve real differences as our eyes become better trained.

(b) Every systematist knows that he has made mistakes, partly because of the paucity of material, and partly because he has over-estimated the reliability of witnesses. These errors are especially liable to occur in a protean genus like that of Eucalyptus, whose members are spread over an area larger than that of Europe.

(c) *Homoplasy.* We know that really dissimilar plants prove themselves as soon as the floral or fruiting organs are exhibited, but that there are closely simulating examples in the vegetative stage every botanist knows.

4. In a fossil leaf, one cannot take count of adaptive characters as a very general rule; one must take the leaf as we superficially see it; of its morphological characters.

Let us consider the question of timber for a moment. No two sticks of timber in a timber yard or in the forest are precisely alike. The timber is subject to all the limitations of variation of the species from which it sprang. And if these nuances of variation are difficult to record in the species itself, they are difficult to interpret in the quantitative records of the timber tester. All that we can say is that these records vary between such limits as have been (perhaps arbitrarily) asigned to the species by the systematic botanist. To say that the quantitative results are variable between certain limits is another way of saying that the species is variable, that certain forms have been admitted under the banner of the species by the botanist. If the botanist changes his views as to the direction and amount of variation in a species, the timber-tester must modify his figures accordingly, or persuade the botanist to alter his views. There is nothing final about timber tests, and the only way to render them comparable is to render available with them the fullest particulars as to habitat, size of tree, season of felling, and subsequent treatment, relative position in the trunk of the tree of the test piece, particulars in regard to the meteorological conditions of

the locality of the tree, for as long a period as possible. Of each piece of timber a number of thin sections should be submitted to microscopic examination in addition, in order that clues may be obtained for the interpretation of the quantitative tests aforesaid.

Quantitative tests are only valuable to the extent to which they are supplemented by specific particulars which will render the materials comparable. In old settled countries a considerable amount of information has been accumulated which enables an expert to say the directions along which variation has proceeded. Scots Pine, for example, is not a definite entity like refined gold, but a living, plastic, variable something, and the results of the timber-tester must be variable, because he does not deal with a constant. Although we have aggregations of individuals which we label a species, it is pertinent to remind engineers that no two blades of grass in the field, no two leaves of a tree, no two trees, are absolutely identical.

The same train of thought and action must be applied to oil-results.

I submit that it is unsafe to generalise in regard to the composition of Tasmanian oils from the very few distillations that were available to Messrs. Baker and Smith. Very many additional oils are required even for generalisations. Before a complete research can be made, a full series of oil-determinations in regard to a particular species should include leaves taken every month of the year, and for as many years as possible, as the meteorological conditions of any year differ from those of every other year, in spite of the search after cycles by meteorologists. Leaves should be collected from the lower branches and from those at the top, from those along the periphery, and from those at a distance from it. Then we require leaves from trees of various ages and sizes, from trees growing in as many districts as possible, and in situations exhibiting as much accommodation to environment as possible. The above refer to spontaneous trees; the variation that takes place in cultivated trees is almost a sealed book.

Every charge of leaves submitted to distillation should be backed by specimens in the herbarium, so that any questions that may arise at any time in regard to anomalies, or reputed anomalies connected with the oil results, may be considered in connection with the corresponding botanical material. The referential material in regard to oil-analysis should be at least as complete as systematists find necessary in their investigations of a species. As regards every oil referred to in literature, there should be a schedule of

particulars as to the tree which yielded it, date of collection, and so on. Systematists are by no means free from blame as regards their work. Mueller has placed us under the greatest obligation in regard to his pioneering monograph on Eucalyptus, a foundation on which all succeeding workers must build, but in the vast majority of his plates he gives us no details as to the specimen figured. In effect, he says, "This is Eucalyptus of such and such a species, never mind whether it is the type, or a South Australian or Queensland form of it." We have the same absence of necessary particulars in regard to his illustrated works on Acacias, Salsolaceous plants, Myoporineæ, Candolleaceæ, and, indeed, most of his works. In the vast majority of plates the types certainly are not drawn, and what particular form, attributed to the species, we can only guess at. The value of a botanical drawing may be very greatly discounted if the precise locality, date of collection, and even the name of the collector, be omitted. If these particulars cannot be given, the plate should not be published.

Messrs. Baker and Smith have a practical monopoly, an honourable monopoly, in regard to appliances for oil distillation and analysis, and all monopolies are to be deprecated. When another scientific institution can undertake the cost involved in the installation of such apparatus, we shall have a series of independent observations accompanied by data that I have indicated, and such as these gentlemen, holding the opinion that oil from the same species does not vary, consider unnecessary.

