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宇和島

縱行一九橫行三四
圖幅第二一五二號

地質說明書

地質調査所

宇和島 縦行一九横行三四 圖幅第二五二號 地質說明書

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第一章　地質

一、四萬十統

本統ハ砂岩、頁岩、放散蟲頁岩及蠻岩ヨリ成リ稀ニ石灰岩ヲ挾ム、從來時代未詳ノ中生層トセラレシモノニシテ大部分ハ安藝川層ニ相當スルモノナリ

砂岩　灰色或ハ暗灰色ヲ呈シ細粒乃至中粒ノモノ多ク稀ニ粗粒ノモノアリ、石英、長石及雲母ヨリ成ル、本岩ハ〇、三米內外ノ薄層ヲ成シ頁岩ト互層セルモノト、厚サ一米乃至三十米ニテ頁岩ト互層セルモノトアリ、高知縣幡多郡津大村黑尊及愛媛縣北宇和郡御槇村ニ於テハ黑雲母花崗岩ノ貫入ノ爲メニ變質シテ堅硬トナレリ

頁岩　灰色、暗灰色或ハ帶綠灰色ヲ呈シ普通緻密ナルモ時ニ砂質ナルモノ或ハ泥灰岩ノ團塊ヲ藏スルモノアリ、火成岩ニヨリテ變質シテ「ホルンフェルス」ト化セルモノハ御槇村、津大村等ニ發達ス、其岩質甚タシク堅硬ニシテ角岩ノ如ク緻密ナリ、普通厚サハ一米乃至二十米ナルモ厚キモノハ百米ニ達シ又薄キモノハ厚サ〇·三米内外ヲ以テ砂岩ト互層セリ

放散蟲頁岩　本岩ハ頁岩ニ伴ヒテ産シ概シテ赤色ヲ呈シ時ニ帶綠色ノコトアリ、赤色ナルハ赤鐵鑛ノ細粒ヲ含ムガ爲メナリ、又幡多郡富山村小古尾ニ於テハ輝綠岩ニ伴ヒテ赤色頁岩アルモ放散蟲ヲ含マス、其他ニ於テハ頁岩ト共出シ放散蟲ヲ含ムヲ常トス、東山村利圓ニ於ケルモノハ硅質ニシテ硅板岩(チヤート)ト稱スヘキモノナリ、本岩ノ厚サハ普通一米乃至三米ナルモ厚キモノハ十米ニ達ス

蠻岩　灰色ヲ呈シ小豆大乃至大豆大ノ角礫或ハ圓礫ヨリ成リ、砂岩ニ移過スルコトアルモノニシテ厚サ一米乃至二米ナリ

石灰岩　愛媛縣南宇和郡綠僧都村僧都ニ於テ白色結晶質ノ石灰岩ヲ發見セリ、本岩ハ頁岩中ニアリテ一部硅質ニシテ縞狀ヲ呈ス、石灰質ノ部分ハ全部方解石ノ結晶ノ集合體ヨリ成レルモ時ニ綠色ノ頁岩ヲ挾メルコトアリ、厚サハ約三米ナリ

時代　本統中ノ放散蟲頁岩中ニハ化石ヲ含ミ、高知縣幡多郡富山村大用ニ於テハ放散蟲ノ

Cenosphaera, *Dictyomitra*, *Sphaerozoum* 及ヒ海綿ノ針骨ヲ、同富山村蕨合ノ奥ニ於テハ *Cenosphaera* cfr. *pachyderma* Rüst., *Dictyomitra* ノ二種類ヲ、富山村、大正村間越ノ峠ノモノニハ *Cenosphaera* ヲ各多量ニ含ム、又同郡昭和村北川谷ニ於テ稍々多量ノ *Dictyomitra*, *Cenosphaera* ヲ含メルモノアリ、同郡大正村奥留及下道ニ於ケルモノハ中ニハ少量ノ *Cenosphaera* 稀少ノ *Dictyomitra* ヲ含メリ

放散蟲ノ化石ヨリ見ル時ハ四萬十統ハ大部分安藝川統ニ相當セルモノナランモ一部ニハ石灰岩ヲ挾ムモノアリテ鳥ノ巢統ニ類似シ、又他ノ一部ニテハ砂岩及頁岩ハ白堊系ノ岩石ニ類似シ白堊系ナラサルヤノ疑ヒアルモ、本統ハ宇和島市赤松ニ於テハ白堊系ニヨリ不整合ニ被覆セラレ、津大村大宮地方ニ於テ鳥ノ巢統ト整合シテ其下位ニアリ、本統ハ大略放散蟲頁岩ヲ含メル砂岩頁岩層ナルモ殊ニ中部ニハ砂岩頁岩ノ發達著シ、而シテ大宮地方ニ於テ鳥ノ巢統ニ整合セル部分ニ發達セル砂岩頁岩層ハ本層ノ最上部ヲ表スモノナラン

後川村、蕨岡村地方ニ發達セル四萬十統ニハ放散蟲頁岩介在シ、是ト同地方ノ鳥ノ巢統トハ斷層ヲ以テ相接スルモ鳥ノ巢統ニハ下部ニ蠻岩層アルヲ以テ或ハ兩者不整合的關係ヲ爲スニ非サルカノ疑アリ、要スルニ本統ノ主體ハ鳥ノ巢統ヨリモ下位ナルヘク其時代ハ鳥ノ巢統ヨリ古キモノニシテ即チ上部珠羅系ヨリ連續シ之ヨリ古期ニ屬スルモノナラン

構造　本統ハ圖幅地内ノ大部分ニ亙リ殆ント其東半部及南半部ヲ占ム、其北西側ハ江川崎村權谷、西ケ方、明治村目黒、清滿村御代川、神田、畑地村上畑地等ヲ通シ約東西或ハ南北ニ走レル斷層ヲ以テ鳥ノ巢統或ハ白堊系ニ接ス、又圖幅南東部ノ鳥ノ巢統及白堊系トモ斷層ヲ以テ界ス、而シテ廣域ニ亙リテ發達セル本統ハ亦斷層ニヨリテ多數ノ地塊ニ分割セラル、是等地塊ノ構造ニ就テハ全分布區域ヲ(一)北東部(二)中央部(三)南東部(四)南西部ニ分チテ逐次說明スヘシ

(一)北東部　ハ土佐國富山村、大正村、昭和村、十川村地内ニ亙レル區域ナリ、本區域ニ於テハ四萬十統ハ大略北方ニ傾斜セル單斜層ヲナセルモ局部ニヨリテ變化アリ、南部ノ富山村地方ニテハ同村大用附近ニ下部即チ多數ノ放散蟲頁岩及頁岩ニ富メル砂岩頁岩層發達シ、概略北五十度西ニ走リ北東ニ傾斜ス、是ト同層位ト推定セラルヽ下部層ハ放散蟲頁岩及頁岩ノ發達著シカラサルモ是ヨリ西方小古尾及竹屋敷附近マテ連續シ走向東西ヨリ漸次北四十度東ニ轉向シ、北方ニ向ヒ凸出セル弧狀ヲ描キ傾斜ハ概シテ北方ニ向ヒ四十度乃至八十度ナリ、此北ニ當レル同村片魚、堂ケ森附近ニハ中部層ノ砂岩頁岩層發達シ略東西ニ走リ北方ニ五十度乃至七十度斜下セリ、更ニ其北方大正村田野々、昭和村四手、十川村廣瀨附近ニアリテハ北方ニ傾斜セル砂岩頁岩層露出セリ、圖幅地内ノ最北東部ノ大正村木屋内、十川村鳥地方ニ於テハ上部層即チ放散蟲頁岩及頁岩ノ發達顯著ナル砂岩頁岩層地帶アリテ北々東ニ傾斜セリ、以上記載シ

