NOTES RELATING TO CERTAIN FOSSIL LEAVES AND FRUITS FOUND IN THE AURIFEROUS DRIFTS OF GULGONG, NEW SOUTH WALES.

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The few specimens of Palæontological Botany I am sending to the Museum of the Royal Society, Tasmania (kindly forwarded by my father), are complementary to the fossil seed-vessels or fruits presented by me to the Museum some eighteen months back. They all were obtained from the same "lead," or auriferous drift, in the immediate neighbourhood of Gulgong, at a depth of about 146 feet. This ancient watercourse, called the "Black Lead," from containing dark ligneous clay amongst its strata, has been worked for fully a mile in length, and was found very rich in gold. The overlying strata consist of alluvial soil of a rich volcanic character—clay, gravel, and basalt. Of the latter, two varieties are met with; one, the hard, close-grained, bluish-black stone; the other, called by miners "soft basalt," from its friable, earthy nature, and derived from the hard variety by decomposition.

Specimens of each are also sent with the fossils.

Immediately beneath the basalt is a layer of dark bluish clay, containing leaves and fruits arranged in distinct layers. This clay overlies the "drift," or "washdirt," which contains the gold, and varies in thickness from one to several feet, and beneath the latter is another layer of clay, all containing trunks of fossilised trees, branches and roots of these, together with fruits, ferns, sedges, and the remains of animal life. Such is a brief sketch of the *locale* whence these specimens were obtained, and which had lain there for ages, only to be unearthed by the ever active miner in his search for the golden treasures buried therein.

Though the specimens sent are but fragmentary, yet they will in a measure help to illustrate the character of the vegetable world of this country, during a period generally considered by geologists to belong to the Upper Pliocene era. And, to show how extensive an area was covered by these Pliocene forests, similar fossils to these are found in several localities in this Colony, in Queensland, in Victoria, and also Tasmania. Since the volcanic activity which closed that period in this portion of the continent but comparatively little material alteration in this configuration has taken

place, but great have been the changes as regards vegetation and animal life. Whole orders and genera have become extinct, their place being taken by totally new forms; and the huge animals of the past are replaced by a lesser-sized race of descendants.

From the absence of marine deposits being associated with the strata of this period, it is inferred that the land had not suffered an immersion by the sea since that time. Everything points to the sedimentary deposits having a freshwater origin.

The fruits that have been discovered are of the most value, as they serve to indicate the natural order to which they severally belong. And so, with this knowledge before us, we can form some idea of the kind of forest that once flourished on this continent in those early times.

Already can be shown that there once grew specimens of the natural order *Conifer*, by the finding of the seed-vessel *Spondylostrobus Smythii*; of the order *Magnoliaceæ*, by the finding of *Illicites astrocarpa*; *Sapindaceæ*, by *Wilkinsonia bilaminata;* and other orders, as *Menispermeæ*, as well as ferns, etc. And to show that they have as well a more practical value, it has been observed that auriferous strata are associated with the *Spondylostrobus Smythii*, and also with another fossil fruit, *Pentenne Clarkei*. The finding, then, of either of these fossils ought to encourage the gold-seeking miner to further efforts, as most probably success would not be far off.

It is singular, and of much interest, that a fossil fruit, something similar to the *Pentenne Clarkei*, was found by the late lamented Morton Allport at Geilston Bay, Tasmania, in tertiary travertin. A further search in the neighbourhood might lead to the discovery of the source whence this one came, as probably it was washed there from some distance during the Pliocene period, when this bed was being formed; for should, upon sinking a shaft, a drift or bed be found containing these fossils, I should not at all be surprised to hear of it being discovered to be auriferous.

As yet no flowers have been found, probably from their having perished before leaving indelible impressions of their forms. Even the more resisting leaves are not perfectly preserved, as can be seen in these specimens; and soon after exposure to the air, when brought up from below, unless artificially preserved, they soon begin to crumble into dust.

The leaves, or what is left of them, are generally found embedded in the clay in successive layers, as if they had been gently strewn while being covered up by the argillaceous deposit. They all present the same soft thin delicate

structure, which is evidently a mere remnant of the original tissue of the leaf. Just sufficient is left to barely indicate its general outline and feature. This will be seen in the specimens sent, one of which presents a more perfect form of the original leaf than is usually met with. By measurement, this one is 4 inches long, by $1\frac{1}{4}$ inches broad. It is evidently membranous as regards its texture, with margin entire; its venation is reticulate, with the mid-rib giving off on each side alternate lesser veins. In shape it is oblong-ovate, with apex acute. No petiole is seen in specimen. The mass of the leaves found much resembles this one, some being larger, as I have measured one which was 3 inches broad, and over 7 inches long, but generally they are seen to be of a much smaller size than either of these two.

These leaves evidently belong to the Botanical Division *Angiospermia*, and as yet no foliage belonging to the coniferous trees has been discovered in this continent. It was reserved for Mr. R. M. Johnston, of Launceston, to be the first to discover the foliage of a conifer (most probably of the *Spondylostrobus Smythii*) at Beaconsfield. This has been delineated by Baron von Mueller in the Victorian Mining Reports, and commented thereon by him. The Baron there too acknowledges the value of Mr. Johnston's exertions on behalf of the geology of Tasmania, and the assistance he has obtained from him in studying the Palæontological Flora of these lands.

Embedded in the same clay with these leaves and fruits are found the branches, trunks, and roots of the trees that bore them. Frequently it has been noticed by the miner that the leaves and fruits lay thickest around the trunks of the fossilised trees, as if they had quietly fallen there during the peaceful and flourishing condition of the forest, before the taking place of the eruption that overwhelmed them.

The fossil wood, specimens of which I also send, will also help to show the kind of tree that had grown in this ancient forest. One specimen shows as well the bark, and another a portion of a root embedded in the earth, in which the tree evidently grew. The wood has become heavy and black from lying so long in wet clay, and in some specimens can be seen encrustations, with carbonate of lime in small crystals. From its appearance, the wood of these trees must have been of a tough, fibrous character, and evidently well suited to withstand the fury of the elements.

The following is a list of fossil fruits as yet found and named:—

Spondylostrobus Smythii
Phymatocaryon Mackayii

Eisothecaryon semiseptatum
Wilkinsonia bilaminata
Octhodocaryon Wilkinsonii
Odontocaryon Magregorii
Rhyndotheca Lynchii
Plesiocapparis leptocelyphis
Illicites astrocarpa
Conchocaryon Smythii
Trematocaryon McLellani
Celyphina McCoyi
Plesiocapparis prisca et myosperma
Conchotheca rotundata et turgida
Pentenne Clarkei
Pentenne brachy—et trachy—clinis
Dienne pluriovulata
Platycoila Sullivani
Rhyndocaryon Wilkinsonii
Rhymalocaryon bivalve
Pentacoila Gulgonensis
Acrocoila anodonta
Tricoilocaryon Barnardi.