Brief notes will now be given in regard to some of the species referred to by the authors.

1. *E. acervula* Hook. f.

The authors state that *E. acervula* Hook. f. and *E. paludosa* R. T. Baker are specifically distinct, specifying the following differences:—

(a) The smooth bark of *E. paludosa* and the rough bark, 'mostly" of *E. acervula.*

(b) Bushy top and leaves of rather pendulous growth of *E. acervula*, while *E. paludosa* "is a fine typical tree, "with stout outstretching branches and a straight stem."

(c) "The timber of *E. acervula* is harder, closer grain-"ed and altogether superior to that of *E. paludosa.*"

(d) "The oil of *E. acervula* does not agree entirely in "general characters with that of *E. paludosa.*"

Let us examine these points in detail.

(a) Rodway, *Tasmanian Flora*, p. 57, says of *E. acervula*, "Bark scaly below, smooth above." A field note

of mine on a New South Wales specimen of Mr. Baker's *E. paludosa* is, "fibrous at butt—a white gum." I know both trees, and at different times would describe them similarly.

(b) Hooker says of *acervula* "trunk erect, often lofty." Personally, I have not been able to see any difference between *E. acervula* and *E. paludosa* in habit.

(c) It requires long experience of timber workers to decide the relative merits of two timbers grown in different States.

(d) Some difference is to be looked for, and the value of the difference can only be ascertained after careful examination of the products of many trees.

2. *E. linearis* Dehn., non A. Cunn. (Baker and Smith's paper, p. 157).

E. linearis Dehn., in Rodway's *Tasmanian Flora*, p. 56.

I invite those who desire to follow the history of this species to read the information I have laboriously collected at p. 168, part VI. of my *Critical Revision*. I do not see what justification there is for cancelling Dehnhardt's name, giving A. Cunningham as the author. Indeed, Messrs. Baker and Smith say, "It is stated" (by me J.H.M.) "that A. "Cunningham collected specimens and labelled them '*E.* "*linearis*, Hobart Town, 1819, A. Cunn.,' in which case it "might be surmised that this is the tree, but this is only "a surmise....." Then why add, "..... we have de- "cided to let the name stand, but give the authorship to "A. Cunningham....." This lofty action is unnecessary, and complicates nomenclature without advantage.

3. *E. Perriniana* F.v.M.

This is given as above by Baker and Smith in their *Research on the Eucalypts*, but *E. Perriniana* R. T. B. and H. G. S. at p. 163 of the present paper. It is *E. Gunnii* Hook. f. var: *glauca* Deane and Maiden which I will re-examine when I revise *E. Gunnii* for my *Critical Revision*.

Ewart (*Proc. Roy. Soc. Vict.* XXVI., 3, 1913) suggests that the author should be Rodway, according to the Rules of the International Botanical Congress. I suggest, with Rodway, that since Mueller first suggested the name, he should be given the credit of it.

Where a name has once been used by an author, prior to the promulgation of the above Rules (Vienna, 1905), it has been the recognised practice to give the authorship to the

man who first used it. Botanical history teems with such examples, and it was immaterial whether a description was furnished or not. In the present case, "R. T. B. and H. G. S." did not first employ the name, *Perriniana*, and they should not assume it.

4. *E. coriacea* A. Cunn. (*E. phlebophylla* F.v.M.)

If my readers will turn to p. 136, Part v. of my *Critical Revision*, they will see that I have given the detailed history of *E. phlebophylla* F.v.M., which Messrs. Baker and Smith at p. 165 of their paper desire to restore for the Tasmanian tree hitherto named *E. coriacea*. The type came from Mt. Aberdeen, a peak of the Buffalo Range, Victoria, and Stuart's Tasmanian specimen was a co-type. I cannot tell the difference between the Victorian Alps (Mt. Aberdeen) specimens, those from Tasmania and those from New South Wales. Nor could Mueller, nor any later botanist. I do not see the point of the statement that "In all proba-"bility Mueller had not seen specimens of *E. coriacea* when "he described his species in conjunction with Miquel....." It may also be pointed out that the species (*phlebophylla*) was not a joint one by Miquel and Mueller. It is Mueller's, who, after the fashion of the time, sent descriptions to Europe to a distinguished botanist for publication.