タル北東部ニ於ケル四萬十統ノ岩層ハ大用、木屋内間或ハ宮ノ下、鳥間ニ於テ見タルカ如ク多數ノ斷層アルヘキモ全厚大略六千米ニ達シ、其上部及下部ニ放散蟲頁岩及頁岩ニ富メル砂岩頁岩層發達シ中部ハ放散蟲頁岩ヲ挾マサル砂岩頁岩層著シク發達ス

(二)中央部區域　ハ幡多郡西部ヲ包括スル區域ニシテ之ニ西隣伊豫ノ少部ヲ含ム、四萬十統ハ東西或ハ南北等ニ走レル斷層ニヨリ更ニ多數ノ地塊ニ分タル、津大村藤ノ川區、後川村川奥區ニ於テハ走向約東西ニシテ傾斜北方ニ五十度乃至八十度ヲ示セル單斜層ヲ成シ、藤ノ川區ニ於テハ砂岩頁岩層中頁岩稍々發達セリ、津大村津川區ニ於テハ走向北二十度乃至四十度東、傾斜北西方四十度乃至八十度ノ單斜層ヲナス、津大村津賀區ニアリテハ走向約東西ニシテ傾斜北方ニ四十度乃至八十度ヲ示シ南北ニ長キ區域ヲ占メタル單斜層ナリ、尚ホ津賀區ノ南部玖木、石川ニテハ走向少シ宛轉シテ弧狀ヲ描キ舟底形構造ヲ形成セリ

津大村奥屋内及大黒山地方ニ於テハ北西ヨリ南東ニ走レル斷層、南北ニ走レル斷層、東西ニ走レル斷層等ニヨリ數區ニ分レ、津大村藤瀬、宮川附近ニ於テハ走向南北ニシテ兩翼約七十度傾斜セル向斜構造ヲ爲シ、又奥屋内、鍛冶屋附近ニテハ走向北五十度西、傾斜北東方六十度内外ノ單斜層ヲ成セリ、大黒山及其東隣ノ區域ニ於テハ走向約東西ヲ以テ北方ニ五十度乃至八十度斜下セル單斜層ヲ形成セリ、而シテ御槇村加塚附近ニ於テハ急ニ走向變轉シテ約南北トナ

り傾斜西方ニ五十度内外ヲ示セリ蓋シ四萬十統砂岩頁岩層ハ之ニ貫入セル黒雲母花崗岩ノ底盤ノ爲メニ共周圍ヲ繞ルカ如キ構造トナレルモノナラン、清滿村大道附近ニ於テハ走向東西或ハ北七十度東ヲ示シ傾斜北或ハ北西方ニ六十度内外ニシテ單斜層ヲナス

(三)南東部　ハ後川附近ニ發達セル鳥ノ巢統ノ區域ノ北ヨリ南東ニ亙レル地ナリ、四萬十統ハ南北、北西―南東或ハ東西等ニ走レル斷層ニヨリテ小ナル數區ノ地塊ニ分ル

加知加野及二反田ノ地塊ニテハ走向約東西、傾斜北方四十度乃至八十度、其南方燒野區ニテハ走向北四十度東、傾斜北西四十度、北ノ川區ニテハ走向北四十度西、傾斜北東八十度内外、伊才原區ニテハ走向南北、北微東、或ハ北微西ニシテ、傾斜西方ニ四十度乃至七十度ナル等地塊ニヨリテ走向、傾斜區々タリ、後ノ三區ニハ四萬十統砂岩頁岩互層アルモ伊才原區ニ於テハ頁岩ノ發達稍々顯著ナリ

加持川上流地方ニ於テハ走向北三十度東或ハ東西ニシテ傾斜北西方或ハ北方ニ七十度内外ナルニ入野村橘川ニ於テハ走向殆ント南北、傾斜東方六七十度ニ變ス、更ニ其南ノ御坊畑及其西ノ高石見山、柿谷附近ニテハ走向或ハ東西、或ハ北三十度乃至六十度東、或ハ北四十度東等ニシテ傾斜北方又ハ北西方ニ五十度内外ナルトコロ多キモ唯柿谷區ニ於テハ南東方ニ向テ斜下セル單斜層ヲナス、岩石ハ砂岩頁岩互層ナルモ柿谷區及田ノ口村上田ノ口ニ於テハ頁岩

層著シク發達セリ

(四)南西部　ハ大出又、久保川、鄉木山、出井、神田等ヲ通スル約東西或ハ南北ノ斷層以南ノ地ナリ、四萬十統ハ南西隅ノ觀音山地塊ヲ除キ他ノ大部分ハ北微東乃至北東ノ走向ヲ示シ、傾斜ハ北西四十度乃至八十度ナリ、各地共ニ砂岩ノ發達著シキ砂岩頁岩互層ニシテ北西ニ向ヘル單斜層ヲ成スモ八ケ森區ニ於テハ一ツノ向斜層ヲ構成シ向斜軸ハ八ケ森ヲ通シテ東北東ニ走リ兩翼ハ南北ニ近キ走向ナルモ東翼ハ東スルニ順ヒ北東ノ走向ヨリ北東―南西トナリ、傾斜ハ四十度乃至七十度ナリ、鵜江、田出川附近ニ於テハ走向全ク北東―南西ナルモ時ニ東西ニ亙レル部分アリ、傾斜北西或ハ北方ニ四十度乃至八十度ナリ、最南部ノ觀音山區域ニ於テハ走向約東西、傾斜北方ニ三十度乃至八十度ニシテ處々ニ石英斑岩ノ岩脈之ヲ貫通セリ

二、上部珠羅系―鳥ノ巢統

本統ハ頁岩、砂岩、礫岩及石灰岩ヨリ成ル、石灰岩ハ鳥ノ巢石灰岩ト稱セラルヽモノニシテ特徴アル化石ヲ埋藏ス、然レトモ一部ニハ無化石或ハ結晶質ノモノアリ

頁岩　綠色或ハ暗灰色ヲ呈シ緻密ナリ、幡多郡十川村大野及北宇和郡明治村面谷ニ於テハ泥灰岩ノ團球ヲ包藏ス、普通厚サ一米乃至十米ニテ砂岩ト互層セルモ時ニ厚層ヲ成シ百米ニ

達スルコトアリ

砂岩 灰色或ハ暗灰色ヲ呈シ細粒乃至組粒ニシテ粒狀ノ石英及長石並ニ頁岩、硅岩等ノ細片ヲ粘土質物ニテ膠結セルモノナリ、時ニ礫岩ニ移過スルモノアリ、厚サハ普通一米乃至五米ナルモ時ニ〇・三米ノ薄層ヲ成シテ頁岩ト互層ス

礫岩 本岩ハ砂岩、粘板岩、硅岩等ノ大サ大豆大乃至拳大ノ礫ヲ砂粒ニテ膠結セルモノニシテ砂岩ニ移過セリ、其間小豆大ノ細粒ノ礫ヨリ成ル處アリ、厚サ一米乃至三米ナリ、幡多郡田ノ口村馬荷ニ露出セル礫岩ハ稍々暗灰色ヲ呈シ黒色粘土質物ニテ膠結セラレ、厚サ十米ニ達スルモノアリ

