

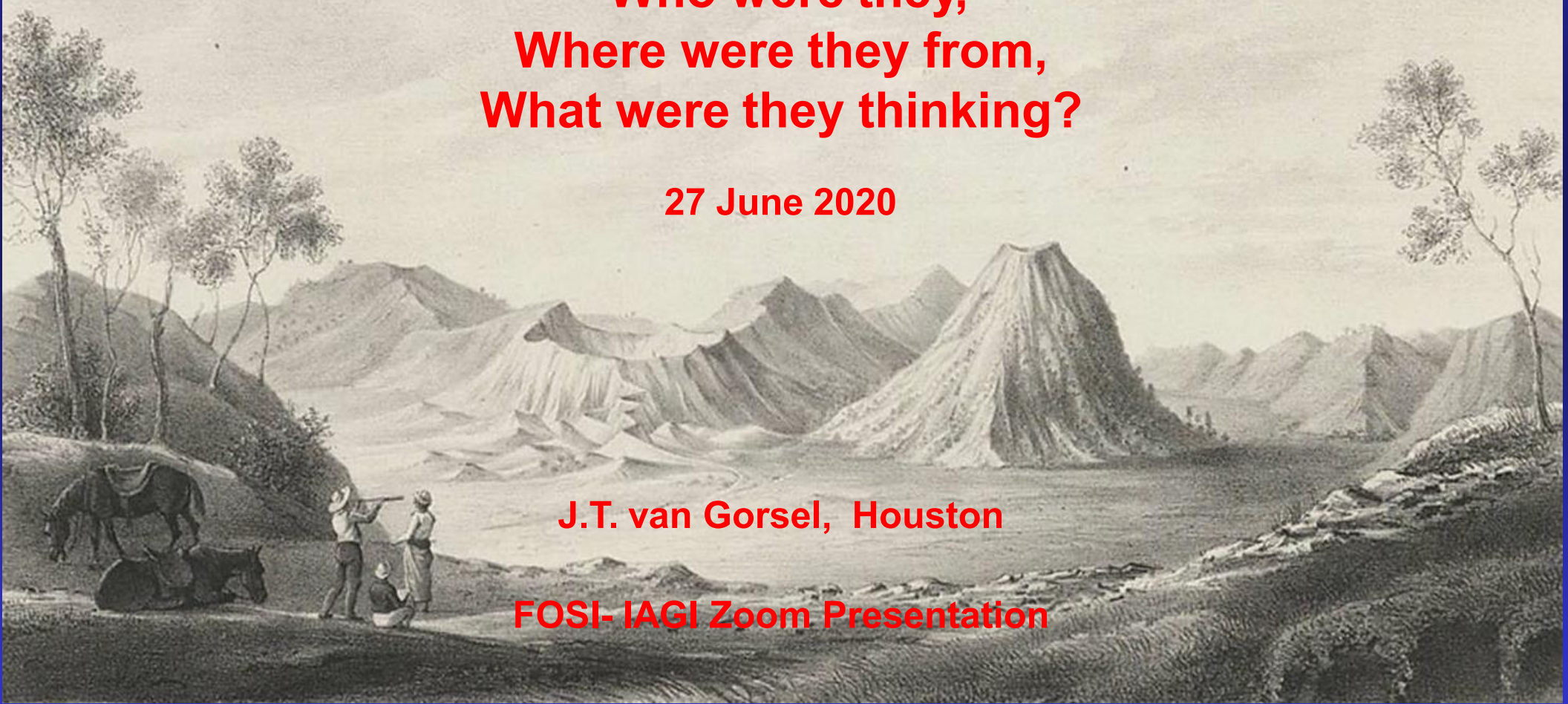
# **Pioneers and Milestones of Indonesian geology (1800s- 1950s)**

**Who were they,  
Where were they from,  
What were they thinking?**

**27 June 2020**

**J.T. van Gorsel, Houston**

**FOSI- IAGI Zoom Presentation**





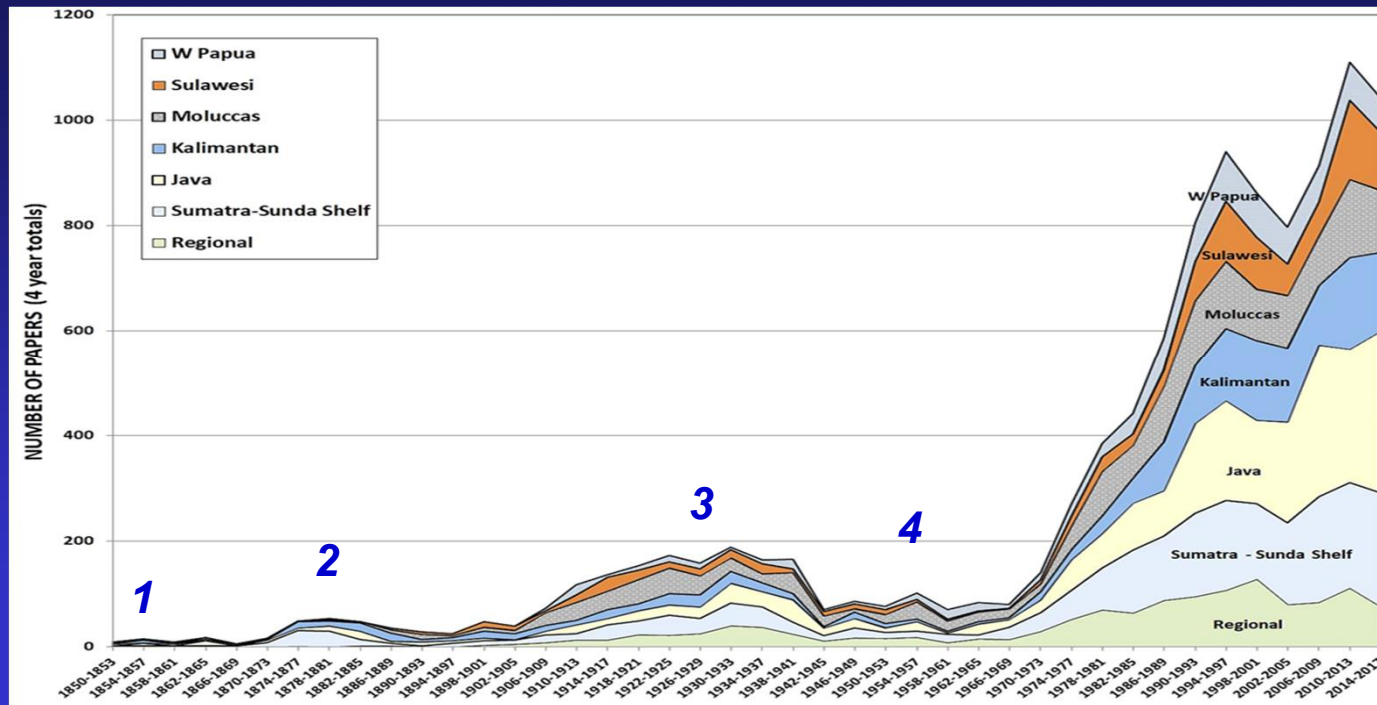
## Pioneers and Milestones of Indonesian geology (1800s- 1950s)

- \* During the Dutch colonial era >1000 geologists/ mining engineers spent parts or all of their career in the Netherlands Indies (Van Bemmelen, 1954)
  - government, private industry, academic researchers, independent prospectors
  - a majority had doctorates from top European universities of that time
- \* This talk is a brief selection of key individuals, topics and stories
- \* Although Indonesia was a Dutch colony, in the 1800s- early 1900s most of the naturalists and geologists were actually German or Swiss.
- \* Many of them were larger-than-life personalities, with stories of successes, but also of failures, personal dramas and disasters.
- \* Many of them died from tropical diseases, accidents or hostilities and never returned to their home countries.

