DESCRIPTIONS OF NEW SPECIES OF FOSSIL LEAVES FROM THE TERTIARY DEPOSITS OF MOUNT BISCHOFF BELONGING TO THE GENERA EUCALYPTUS, LAURUS, QUERCUS, CYCADITES, ETC.

By Robt. M. Johnston, F.L.S.

[*Read June* 9, 1885.]

To Mr. Sprent, who is now taking a very active part in arousing the interest of Surveyors, and others throughout the island, in all matters connected with local geology, I am indebted for the opportunity afforded me for the examination of a very valuable collection of Fossil Leaf impressions collected by Mr. Kayser, the very able manager of the Mount Bischoff Tin Mining Company's works at Mount Bischoff. The fossil impressions are very numerous and well defined, in a somewhat greyish sandstone, whose position, I learn from Mr. Kayser, underlies that recent basaltic sheet, which, with associated tuffs, occupies a considerable portion of the country in and around Mount Bischoff, and also extends more or less uninterruptedly over a considerable portion of the Surrey and Hampshire Hills, and towards Emu Bay, where a fine exposed headland exhibits basaltic columns, remarkable for their prismatic form and regularity. These tertiary beds repose upon or flank the tin-bearing eurite porphyries and the older associated slates, which, with their detritus, form the principal elevated boss of Mount Bischoff. The mount in itself is not very conspicuous at a distance, as it rises from the great elevated undulating plateau, stretching throughout a very considerable portion of the west and north-west part of the island. The level of this plateau maintains a general altitude above the sea of from 1,500 to to 2,000 feet all along the western flanks of the greater inland greenstone plateau of the Lake Country, and for a considerable extent towards the northern and western coast line, towards which it ultimately slopes more or less gradually.

The leaf beds at Mount Bischoff, therefore, are at a very much higher level than those with which we are already familiar in the Tamar and Derwent Basins, which latter range in altitude from sea level to 600 feet. The collection made by Mr. Kayser is a very interesting one, as not only do all the forms discovered appear to belong to new species, but in some cases to genera not before discovered fossil in Tasmania. The prevailing form appears to be a species of *Oak*, allied to *Quercus drymejoides* Ettingshausen, found at Dalton, near Gunning, New South Wales. One of the most striking and beautiful forms, however, is a species of *Laurus*, 7 inches long and 2 inches wide, which I have described and named *L. Sprentii*, in honour of Mr. C. Sprent, Deputy Surveyor-

General, whose kindly help in matters relating to the study of the Geology of Tasmania I take this opportunity of gratefully acknowledging. Another form, a species of *Eucalyptus*, is of singular interest, as it is undoubtedly the first fossil indication which I have yet seen in Tasmania of a representative of our existing gum trees, which so peculiarly characterise the existing vegetation of this island. The fossil *Eucalyptus* is very distinct from *E. Pluti* M'Coy, found similarly in Victoria. The Mount Bischoff form I have named *E. Kayseri*, in honour of the discoverer. Many of the plant remains are imperfect, although I can with certainty make out 15 or 16 distinct new species, the greater number of which has been figured by me for this paper.

Figures, in the meantime, for comparative purposes, are the best guides.

There are not sufficient characters to enable me with confidence to refer the most of the forms to known genera, although I have satisfied myself that some of them can with safety be referred to the genera Eucalyptus, Quercus, Laurus, Cycadites, and Ulmus, while others closely approach forms occurring in similar rock under the basalt at Breadalbane and at One Tree Point, which have been referred to the genera Lomatia, Ceratopetalum, and Ficonium, by Baron Von Ettingshausen. The determination of these doubtful forms I intend to submit to Baron Von Ettingshausen and to Baron Sir Ferd. Von Mueller, who have already elaborated a great number of our Fossil Tertiary vegetable remains.

The prevalence of the Oak, Laurel, and Elm, associated with the Gum tree in this tertiary deposit at Mount Bischoff, is of the greatest interest, as it substantiates the opinions advanced by Baron Von Ettingshausen, and mentioned with approval by Baron Sir Ferd. Von Mueller, viz., "that the whole existing vegetation of the world can in its development be traced to an universal flora in bygone geologic ages," and, therefore, such evidence is in perfect accord with the evolution hypothesis. It is, nevertheless, somewhat strange to find that a great number of the prevailing forms in our tertiary deposits (Oak, Birch, Elm, Alder, and Beech), should show a closer alliance to the existing flora of Europe than to the existing flora of Tasmania.

So far as it appears the Tertiary Flora of Tasmania is extremely rich and varied, and its development is worthy of our closest attention.

Eucalyptus Kayseri, n.s. Fig. 4.