石灰岩 暗灰色、黒色或ハ灰色ヲ呈ス、普通細粒或ハ緻密ニシテ化石ヲ含メルモ、幡多郡十川村大野、北宇和郡明治村上目黒、吉生野村谷口ニ於ケル石灰岩ハ灰色或ハ灰白色、結晶質ニシテ殊ニ上目黒ニ於ケルモノハ直徑二糎內外ノ方解石結晶ノ集合ヨリナレリ、幡多郡江川崎村西ケ方及檮谷、明治村富岡北宇和郡泉村興野々、幡多郡後川村佐田、田ノ口村福堂等ノモノニハ化石ヲ含ミ佐田、福堂ニ於ケルモノ、中ニハ二枚介化石ヲ包藏セリ、本岩ハ概シテ扁桃狀ヲ呈シテ頁岩中ニ介在ス、其厚サハ一米乃至五米ナリ

時代 本圖幅地域中ニ發達セル鳥ノ巢統ハ四國外帶ニ廣ク發達セル鳥ノ巢統ト一般同時代ノモノニシテ之ニ挾有セラル、石灰岩中化石ヲ含メルモノハ愛媛縣北宇和郡泉村興野々、旭村近永、明治村富岡、上家地、高知縣幡多郡江川崎村西ケ方、檮谷、十川村鍋谷、田ノ口村福堂、後川村佐田ニアリ

井上禧之助博士ハ二十萬分之一宇和島圖幅說明書ニ次ノ化石產地及各屬名ヲ記載セリ

興野々　珊瑚及有孔蟲
近永　*Cladophyllia, Tamnastraea, Isastraea, Dimorphastraea*
上家地　石蓮蟲ノ莖
西ケ方　*Alcyonaria? Thamnastraea?* 蘚苔蟲石蓮蟲ノ莖
佐田　*Serpula, Lucina, Melania, Cyrena,* (介類) *Nodosaria* (有孔蟲)
檮谷　有孔蟲

今回調査中採取セル化石ノ屬名ハ次ノ如シ

西ケ方　*Stromatopora (Parastromatopora) inouei* Yabe & Sugiy.
鍋ケ谷(大野附近)　*Petrophyton* ?
福堂　*Circoporella* cfr. *semiclathrata* Hayasaka *Ostrea, Cyrena.* 珊瑚、海綿

本統ハ右ノ石灰岩中ノ化石ニヨリ四國各地ノ鳥ノ巢統ト同シク上部珠羅系ニ屬スルモノ

ナリ

本統ハ明治村大宮附近ニ於テハ四萬十統ヲ整合ニ被覆シ、富岡地方ニ於テハ白堊系ト推定セラル、地層トハ斷層ヲ以テ界スルカ如ク兩者ノ關係明カナラス

本圖幅ノ南東部ニ發達セル島ノ巢統ハ其他ノ島ノ巢統ト稍々異ナリ、介在スル石灰岩中ニハ珊瑚、石灰藻、海綿ノ外ニ二枚介ノ化石ヲ含ムヲ特徴トン同層位ナルヤ疑ヒナキニ非ラサルモ二枚介以外ノ珊瑚、海綿等ノ化石ニ依リ之ヲモ島ノ巢統中ニ包括シタリ

尚ホ南部岩松町附近高近村ヨリ北灘村ニ亙レル本統ハ西方ニ連續シ本圖幅地外ナルモ是ニ近キ北灘村ノ國永ニ於テ石灰岩ヲ夾ミ其中ニ島ノ巢統ニ特有ナル化石 *Peterophyton* cfr. *miyakoense* Yabe 及有孔蟲ヲ含メリ

構造 本統ハ(一)愛媛縣北宇和郡泉村、明治村、吉生野村、高知縣幡多郡江川崎村、津大村及十川村地方(二)十川村大野地方(三)高知縣幡多郡後川村、蕨岡村、田ノ口村地方及(四)愛媛縣北宇和郡高光村、北灘村地方ノ四地方ニ賦存ス

(一)泉村ヨリ十川村ニ亙ル本統ハ北隣卯之町圖幅ニ亙レルモノニシテ同圖幅地内ニ於ケルト同樣東西或ハ南北或ハ北西—南東ニ走レル斷層ヲ以テ西側ノ白堊系及東側ノ四萬十統ニ接ス、而シテ其地域内ニ於テモ多數ノ斷層アリテ幾多ノ地塊ニ分割セラル、岩層ハ最北ノ地塊

ニアリテハ吉生野村奥内ニ於テ走向東西、傾斜北方ニ六十度、江川崎村山奥ニ於テ走向東西、傾斜北方ニ七十度ヲ示シ單斜層ヲナス、其南ノ地塊ニ於テハ谷口ニテ走向東西ナルモ東スルニ從ヒ北五十度乃至七十度東ノ走向ニ轉シ北方ニ四十度乃至七十度斜下セリ、吉生野村眞土附近ヨリ江川崎村葛川及西ケ方、明治村面谷ニ亙レル數地塊ニ於テハ走向概シテ北東ニシテ傾斜ハ北西方ニ五十度乃至八十度ナルモ津大村中家地ニ於テハ斷層附近ニ於テ南東方ニ七十度ノ傾斜ヲ示シ小向斜層ヲ形成セリ

明治村目黒及黒ケ谷附近ノ地塊ニテハ北方ハ東西ニ走レル斷層ヲ以テ白堊系ニ接シ南方ハ四萬十統ヲ被覆シテ其上ニ整合シ、西ハ黒雲母花崗岩ニテ貫通セラル、本地塊ノ岩層ハ東西ニ走リ、北方ニ四十度乃至八十度ニ傾斜シ單斜層ヲナス、其下部ハ頁岩層ニシテ其上ニ砂岩頁岩互層アリテ之ニ石灰岩ヲ挟ミ其上ハ砂岩多キ砂岩頁岩層、最上部ハ石灰岩ヲ挟メル砂岩頁岩層ニシテ其全厚約一千米ニ達ス

(二) 十川村大野地方ノ島ノ巢統ハ頁岩多キ砂岩頁岩層ニシテ之ニ石灰岩ヲ挟ミ周圍ノ四萬十統トハ東西、北西—南東及南北ニ走レル三斷層ニヨリテ界シ地塊ヲ成ス、東部ノ小野、久保川附近ニ於テハ走向概シテ南北乃至北四十度西ニシテ西方或ハ南西ニ六十度乃至七十度傾斜シ、其西方ノ小貝ニテ走向北六十度東、傾斜北西七十度ナルモ大野附近ニ於テハ走向北三十

度西、傾斜北東ニ六十度乃至八十度ニシテ共間ニ彎曲セル構造ヲ現セリ

(三) 高知縣幡多郡後川村ヨリ田ノ口村福堂ニ亙レル島ノ巣統ハ其四周斷層ニヨリテ圍繞セラレ四萬十統中ニ斷層地塊ヲナス、後川村佐田附近ニ於テハ走向北六十度東、傾斜北西方六十度內外、其北東方蒗岡村內ニ於テハ走向東西、傾斜北方三十度乃至七十度、東隅ノ福堂附近ニ於テハ北四十度東、傾斜北西方五十度內外ナリ、卽チ中央部ニテ東西ニ走レル處アルモ概シテ北東ヨリ南西ニ走リ北西方ニ傾斜セル單斜構造ヲ形成ス、蒗岡村高知谷及田ノ口村馬荷ニ亙レル岩層ハ下部層ニシテ蠻岩ヲ挾ミ頁岩ニ富メル砂岩頁岩層ニシテ福堂ヨリ小瀨々ヲ經テ佐田ニ亙レル頁岩層ハ中部層ニシテ小瀨々ニ於テ石灰岩ヲ挾ミ、上部層ハ北川口附近ニ於ケル石灰質蠻岩ヲ挾メルコトアル砂岩頁岩層ナリ