# Indonesia Geology - Early phases

## Four main early stages of Earth Sciences discovery in Indonesia

- 1. Before ~1850:** No geologists working in the country: only 'naturalists' making first observations on volcanoes, some fossils
- 2. ~1850-1900:** Mainly brief summaries of mineral or coal surveys by mining engineers of the *Dienst van het Mijnwezen* (Bureau of Mines/ Geological Survey. Mainly on West Indonesia. Mining and petroleum extraction opened up to private industry: rapid increase in mineral and oil prospecting in 1890s, but most ventures short-lived
- 3. ~1900-1940:** Significant expansion of mapping and geological studies, slowing down during Depression of early 1930's. Many new hydrocarbon and minerals discoveries. Systematic mapping programs of Sumatra and Java started in 1920s. Increase in industry, government and academic reconnaissance surveys into Eastern Indonesia and New Guinea.
- 4. 1940-1970:** Geological surveys and publishing at almost complete standstill





# BIBLIOGRAPHY OF THE GEOLOGY OF INDONESIA AND SURROUNDING AREAS, Edition 7.1, June 2020



\* An annotated listing of > 23,700 titles on >2800 pages of geoscience publications on Indonesia and surrounding regions

*(not including unpublished/ proprietary reports in Government and Industry files)*

\* Online at: [www.vangorselslist.com](http://www.vangorselslist.com)