Speaking of the field characters of *E. phlebophylla* the "Weeping or Cabbage Gum," the authors (p. 166) quote Hooker that it has "generally spreading limbs and weeping "branches, and branchlets that hang down 10 or 12 feet, "and gives the height from 40 to 50 feet." They add that "*E. coriacea* has not this field character, but is a tall, up-"standing tree with large spreading branches."

Incidentally it may be mentioned that Mr. Rodway's label on a specimen of his own collecting is "erect tall tree, "Chudleigh, Dec., 1909."

As a matter of fact, over large areas in New South Wales, the description of the Tasmanian tree exactly applies, and it is often called "Weeping Gum" in New South Wales.

I have again examined Tasmanian specimens of this species and cannot see that they differ in any important character from *E. coriacea* A. Cunn.

Habit is a variable thing, and should be used with the greatest precaution as a factor to constitute species. An instance taken at random is the "Weeping Box" or "Mackenzie River Box" of Queensland which is *E. melanophloia*, but it cannot be separated from the Ironbark of the district, which is also *E. melanophloia*.

5. *E. regnans* F.v.M.

(including *E. fastigata* Deane and Maiden, as a variety).

At p. 170 Messrs. Baker and Smith repeat a former statement of theirs that *E. fastigata* is a distinct species, making the naive remark that Mueller "hesitatingly named it *E.* "*amygdalina* var., showing that he never associated it with "his *E. regnans*, a species of his own collecting." This incident only proves, and it proves nothing more, that on one occasion Mueller received a specimen of the tree afterwards named *fastigata*, and placed it under *amygdalina*. There are two kinds of names, those given by a botanist off-hand without prejudice, as the lawyers say, and those given as the result of special research. Every botanist in large practice (as a lawyer or medical man would say) must name some plants off-hand or else leave them unnamed, and it is misleading, unless accompanied by a clear statement of the evidence, to make a point that a botanist "never asso-"ciated" a plant with another.

Like these authors, the present writer has examined *E. regnans* and *E. fastigata* in the field, and he looks upon the latter as simply an environmental form of the other, one that frequents drier situations. Some differences in the composition of the oils from a few distillations of the two forms, simply prove that oils are variable (within limits) like everything else pertaining to Eucalyptus.

6. *E. dives* Schauer.

Messrs. Baker and Smith, p. 173, repeat their statement that "in the case of *E. dives* it was not, till shown by this "Research (1902) that the mature trees became identified." If my readers will do me the favour of reading p. 190, Part vii., of my *Critical Revision* they will see this species historically treated, and Mr. Deane and I announced the rediscovery or identification of *E. dives* in the year 1899, (*Proc. Linn. Soc. N.S.W.* xxiv., 460), three years earlier than Messrs. Baker and Smith's observation!

7. *E. Risdoni* Hook. f.

I have gone very fully into this species at p. 172, Part vi., of my *Critical Revision*, although the reference has escaped the notice of Messrs. Baker and Smith.

Perusal of p. 175 and of Plate 32 of my work will show that I had already confirmed Bentham's observation by noting "lanceolate leaves are common on the tops of "branches of *E. Risdoni*," and Mr. Deane and I compared them with a similar phenomenon in *E. pulverulenta* (*cinerea*).

8. *E. unialata* Baker and Smith (*E. viminalis* Labill., var. *macrocarpa* Rodway).

While in 1902, I had considered this a form of *E. Maideni*, I had dropped this view in *Proc. Linn. Soc. N.S.W.* xxx., 499 (1905), and my three years later opinion should have been quoted by Messrs. Baker and Smith. I came round to Mr. Rodway's view that it was a hybrid, and added, "Some of the juvenile foliage in my possession is "coarser than any I have seen in *E. viminalis*, and I think "that Mr. Rodway's statement that this form only occurs "in plantations of *E. viminalis* growing with *E. globulus* is "a sufficient explanation."

From that day to this I understood that the specimens came from a plantation, and in view of the fact that Messrs. Baker and Smith state that only two trees were found, they require further examination, which I will give on my next visit to Tasmania.

9. *E. gigantea* Hook. f., "Gum-topped Stringybark."

In Part xx. of my *Critical Revision* and Part 51 of my *Forest Flora*, I have reproduced Hooker's (Fitch's) figure, No. xxviii., *Flora Tasmaniae*, and have shown that, making allowances for some confusion in the text with *E. obliqua* L'Herit., Fitch's beautiful figure should stand, and that it includes *E. delegatensis* R. T. Baker. There seems to be no sufficient reason for relegating *E. gigantea* to the rubbish heap.

