

PROGRESS REPORT

on

THE PORT DAVEY - COX BIGHT AREABATHURST

20th October, 1956

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INTRODUCTION

The Regional Geological Survey of the Port Davey - Cox Bight Area started during October, 1954 and has proceeded intermittently to the present date. The boundaries of Port Davey - Cox Bight area was defined by the then Director of Mines, Mr. W.H. Williams as follows:-

"Starting from New River Lagoon along the south coast to South West Cape and thence north along the west coast through Port Davey north up to 43° 7' 30" latitude south and thence along the above parallel to Arthur Ranges, just below Mt. Hayes and then along the western parts of the Arthur Ranges via New River to New River Lagoon, the point of commencement, a total area of approximately 850 square miles."

To the present date, the south west part of the above area of approximately 220 square miles with the following boundaries:-

"Starting from Port Davey itself proceeding along the Channel to East Bathurst Harbour and thence along Moulter Cove, Ray River, Cox Bight - Red Point, thence along the south coast up to South West Cape and then north along the west coast up to Port Davey the point of commencement,"

has been more or less completed.

The whole area is divided into ten map sheets, each one map square in size 10,000 by 10,000 yards.

To make possible the above Regional Geological Survey at the S.W. part of the above area, maps have been produced from air photos by the Mines Department, with the help of old surveys and surveys done by Robinson during June, 1955. Two scale maps have been produced, one scale of 20 chains to the inch and the other 1 inch to a mile.

To enable further scientific geological surveys and mineral research, new topographical maps should be produced of the remaining area.

ACCESS

Access within the Port Davey - Cox Bight Area is confined solely to water ways, tracks and occasionally to landing strips on the beaches.

(a) Port Davey - Channel, Bathurst Harbour - Melaleuca Inlet, Long Bay and Moulter Cove are the main water-ways navigable for all fishing craft. Port Davey - Channel and Bathurst Harbour are navigable for all ocean going vessels.

(b) Bathurst Harbour Mines Department Establishment, on Melaleuca Inlet and Kings Place Tin Area on Moth Creek can be reached by fishing craft passing from Port Davey through the Channel, Bathurst Harbour and Melaleuca Inlet.

(c) All places along the sea coast, during calm sea, can be reached by fishing boats.

(d) The interior can be reached from Bathurst Harbour rivers and inlets, by T.B. Moore's track and from Long Bay by A. Marsden's track. These tracks are heavily overgrown in places.

(e) The only track in use, is the 8 mile track connecting Cox Bight with Kings Place.

(f) In 1955, D. King started an airstrip at Kings Place, which should be completed by 1957.

### TOPOGRAPHY

The main drainage of the northern part of the South West is effected by the four "consequent" rivers, namely the Davey River, Spring River, North River and the Old River, all flowing to the south. The southern part of the South West is drained by three smaller rivers, namely the Melaleuca, Moth Creek, and Ray River. All the rivers flow into Bathurst Harbour, except the Davey River, which drains into Payne Bay. The only bigger river flowing directly to the sea is the Louisa River at the South East. There are many small creeks flowing directly to the sea, mostly unnamed.

In regard to the land forms, the chief features of the South West Area are the South West Cape Ranges (2,600 ft.), the New Harbour Range (1,680 ft.), Bathurst Range (2,600 ft.) Ray Range (2,800 ft.), Spero Range (2,000 ft.), and its northern prolongation separated by Old River - the Norolds Mountains (3,000 ft.), and the Iron Bound Range (4,000 ft.). At the Northern part, there are minor groups of hills and ranges like the Mt. Rugby (2,520 ft.) Range, Mt. Berry Range (2,132 ft.) and De Witt Range at the extreme North West (2,800 ft.).

The major plain-like country is confined in the northern part of the S.W. to the 4 northern rivers, (Davey, Spring, North and Old Rivers) and in the southern part of the S.W. to Cox Bight - New Harbour up to Bathurst Harbour, Ray River - Moulters Cove and a small plain north to Horseshoe Inlet.