*Who were the people that wrote these papers?*



**Oh look, more books !**

# **Pioneers and Milestones of Indonesian geology** *(in prep., 2020)*

**Histories of ~200 pioneering earth scientists and explorers  
from the 1800s until the end of the Dutch colonial era**



**Pioneers and Milestones  
of Indonesian geology**

**1. Scientific explorers**

J.T. van Gorsel DRAFT



**Pioneers and Milestones  
of Indonesian geology**

**2. Geological Survey, Volcanology,  
1850-1950s**

J.T. van Gorsel DRAFT



**Pioneers and Milestones  
of Indonesian geology**

**3. Paleontologists and other specialists**

J.T. van Gorsel DRAFT



**Pioneers and Milestones  
of Indonesian geology**

**4. Petroleum and Mining Industries,  
Post-1945 Restart**

J.T. van Gorsel DRAFT





**Pioneers and Milestones  
of Indonesian geology**

**1. Scientific explorers**

J.T. van Gorsel

DRAFT

## THE EARLY NATURALISTS (1600's- 1800's)

Georg E. RUMPHIUS

Caspar G.C. REINWARDT

Heinrich C. MACKLOT

Carl A.L.M. SCHWANER

Franz W. JUNGHUHN

C.F.A. SCHNEIDER

Raden SALEH

Thomas HORSFIELD

Salomon MULLER

Ludwig HORNER

Heinrich VON GAFFRON

C.B. Hermann VON ROSENBERG

Johan H. CROOCKEWIT

Theodor POSEWITZ

## GEOLOGIC-GEOGRAPHIC EXPEDITIONS FROM ~1900

Wilhelm T.A.H. VOLZ

Karl DENINGER

Johannes E.W. ELBERT

Gustaaf A.F. MOLENGRAAFF

Johannes H.W. AHLBURG

Willem P. DE ROEVER

Otto Gerhard HELDRING

Paul François HUBRECHT

C.E. Arthur WICHMANN

Georg BOEHM

Louis M.R. RUTTEN

Paul and Fritz SARASIN

Eduard C. ABENDANON

Dietrich TAPPENBECK

Willem K.H. FEUILLETAU DE BRUYN

J. Jacques DOZY

## MARINE GEOLOGIC-OCEANOGRAPHIC EXPEDITIONS

C.G. Ferdinand VON HOCHSTETTER    Philip H. KUENEN



## THE BUREAU OF MINES/ GEOLOGICAL SURVEY

**Cornelis DE GROOT (VAN EMBDEN)**

**Johannes E. AKKERINGA**

**Pieter VAN DIJK**

**G.P.A. RENAUD**

**Rogier D.M. VERBEEK**

**Reinder FENNEMA**

**Nicolaas WING EASTON**

**Hendrik A. BROUWER**

**Walter DIECKMANN**

**Pieter HOVIG**

**Jozef ZWIERZYCKI**

**Willem F. F. OPPENOORTH**

**Carel TER HAAR**

**Wolfgang LEUPOLD**

**Reinout W. VAN BEMMELEN**

**Jan WESTERVELD**

**August C.D. BOTHE**

**Johan DUYFJES**

**Adolf L. SIMONS**

**Soenoe SOEMOSUSASTRO**

**Aquasi BOACHI**

**Roeland EVERWIJN**

**Pieter H. VAN DIEST**

**Carel Jan VAN SCHELLE**

**Jan A. HOOZE**

**Marcus KOPERBERG**

**August TOBLER**

**Eduard HARTMANN**

**E.R.D. GOLLNER**

**C. MOERMAN**

**W.C. BENSCHOP KOOLHOVEN**

**Louis J.C. VAN ES Jr**

**K.A. Friedrich R. MUSPER**

**Wilhelm H. HETZEL**

**Johannes F. VAN TUIJN**

**C.P.A. ZEIJLMANS VAN EMMICHOVEN**

**Johannes G.H. UBAGHS**

**Charles E.A. HARLOFF**

**Nobuo IKEBE**

**George A. DE NEVE**

## VOLCANOLOGY

**Georges L.L. KEMMERLING**

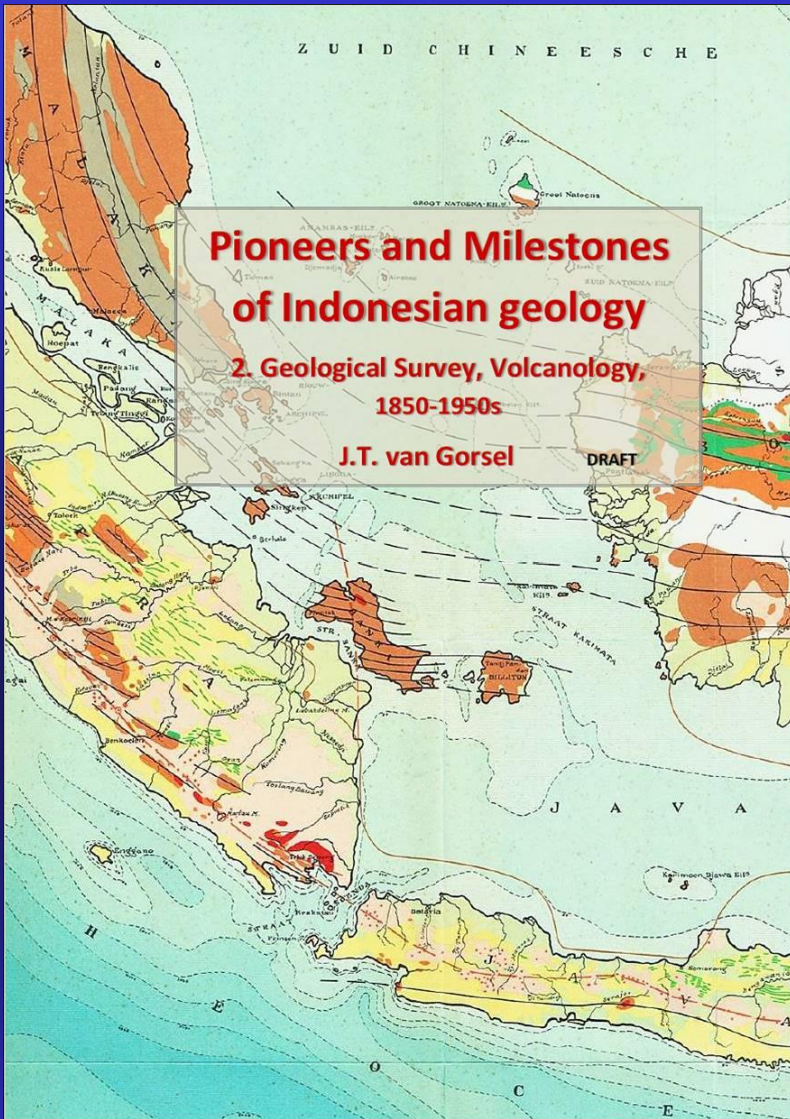
**Nicolaas J.M. TAVERNE**

**Maur NEUMANN VAN PADANG**

**Berend G. ESCHER**

**Charles Edgar STEHN**

**Wladimir A.PETROESCHEVSKY**







**Pioneers and Milestones  
of Indonesian geology**

**3. Paleontologists and other specialists**

J.T. van Gorsel

DRAFT

## MASTERS OF PALEONTOLOGY

H. Ernst BEYRICH

Oskar BOETTGER

Hanns Bruno GEINITZ

August ROTHPLETZ

J. Karl MARTIN

Lothar E.N. KRUMBECK

Ernst STOLLEY

Johannes WANNER

Erich JAWORSKI

Johannes H.F. UMBGROVE

Martin G. RUTTEN

Rogier D.M. VERBEEK (Pal.)

Karl W. G. VON FRITSCH

C. Ferdinand VON ROEMER

Ferdinand BROILI

Friedrich VOGEL

Carl DIENER

Paolo E. VINASSA DE REGNY

C.A. HANIEL

A. Heinrich P. GERTH

C.H. OOSTINGH

Teiichi KOBAYASHI

## PIONEERS OF MICROPALAEONTOLOGY

Henry B. BRADY

Richard J. SCHUBERT

Henri DOUVILLE

Isaak M. VAN DER VLERK

TAN SIN HOK

Louis A.J. BAKX

Heinrich K.E.A. KUPPER

Jacobus T. KINGMA

C. Geoffrey ADAMS

Wilhelm A. MOHLER

Hisakatsu YABE

George J. HINDE

Charles SCHLUMBERGER

Louis M.R. RUTTEN

C.M. Bramine CAUDRI

Willem Frederik KRIJNEN

Thomas REINHOLD

Lubbartus BOOMGAART

Martin F. GLAESSNER

Hans THALMANN

Leslie W. LEROY

Shoshiro HANZAWA

## MAMMALS- HOMINIDS, PALEOBOTANISTS

M. Eugene F.T. DUBOIS

M. Lenore SELENKA

G.H. Ralph VON KOENIGSWALD

Dirk A. HOOIJER

J. Heinrich R. GOEPPERT

Oswald HEER

Wilhelmus J. JONGMANS

Oene POSTHUMUS.



## Pioneers and Milestones of Indonesian geology

4. Petroleum and Mining Industries,  
Post-1945 Restart

J.T. van Gorsel

DRAFT

### EARLY PETROLEUM ENTREPRENEURS

Jan REERINK

J.B. August KESSLER

Jacobus H. MENTEN

Aeilko J. ZIJLKER

Adriaan STOOP

W.H. DE GREVE Jr

### PETROLEUM GEOLOGISTS

F.C.B. Hugo BUCKING

Cesare PORRO

Hans CLOOS

Willem C. KLEIN

A. Arnold HEIM

G. Leonard SMIT SIBINGA

Hans R. GRUNAU

Jacobus J. HERMES

Carl SCHMIDT

Hans HIRSCHI

Herman WITKAMP

Friedrich WEBER

Lajos VON LOCZY Jr.