(四) 愛媛縣高近村、北灘村及岩松町ニ發達セル島ノ巣統ハ東西ニ亙レル狹長ナル地域ヲ占メ北ハ約東西ニ走レル斷層ヲ以テ、南ハ東北東ヨリ西南西ニ走レル斷層ヲ以テ各四萬十統及白堊系ニ接セリ、岩層ハ頁岩多キ砂岩頁岩層ニシテ西方ハ圖幅外ニ連亙シ北灘村國永ニ於テ其中ヨリ含化石石灰岩發見セラレタリ、走向ハ約東西ニシテ傾斜北方ニ六十度內外ナルモ北部四萬十統ニ接スル部分ハ直立セル處アリ

三、白堊系

本系ハ砂岩、頁岩及蠻岩ヨリ成リ、岩石ハ一般ニ島ノ巣統及四萬十統ノモノヨリ稍々柔軟ニシテ白堊紀ニ特徴ノ化石ヲ含メルモノ多シ

砂岩 灰色、暗灰色或ハ帶綠色ヲ呈ス、細粒乃至粗粒ニシテ普通石英及長石ノ砂粒ヨリ成リ、灰色、暗灰色、或ハ綠色ノ粘土質物ニテ膠結セラル、本岩ニハ頁岩ト互層セルモノ、蠻岩ニ移過スルモノ及砂質頁岩ニ漸移スルモノ等アリ、三浦村夏秋及無月附近ニ於ケルモノハ炭質物ヲ含ム、旭村牛ノ川ニ於ケル砂岩ハ「イノセラムス」「コダイアマモ」等動植物化石ヲ包藏セリ、本岩ノ薄キモノハ〇・二米內外ニシテ頁岩ト縞狀ニ互層スルモ普通厚サ一米乃至五米ニシテ厚キモノハ三十米ニ達スルコトアリ

頁岩 暗灰色或ハ帶綠灰色ヲ呈シ稍々柔軟ナルモノ多シ、本岩層中ニ貫入セル花崗岩附近ニハ變質シテ緻密堅硬トナリ殆ント「ホルンフェルス」ノ狀ヲ呈ス、斯ノ如ク變質スルモノハ宇和島市野川、大超寺奥、千羽ケ峠等ニ發達セリ、本岩中ニハ泥灰岩ノ團球ヲ含有セルモノアリ、三浦村夏秋ニ於テハ石灰岩ト稱スヘキモノヲ包藏ス、明治村野尻、三浦村小池、旭村奈良、宇和島市古城山、山際、宮ノ下、來ノ村寄松等ニ於テハ化石ヲ含ム、又砂質ニシテ砂質頁岩ト稱スヘキ暗灰

色或ハ黒色ノモノハ明治村岩井、地吉、三浦村船隠ニ發達シ、動植物ノ化石ヲ含メリ、本岩ハ厚サ〇・二米内外ニテ砂岩ト互層セルモノアルモ普通厚サ一米乃至十米ニシテ時ニ五十米ニ達スルモノアリ

蠣岩　本岩ハ高光村槇ノ山及九島ニ最モ良ク發達シ又明治村、來ノ村、畑地村、清滿村、三浦村等ノ處々ニ賦存ス、槇ノ山及九島ニ於ケルモノハ砂岩、頁岩ノ頭大ノ礫、硅岩、粘板岩、珪岩、斑岩等ノ胡桃實大乃至拳大ノ礫ヲ細粒ノ砂及粘土ニテ膠結セルモノナリ、頁岩ノ礫ニハ扁平圓滑ナルモノアリ、蠣岩層ノ厚サハ一米乃至十米ナリ

其他ノ地ニ賦存セルモノハ礫ノ岩質ハ同樣ナルモ大サハ拳大ノモノヲ最大トシテ小豆大ノモノニ及ヒ時ニ砂岩ニ移過セルコトアリ、厚サモ稍々薄ク一米乃至五米ナリ

時代　本系中化石ヲ含メル岩層ハ北部ノ槇ノ山區、中央部ノ宇和島市附近及松丸附近ニ多ク、砂岩中ニアルモノハ旭村牛ノ川ニ、頁岩中ニアルモノハ宇和島市古城山、山際、寄松、三浦村小池、旭村奈良、明治村野尻ニ、砂質頁岩中ニアルモノハ明治村岩井、地吉、三浦村船隠等ニ在リ、此内井上博士ハ二十萬分之一宇和島圖幅地質說明書中ニ於テ奈良ノ砂岩中ヨリ「イノセラムス」ヲ、三浦村小池ヨリ双貝類ノ化石ヲ產スルヲ誌セリ、江原博士ニヨリテ始メ記載セラレ（On the Izumi-Sandstone Group in the Ōnogawa-Basin, Prov. Bungo, and the Same Group in Uwajima, Prov. Iyo. Japan. Jour. of Geol. & Geogr. Vol. III, No. 1)次テ矢部博士ニヨリテ本邦白堊系ノ論述（Cretaceous Stratigraphy of the Japanese Islands, Sci. Rep. of the Tōhoku Imp. Univ., Sendai, Japan. Second Series (Geol.), Vol. XI, No. 1）中ニ引用セラレタル宇和島地方古城山產化石ハ左ノ如シ

Helicoceras cfr. *venustum* Yabe

Gaudryceras limatum Yabe

Inoceramus amakusensis Nagao

Inoceramus cfr. *percostatus* Müller

Inoceramus akamatsui Yehara

Inoceramus cfr. *regularis* d'Orb

Echinoid

尙古城山ヨリハ矢部博士 *Yezoites* sp. ヲ發見シタリト云フ、今回調査中發見セル化石及其產地次表ノ如シ

	小池	山際	船隠	牛ノ川	野尻	地吉	岩井	奈良	等
Inoceramus cfr. *amakusensis* Nagao	×	×							

Inoceramus cfr. *pervostulus* Müller							×	
Inoceramus cfr. *regularis* d'Orb.							×	
Inoceramus cfr. *schmidti* Michael							×	
Inoceramus sp.						×		
Lucina sp.					×	×		
Gaudryceras limatum Yabe								
Crinoid				×	×			
Archaeozostera			×					
						×		
						×	×	
						×		
						×		

以上ノ化石中古城山及船窪ニ産スル菊石ハ「セノニア階ニ産スルモノニシテ之等ノ化石帯ハ「セノニア階ヲ代表スヘク「コダイアマモ」及「イノセラムス」ノ類ハ四國内帯ニ發達セル和泉砂岩層中ヨリ産ス、即チ本層ノ大部ハ上部白堊系ニ屬スルモノナリ

尚ホ岩松地方ノ白堊系ハ清滿村山財谷奥ニ於テ頁岩中ニ「イノセラムス」ヲ含ミ、又山財芋地谷附近ノ蠻岩中ヨリハ巻貝、畑地村保場川附近ノ頁岩(?)中ヨリハ二枚介化石採取セラレタルコトアリト云フ、此ノ如ク岩松地方ノ白堊系ハ清滿村山財谷ニ於テ化石ニヨリテ確的ニ立證セラレタルモ其南方ノ大部分ハ未タ證明セラレタルニアラス、唯化石ヲ産シタリト云フ巻說アルト岩石ノ性質トニ基ツキ玆ニ白堊系ニ編入セルモノナリトス、蓋シ宇和島地方ニ發達セル白堊系ヨリハ下部ヲ代表スルモノナランカ