The topography has been modified to a certain extent by the "Pleistocene" glaciation. Several glacial "striations" have been observed over the plains at the Bathurst Mines Department Establishment. Further evidence of glaciation can be seen at the Norolds Mountains with its glacial "debris". Glaciated land forms (circs) can be seen at the Northern and southern part of Mt. Brock. The most characteristic feature of this glaciation is the conglomerate, scattered around many places and plains. The land forms do not show any appreciable rejuvenation, as it is the case, for example, at the Zeehan - Rosebery district. However, there is evidence in many places that the land has risen, and the sea receded in recent geological times.

### VEGETATION

Vegetation in general shows a direct relationship to the rock types. The quartz and quartzites covering the major part of the South West are barren, except for a few valleys and gullies which are timbered with mixed Eucalypt types almost always associated with "Bauera" scrub. The "fluvio-glacial" plains support only button grass. In the schists, shales, sandstones and softer type of conglomerate zones, we find the typical West Coast rain forest with its myrtles, eucalypts, leatherwood, occasional blackwood and wattle. Nearly the whole of the West, South and north of the South West is barren. All major vegetation is confined to the eastern parts of the South West.

MINERAL OCCURRENCES - (In the Port Davey - Bathurst Harbour - Cox Bight Area)

Within the boundaries of the South West (Port Davey, Bathurst Harbour, Ray River, Cox Bight) now investigated, the only mineral occurring in commercial quantities is tin. This occurs as cassiterite in the alluvials and fluvio-glacials of the three main tin fields, namely, the Cox's Bight, the Ray River and the Moth Creek. All these tin fields and in particular Cox's Bight, have been well described mainly by the two Government Geologists, W.H. Twelvetrees - "Report on Cox's Bight Tin Field", 5th December, 1906, and P.B. Nye, "Report on the Cox's Bight Tin Field", 2nd February, 1927.

During my present geological investigations in the Cox's Bight area I found the tin associated with quartz veins, in three different formations i.e. in the schists, sandstones, quartzitic sandstones, as well as in the granites. As the Cox's Bay area has been already well reported by the above mentioned geologists it is therefore not proposed to describe it fully again in this report.

My recent investigations have been confined to the Moth Creek Tin Field only.

Moth Creek Tin Field - was discovered by B. Adams and A. Evendon in the years 1934-35. In 1935 a company was floated under the name, "New Harbour Tin Company".

After two years, Brock took over this Company's leases, but a few months later surrendered the leases. In 1938, Hollingsworth took the leases, bought new machinery and worked them for nearly two years. In 1941, Hollingsworth handed the leases to C. King and R. Young.

Melaleuca Lagoon Area - This is an area well mineralised with commercial tin deposits extending mostly on the left of the Moth Creek, over a distance of approximately  $1\frac{1}{2}$  miles south of the Melaleuca Lagoon and River and of an average width  $\frac{1}{2}$  a mile close to the above Lagoon and River, and a  $\frac{1}{4}$  of a mile width at the southern end. The major part of the above tin field is at present occupied by four lease holders namely by R. Young (80 ac.) C.G. and W.S. King (80 ac. and 40 ac.) and by D. Dicker (40 ac.). The tin is here associated with monazite. I found tin, monazite and copper pyrites together in an old shaft close to King's present workings. Another find of tin and monazite in a quartz veinlet was in a sluicing cutting, close to the King's old tractor shed.

Most of the tin has been worked and is still worked from a shallow ground, although some deeper ground has been also mined, and in the very near future will again be mined as it contains good amounts of tin ore.

Apart from tin, sphalerite and antimony are found in quartz veins and veinlets, exposed by D. King's recent workings. Pyrite is found over a distance of nearly one mile, in veins and veinlets. It looks as if this tin field is well mineralised and further investigations by diamond drillings may give some encouraging results, as the deeper rocks may prove as a good host rock for Zn. and Sb. deposition.

OTHER MINERAL OCCURRENCES - Pyrites and Copper Pyrites - Hannant Inlet.

Pyrite is found approximately  $\frac{1}{4}$  of a mile

south from Kandall Creek on the Eastern shore of Hannant Inlet, spread along the beach. No pyrite has been found here in situ. A smokey quartz is also found from the same area. The pyrite is string-like in appearance.

Copper Pyrite is found in black schists along the eastern shore of Bathurst Harbour Island Bay on Fairy-Tale Head Peninsula. It is a small occurrence and besides scientific interest has no economic value.