Ernst KUNDIG

Horst F.J. VON BANDAT

### MINERS, PROSPECTORS, MINING GEOLOGISTS

Tin: John Francis LOUDON

C.H.J. WILHELM

Gold: Johann Wilhelm VOGEL

Reinier Dirk VERBEEK

Samuel John TRUSCOTT

Petrus Joannes JANSEN

C.E.G.H.M.L. HUNDESHAGEN

Hendrik TERPSTRA

Hermann SIBER

Coal: W.H. DE GREVE Sr

Cornelis H. VAN RAALTEN

James MOTLEY

K.G.J. ZIEGLER



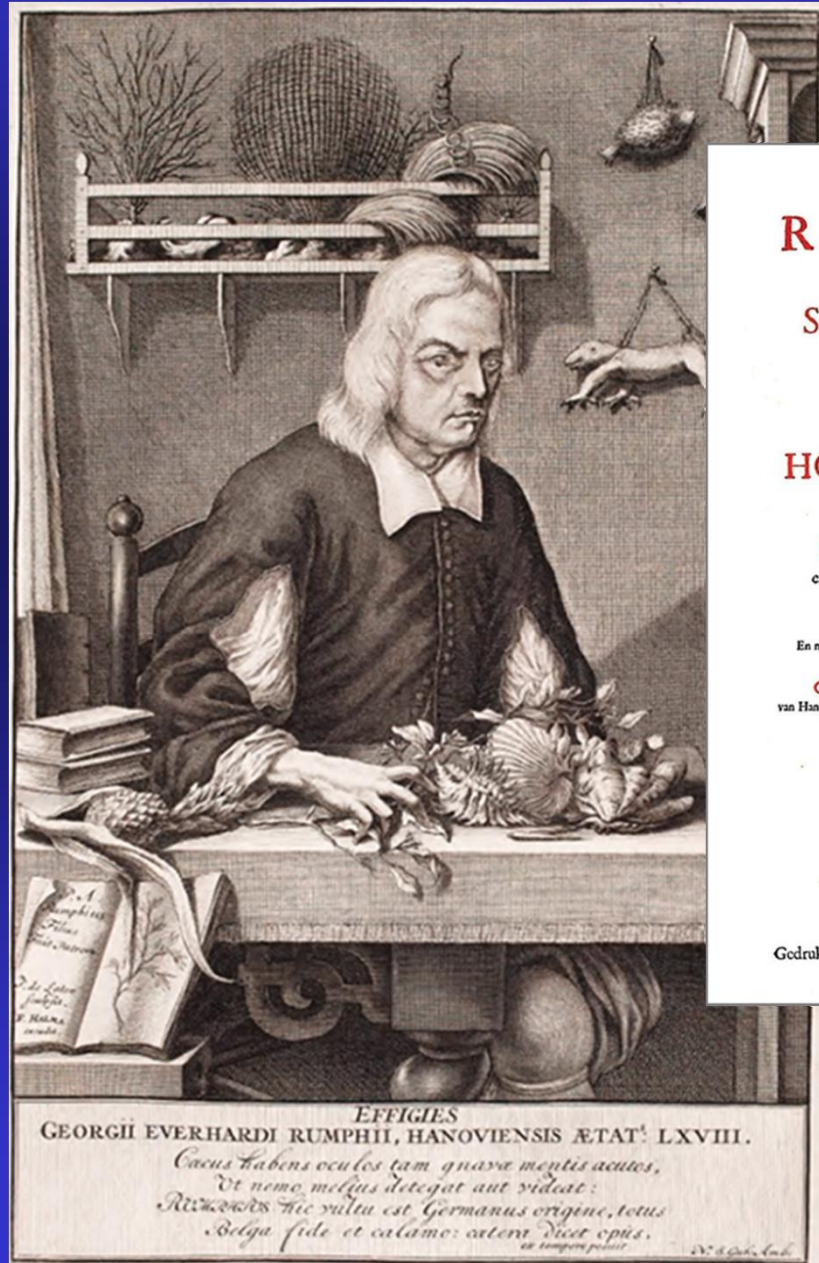




# Pioneers – Vol. 1: Early Naturalists- Rumphius

## Georg E. RUMPHIUS (1627-1702)

- \* The earliest naturalist was a VOC official in Amboin from 1652-1702: “the blind seer of Amboin”
- \* “The Ambonese Curiosity Cabinet “ published posthumously in three volumes in Amsterdam in 1705



**D'AMBOINSCHÉ  
RARITEITKAMER,**  
Behelzende eene BESCHRYVINGE van allerhande  
zoo wecke als harde  
**SCHAALVISSCHEN,**  
te weeten raare  
**KRABBen, KREEFTEN,**  
en diergelyke Zeedieren,  
als mede allerhande  
**HOORNTJES en SCHULPEN,**  
die men in d'Amboinsche Zee vindt:  
Daar beneven zommige  
**MINERAALen, GESTEENTEN,**  
en soorten van AARDE, die in d'Amboinsche, en zom-  
mige omleggende Eilanden gevonden worden.  
Verdeelt in drie Bocken,  
En met nodige PRINTVERBEELDINGEN, alle naar 't leven getekent, voorzien.  
Beschreven door  
**GEORGIUS EVERHARDUS RUMPHIUS,**  
van Hanauw, Koopman en Raad in Amboina, missgaders Lid in d' *Académie Chrétienne Nature,*  
in 't Dainische Roomsche Ryk opgerecht, onder den naam van  
**PLINIUS INDICUS.**

**TAMSTERDAM,**  
Gedrukt by FRANÇOIS HALMA, Bockverkooper  
in Konstantijn den Grooten.  
1705.



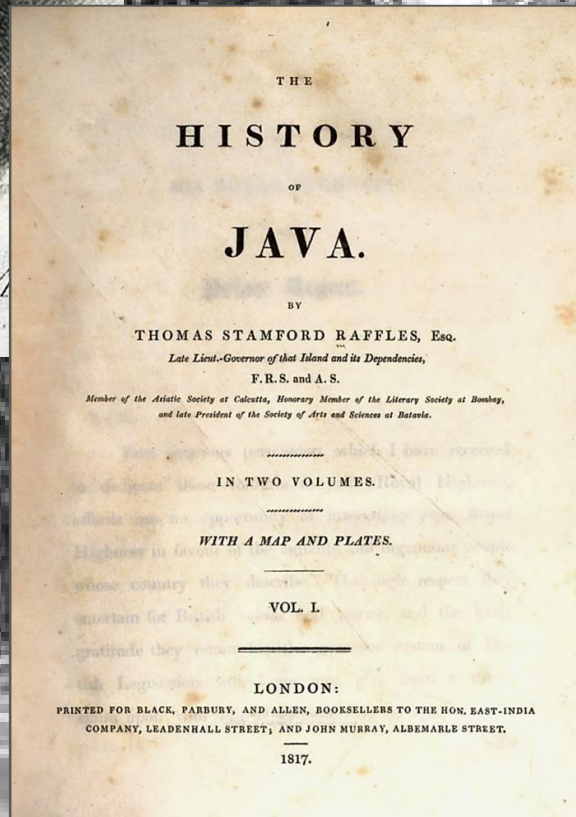


# Pioneers – Vol. 1: Early Naturalists – T.S. Raffles



## THE BRITISH INTERREGNUM (1811-1815) -

- \* While The Netherlands were occupied by Napoleonic France , Java was technically a French colony
- \* The British invaded Java in 1811, appointing Thomas Stamford Raffles as Governor, replacing H.W. Daendels
- \* Raffles was probably the first to show a serious scientific and historic interest in Java



'The history of Java', (Raffles, 1817)  
geography, people and historic objects of Java)





