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MICROPALAEONTOLOGICAL EXAMINATION OF ROCK SAMPLES FROM THE LESI AND OIAPU STRUCTURES, PAPUA.

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by

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LESI STRUCTURE.

Owing to the absence of names of villages in the area, the position of the specimens has been fixed by Latitude and Longitude readings. Co-ordinates have been measured from Plan PNG--IG-13 accompanying M.A. Condon's report on the Lesi structure.

F.1. Lat. 8°15'41"S., Long. 146°16'59"E.

Sandstone with indeterminate plant remains. No microfossils.

F.2. Lat. 8°15'59.5"S., Long. 146°17'26"E.

Limonitic clay. No microfossils.

F.3. Lat. 8°15'49.5"S., Long. 146°17'32.5"E.

Brown sandstone with greenish mud balls. No microfossils.

F.4. Same locality

Ochreous, fine grained, calcareous grit. No microfossils.

F.5. Lat. 8°16'26"S., Long. 146°17'47"E

Hard, shelly sandstone with indeterminate shell fragments. A thin section of the rock shows fine angular quartz grains, molluscan shell fragments and woody particles.

F.6. Lat. 8°16'28"S., Long. 146°17'42.5"E.

Grey laminated siltstone with fine angular quartz grains. No microfossils.

F.7. Lat. 8°16'12.5"S., Long. 146°17'42.5"E.

Brown calcareous sandstone with poorly preserved molluscan shells.

Pelecypoda: Dosinia sp.
Paphia textile (Chem.)
Tellina cf. striatula Lam.

Gasteropoda: Turris cf. gendenganensis (Martin)

F.8. Lat. 8°17'23.5"S., Long. 146°17'35"E.

Ochreous and grey laminated siltstone with minute angular quartz grains. No microfossils.

Lat. 8°17'25.5"S., Long. 146°17'32"E.

F.9. Fine grained compact sandstone with included cherty balls. A thin section shows quartz grains surrounded with a coating of ? siliceous material and indeterminate foraminifera.

Lat. 8°16'41"S., Long. 146°17'32"S.

F.10 Grey, calcareous sandstone boulder with fish scales.

Lat. 8°15'19.5"S., Long. 146°17'32"E.

F.13. Brownish, calcareous grit with indeterminate pelecypoda.

Lat. 8°15'31.5"S., Long. 146°16'59"E.

F.14. Limonitic and grey siltstone and sandstone. No microfossils.

F.15. Limonitic and grey siltstone. No microfossils.

F.16. Fine calcareous sandstone with foraminifera area, and probably derived.

Foraminifera: Haplophragmoides sp.

Lat. 8°15'00"S., Long. 146°17'10.5"E.

F.17. Brown, calcareous sandstone with fragments of pelecypoda.

Pelecypoda: Ostrea sp., cf. Arca sp.

Lat. 8°14'40.5"S., Long. 146°17'07.5"E.

F.18. Limonitic and grey siltstone with sphaerical bodies, cf. radiolaria.

F.18a. Limonitic sandstone.

Lat. 8°15'27.5"S., Long. 146°18'09"E.

F.19. Grey and limonitic greywacke with mud balls. No microfossils.

F.20. Grey to limonitic siltstone. No microfossils.

Lat. 8°17'46"S., Long. 146°18'16"E.

F.21 Brown sandstone with fragments of indeterminate mollusca.

Lat. 8°17'30"S., Long. 146°18'29"E.

F.22 ? Worm casts in sandstone.

Lat. 8°16'03.5"S., Long. 146°17'18"E.

F.23. Calcareous sandstone and fine sandstone with poorly preserved foraminifera, corals and bryozoa.

Foraminifera: Elphidium sp., Quinqueloculina sp.

Bryozoa: Lunulites sp.

Lat. 8°17'50.5"S., Long. 146°17'50"E.

F.24. Greyish sandstone with bands of ironstaining and with microfossils scarce.

Foraminifera: Elphidium sp..

Lat. 8°18'06.5"S., Long. 146°18'01.5"E.

F.25. Calcareous sandstone with poorly preserved pelecypoda.

Pelecypoda: Arca sp.,
Arca (Barbatia) sp.,
Tellina sp.

F.26. Ochreous marly sandstone. No microfossils.

F.31 Limonitic and fine sandy material. No microfossils.