構造　本區域内ニ發達セル白堊系ハ略東西ニ亙レル二斷層ニヨリテ三區域ニ分タル、即チ宇和島市赤松ヨリ旭村牛ノ川、奈良ニ通スル斷層ト、三浦村夏秋ヨリ清滿村御代ノ川上流ニ亙レル斷層トニヨリテ北ヨリ(一)槇ノ山區(二)九島、宇和島及松丸區及(三)岩松區ノ三區域ニ分タル、別ニ南東隅ニ於ケル、田ノ口村ニモ本層ニ類似セル田ノ口層アリ

(一)槇ノ山區　ノ本系ハ北隣卯之町圖幅地内ノモノニ連續シ夫ヨリモ下層位ノ部分ニシテ、頁岩ヲ挟メル砂岩蠻岩層ヨリ成リ、走向約東西ニシテ傾斜北方ニ五十度乃至七十度ナリ

赤松地方ニ於テ其基底部ヲ露ハシ四萬十統ヲ不整合ニ被覆セルカ如シ、高光村安常ノ北ニテ本層中ニ岩脈ヲ爲シテ花崗斑岩貫入セリ

(二)九島、宇和島、松丸區　九島ニ於ケル白堊系ハ一ノ斷層地塊ナルカ如ク斷層ニヨリ更ニ小地塊ニ分タレ、東岸ニ於テハ北三十度東ニ走リ北西ニ傾斜シ西岸ニ於テハ北四十度西ニ走リ北東ニ傾斜シ斷層ヲ挿ミテ舟底狀ノ向斜構造ヲ形成セリ、本島ノ岩層ハ槇ノ山區ニ於ケルト同樣比較的下部ノモノト推定セラル、宇和島市附近ヨリ明治村松丸地方ニ亙レル白堊系ハ高月山ノ黑雲母花崗岩地域ニヨリ東西ノ兩部ニ分タル、西部ノ宇和島地方ニテハ篠駄場、藥師谷、白濱ニ亙レル斷層ヨリ以南即チ來ノ村及三浦村ノ白堊系ハ東西ニ走レル斷層ヲ以テ南方ノ

四萬十統ニ接ス、岩層ハ西方海岸地方ニ於テ北五十度西ニ走レルモ東スルニ從ヒ走向東西ニ變ス、傾斜ハ北東或ハ北方ニシテ五十度乃至八十度ナリ、熊峰ヲ通シテ南北ニ走レル斷層附近ニテハ地層擾亂セリ、下部ノ地層ハ千代浦ヨリ柿谷ニ連亙シ砂岩、蠻岩ヨリ成リ其上ニハ船隱ニ於テ頁岩及砂岩、無月ニ於テ砂岩、蠻岩、小池ニ於テハ頁岩層、堂崎附近ニ於テ砂岩頁岩層ト順次ニ上位ニ整合セリ

篠駄場ヨリ白濱ニ亙レル斷層ヨリ以北ノ宇和島市附近ニテハ南北及北東、南西ニ走レル斷層ニヨリテ數箇ノ地塊トナレリ、宮下ニ於テハ北四十度西、山際ニ於テ北七十度西、大超寺奥ニ於テ東西ニ走リ一ツノ彎曲層ヲ形成シ、北方乃至北東方ニ四十度傾斜セリ、然ルニ宇和島市ノ北、大浦ニ於テハ東西ニ亙リテ一向斜層ヲ形成ス、之ヨリ北東方千羽ケ峠ニ至ル間ハ數區ノ地塊ニ分タレ岩層ハ或ハ南北ニ走リ或ハ東西ニ走リ各地塊ハ異ナリタル方向ニ傾斜セル單斜層ヲ爲ス

明治村松丸地方ノ白堊系ハ南及東ハ斷層ヲ以テ島ノ巢統ニ接ス、域内ノ金剛瀧ニ於テ走向北四十度西、川ノ内ニ於テ東西、松丸ニ於テ北四十度東ニシテ岩層ノ走向次第ニ變シ南凹ノ彎曲層ヲ形成セリ、而シテ明治村富岡、吉生野村吉野地方ニテハ斷層多ク小地塊ニ分タレ岩層ハ擾亂セリ

(三)岩松地方　ノ白堊系ハ東ハ御代川及神田ヲ通スル走向南北ノ斷層ニヨリ、南ハ神田ヨリ上畑地ニ亙レル走向東西ノ斷層ヲ以テ共ニ四萬十統ニ接シ北ハ亦東北東ヨリ西南西ニ走レル斷層ヲ以テ北灘村附近ノ島ノ巢統ニ界セリ、本地域内ニアリテハ北部ニ頁岩層多ク南部ニ蠻岩ヲ挾メル砂岩頁岩層發達セリ、岩層ハ南部畑地村ニ於テ東西乃至北東—南西ニ走リ傾斜北方ニ四十度乃至八十度ナルモ岩松附近ニ於テハ走向北三十度乃至六十度東ニシテ傾斜北西方ニ四十度乃至八十度ニシテ單斜層ヲ成セリ

清滿村ニ於テハ一般ニ北西傾斜ノ單斜層ナルモ北東、南西或ハ南北ニ走レル斷層ニヨリテ數地塊ニ分レ斷層附近ニ於テハ南東ニ斜下スル部分アリテ小局部ニ小向斜或ハ直立層ヲ成セリ

四、更新統

本統ハ御槇村御内、一本松村御在所、橋上村補山、吉生野村西、旭村永野、泉村興野々等ニ河成堆段ヲ成シテ發達シ砂礫、粘土等ヨリ成ル、下部ニ粘土、上部ニ砂礫層アルヲ普通トスルモ砂礫層ノミノ場所モ少ナカラス、厚サハ御内ニ於テハ約二十米補山西及御在所ニ於テハ三米乃至五米ナリ

五、現世統

本統ハ河岸或ハ海岸竝ニ宇和島及岩松附近ノ平地等ニ發達シ粘土層或ハ砂礫粘土層ヨリ成ル、宇和島ノ海岸及四萬十川岸等ニ於テハ砂礫層多ク、宇和島及岩松附近ノ平地、奈良、松丸附近等ニ於テハ粘土層多ク其他ハ砂礫及粘土ヨリ成ル、厚サハ宇和島附近ニテ三十米以上ニ達スヘシ

六、黑雲母花崗岩

本岩ハ圖幅内ノ中央部ヲ南北ニ配列セル三地方即チ北ノ高月森滑床地方、中部ノ黑尊地方及南ノ御内地方ニ露出ス、蓋シ一底盤ヲ成セルモノ、上部ノ地層カ削剝セラレタルニヨリテ露出セルモノナルヘシ

岩石　灰色ヲ呈シ、一般ニ粒狀結晶質ナルモ各地ノ周緣部ハ稍々細粒ナリ、主成分ハ肉眼ニテ之ヲ識別シ得ヘク、正長石、石英、黑雲母ニシテ之ニ伴ヒテ斜長石、白雲母、燐灰石、風信子鑛及綠簾石アリ

