The positions of 1 and 2 I obtained by careful micrometer measurement, the other numbered lines I estimated.

The spectra I have given for comparison (atmospheric and calcium) are the only ones I can find mapped in Roscoe's work that can at all compare with the "glow" spectrum; that of calcium, especially *Bunsen's*, appearing to me to have the most resemblance.

In recording these observations I do so in the position of a *witness*, and not that of a *judge*, hoping that the evidence I have to offer may, in connection with that contributed by others, help in some measure to elucidate the mystery of the phenomenon that has excited so much interest. I dare not venture to offer an opinion upon these observations, only, I would remark, that the idea of calcium vapour being in the air at this time is perhaps not very absurd, considering the vast quantity of limestone that must have been in contact with volcanic heat.

I am not yet prepared to offer a definite opinion upon the deposit which I collected from the January rains. I have submitted it to a partial examination in the microscope, and found the heavier portion, obtained by precipitation in water, to consist, apparently, chiefly of silicious particles, intermixed with insect exuviæ, etc.; also a few particles of magnetic substance, somewhat pear-shaped, evincing, in proximity of a magnet, decided polarity. The lighter washing exhibited, microscopically, a marked resemblance to a specimen of volcanic dust with which I compared it.

This volcanic dust specimen was given me by Mr. Dean, sen., of Launceston, who obtained it, I believe, from the captain of the ship upon which it fell in the vicinity of Sunda.

REFERENCES TO BARON CONSTANTIN VON ETTINGSHAUSEN'S RECENT OBSERVATIONS ON THE TERTIARY FLORA OF AUSTRALIA,

By Baron Ferd. Von Mueller, K.C.M.G., M.D., F.R.S., F.G.S., Etc.

[*Read April* 8, 1884.]

The 47th volume of the Imperial Academy of Science, Vienna, issued this year, contains an important essay on tertiary vegetable fossils of Australia, the results of original

researches by Baron Von Ettingshausen, who has been engaged for fully 30 years in endeavours of systematising on the often enigmatic relics of vegetations of former geological periods. Tasmania is also largely interested in these new enquiries of a palæontologist, who, in the fields of fossil-plants, has gained experience rivalled only by those of Goeppert, Heer, Saporta, and Lesquereux, after the founders of vegetable palæontology, Sternberg, and Brogniart, and some of its earliest promoters, leadingly Unger, have passed away. Baron Von Ettingshausen, on this present occasion, alludes extensively to leaf impressions obtained by Dr. R. McCormick (one of the surgeons of Sir James Ross' antarctic expeditions during the stay of the Erebus and Terror at Hobart) in the travertin of the country adjacent to the entrance of the Derwent; and this distinguished palaeontologist had likewise an opportunity, through the authorities of the British Museum, to examine the specimens of fossils collected in the same region by Mr. R. M. Johnston,—the very material, of which the last-mentioned zealous and circumspect observer gave already some general accounts, accompanied by lithographic drawings in the proceedings of the Royal Society of Tasmania, 1873, 1874, 1879, and 1881, determining at the same time the precise geologic age of these tertiary layers. From these united Tasmanian collections Baron Von Ettingshausen has defined 33 species, which he assorts into 21 genera, pertaining to 16 natural orders. As the "Denkschriften der Wiener Akademie" may not reach many of those who, locally, are interested in these enquiries, it may not be out of the way to give a list of the fossils thus named and diagnosed; excellent lithograms enrich this treatise, so that no difficulty should arise to trace out the now described species under their present designation at the places of discovery; this is still further facilitated by citations of Mr. Johnston's illustrations for 20 of the species.

Myrica Eyrei (Johnston f. 5).
Betula Derwentensis (Johnston f. 10.)
Alnus Muelleri (obtained at Risdon.)
Quercus Tasmanii (obtained at Risdon.)
Fagus Risdoniana (obtained at Risdon.)
Salix Cormickii.
Cinnamomum Woodwardii (obtained at Shoebridge.)
Cinnamomum Hobartianum.
Lomatia prae-longifolia (Johnston f. 16.)
Dryandroides Johnstonii (Johnston f. 29.)
Coprosma prae-cuspidifolia.
Apocynophyllum travertinum (Johnston f. 14.)
Apocynophyllum microphyllum (Johnston f. 8.)
Echitonium obscurum.

Cordia Tasmanica (obtained at Risdon.)
Premna Drummondi (Johnston f. 2, 25, 26.)
Sapotacites oligoneuris (Johnston f. 1, 30.)
Sapotacites achrasoides.
Ceratopetalum Woodii.
Ceratopetalum prae-arbutoides (Johnston f. 35.)
Sapindus Tasmanicus.
Elaeocarpus Bassii (Johnston f. 57, 60; obtained at Beaconsfield.)
Cassia Flindersi (Johnston f. 13.)
Phyllites populiformis (Johnston f. 20.)
Phyllites ficiformis (Johnston f. 11.)
Phyllites juglandiformis (Johnston f. 28.)
Phyllites ligustroides (Johnston f. 22.)
Phyllites pyriformis (Johnston f. 23.)
Phyllites phaseolites (Johnston f. 4.)
Phyllites sophoræformis (Johnston f. 9.)
Phyllites mimosæformis (Johnston f. 31.)
Carpolithes gaertnerioides (Johnston f. 34; obtained from Pipeclay Bluff.)
Carpolithes Risdonianus (from Risdon.)