## **Pioneers – Vol. 1: Early Naturalists – Raffles & Horsfield**

### **THE BRITISH INTERREGNUM (1811-1815)**

**British governor T.S. Raffles was one of the first to show scientific and historic interest in Java**



**View of Gunung Gede & the River Ciliwung in Java  
from the Garden at Buitenzorg (Bogor; Raffles 1835)**



# Pioneers – Vol. 1: Early Naturalists – Thomas Horsfield

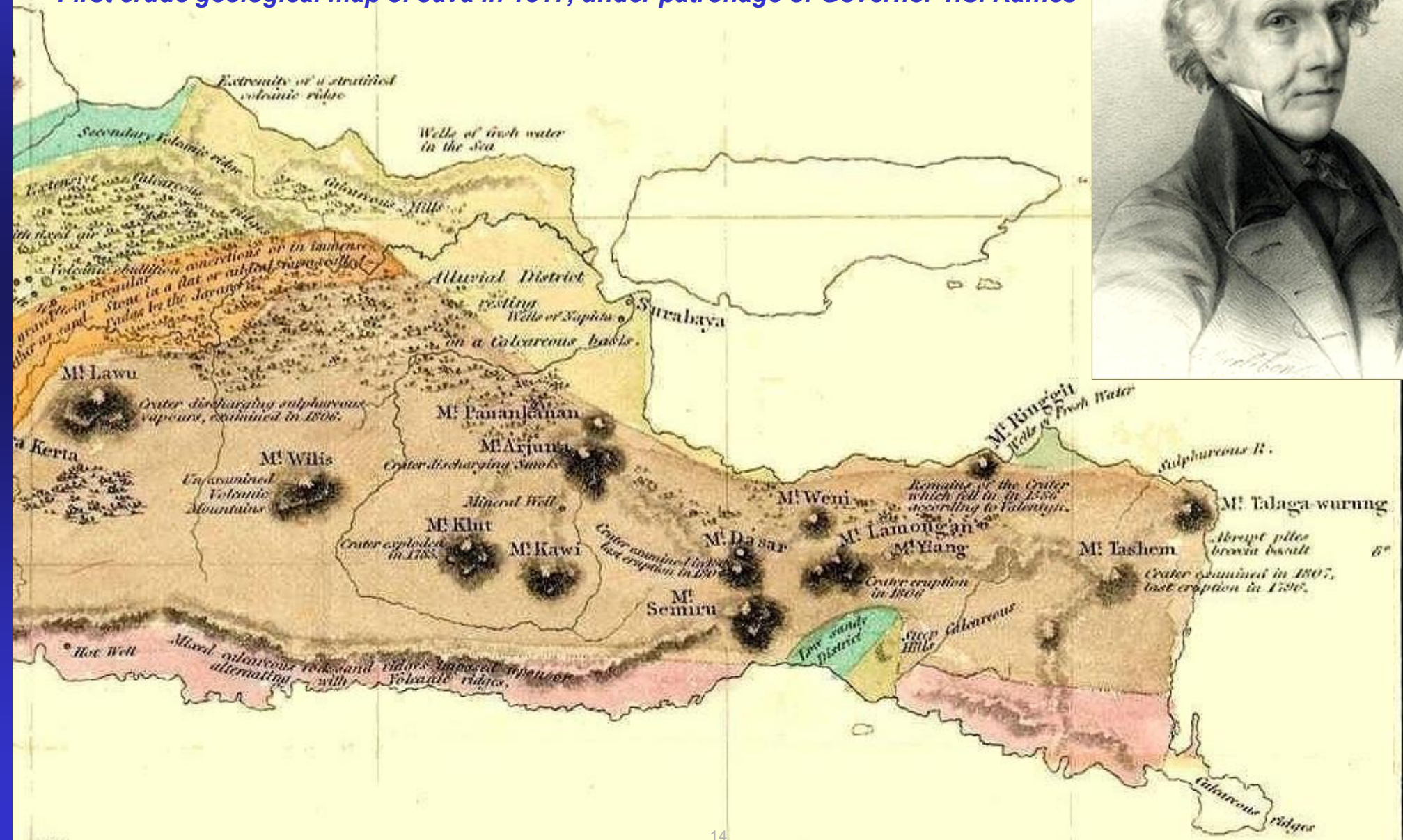
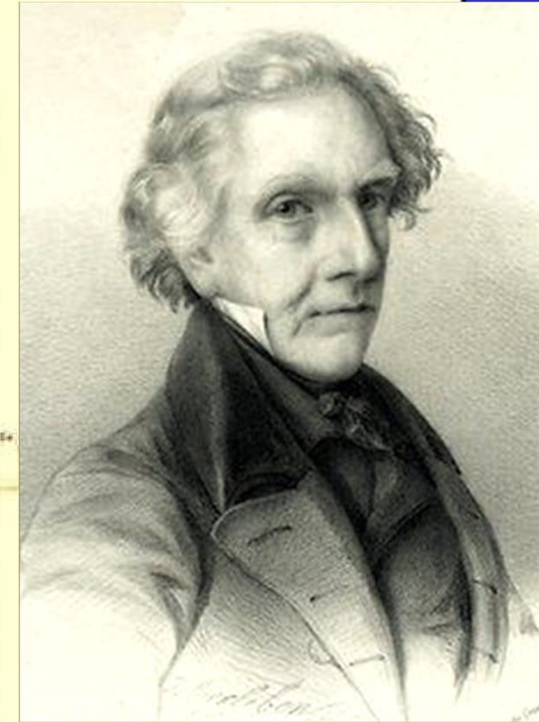
## MINERALOGICAL SKETCH OF THE ISLAND OF JAVA.

BY DR THOMAS HORSFIELD. 1822.

*At The Trees show the line of the Teak forests.*

**Thomas Horsfield (1773-1854)**

- \* American medical doctor and naturalist, on Java from 1801-1815
- \* First crude geological map of Java in 1817, under patronage of Governor T.S. Raffles





### The 'NATUURKUNDIGE COMMISSIE' (1820-1850)

Caspar G.C. REINWARDT

Salomon MULLER

Heinrich C. MACKLOT

Ludwig HORNER

Carl A.L.M. SCHWANER

Franz W. JUNGHUHN

- \* The "Commission for Natural Sciences of the Netherlands Indies" was founded in 1820 in Leiden
- \* Its mission was to fund 'Naturalist explorers' in the tradition of Charles Darwin and Alexander von Humboldt, to study and collect natural objects in the Netherlands Indies for the Natural History Museum in Leiden, and keep an eye out for potential mineral and coal deposits
  - Caspar G.C. Reinwardt was instrumental in its creation and management
- \* In 30 years it appointed 18 'Members' (Naturalist explorers), to work in the Netherlands Indies for 4-year periods, then return to Leiden to document results (incl. 8 German, 4 Dutch and 1 French nationals)
  - expeditions to Borneo, New Guinea, Timor, etc.
- \* Most of the reports of Commissie Members were written as reconnaissance travel logs