正長石ハ半自形或ハ粒狀ヲ呈シ陶土化セリ、時ニ白雲母ノ鱗片狀ノモノヲ包裹セルコトア

リ、斜長石ハ柱狀ヲ成シ「アルバイト」式聚片双晶ヲ成セルモノ多ク、中性長石乃至曹長石ニ屬ス、正長石ハ大サ一糎ニ達スルモノアルモ斜長石ハ〇・二糎内外ナリ、石英ハ粒狀ヲ呈シ長石間ニアリ、時ニ大サ四粍ニ達シ氣泡或ハ液泡ヲ含メルモノアリ、黑雲母ハ大サ三粍内外ノ板狀ノ結晶ニシテ褐色ヲ呈シ綠簾石ハ短柱狀、燐灰石ハ細柱狀、磁鐵鑛ハ粒狀、風信子鑛ハ短柱狀ノ細粒ヲナシテ雲母或ハ長石中ニ包裹セラル

本岩ノ周緣部ニ於テハ宇和島滑床間道路或ハ御槇村境附近ニ見ルカ如ク白色粒狀ノ優白質岩石トナリ殆ント長石及石英ノミヨリ成リ半花崗岩ノ如キ性質ヲ示ス、殊ニ滑床街道ニ於テハ電氣石結晶ノ集合體ヲ斑紋狀ニ含ミ電氣石ノ大サ一糎乃至三糎ノ長徑ニ達スルモノアリ、「黑尊ノ奥ノ谷間ニハ「ペグマタイト」岩脈アリ、是レ花崗岩ノ周緣ヨリ分岐貫入セルモノナルカ如シ、尙ホ此附近ニ於ケル花崗斑岩及石英斑岩ハ各地ニ散在シテ貫入セルモ恐ラク花崗岩貫入ノ際是ヨリ岩漿分化ニヨリ誘導セラレタル同源ノ岩石ト觀ルヘク孰レモ同時代ノモノナラン

七、花崗斑岩

本岩ハ岩脈トシテ黑尊谷及高光村光滿ニ露出シ稍々斑狀ノ結晶質岩石ニシテ斑晶ニハ長

石多ク、稀少ノ石英及黒雲母アリ、石基ハ粒狀構造ヲ呈シ、長石、石英、黒雲母、磁鐵鑛、燐灰石、風信子鑛、柵石、綠簾石等ヨリ成ル、斑晶ヲナセル長石ハ主ニ正長石ニシテ「カールスバト」式双晶ヲ成シ大サ五粍内外ノモノアリ、斜長石ハ中性長石ニシテ卓狀ヲ呈シ其量ハ少ナキモ「アルバイト」式双晶ヲ爲ス、石英ハ斑晶ヲナスモノ半自形ニシテ時ニ兩錐ノモノアリ、石基中ノモノハ粒狀ナリ、黒雲母ハ板狀、磁鐵鑛ハ粒狀、燐灰石ハ細粒狀、柵石ハ粒狀ナリ、風信子鑛ハ細粒ノ柱狀ニシテ其他綠簾石ノ半自形ノ小結晶アリ、岩石ハ概シテ風化或ハ變質シテ陶土化シ或ハ白雲母化セル部分多シ

八、石英斑岩

本岩ハ畑地村及綠僧都村ノ數箇所ニ四萬十統ヲ貫通シテ岩脈狀ヲ成シテ露出セリ、灰色或ハ暗灰色ニシテ斑狀ヲ呈ス、斑晶ハ石英及長石ニシテ石基ハ緻密ナリ、石英ハ兩錐形ノモノ多ク融蝕セラレ直徑一粍内外ナリ、正長石ハ半自形或ハ短柱狀卓狀ニシテ概シテ變質シ陶土化セリ、時ニ絹雲母ノ鱗片ヲ含ム、斜長石ハ「アルバイト」式双晶ヲ爲シ卓狀ナリ、多クハ中性長石ニシテ時ニ之ヨリ酸性ノモノヲモ交フ、大サ二粍内外ナリ、黒雲母ハ變質シ其外形ニヨリ之ヲ認メ得ヘク、綠簾石、磁鐵鑛ノ集合物ト成レリ、燐灰石ハ細柱狀ヲ成ス、石基ハ主ニ石英及長石ヨリ

成リ微晶質構造ヲ呈ス

九、紫蘇輝石玢岩

本岩ハ愛媛縣南宇和郡綠僧都村鹿鳴（カナヨシ）渓谷奥及北宇和郡清滿村增穗ノ西方鴨田ニ露出シ四萬十統及白堊系ヲ貫通シ共ニ岩株ヲ成スモノヽ如シ、暗灰色斑狀ノ岩石ニシテ、長石ノ大サ約三粍内外ノ斑晶ヲ含ム、石基ハ長石、黒雲母、角閃石、紫蘇輝石等ヨリ成リ粒狀構造ヲ示ス、長石ハ中性長石ニ屬シ異帶構造ヲ示シ或ハ「アルバイト」式双晶ヲ作セリ、石基ヲナセル長石ハ細小ニシテ小粒狀ヲ成ス、紫蘇輝石ハ柱狀ニシテ細小ノモノト稍大ナルモノトアリ、大形ノモノハ變質セリ、黒雲母及角閃石ハ各自形ナルモ變質シ磁鐵鑛、綠泥石等ニ變セリ

增穗ノ西方鴨田ニ於ケル本岩ノ外緣ハ斑狀ノ岩石ナルモ内部及中心部ハ稍之ト異ナリ粒狀構造ヲ示セル岩石ナリ、卽チ閃綠岩ニ近ク中性長石及紫蘇輝石ノ他ニ角閃石ヲ交ヘ且ツ融蝕セラレタル石英ヲ含ム

十、石英粗面岩

本岩ハ岩脈ヲ爲シ白堊系或ハ四萬十統ヲ貫通シ綠僧都村山出、御莊町菊川奥及畑地村保場

川ニ露出セリ、灰色斑狀或ハ緻密ナリ、之ヲ顯微鏡下ニ檢スルニ石英及長石ノ斑晶ト石英及長石ノ微粒結晶質ノ石基ヨリ成ル、石英ハ融蝕ヲ受ケタル粒狀ノモノ多ク中ニハ錐面ヲ表スモノアリ、大サハ一粍內外ナリ、長石ハ變質シテ種類不明ナルモノ多ク微カニ「カールスバト」式双晶ヲ示スモノアリテ正長石ニ屬スルモノアリ、大サ一粍內外ナリ、石基ハ微粒狀構造ヲ示シ長石、石英ノ他ニ黑雲母、磁鐵鑛粒、稀ニ燐灰石ヲ交フ、菊川奥ニ露出セルモノニハ電氣石ノ針狀結晶放射狀ニ集合シテ散點シ、石基及長石ハ陶土化セルモノ或ハ白雲母化セル部分アリ

十一、輝綠岩

本岩ハ富山村奥古尾及田ノ口村ニ於テ四萬十統中ニ赤色頁岩ニ伴ヒ岩床ヲ成シテ露出ス綠色ヲ呈シ緻密ナル岩石ナリ、之ヲ顯微鏡下ニ檢スルニ斜長石ト輝石トヲ以テ「オフィチツク」構造ヲ示ス、概シテ變質シテ輝石ハ綠泥石、磁鐵鑛等ノ集合物トナレリ、斜長石ハ曹灰長石ニ屬シ「アルバイト」式双晶ヲ成ス、副成分トシテ磁鐵鑛、燐灰石等ヲ含ム