Leaf lanceolate acuminate, slightly bent, and very attenuate towards the acute apex; base rounded and tapering, about $4\frac{3}{4}$ inches long and 21 millimetres wide; substance evidently thin;

mid-rib well marked; lateral veins numerous and very delicate, sub-parallel, almost horizontal near mid-rib, the most prominent becoming very indistinct and curving upwards at junction with intra-marginal vein, the least prominent usually anastomising before reaching the same vein; intra-marginal vein delicate, wavy, following moderately close to the edge.

This form is easily distinguished by its most delicate, close, and almost horizontal veins, and by its extremely acuminate apex. Named in honour of Mr. Kayser, the discoverer of many new fossil leaf forms at Mount Bischoff. Found in Tertiary Sandstones, underlying basalt, Mount Bischoff.

Laurus Sprentii, n.s. Fig. 1.

Leaf coriaceous, rigid, oblong, about 7 inches long. and 2 inches wide below the middle; base imperfect, but evidently acutely tapering; apex somewhat mucronate; margin simple, very slightly and irregularly undulating; mid-rib strong; lateral ribs (eight pairs), somewhat thick near mid-rib, first three sub-equal, upper pairs lessening; lateral ribs emerge at an angle of 70 to 80 degrees, gradually becoming extremely fine as they gently curve upwards and outwards towards margin, into which they run at a very acute angle; tertiary veins inconspicuous. From base to 1st secondary vein, 25 mil.; 1st to 2nd, 16 mil.; 2nd to 3rd, 25 mil.; 3rd to 4th, 19 mil; 4th to 5th, 13 mil.; 5th to 6th, 12 mil.; 6th to 7th, 14 mil.; 7th to 8th, 10 mil. Nervules very indistinct, evidently forming a fine oblong reticulation transverse to secondary veins.

Cycadites microphylla, n.s. Fig. 8.

Leaf imperfect, simply pinnate; pinnæ, with scarcely visible mid-rib, very minute, flat, linear-subulate, inserted obliquely on the margin of rhacis, at an angle of about 25 degrees, contracted at the base, falcate obtuse or pungent pointed, about 12 millimetres long, and 2 broad at base.

Quercus Bischoffensis, n.s. Fig. 5 6.

Leaf ovate-acuminate, ; mid-rib and secondary nerves valid, raised, the latter (about 14 pairs) regular, simple, emerging from mid-rib at an angle of from 45 to 50 degrees, and scarcely curved as they proceed directly upwards and outwards to margin, where each nerve terminates in the sinus or apex of a minute serrature; margin minutely and somewhat irregularly serrated, from two to four serratures between the extremities of secondary nerves. Mature specimens about 5½in. long and 2in. broad.

This handsome form occurs in the greatest abundance in tertiary sandstone of Mount Bischoff. It is distinguished from *Q. drymejoides*, Ettingshausen, which it resembles in

some respects, by its more ovate shape and its peculiarly serrated margin.

Ulmus Tasmanicus, n.s. Fig. 7.

Leaf ovate-lanceolate; base somewhat imperfect in the only specimen obtained, but evidently rounded; mid-rib strong towards base, and rapidly diminishing towards acuminate apex, where it is extremely delicate though sharply raised; secondary nerves simple or furcate (about 12 pairs) emerging from mid-rib at an angle of about 60 degrees, and proceeding upwards and outwards more or less irregularly straight or curved, terminating in a marginal tooth or serrature; margin somewhat coarsely and irregularly serrate, one or two serratures between extremities of secondary nerves. Viewed from the exposed lower surface of leaf, the left side has the fourth and sixth, and the right side the fifth, seventh, and eighth secondary nerves, furcate: Tertiary nerves at right angles to the secondary rare and very delicate, losing themselves in an extremely fine reticulation.

Length, about 5in.; greatest breadth, about $1\frac{3}{4}$in.; distance between each of the lowest four secondary nerves at base about 12 milimetres, the spaces gradually lessening upwards. Tertiary Sandstone, Mount Bischoff.

Although it is somewhat hazardous to determine the true position of a plant in the absence of fruit, I have referred the above leaf to the genus *Ulmus*, on account of the very characteristic form and neuration. I have frequently observed winged seed-impressions very like that of the Elm at One Tree Point.

Figs. 2, 3, 9, 10, 11 represent leaf impressions found associated with those described from the Tertiary Sandstones, Mount Bischoff, but whose position is as yet undetermined.

THE TASMANIAN EARTH TREMORS, 1883-4-5.

By A. B. Biggs.

(*Read 9th June*, 1885.)

The minute earth-shocks which have, during the past two years, been adding a new chapter to the history of our island, have been to me from the first a special subject of observation and study. The principal points which I set myself, if possible, to ascertain, were—First.—To arrive at an estimate of the actual magnitude of the surface-motion of the earth; and second.—To gain some idea of the position of the source, or focus, of the disturbance. I soon found, however, that the subject was much more difficult than I anti-