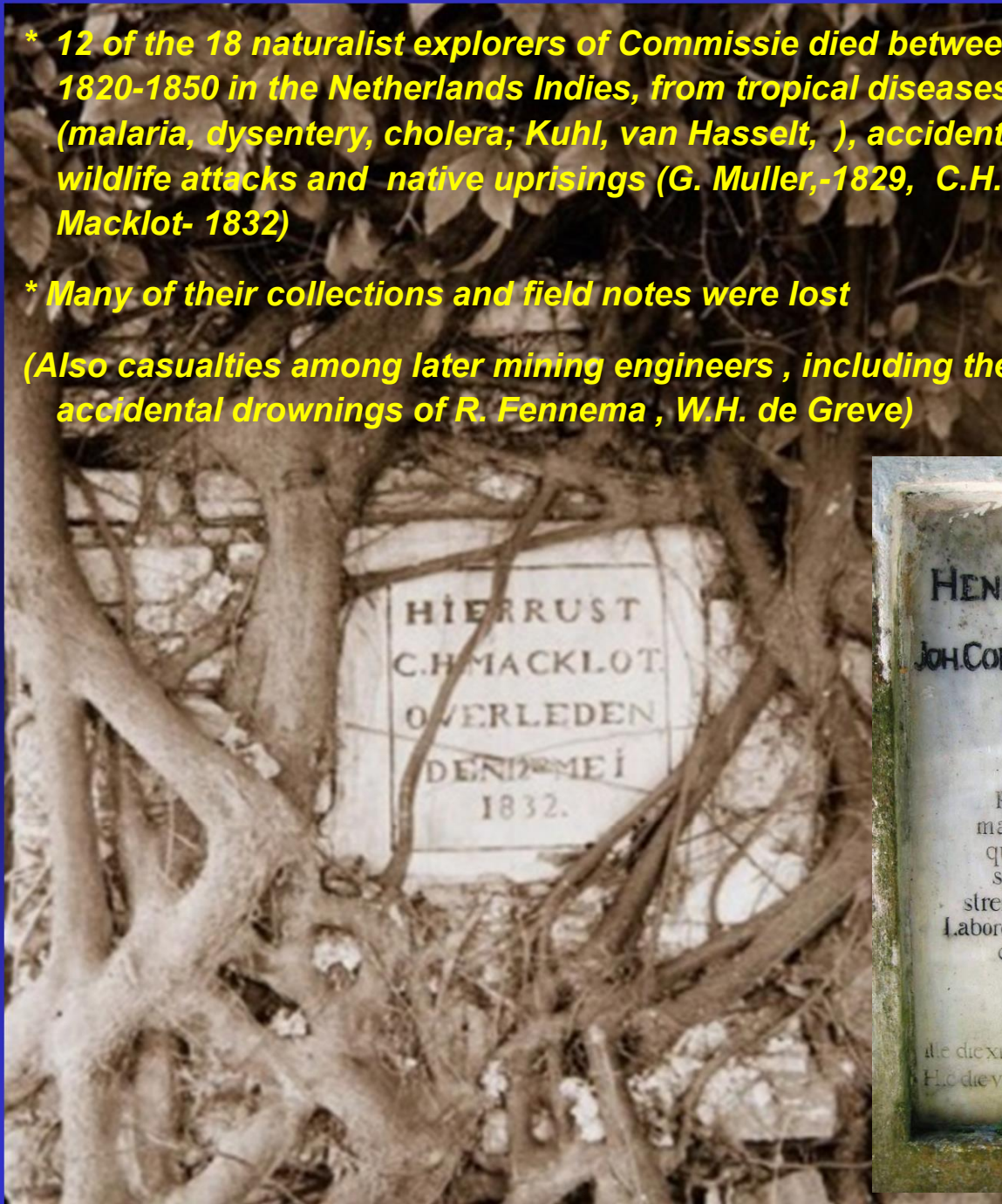


## PREMATURE DEATHS

\* 12 of the 18 naturalist explorers of Commissie died between 1820-1850 in the Netherlands Indies, from tropical diseases (malaria, dysentery, cholera; Kuhl, van Hasselt, ), accidents, wildlife attacks and native uprisings (G. Muller,-1829, C.H. Macklot- 1832)

\* Many of their collections and field notes were lost

(Also casualties among later mining engineers , including the accidental drownings of R. Fennema , W.H. de Greve)

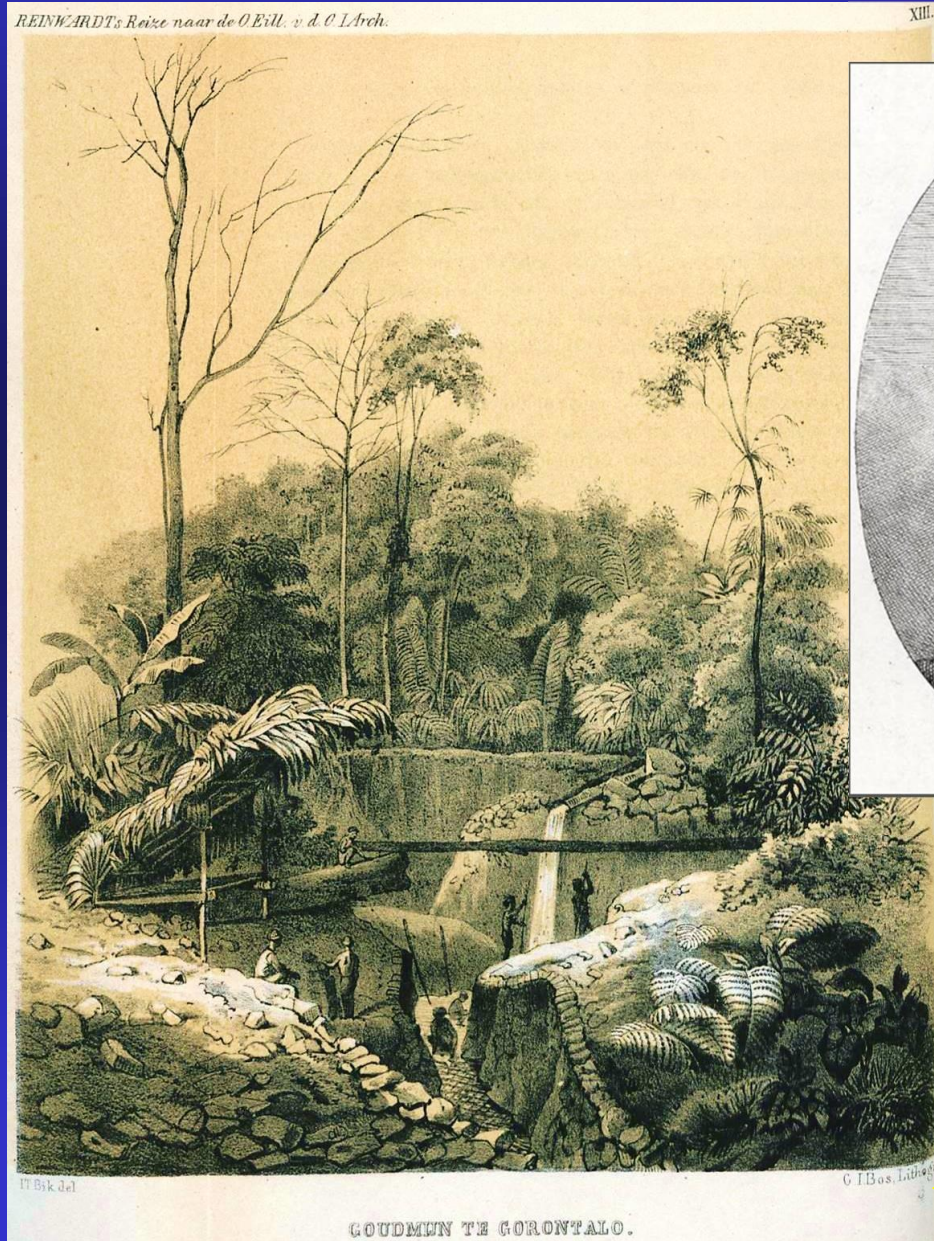




# Pioneers - Vol. 1: Early Naturalists - C. Reinwardt

## Caspar G.C. Reinwardt (1773-1854)

- \* Naturalist (mainly botanist) from Prussia (Germany)
- \* Professor of Natural History at Athenaeum Illustre, Amsterdam, 1810-1815
- \* Director for Agriculture, Arts and Sciences in Netherlands Indies, 1815-1822



- \* Founder of the Bogor Botanical Gardens, 1817-1821, on grounds of the "Buitenzorg Governor's Palace"
- \* East Indonesia Expedition, 1821-1822
- \* Director Botanical Gardens Leiden 1823-1845.

