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FOSSIL INSECT BEDS OF BELMONT, N.S.W.

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(One map.)

Fossil insect remains were discovered in the Newcastle Coal Measures in 1898 by Mr. John Mitchell, Principal of the Newcastle Technical College, when a wing, not described and subsequently lost, was found by him in shale overlying the Yard Seam at the base of Flagstaff Hill, Newcastle, and reported in the Proceedings of the Linnean Society of New South Wales, Vol. xxiii, 1898, p. 437.

In 1917 Dr. R. J. Tillyard described a number of wings found by Mr. Mitchell, of which two were found near the Soldiers' Baths, Newcastle, on an horizon just above the Dirty Seam (Proc. Linn. Soc. N.S.W., xlii, 4, p. 721), and in 1921 Dr. Tillyard described a further two wings found by Mr. Mitchell on the railway embankment near Merewether Beach, Newcastle (Proc. Linn. Soc. N.S.W., xlvi, 4, p. 413).

With the exception of these five wings, all the insect remains from the Newcastle Coal Measures have been found on an horizon which was first discovered by Mr. Mitchell in a shallow quarry about two miles north of Belmont, and subsequently traced to other localities between Belmont and Warner's Bay on Lake Macquarie. This horizon has proved to be very prolific in fossil insect remains, and nearly two thousand specimens from it are registered in the Australian Museum collection. Of these, approximately half are represented by the magnificent collection presented to the Museum by Mr. Malcolm S. Stanley in 1943.

During the past three years the writer and Mr. D. Walker have spent such time as was available in mapping the Belmont insect beds and determining their correct relation to the Newcastle Coal Measures. The outcrop is shown by the heavy broken line on the accompanying map.

The original outcrop found by Mr. Mitchell is approximately half a mile north of the John Darling Colliery and a quarter of a mile east of the Pacific Highway at the turnoff to the John Darling Colliery and Redhead. It continues around a low hill to the east of the Highway, and outcrops very prominently at the main gate of the colliery and along its northern boundary.

This eastern outcrop, however, is an isolated one, the main portion of the beds occurring to the west and north of the Pacific Highway.

At the top of Devil's Elbow, on the Pacific Highway, three miles north of Belmont, the beds outcrop about five chains to the west of the highway on the road leading through Violettown to Warner's Bay. This road follows a ridge running north-west for half a mile and then north for another mile and a half, and the insect beds outcrop to the east of the road at distances varying up to 20 chains and at an elevation of 200 to 280 feet above sea level.

West of this road the horizon follows the heads of the gullies feeding Sheppard's Creek and Snake Creek, and crosses the road again about two miles north of the Devil's Elbow.

The dip of the beds is in general W to SW at approximately 3°, but is variable, the strike following roughly the contours of the structural basin of which Lake Macquarie occupies the centre.

In the vicinity of the ridge running east from Rocky Point, at the southern extremity of Warner's Bay and dominated by a hill known as The Knob, a very pronounced vergation in the structural contours indicates local warping with a crest of about 70 feet above the normal horizon.

Isolated outcrops have been found near the shore of Warner's Bay, one at lake level on the northern shore of the bay and one eight feet above mean water level in a cliff on the eastern side of the road skirting the bay, about eleven chains north of the Warner's Bay-Charlestown Road.

The horizon of the beds lies about 70 feet below the bottom of the Fassifern Coal Seam or approximately 270 feet below the upper limit of the Newcastle Coal Measures as given by David (Geological Survey of N.S.W. Memoir, Geology, No. 4, 1907).

The rock in which the insect remains are found is a hard, very fine-grained chert about two feet six inches thick. Stratification is pronounced and well-defined joints cause the chert to break into rhomb-shaped blocks. The colour is light-grey to bluish-grey near its upper surface and becomes black towards the lower boundary. It weathers to a softish white rock stained a pinkish-brown colour on the weathered faces. In some cases the chert is so highly silicified as to be slightly translucent, and all evidence of banding is obliterated. These characteristics are typical, and even when the outcrop material is almost completely disintegrated the presence of the chert outcrop is indicated by small flat fragments of a pinkish colour.

The insect bed is underlain by sandstone for a depth of 15 to 18 feet, beneath which is a very prominent bed of coarse, strongly-cemented conglomerate, consisting of water-worn pebbles, including pebbles of coal. The thickness of this conglomerate is approximately 50 feet.

At a level about 10 feet below the insect bed, fossil wood abounds on the surface wherever the chert has been traced, and this horizon includes sections of fossil trunks up to 18 inches in diameter.

The insect remains are invariably associated with *Leaia* and *Estheria*. Fish scales are plentiful in some localities, though no fossil fish have been found. One specimen of a king crab (*Limulus*) has been reported, but this has not been verified.

The associated fossil plant remains are *Glossopteris*, *Phyllothea*, and *Noeggerathiosis* with occasional *Annularia* and *Sphenopteris*. The lower portions of the beds possess a coarse texture and are dirty brown to black in colour. Comminuted plant remains resembling chopped straw are prevalent in this portion of the beds.

Taking into consideration the odds against an insect wing being preserved and against cleavage just where a wing occurs, the number of wings found indicates that the insect population must have been extraordinarily large. Although each wing found represents two to three hours' work, the yield from a cubic foot of the best layers, split in a good light and carefully examined, is estimated at 10 to 20 wings. This can only be a very small fraction of the insect population and yet indicates some hundreds of million wings per square mile of the beds.