Lat. 8°15'4"S., Long. 146°17'46"E.

F.32. Sandstone with thin bands of limonite. No microfossils.

Lat. 8°15'44.5S., Long. 146°17'47.5"E.

F.33 Sandstone and siltstone. No microfossils.

Lat. 8°15'42"S., Long. 146°17'38"S.

F.34. Mudballs in friable greywacke. No microfossils.

Lat. 8°15'49"S., Long. 146°17'32.5"E

F.35. a. Hard calcareous, limonitic sandstone with casts of indeterminate molluscan shells.

b. Friable, grey to limonitic siltstone. No microfossils.

Lat. 8°15'53.5"S., Long. 146°17'

F.36. Greyish to limonitic sandstone. No microfossils.

Lat. 8°15'59.5"S., Long. 146°17'25.5"E

F.37. Limonitic sandstone. No microfossils.

Lat. 8°18'38"S., Long. 146°18'06.5"E.

F.41. Brownish fossiliferous sandstone with poorly preserved mollusca.

Pelecypoda: Cyprina sp., Unio sp.

Gasteropoda: Melania sp.

Same Locality

F.42. Micaceous sandstone and siltstone. No microfossils.

Lat. 8°18'37"S., Long. 146°18'30"E.

F.43. Yellowish to brownish sandstone and siltstone. No microfossils.

Lat. 8°18'16.5"S., Long. 146°18'33"S.

F.44. Yellowish green to brownish, fine grained sandstone. No microfossils.

Lat. 8°19'16"S., Long. 146°18'57"E.

F.50. Brownish sandstone with plant remains indeterminate.

Lat. 8°18'35.5"S., Long. 146°19'36.5"E.

F.51. Whitish, micaceous sandstone with plant remains indeterminate.

Lat. 8°18'37"S., Long. 146°19'20"E.

F.52. Argillaceous limestone with no determinable fossils.

Lat. 8°18'38.5"S., Long. 146°19'15.5"E.

F.53. Argillaceous limestone with no determinable fossils.

Lat. 8°20'04"S., Long. 146°18'35.5"E.

F.54. Medium grained grit with mud balls. No microfossils.

Notes on Samples.

The rocks examined from the Lesi structure included sandstones, grits, siltstones and argillaceous limestones. Unfortunately few of them were fossiliferous and even when so the fossils were so poorly preserved that specific determinations and sometimes generic determinations were almost impossible. Consequently, it has been difficult to give a definite age to the majority of the samples.

Indeterminate plant remains occurred in Nos. 1, 50 and 51, and the rocks may be as old as Upper Miocene.

Foraminifera were very scarce and were recognised only in four samples, Nos. 9, 16, 23 and 25. The specimen in No. 16 has been referred to Haplophragmoides sp.. It has apparently been derived from Mesozoic sediments as its affinities are with species of that age. The broken tests of Elphidium and Quinqueloculina in Nos. 23 and 25 yield little information as to age except that they are characteristic of assemblages of Upper Miocene to Recent age in the Indo-Pacific.

Sphaerical forms, most probably referable to radiolaris, occurred in sample No. 18 and indeterminate corals and bryozoa on No. 23.

Poorly preserved mollusca were present in samples Nos. 5, 7, 13, 17, 21, 25, 35a and 41. The determinable forms in No. 7 suggest a Pliocene age. The association of large Ostrea and Arca in No. 17 and of Unio and Melania in No. 41 is indicative of estuarine conditions during sedimentation.

Some of the unfossiliferous siltstones may be comparable with those from the Oiapu area which are apparently Upper Miocene to Pliocene in age.

OIAPU STRUCTURE.

Samples 0.1 to 0.6 came from a Creek, 1 mile southeast of Love Village. 0.1 was taken at the mouth of the Creek and the others were taken in sequence up the creek but down the section.

0.1. Brownish, micaceous siltstone with indeterminate plant remains.

0.2. Greenish grey, fossiliferous grit with poorly preserved foraminifera, mollusca and ostracoda.

Foraminifera: Amphistegina sp.
Cibicidella variabilis
Elphidium advenum
Elphidium craticulatum
Elphidium sp.
Operculina matapauensis
Operculinella venosa
Quinqueloculina lamarckiana
Rotalia conoides
Rotalia schroeteriana
Triloculina tricarinata

Pelecypoda: Arca sp.
Placenta sp.