← Gold mine in Gorontalo, Sulawesi, ~1822 (Reinwardt 1858)



REINWARDT's Reize naar de O.E.I.L. v.d. O.I. Arch.

IX.



'Crater of the Fire Mountain of Ternate', ~1822 (Reinwardt 1858)

C. J. Beuk. Lithogr.

DE KRATER VAN DEN VUURBERG VAN TERNATE.



## **Pioneers - Vol. 1: Early Naturalists – Salomon Muller**

### **Salomon Muller (1804-1964)**

- \* **German naturalist (mainly zoologist) from Heidelberg, in the Indies from 1826-1837**
- \* **Mullers travels on Java, Borneo, Sumatra, New Guinea, etc., focused on geography, botany, zoology**
- \* **Wallace Line (1869): faunal demarcation between West and East Indonesia already described by S. Muller in 1842 and 1845; he should be credited as the founder of 'zoological geography' (Glaubrecht, 2002)**
- \* **Muller is credited with first reports of coal in SE Borneo, gold and copper on Timor**



**Crater of Gunung Gede, West Java (Muller 1844)**



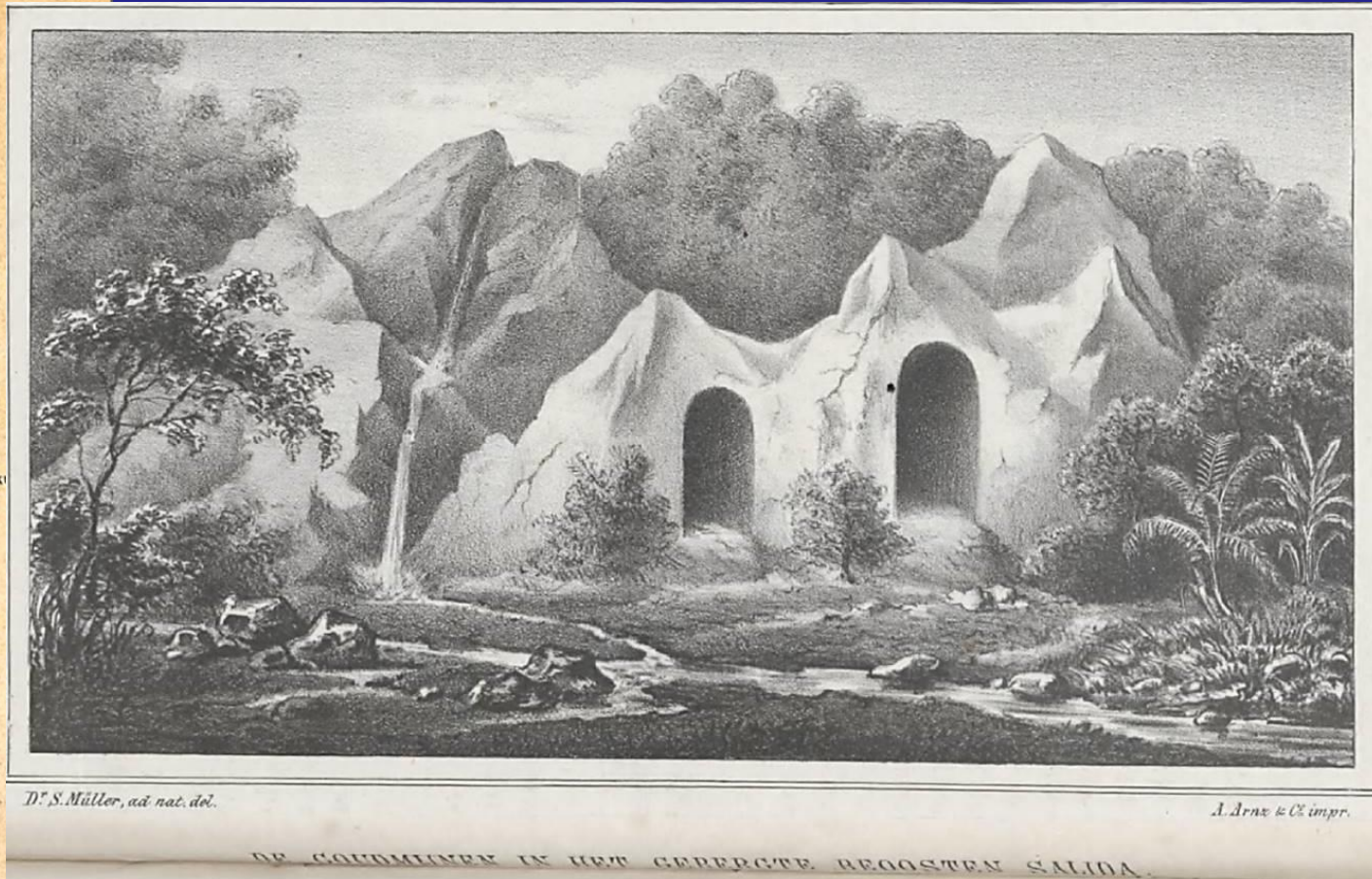
# Pioneers - Vol. 1: Early Naturalists— Salomon Muller

831 et 2

REIZEN EN ONDERZOEKINGEN  
IN  
S U M A T R A,  
GEDAAN  
OP LAST DER NEDERLANDSCHE INDISCHE REGERING, TUSSCHEN  
DE JAREN 1833 EN 1838,  
DOOR  
D<sup>r</sup>. S. MÜLLER EN D<sup>r</sup>. L. HORNER,  
LEDEN DER NATUURKUNDIGE COMMISSIE IN NEDERLANDSCH INDIE.  
BEWERKT DOOR  
D<sup>r</sup>. S. MÜLLER.  
UITGEEVEN VAN WEGE HET KONINKLIJK INSTITUUT VOOR DE TAAL- LAND- EN VOLKENKUNDE  
VAN NEDERLANDSCH INDIE.  
KONINKLIJKE  
BIBLIOTHEEK  
t. s. gravenhage.  
'S GRAVENHAGE,  
K. FUHRI.  
1855.