第二章　應用地質

一、銅　鑛

高知縣幡多郡田ノ口村上田ノ口ニ於テハ嘗テ田ノ口鑛山ト稱セラレタルモノアリテ銅鑛ヲ採掘シタルコトアリ、其發見ハ元祿年間ニシテ其後ノ經過不明ナルモ明治十七、八年ノ交高知縣廳ノ稼行スル所トナリ、次テ民間ノ手ニ歸シ轉々シテ明治三十五六年頃マテ採掘セラレ其後廢山ニ歸セリ、現時ハ坑口全ク崩壞シ入坑スルヲ得ス

附近ノ地質ハ四萬十統ノ砂岩頁岩層ニシテ走向約東西、傾斜北方ニ五十度內外ナリ、舊記ニヨレハ鑛脈ハ走向東北東ニシテ南々東ニ急斜シ、鑛石ハ黃銅鑛、黃鐵鑛ノ細結晶ノ交雜セル塊狀鑛ニシテ、石英ヲ脈石トシテ交エタリト云フ、採掘當時ノ現況ハ明治廿六年刊行地質要報及二十萬分之一宇和島圖幅地質說明書中ニ揭載セラレタリ

二、安質母尼鑛

本區域ノ安質母尼鑛ハ二箇所ニ在リ、其一ハ大正四、五年ノ交ニ愛媛縣北宇和郡下灘村嵐鑛山ニ於テ井澤光三郎ニヨリ採掘セラレタリ、本鑛山ハ下灘村ト畑地村トノ境、國道峠ノ南東約五百米ニ在リ、鑛床ハ四萬十統ノ砂岩頁岩互層中ニ鑛脈ヲ形成ス、三箇所ニ坑口アリ、調査當時ハ坑口破損シ入坑スルコト能ハサリシモ、坑口ハ略鑛脈露頭上ニ排列セルモノヽ如ク、之ヨリ推定セハ鑛脈ハ略南北ニ亙レルカ如シ、坑口附近ニ堆積セル拾石中ニハ安質母尼鑛ヲ發見セ

ス、唯石英脈石ト之ニ附着セル黄鐵鑛ヲ認メタリ、尚大正五年度ニ於テ本鑛山ヨリ十三屯ノ安質母尼鑛ヲ產出セリト云フ

他ハ愛媛縣北宇和郡清滿村增穗ニ於テ曾テ安質母尼鑛ヲ試掘セラレタルコトアリト稱スルモ巡回當時ニハ其跡ヲ止メス

三、滿俺鑛

本鑛ハ四萬十統中ノ放散蟲頁岩ノ硅質ノ部分ニ鑛染トシテ存スルコトアリ

富山村大用、住次郎等ニ於テ採取セラレタルコトアリシモ其含有量少ナキ爲メ利用ニ堪エサリシト云フ

四、石材

本區域內ノ四萬十統及白堊系ノ砂岩竝ニ黑雲母花崗岩ハ石垣石、墓石、敷石等トシテ利用セラル、千羽ケ峠及御嶺村ニ於テハ花崗岩ヲ、來ノ村、三浦村ニ於テハ白堊系ノ砂岩ヲ、蔵岡村、田ノ口村ニ於テハ四萬十統ノ砂岩ヲ採石セルモ其量ハ地方ノ需要ヲ充スニ過キス

五、石灰岩

島ノ巢統ノ石灰岩ハ石灰焦製用トシテ採取セラレ泉村興野々、吉生野村谷口、明治村上家堺、上目黑、富岡、十川村大野等ニ於テハ農家ノ閑時ニ採掘セラレ施肥料トシテ、石灰製造ニ利用セラル

六、甑土

沖積層ノ粘土ハ瓦燒キノ原料トシテ利用セラル、卽チ宇和島市附近、岩松町附近、松丸、吉野附近等ニ於テハ田畑ノ粘土ヲ採掘シ瓦燒粘土トシテ利用セラルヽモ瓦ノ產額ハ不定ニシテ地方ノ需要ニ應シテ供給セラルヽノミナリ

七、鑛泉

北宇和郡旭村奈良及御槇村ニハ花崗岩中ヨリ湧出スル硫黄泉アリ、幡多郡安並村、田ノ口村馬荷御坊畑及南宇和郡一本松村御在所ニハ四萬十統ヨリ湧出セル鑛泉アリ、安並村ノ鑛泉ハ炭酸泉ナルモ共他ハ悉ク硫黄泉ナリ、之等鑛泉中馬荷安並等ニ於ケルモノハ往時利用セラレタルコトアルモ巡回當時ニ於テハ利用セラルヽモノナシ

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EXPLANATORY TEXT

OF THE

GEOLOGICAL MAP OF JAPAN

Scale 1 : 75,000

UWAJIMA

Zone 34 Col. XIX

Sheet 252

By

TATSUO SUZUKI

(Written in 1934)

(Abstract)

GEOLOGY

Shimanto Series consists of sandstone, shale, Radiolarian shale, conglomerate and limestone. The sandstone and shale which occur in multiple alternation, are the chief component rocks. Thin layers of reddish or rarely greenish coloured shale carrying Radiolarian remains are intercalated in the lower and upper parts of the series. In the shale at Sōzu in Minami-uwa-gun, Iyo, is found a white crystalline, partly siliceous limestone, 3 m. thick.

The series has a wide extension, occupying nearly three quarters of the sheet map area. It is fallen into a complex of blocks cut by faults trending nearly north-

south, east-west or northeast to southwest. In each of most of these blocks, the strata maintain the general east-west strike and monoclinal dipping to north ; but in some of the blocks they strike from northeast to southwest or from north to south.

The series is conformably overlain by the Torinosu series of Upper Jurassic at Meguro in Akiharu-mura. On this account, the greater part of the series is considered to be Lower Jurassic in age and correlated to the Akigawa series developed and described in the neighbouring sheet map areas in Shikoku. Minute organic remains such as *Cenosphaera*, *Dictyomitra*, *Sphaerozoum* and spicules of Monoactinellid sponges, quite common to and widely distributed in these series, are examined in the Radiolarian shale. The thickness of the whole Shimanto strata, as estimated by means of a section across the strip from Ōyu to Tanono, is about 6,000 metres.

Torinosu Series consists of greenish or dark gray shale, gray, fine to coarse grained sandstone with interbeddings of fossiliferous dark gray limestone, and conglomerate which is composed of pebbles of sandstone, slate, quartzite, etc., cemented by fine sandy matrix. The series is distributed in four regions as faulted blocks keeping contact with the Shimanto series and the Cretaceous, the faults trending in various directions. In the region comprising Izumi, Akiharu, Yoshino in Iyo and Ekawasaki, Tsudai and Tōkawa in Tosa, the series is

again subdivided into many fault-blocks, within which the strata, in most cases, form monoclines dipping to north or northwest. It is a remarkable fact that the lower part of the series overlies conformably the Shimanto series in the neighbourhood of Meguro, Akiharu-mura in the south, while the most of the series is faulted down against the Shimanto series on the east. The limestone lenses, generally known as Torinosu limestone, contain numerous fossils just as the most of the Torinosu limestone in the Outer Zone of Shikoku do. . Dr. K. Inouye has recorded the occurrence of the following fossils from the limestone :

(Fossils)	(Localities)
Coral and Foraminifera.	Okinono
Cladophyllia, *Tamnastraea*, *Isastraea*, *Dimorphoatraea*.	Chikanaga
Crinoidal stem.	Kami-iyeji
Alcyonaria?, *Tamnastraea*?, Bryozoa, Crinoidal stem.	Nishigaho
Serpula, *Lucina*, *Melania*, *Cyrena* ; *Nodosaria*.	Sada
Foraminifera.	Gontani.