No further work has been done on the insect horizon discovered by Mr. Mitchell at Newcastle in the neighbourhood of the Yard and Dirty Seams, nor has the extent of the Belmont insect-bearing beds been determined. Undoubtedly this insect horizon will be found outcropping in the hills to the north-east of Warner's Bay and in the hills to the east of the John Darling Colliery, between the Belmont railway and Nine Mile Beach. It may also be found on the other side of Lake Macquarie in the vicinity of the West Wallsend-Awaba Road, and even further south.

One insect wing has been recorded by W. S. Dun (Journ. Proc. Royal Soc. N.S.W., Vol. xlv, 1911, p. 554) from the roof of the coal seam in the Sydney Harbour Colliery at Balmain, associated with a species of *Taeniopteris*.

Tillyard, in describing this wing (Proc. Linn. Soc. N.S.W., xliii, 2, p. 260) gives its horizon as 600 feet above that of the Belmont beds, which would place it about 300 feet

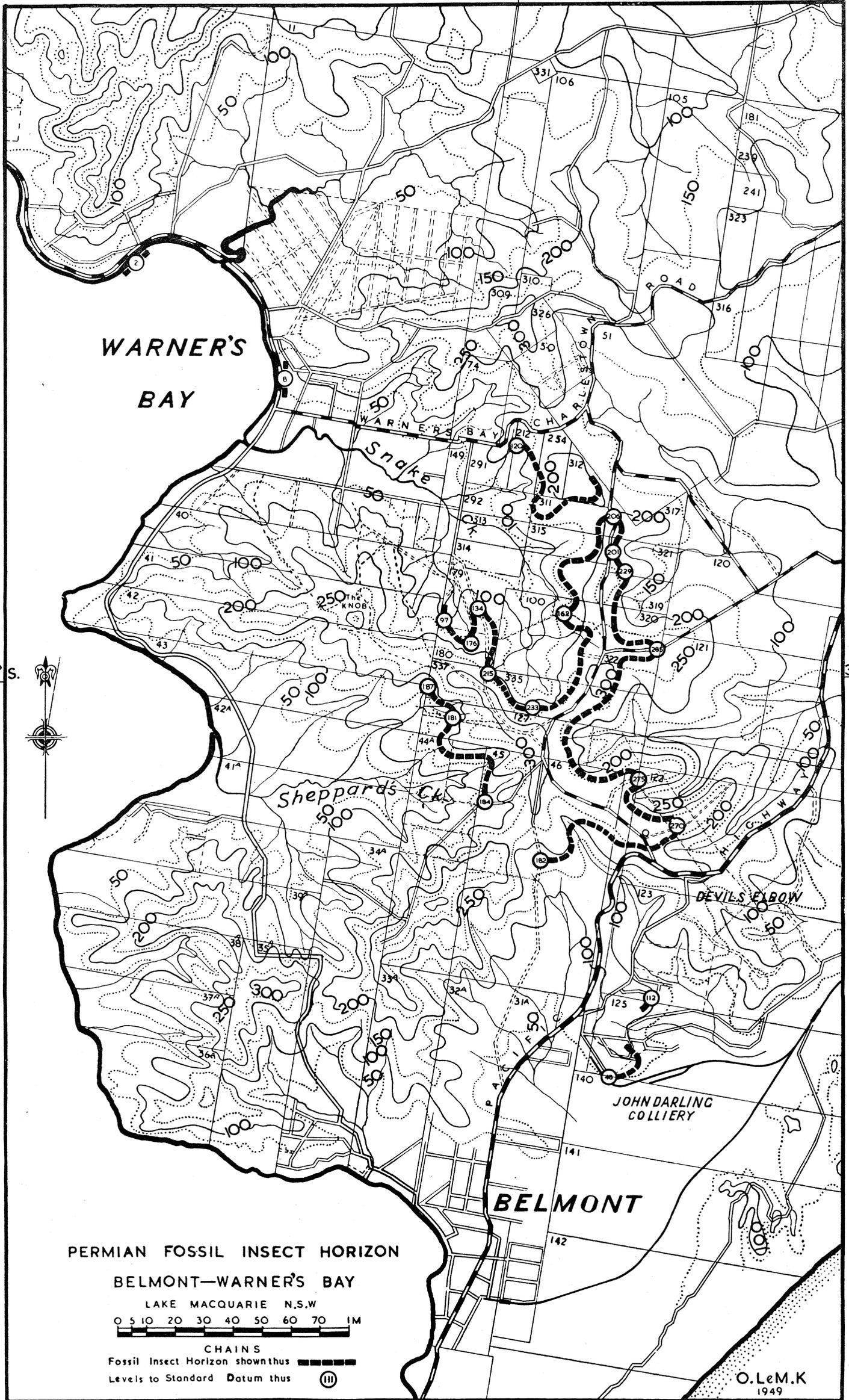
above the upper limit of the Permian as given by David. Although closely associated with the Upper Coal Measures, it is doubtful whether this insect should be considered a Permian genus.

Permian Fossil Insects from the Newcastle (N.S.W.) Coal Measures.

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151°40'



WARNER'S BAY

Snake

Sheppard's Ck

DEVILS CROOK

JOHN DARLING COLLIERY

BELMONT

PERMIAN FOSSIL INSECT HORIZON

BELMONT—WARNER'S BAY

LAKE MACQUARIE N.S.W

0 5 10 20 30 40 50 60 70 1M

CHAINS

Fossil Insect Horizon shown thus 

Levels to Standard Datum thus 

O.LeM.K
1949

33° S.

33° S.

151°40'