From this list it will be observed that Baron Von Ettingshausen refers unhesitatingly fully half the plants, the leaf impressions of which he had from near Hobart before him, to genera of the existing vegetable world; some, however, he places into genera solely established for the systematic reception of vegetable relics of former ages, while Phyllites also, here as elsewhere, becomes the generic receptacle for fossil leaf—remnants not readily referable to any defined generic group of plants, whether living or extinct—whereas Carpolithes serves for keeping together by prevalent palaeontographic usage some fruits of obscure affinity, generally regarded as gymnospermous, but not always congeneric, and sometimes, perhaps, not even co-ordinal.

Were I to be allowed to offer a suggestion on a subject, which from its very nature must be perplexing, it would be to recommend a preference of new generic names for all such organic remnants as cannot be put with any degree of certainty along with generic forms now living, nor can safely be placed into clearly defined fossil genera, as this would not commit us to fix the exact systematic position of any organism, known only from fragments quite insufficient for that strict generic recognition which, for instance, would be expected from dealing with Laurineae, in the sense of living genera of that order, the corresponding exact circumscription of which for fossils, even if flowers and fruits were always or finally obtained, would ever remain an impossibility. Thus only in such cases would the generic name of living organisms become adopted for

fossils, when direct certainty or far-reaching circumstantial evidence existed, as, for instance, in the case of Araucaria Johnstoni, alluded to by Baron Von Ettingshausen, which Conifer, though its cone is as yet known only in a young state, was placed in that genus, not because the carpologic characteristics were conclusive, but because the genus Araucaria has been traced elsewhere from living forms successively through several geologic epochs. There may, however, exist in many localities a consociation of vegetable fossils to such an extent, and of such a similarity, as to justify from the mere presence of some peculiar foliage, not absolutely characteristic by itself for any particular genus, our systematising on mere leaf forms, especially if such an intimate and extensive anatomic knowledge, as Baron Von Ettingshausen displays, is brought to bear on such fossils; nevertheless, the almost infinite forms, some of which not rarely reiterative in various genera and even different orders of plants, assumed by leaves throughout the whole wide creation, would render identification, unaided by floral and fructifying organs, often hazardous in the extreme, even to the most experienced scrutator.

Incidentally it should perhaps here be mentioned, that we owe the earliest records of tertiary Tasmanian plants to Sir Paul de Strzelecki, who in his valuable volume "Physical description of New South Wales and Van Diemen's Land," 254 (1845), offered a note by Professor J. Morris on two leaf impressions and a branchlet fossil in the travertine near Hobart, all three delineated on plate vii. of his work, and he adds that the celebrated Charles Darwin, whose death we had lately to deplore did notice already the occurrence of leaves of a supposed Palm in the same deposit.

The essay presented to us by the celebrated Austrian palaeontologist, is, independent of its special local interest, also of general importance, inasmuch as he enunciates his opinion that the whole existing vegetation of the world can in its development be traced to an universal original flora of bygone geologic ages, a conclusion from palaeontologic data first drawn distinctly by Baron Von Ettingshausen, although foreshadowed by other observers and indicated already by D'Archiac in the wording quoted by Schimper, "Le présent de la terre n'est que la consèquence de son passé." This enunciation, it need hardly be said, supports the theory of organic beings having gradually ascended in the scale of development.

One of the most interesting forms of pliocene plants, rendered known by this new essay, is the Alder, with which Baron Von Ettingshausen has generously connected the name of the writer of these lines, no species of Alnus occurring in the

existing vegetation of Australia, nor any having been found in a fossil state previously in this part of the globe, although South-Eastern Australia and New Zealand possess—as well-known—the co-ordinal genus Fagus. This announcement of the occurrence of an Alder in the Tasmanian Travertin is all the more to be appreciated, as Mr. Johnston was fortunate enough to detect a fruit, amentum of this plant; a fact like this should encourage Tasmanian geologists to persevere in further searches after carpologic specimens in the rich and very accessible beds of fossils in their island. Schimper in 1872 enumerated 30 fossil species of Alnus, but only seven of these were any amenta procured by the several finders, the rest were described from leaves alone, and must therefore remain doubtful as regards generic and specific limits.

The prospect of Dr. Barnard settling professionally in his native city, holds out much additional hope for revelations in the fossil flora of the vicinity, after that talented gentleman has aided already so much in elucidating the pliocene vegetation of Gulgong.

It remains to confirm the systematic position now given to the above-mentioned Tasmanian pliocene plants by searching for fruit traces, irrespective of the likelihood of future investigations, proving that in Tasmania, as in many other parts of the world, the pliocene vegetation to which Alders were immixed, was also one of great richness in specific forms, few of them as yet known to us.

NOTES OF A CRITICAL EXAMINATION OF THE MOLLUSCA OF THE OLDER TERTIARY OF TASMANIA, ALLEGED TO HAVE LIVING REPRESENTATIVES.

By Professor Ralph Tate, F.G.S., F.L.S., Etc., Corr. Memb.

[*Read June* 9, 1884.]

Mr. R. M. Johnston, in Proc. Roy. Soc., Tasmania, 1880, p. 31, gives a list of Table Cape fossils, which have been referred to existing species. As I think that some of them have been incorrectly identified I am desirous to give explanatory reasons for the adoption of other names. Before doing so, I may remark that in my presidential address to the Royal Society of South Australia, vol. ii., p. lvi., 1879, I gave a list of 24 living species of various classes which existed in the Australian