Pyrite is also found in the black schist gravels from the Upper Window Pane Creek.

Tin in small quantities has been found along the plains on both sides of Melaleuca Inlet, up to Bathurst Harbour's southern shores.

Tin has been found also in the creek at Wilson Bight with small amounts of molybdenite.

REGIONAL GEOLOGICAL SURVEY OF PORT DAVEY - COX'S BIGHT AREA

1. SUMMARY

The rocks of Port Davey - Bathurst Harbour - Cox's Bight Area range in age from Upper Lower Pre-Cambrian to Lower or Middle Devonian, and include both sedimentary and igneous rocks. Of the sedimentary rocks, there are four distinct groups with at least two, or possibly more unconformities. They are the three distinct Davey groups of rocks and the Bathurst Harbour - Long Bay varvy shales, sandstones and sandstone conglomerates.

The oldest Pre-Cambrian rocks are the dark grey garnet schists at Elphinstone and Earl Points. There is probably an unconformity between the above garnet schists and the overlying black-grey and greenish schists. There was no time, nor possibility as yet for closer investigations of the above area. From the structures it is obvious, that the sequence of schists in the now investigated area is as follows:-

The oldest garnet schists, probable unconformity, the black and grey schists interbedded in places with phyllites and black slates, further the grey greenish schists (sericite - chloritic and actinolite schists) passing into mica - sericite schists, interbedded with micaceous schistose sandstones and shales. These rocks occur at well exposed anticlines and underground elevations. All the above schists and schistose rocks have been silicified in a much later geological time from the top (surface) forming highly silicified rocks, (cherty quartzites, hornfels and quartzites) passing into silicified (quartzites, quartzitic schists and sandstones) and then gradually into partly silicified rocks (sandstones, grits passing into schistose rocks and schists), occurring in synclines and basins (depressions). The silicified group of rocks, can be recognised, as a group, from the air photographs, as well as in the field and it is the most extensive in the South West area.

These groups of rocks are overlain unconformably by varvy shales, slaty shales, sandstones, sandstone-conglomerates and finally unconformably by coarse bands of conglomerates (C.C. on maps), probably corresponding to the Ordovician/Conglomerates further north.

Owen

The Igneous rocks are of two types; the acidic and basic rocks. The acidic is represented by the two "Palinogenetic" types of granites - the S.W. Cape granite and the

Cox's Bight Granite, and the basic by a probable dyke of hornblende lamprophyre intrusive (W.H. Twelvetees description) into the sandstones and quartzitic schists found as loose boulders on the beach at the east end of western bay. (Cox's Bight).

The Cox Bight granite as the major mineraliser is of economic importance.

2. SEDIMENTARY ROCKS.  
 (a) Sequence of Sedimentary Rocks

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SYSTEM	GROUP	FORMATION	LITHOLOGY	CORRELATION
Recent	Alluvials	Alluvial	Sands, Gravels and Detritus. Sands, Gravels, with Carbonaceous materials morains.	
Pleistocene	Fluvio-Glacials	Fluvio-Glacials		
Ordovician?	None?	Conglomerates Unconformity		
Cambrian		Sandstone-Conglomerates Varvoid shales, slaty shales and Sandstones (Fragmental Tuffs?) Disconformity		
(Time of silicification) Cambrian to Ordovician?	Davey Group	Silicified formations include middle and upper Davey Groups	Hornfels, Quartzites, Quartzitic schists, sandstones, grits, slates and shales	Upper Davey Group and Middle Davey Group
Lower Upper Precambrian?	Davey Group	Sericite - Mica schists - Formation	Sericite - Mica schists Micaceous sandstones, grits and schistose shales	Upper Davey Group
Upper Middle Precambrian to Lower Upper Precambrian?	Davey Group	Greenish, grey and black schists, phyllites and slates formation	Schists, phyllites and slates	Middle Davey Group
Upper Lower to Middle PreCambrian?	Davey Group	Unconformity? Garnet schists formation	Sericite - Muscovite-Biotite Garnet schists	Lower Davey Group

(b) Davey Group

The Davey Group of rocks is divided into three separate groups, on lithological grounds and the degree of metamorphism.