0.3. Brownish siltstone with minute foraminifera and poorly preserved mollusca.

Foraminifera: Elphidium cf. advenum
Nonion scapha
Rotalia beccarii
Rotalia conoides

0.4. Greyish siltstone with a few minute foraminifera.

Foraminifera: Cibicides ungerianus
Bolivina sp.
Discorbis sp.
Globigerina bulloides
Globigerinoides trilobus
Rotalia conoides

0.5. Brownish siltstone with fragments of woody material, minute foraminifera, and casts of mollusca indeterminate.

Foraminifera: Rotalia sp.

0.6. Brownish sandstone with indeterminate plant remains.

Samples 0.7 to 0.23 were taken on ridge to the south and above creek.

0.7. Hard calcareous sandstone.

0.8. Siltstone with foraminifera rare.

Foraminifera: Quinqueloculina sp.

0.9. Siltstone with interbedded limestone containing corals.

Foraminifera: Elphidium sp.
Quinqueloculina lamarckiana
Rotalia calcar
Rotalia conoides

Anthozoa: cf.Orbicella
Platygyra phrygia

0.10. Calcareous sandstone with foraminifera, cidaroid plates, ostracoda and cirripedia (Balanus sp.)

Foraminifera: Amphistegina lessonii
Calcarina defrancii
Elphidium macellum
Eponides sp.
Operculina matapauensis
Rotalia calcar
Rotalia schroeteriana
Siphogenerina raphanus

0.11. Coralline limestone, with corals too altered for determination and grit with casts of indeterminate mollusca.

0.12. Ochreous limestone with poorly preserved foraminifera and small mollusca.

Foraminifera: Alveolinella quoyi
Amphistegina sp.
Bolivina spp.
Globigerina bulloides
Marginopora vertebralis
Operculina bartschi
Rotalia schroeteriana
Sorites marginalis

0.13. Foraminiferal siltstone with abundant Operculina

Foraminifera: Alveolinella quoyi
Ammobaculites reophaciformis
Amphistegina lessonii
Anomalina glabrata
Anomalinella rostrata
Bolivina cf.compacta
Bolivina hantkeniana
Bolivina karreriana
Bolivina limbata
Bolivina robusta
Bolivina variabilis
Bolivina sp.
Calcarina sp.
Cibicides mundulus
Cibicides ungerianus

Elphidium craticulatum
Eponides praecinctus
Eponides procerus
cf.Glandulina laevigata
Globigerina bulloides
Globigerina conglobata
Globigerinella aequilateralis
Globigerinoides trilobus
Globorotalia menardii
Heronallenia lateralis
Heterostegina depressa var. tuberculata
Lenticulina mamilligera
Lenticulina rotulata
Marginopora sp.
Nonion turgida
Operculina ammonoides (c)
Operculina bartschi (c)
Orbulina universa
Planorbulinella larvata
Rectobolivina bifrons var.striatula
Reussella sp.
Rotalia cf.catelliformis
Rotalia conoides
Rotalia schroeteriana
Siphogenerina columellaris
Siphogenerina raphanus
Textularia cf.conica
Textularia rugosa
Textularia jugosa
Uvigerina asperula
Virgulina schreibersiana

0.14. Hard limestone with Operculina. A thin section shows calcareous algae and foraminifera.

Plantae: Lithothamnium ramosissimum

Foraminifera: Amphistegina sp.
Elphidium craticulatum
Operculina cf.ammonoides

0.15. Ochreous and grey micaceous siltstone. No foraminifera.

0.16. Hard argillaceous limestone with numerous foraminifera. (Operculina, Heterostegina and Eponides on weathered surface).

Foraminfera: Amphistegina sp.
Carpenteria sp.
Elphidium craticulatum
Eponides praecinctus (c)
Globigerina bulloides
Globigerina conglobata
Globorotalia menardii
Heterostegina depressa var. tuberculata
Lenticulina umbonata
Operculina bartschi (c)
Quinqueloculina cf.lamarchiana (cast)
Quinqueloculina sp.
Rotalia conoides
Rotalia schroeteriana
Sigmoidella elegantissima
Triloculina tricarinata

0.17. Ochreous siltstone with small foraminifera.

Foraminifera: Dentalina cf. emaciata
Globigerina bulloides
Globigerinoides trilobus
Lenticulina gemmata
Lenticulina cf. nikobarensis
Orbulina universa
Quinqueloculina lamarckiana
Rotalia beccarii

0.18. Hard, ochreous calcareous sandstone with decomposed tests of foraminifera (Operculina). A thin section showed abundant fine angular quartz grains and foraminifera chiefly ironstained, and broken.