Besides the above, fossils collected in the present field work are listed below :

(Fossils)	(Localities)
Cidaris, *Dimorphina*.	Tomioka
Stromatopora (*Parastromatopora*) *inouyei* Yabe et Sugiyama.	Nishigaho

Petrophyton Nabegatani
Circoporella cfr. *semiclathrata* Hayasaka,
Ostrea, *Cyrena*, Coral and Spongia. Fukudō.

Cretaceous System consists of green or gray shale and sandstone with conglomerate. The shale is sometimes sandy and sometimes nodulous. The sandstone is usually massive and often finely banded with interlamination of coaly matter. The conglomerate is composed of various sized pebbles of sandstone, shale, slate, quartzite, porphyry and porphyrite, cemented by sandy matrix.

The formation is developed widely in the northern part of the sheet map area and faulted down against both the Shimanto and Torinosu series. The whole extension is divided into three sections by two prominent faults running from east to west, the one passing from Uwajima to Nara, the other, from Natsuaki to Miyonokawa. In the northern Makinoyama section, sandstone and conglomerate are more predominant over shale. The basal conglomerate is observed at Akamatsu where it seems to rest unconformably on the Shimanto series.

Fossil localities are numerous in the Makinoyama and Uwajima-Matsumaru sections. The fossils that described by Dr. S. Yehara and quoted by Prof. Dr. H. Yabe in his monograph on the Cretaceous Stratigraphy are as follows :

Helicoceras cfr. *venustum* Yabe
Gaudryceras limatum Yabe

Inoceramus amakusensis Nagao
Inoceramus cfr. *percostatus* Müller
Inoceramus akamatsui Yehara
Inoceramus cfr. *regularis* d'Orb.
Yezoites sp.
Echinoid
(from the Furushiroyama-shale at Furushiroyama, Iyo)

Other fossils hitherto known and their localities are shown below :

	Koike	Yamagiwa	Fanakakushi	Ushinokawa	Nojiri	Jiyoshi	Iwai	Nara	Yorimatsu
Inoceramus cfr. *amakusensis* Nagao	×	×							
I. cfr. *percostatus* Müller	×	×	×	×					
I. cfr. *regularis* d'Orb.					×				
I. cfr. *schmidti* Michael					×				
I. sp.	×					×	×	×	×
Lucina sp.	×								
Gaudryceras limatum Yabe			×						
Crinoid			×				×		
Archaeozostera				×		×	×		

The above fossils prove evidently the Upper Cretaceous age of the containing rocks. Of these, three ammonites are the leading fossils of the Senonian stage. The Cretaceous formation found in the southern Iwamatsu section is somewhat different from that of Uwajima and Matsumaru in lithology and fossil contents.

Its prevailing rocks are sandstone and shale. In them fossils are scanty, only *Inoceramus* and some Gastropods having been found. On this account it is supposed that the Iwamatsu section may be a deposit of slightly older stage than that of Uwajima and Matsumaru. There are many faults in the Cretaceous formation and its thickness is difficult to be estimated but roughly measured in the section passing through Kakidani and Yorii varies from 1,000 m. to 1,500 m.

Pleistocene and Recent Both deposits consist of sand, gravel and clay. Pleistocene deposits form terraces along the rivers. Recent deposits constitute alluvial plains along the rivers and sea coast. Clay is most prevailing in the deposits of wide plains near Uwajima, Iwamatsu and Matsumaru, while sand and gravel are abundant in the alluvium along rivers and sea coast.

Biotite-Granite intrudes the Cretaceous, Torinosu and Shimanto series in three regions, Takatsukiyama-Nametoko, Kuroson and Miuchi. These three granite masses may be denuded exposures of projecting portions of a batholith underneath. A small stocks of Biotite-granite is also exposed near Sembagatō. Near the margin of the granitic masses are usually seen fine grained leucocratic, aplitic granites, some of which contain sporadically tourmaline crystals. In the granite are found many dikes of Pegmatite and Aplite which are differentiated products of the granite magma. The age

of the granitic intrusion may be Post-Cretaceous or early Tertiary time.

Granite-Porphyry is found as dikes traversing the Cretaceous or Shimanto rocks in the surrounding regions of the Biotite-granite masses of Kuroson and Takatsukiyama. It has biotite and orthoclase as phenocrysts in microgranular groundmass composed of quartz, orthoclase, plagioclase, biotite, etc. This and the following Quartz-Porphyry may be apophyses branched off from the Biotite-granite and marginal or differentiated products of the same magma.

Quartz-Porphyry is found as dikes cutting the Shimanto series at several places in the Kamihataji region. It is gray coloured and porphyritic with quartz and felspar phenocrysts, sometimes quartz being corroded.

Hypersthene-Porphyrite occurs at two localities. The one is at Masuho in Kiyomitsu-mura in the Cretaceous terrane, the other, at the valley head of Kanarashi in Midorisōzu-mura in the Shimanto terrane. Both of them are dark gray porphyritic rocks having abundant andesine phenocrysts with additional hypersthene and hornblende. At Masuho, the rock is differentiated in part, passing gradually from porphyritic margin to more granular centre.

Liparite occurs as dykes cutting the Cretaceous strata or the sandstone and shale beds of the Shimanto. It is generally compact but sometimes porphyritic with

quartz and felspar. The rock found in the Kikugawa valley is speckled by impregnated radial aggregate of tourmaline needles.

Diabase is found as intrusive sheets in the Shimanto series at Tomiyama-mura. The rock is dark green or reddish purple in colour, compact or fine grained, showing microscopically ophitic structure. Most parts are altered and partially serpentinized.

ECONOMIC GEOLOGY

Copper Ore. Tanokuchi mine at Kamitanokuchi in Tanokuchi-mura was being worked many years ago for copper ore. The ore deposit is reported as that it was found in the shale of the Shimanto series and is a sort of vein carrying intimate mixture of chalcopyrite and pyrite associated with quartz as vein stuff. Now a day, the mine is entirely ruined.

Antimony Ore. Two localities are found in the sheet map area. The one is at Masuho in Kiyomitsu-mura but nothing is known about the deposit. The other is situated at Arashi in Shimonada-mura where three pits were opened for antimony veins in the sandstone and shale beds of the Shimanto in the years of 1914-15, the ore produced being about 13 metric tons in 1915. These pits are all ruined now and the deposits can not be examined.

Manganese Ore Many lenses of manganiferous shales and cherts are found in the Shimanto series. The manganese ore in these rocks was prospected many

years ago at Jujiro and Ōyu in Tomiyama-mura. But the result was of so discouraging that the ores are too poor in manganese content to be worked.

Building Stone. Sandstones of the Cretaceous, Torinosu and Shimanto series are often quarried in Tanokuchi-mura, Kuno-mura and Miura-mura and used as materials for pavement, wall, tomb and monument. Their production is small in amount, only supplying local demands.

Limestone of the Torinosu series is often used for lime-making. It is quarried by local people in their leisured times of farming for material of burning lime. The lime is used as fertilizer and its production is very small in amount.

Clay in the alluvium is used for roof tile making and dug in many places, especially in Uwajima, Matsumaru and Iwamatsu plains. Produced tiles are for only local consume and output of them is very small in amount.

Mineral Springs. At Nara and Miuchi, there are sulphuretted springs spouting out from fissures of Biotite-granite. Sulphuretted springs found at Umani, Ombō-bata in Tanokuchi-mura, both gush out from the rocks of the Shimanto. A carburetted spring at Yasunami issues from fissures of sandstone and shale beds of the Shimanto series. All of these are cold springs and not utilized at present.