The Lower Davey Group is known from the Elphinstone and Earl Points. They show the highest degree of metamorphism amongst the Davey group of rocks. (Garnetiferous schists). The probable age of the above schists (by comparison with other districts) may range from upper Lower, to middle Pre-Cambrian. As there was neither possibility nor time for closer investigations nothing more can be said at present about the above rocks.

The Middle Davey Group of rocks is typically developed at Wilson Bight, Ketchikan Bay, Cox's Bight and can be seen along Window Pane Creek, as well as along the south eastern shores of Bathurst Harbour and Moulters Cove. It is exposed along the anticlinal elevations at the above mentioned places, as black, grey, greenish schists (Muscovite-Biotite) interbedded in places with black slates (Wilson Bight and Ketchikan Bay) and phyllites. Some of the black slates are very often mineralised (FeS<sub>2</sub> and Cu) as that at Bathurst Harbour Island Bay, opposite Celery Island, and the schists in places along Window Pane Creek. At Cox's Bight on the Western side of Black Bluff, they are amongst the schists big inclusions of probably highly altered granite. The whole group of schists and slates show a higher degree of metamorphism. They are contorted and tightly folded. It is difficult at present stage of geological investigations to say about the thickness of the different kinds of schists, slates and phyllites. They probably range in age from Upper Middle to Lower Upper Pre-Cambrian.

The Upper Davey Group overlie the greenish schists (probably conformably) and is well developed east of the line Cox's Bight - Ray River and North River, although it can be seen in places along the foothills of the Eastern S.W. Cape Ranges at Alexander Creek, then at Schooner Cove, Iola Bay, Forest Lagoon, Black Bay, at places on the left side of Moth Creek and in many other places. The rocks are extremely variable in character, consisting mainly of mica schists, mica sericite schists, mica sericite schists interbedded with micaceous sandstones and micaceous argillaceous grits. Towards the synclinal wings they are interbedded with quartzitic sandstones, quartzites and quartzitic schists. These rocks are tightly folded and contorted. The degree of metamorphism is lower than in the underlying schists. They are probably of Upper Pre-Cambrian age.

The silicified Davey Group of rocks is rather characteristic in its origin. It is composed of the upper middle Davey groups of rocks, and in particular Upper group, more or less silicified. The silicification is here rather unusual. It penetrates the different kinds of schists and schistose rocks from the top (surface) downwards, so that the upper parts are the most silicified ones and then downwards the silicification gradually diminishes. These more or less silicified groups of rocks, form the major synclines in this country.

I subdivided this group of rocks into three horizons according to the degree of silicification:-

(i) Highly silicified rocks which have built the highest summits and mountain ridges in the morphology of the country. They consist of hornfels and quartzites. No former bedding or other structures have been preserved. (Deep yellow on the maps represents the above rock formation).

(ii) Silicified rocks composed of quartzites, quartzitic sandstones and schists also form the main ranges in the country. Former rock structures are usually obliterated. (Yellow colour used on the maps for the above formation).

(iii) Partly silicified rocks occur on the peripheries of the major synclines and at the bottoms of the other two. This group of rocks is formed of sandstones, grits, argillaceous sandstones, shales, slaty shales, schistose sandstones and finally passing into schists or schistose rocks. It is this group of rocks, which is typically developed usually on the peripheries of the open button grass plains which form valleys, flat rounded hills and hillocks. There are numerous places, where either the gradual silicification or the silicified metastructures including the previous colours of the former rocks (schists) can be observed. (This formation is coloured light yellow on the maps).

It is not known up till now sufficiently when the silicification of the above rocks took place or what caused it, (certainly not the palaeogenetic granite). However, there are certain indications that silicification started sometime at the beginning of the first onset of a major orogenesis, probably in the Upper Cambrian time (the Tyennan orogeny)?

(c) Bathurst and Long Bay Varvy Shales Sandstones and Conglomerates.