The history of the "Gum-topped Stringybark" and its many synonyms has been very fully gone into at Part ii, p. 68, of my *Critical Revision*, and elsewhere, particularly in the two works to which I have referred.

10. *E. obliqua* L'Herit.

I have explained the long standing confusion with *E. gigantea* Hook. f. in Part xx. of my *Critical Revision* and Part 51 of my *Forest Flora*.

11. *E. haemastoma* Sm.

The authors say that as the result of this investigation "it is found not to exist in the island." This claim is quite untenable in view of the following.

In Part ii., p. 71 of my *Critical Revision*, after drawing attention to the confusion which has grown around the erroneous use of *E. haemastoma* for a Tasmanian tree, I say that the name should be dropped. In Part x., p. 321, of the same work, I expressly exclude *E. haemastoma* from Tasmania, and do the same at Part 37 of my *Forest Flora*.

12. *E. aggregata* Deane and Maiden. "Black Gum" of New South Wales.

This is identical with *E. Roidwayi* Baker and Smith, p. 191 and plate ii. of their paper.

The authors have been misled in the first place by my mistake, through imperfect material, in referring the Tasmanian tree to *E. Macarthuri* Deane and Maiden, with which it would never be confused for a moment by any person who saw its juvenile foliage. The matter would have been cleared up in my "Critical Revision." The authors, both in the botanical and chemical portion of their paper, refer to an unnecessary extent to *E. Macarthuri*.

The fruiting twig of *E. aggregata* (Plate XLIX., *Proc. Linn. Soc. N.S.W.* XXIV., 1899) shows a sessile head of fruits, but oftener than not the fruits are not sessile. See also the pedicellate buds on the plate quoted.

One would naturally expect to see some differences in the oils of the Tasmanian and New South Wales trees.

13. *E. Sieberiana* F.v.M.

At p. 194 of this paper Messrs. Baker and Smith attempt to prove that *E. virgata* Sieb: is identical with *E. Sieberiana* F.v.M.

At Parts ix. and x. of my *Critical Revision*, I have very carefully gone into the subject, quoting my authorities. At p. 307 of Part x. I say:

"In 'Eucalyptographia' under *E. Sieberiana* F.v.M., "Mueller gives *E. virgata* Sieb., as a synonym. It is not "proper to state it so. . . Mueller thought, when describing "it, he was suppressing the 'misleading' name *virgata* for it. "The explanation is that *E. virgata*, Sieber, was for many "years confused by Bentham, by Mueller, and other botanists "with the tree Mueller, in spite of himself, properly separated "from *virgata* under the name *Sieberiana*. I have explained "the situation under *E. virgata*, at Part ix., p. 275, of this "work, and need not repeat myself here."

I know no true synonyms of *E. Sieberiana* F.v.M.

Now Messrs. Baker and Smith, by an argument that is not perfectly clear to me, completely reverse my conclusions, returning, as I maintain, to the old confusion I had cleared up. This is part of their argument:—

"It seems hardly likely either that Sieber, having himself "collected his two species in the field, should have given separate names to one and the same tree, for he was thus able to "speak from actual acquaintance with their field characters, "an experience that is invaluable as regards a knowledge of the "Eucalypts."

In regard to this remark, I can say that, having examined every one of Sieber's numbered Eucalypts in the great herbaria of Europe, he is not always infallible in regard to this difficult genus, and little blame to him, while as regards the reference to actual acquaintance with their field characters, the present writer speaks with infinitely greater experience than this old worthy could have possibly obtained during his rapid and brief collecting tours in New South Wales in the year 1822.

Messrs. Baker and Smith's cancelling of *E. Sieberiana* F.v.M. for the Tasmanian "Ironbark" after it had been adopted by Mueller (*Eucalyptographia* and *Second Census*), Rodway (*The Tasmanian Flora*), and myself seems to be one of the most unfortunate confusions of nomenclature they have introduced into their paper.

14. *E. amygdalina* Labill:

The authors say (p. 200) that the tree of the mainland so differs from that of Tasmania, the original home of the species, both in morphological characters and oil, that they would adopt a different name, were it not for causing inconvenience. They, however, content themselves with the varietal name (*A*)*australiana* for the mainland form. It is not surprising that a slight difference has ensued during the isolation of the two areas caused by Bass' Straits, but I am not prepared to agree that the difference amounts to that of a variety.

In my *Critical Revision* I will examine a few further points in Messrs. Baker and Smith's paper as the individual species are dealt with.