Foraminifera: Bolivina sp.
Globigerinoides trilobus
Heterostegina cf. depressa
Operculina bartschi
Rotalia schroeteriana
Sorites sp.

0.19. Hard coralline limestone. A thin section showed a few foraminifera, indeterminate coral and echinoid spines.

Foraminifera: Elphidium craticulatum
Rotalia sp.

0.20. Ochreous siltstone. No foraminifera.

0.21. Ochreous siltstone. No foraminifera.

0.22. Ochreous siltstone. No foraminifera.

0.23. Yellowish argillaceous limestone. A thin section showed a few foraminifera in an argillaceous matrix.

Foraminifera: Amphistegina lessonii
Globigerinoides trilobus
Operculina bartschi
Rotalia sp.

Notes on the Samples.

The rocks examined from the Oiapu structure were represented by siltstones, calcareous sandstones, coralline limestones and argillaceous limestones. The majority of them were fossiliferous, the foraminiferal assemblages indicating an Upper Miocene age.

The calcareous sandstones and siltstones represented by Samples 0.1, 6, 7, 15, 21 and 22 contained no foraminifera.

The siltstones represented by Samples 0.3, 4, 5, 8 and 17 contain small foraminifera.

Operculina-bearing rocks and coralline limestones were represented by Samples 0.2, 9, 10, 11, 12, 13, 14, 16, 18, 19 and 23.

0.3, 4, 5, 8 and 17 contained small species of foraminifer which are characteristic of the assemblage found in the rocks of the Murua formation of the Popo-Maiva areas and regarded by the Australasian Petroleum Company as of Upper Miocene age.

0.2, 10, 12, 13, 16 and 23 were calcareous sandstones, siltstones and argillaceous limestones in which Operculina was one of the most prominent foraminifera. Large tests of the warm water species Operculina bartschi, predominated the assemblage in 0.13. Other common forms included Rotalia, Amphistegina, Elphidium and Heterostegina. Associated with these were genera characteristic of coral reef conditions, such as Sorites, Planorbulinella and Alveolinella. The above assemblage is found in the beds of the Apinaipi formation of the Popo-Maiva area, which is either Upper Miocene or Lower Pliocene in age.

However, in Sample 0.13, numerous small species characteristic of the upper of the Murua formation, such as Bolivina hantkeniana, B. robusta, B. karerriana, Globigerina bulloides, Globigerinoides trilobus, Orbulina universa, Globorotalia menardii, Eponides praecinctus and Siphogenerina raphanus, were also present. The association of this deeper water and more open sea assemblage, which is regarded as Upper Miocene, with recent warm, shallow water, coral reef forms, suggests an horizon high in the Upper Murua and somewhere about the Miocene-Pliocene boundary.

A rich Operculina-bearing rock with similar associated species occurs at Hepiri, west of Oiapu.

Samples 0.11, 14, 18 and 19 were hard limestones similar to samples previously examined from Wedge Hill, Oiapu. The foraminifera recognised in these samples and in those from Wedge Hill include Amphistegina, Operculina and Rotalia schroeteriana and corals were not infrequently present. It is most probable that the Wedge Hill beds are high in the Upper Miocene.

The assemblage of smaller species, such as listed from Sample 0.13, was a feature of the samples examined from the bores drilled by the Papuan Apinaipi Company in the Apinaipi-Oiapu area, and in only one case, at 523 feet in No. 2 Bore, Jokea-Apinaipi Dome was there an assemblage of larger, warm, shallow water forms associated with the smaller species. At the depth of 523 feet, Amphistegina, Alveolinella, Sorites, Planorbulinella, large tests of Elphidium and Rotalia, and Calcarina were present as well as the smaller forms. The fact that the deeper water assemblage of smaller species only, was found above and below this sample suggests that all the samples in the present collection are of one age, Upper Miocene and the different lithological types and foraminferal assemblages are due purely to facies changes.