Lower Formation. The black schists, and the silicified schists forming sandstones and grits are overlain slightly unconformably by varvy shales, slaty shales, sandstones and sandstone-conglomerates at the southern part of Bathurst Harbour between the outlet of Moulters Cove and Horn Peninsula. (On geology maps marked with light yellow colour with purple // lines). This formation is tightly folded with steep eastern dips, plunging southwards under the sandstone - conglomerates. Another similar formation occurs on the southern side of the Channel Narrows, opposite Ila Bay. The upper part of these series is interbedded with sandstone-conglomerates and argillaceous schistose shale, with occasional pebbles in the argillaceous shales and sandstones. (Tillite)

Upper Formation. This formation lies unconformably over the lower one and is formed of coarse conglomerates, seldom interbedded with sandstone and shale. Coarse hard quartzitic conglomerates occur at Balmoral Hill and between Horn Peninsula and Dixon Bay along the southern shores of Bathurst Harbour. Softer argillaceous conglomerates occur north of Balmoral Hill and east of Mt. Beattie. These conglomerates are well stretched. The harder types of conglomerates have more regular strikes than the softer types, which are much more crumpled with irregular strikes. The whole series of sandstone-conglomerate plunges north westwards and co-ipso is thickening has built on the other side of the Channel, Mt. Rugby, Mt. Misery and Mt. Berry. This group of sandstone conglomerates is probably the same one as the Owen conglomerates, further to the North?

Conglomerates. They are patches of conglomerates highly silicified with well rounded pebbles. They are different from any of the above described conglomerates found in several places at the crests and ridges of the

S.W. Cape Ranges. Their stratigraphical position is still unknown and further investigations are needed to solve the problem.

(d) Pleistocene - Fluvio-Glacials

Gravels and boulders forming terraces of different levels, occur in the north eastern part of Cox's Bight in the plains between Cox Bight - New Harbour and Bathurst Harbour, in Ray River valley, Horseshoe valley, east of Hannant Inlet and also as smaller terraces at Falls Creek, Window Pane Creek and other localities unnamed, marked on the maps. The thickness of the terraces range from a few inches to as much as 30 feet. The age of the fluvio-glacials is regarded as Pleistocene.

Recent. The Recent deposits consist of Alluvium gravels, sands along the courses of streams, givers and sand dunes of "Eolic" origin, some as high as 900 feet a.s.l. (east of Window Pane Bay), along portions of the west and south coast.

3. IGNEOUS ROCKS

(a) Sequence of igneous rocks

System	Formation
DEVONIAN	Cox's Bight Granites
GAMBRIAN ?	S.W. Cape Granites?
UNKNOWN	Andesite Porphyries? (Hornblende - Lamprophyre)

(b) Granites

There are two kinds of granite occurring within the district. One of these is that which has been known long ago to occur at Cox Bight. (See map). This is a medium grained palingenetic granite containing quartz, felspar (Plagio and orthoclase) and biotite. The peripheries of this granite are soft due to weathering and possibly also to mineralising solutions. They are granitic apophyses intruded into the quartz schists, on the western side of Eric Peninsula. Veins of quartz and greisen carrying molybdenite and tin has been found. It is possible, that this granite is intrusive into the quartzites and quartzitic schists. Not enough work, as yet has been done by me to prove the intrusive nature of this granite.

The other area of palingenetic granite occurs at the south west Cape. The intrusive nature of this granite into the schists and partly silicified schists and sandstones, has been proved by my recent investigations. It is a very coarse granite of pegmatitic nature, containing quartz, felspar biotite and muscovite. The latter mineral occurs especially close to the contact with the schistose rocks. It resembles the granite from Zeehan district - The Heemskirk Granite. This granite contains nodules of Turmaline, and Quartz veins are also present. In this granite can be seen even far from the contact, the partly "digested and undigested" schists (green, black, grey schists) as inclusions.

It is rather interesting to follow the contact with the schistose silicified or partly silicified rocks. Where the granite flowed over the schistose rocks, there is no wide effect of silicification or mineralisation at all, but where the granites underly the above rocks a classical example of silicification can be observed for a short distance only from the granites, and pyritisation with other minerals can be seen at a much further distance from the contact. Further, it is also interesting to note that this granite has all the main cleavages observed in the silicified Davey Groups of rocks suggesting an intrusion prior to the orogenesis. As there are no younger rocks anywhere than the silicified schistose rocks in which the granite intruded, it is difficult to state the age of this granite. However, a Devonian age has been assumed by others. This granite extends northwards, up to Rocky Pt. and probably under the sea up to Port Davey and further, as granitic rocks have been found attached to the kelp at Window Pane beach and further north on the two mile beach.

No tin mineralisation has been found so far in the vicinities of this granite.

#### (c) Porphyries

Some boulders on the western side of Pt. Eric resembling andesitic porphyries (have to be examined) are found. No outcrops have been located as yet. It is very likely that they are intrusive into the quartzitic sandstones. W.H. Twelvetrees has described them as hornblende-lamporphyre and suggested a Devonian age.

Tuffs. Some tuffaceous rocks a few feet wide have been found on the eastern side of Melaleuca Peninsula, interbedded with the sandstones (see map - "T").

#### 4. GEOLOGICAL STRUCTURES

These have been well defined on a regional base from the produced geological maps and the two schematic cross sections, one along 648000 N and the other one, along 662000 N. parallel. The more or less silicified rocks are isoclinally folded, especially the synclines with western dips in the South West Cape Ranges. Further east in the two major anticlines - New Harbour - Melaleuca and New Harbour - Cox Bight - Black Bay, the dips are west and east, out again in the New Harbour and Bathurst Harbour Ranges, the prevailing dips are westerly, suggesting isoclinal folding. As already mentioned, the synclines form the major Ranges and the anticlines - the major valleys and plains. There are two major underground elevations, probably cores of old mountain ranges, running more or less parallel to each other in the direction, north-east to south-west. The first one starts from Open Bay through Canyon Creek, upper Melaleuca Creek, south of Moth Creek Tin Field along middle and upper run of Passage Creek and then along Fault Creek through Ray River, further to the North East; the second starts from Window Pane Bay, runs through south western part of Window Pane Creek, runs through upper Alexander Creek, then through Lagoon Creek, Moulters Cove and then further to the North East. These two major underground elevations of a north easterly direction disturb horizontally as well as vertically, the regularity of the north-north-western trend of the major synclinal and anticlinal axes, west of the line Cox Bight - Moth Creek - Melaleuca Inlet and the north-north-easterly trend of the synclinal and anticlinal axes east of the above line. On both sides of the above underground elevations there are underground depressions, which cause the synclinal basins to extend

laterally (eastwards in the South West Cape Ranges). These features can be seen well developed on both sides of each of the above mentioned underground elevations.

The whole country of the South West has two patterns of major faults. One kind of fault is the one more or less parallel to the already mentioned underground elevations and depressions. This fault is the oldest one and the "deepest" in nature. They are rather seldom well exposed in the younger formations of rocks and if well exposed (renewed) then they are usually the youngest ones. These are the main faults which conducted mineralisation upwards in this country. One of the well exposed faults, is the South West Cape and N.I. Fault running S.W. to N.E. Further to the north there are more of these kinds of faults but less exposed and evidence of their existence can be seen from the courses of the rivers mainly. The next one important fault is the Window Pane Creek, Alexander Creek, Melaleuca Lagoon Creek, and an unnamed S.E. of Bay River Inlet to Moulters Cove.

The other kind of fault is the younger one, more "superficial" running often parallel to the strike of the main cleavage. As all of them are well marked on the geological maps, it is needless to mention them in this report. Attention should be drawn to the places where the two kinds of faults cross each other in favourable rock formations, as such places are usually favourable for mineral deposition.

5. SEQUENCE OF GEOLOGICAL EVENTS

The earliest sediments are the well metamorphosed dark-grey garnetiferous schists of the Lower Davey Group of rocks, highly contorted. These are probably overlain unconformably, by all the unslicified and slicified Davey Groups of rocks. It is very likely that at least one orogeny occurred within the unslicified Davey Groups of rocks. As the slicified group of Davey rocks is overlain unconformably by the "varvoid" slaty shales, sandstones, conglomeratic sandstones and unconformably overlying them coarse conglomerates which are less contorted and folded than the slicified group of Davey rocks, it suggests that the slicified group of rocks has been folded prior to the unconformity overlying them, conglomerates (Owen Conglomerates?) probably during the Upper Cambrian (Tyenman orogeny). About the definite age of the two kinds of faults already described above, again at this stage of work not much can be said, except that the older faults have been renewed several times during the time of different orogenesis and the younger one has been produced during the time of the two latest orogenesis. (Tyenman and Tabberabberan)

*accented vltar*

*cf. Z. Stefański*

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20th October, 1956.

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