## Salomon Muller

- \* Traveled parts of Sumatra between 1833-1838, including a study of the area of the VOC Salida gold mines (Muller 1846, Muller & Horner 1855)
- \* One of the few Commissie members to return to The Netherlands alive and document his survey results



Entrances to gold mines in the mountains East of Salida (Muller 1844)  
- exploited gold-bearing quartz veins in dioritic rock



# Pioneers - Vol. 1: Early Naturalists— Salomon Muller

REIZEN EN ONDERZOEKINGEN  
 IN  
 SUMATRA,  
 GEDAN  
 OP LAST DER NEDERLANDSCHE INDISCHE REGERING, TUSSCIEN  
 DE JAREN 1833 EN 1838,  
 DOOR  
 D<sup>r</sup>. S. MULLER EN D<sup>r</sup>. L. HORNER,  
 LEEDER DER NATUURKUNDE IN SRIJLANKA 1796.  
 BEWENKT DOOR  
 D<sup>r</sup>. S. MÜLLER.  
 UITGEEVEN VAN WILHELMUS BRONKHORST, INDIENSCHE VOOR DE TAALEN-LEER- EN VERBODENDE  
 VAN NEDERLANDSCHE ERDE.  
 S GRAVENHAGE,  
 K. FUHRI,  
 1855.



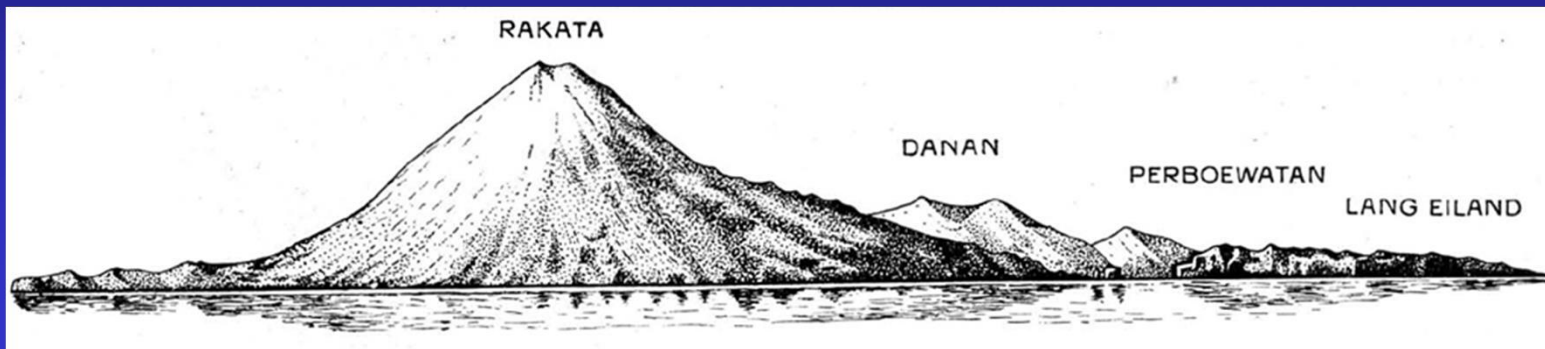
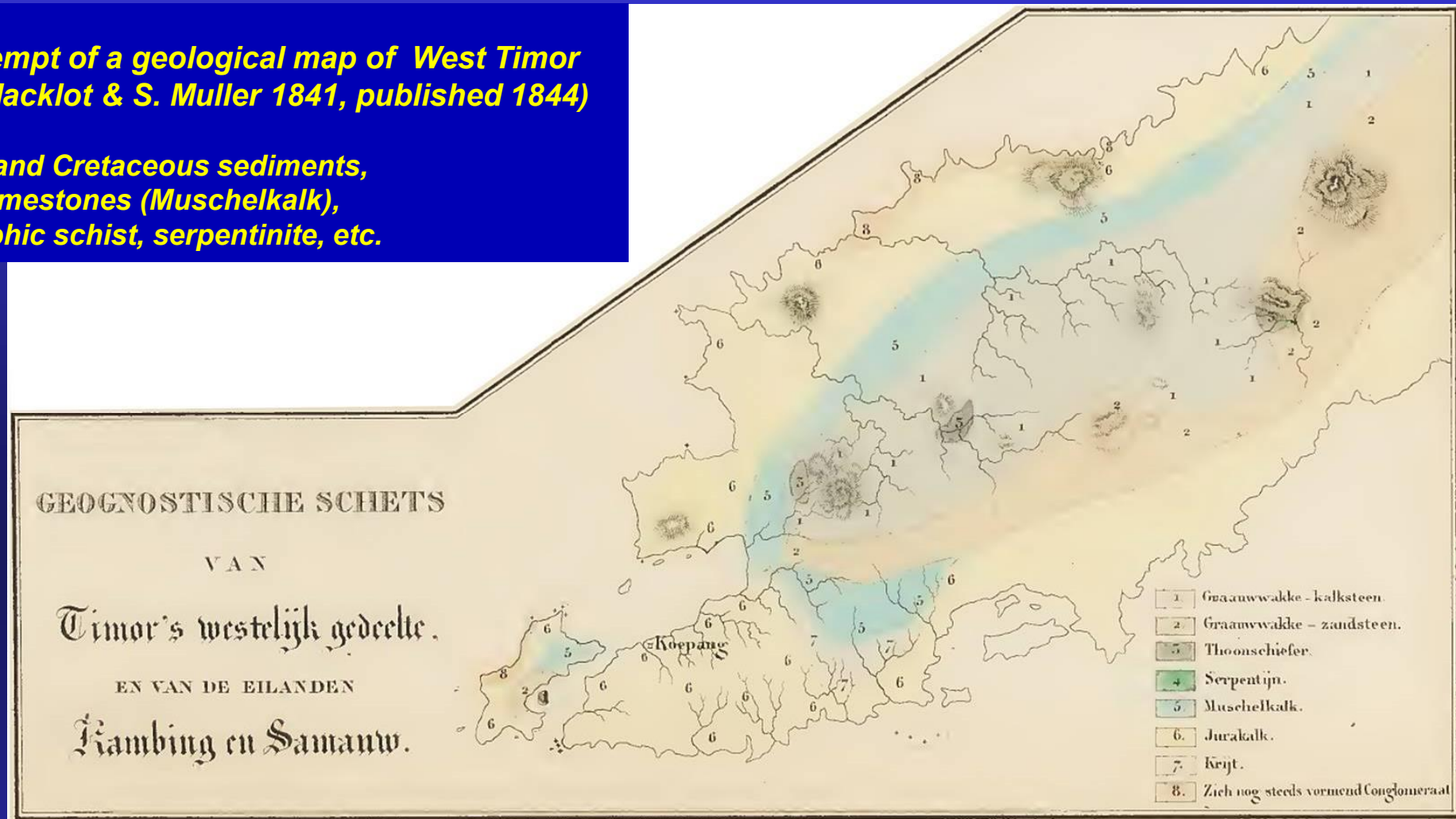
Map of the VOC gold mines (Tambang) in the mountains East of Salida (Muller 1846)



# Pioneers - Vol. 1: Early Naturalists – Salomon Muller

First attempt of a geological map of West Timor  
(H.C. Macklot & S. Muller 1841, published 1844)

\* Jurassic and Cretaceous sediments,  
Triassic limestones (Muschelkalk),  
metamorphic schist, serpentinite, etc.



The Krakatau islands in 1836, before the 1883 eruption (from sketch by S. Muller; in Neumann van Padang 1933).



## B O R N E O.

BESCHRIJVING VAN HET STROOMGEBIED VAN DEN BARITO

en

REIZEN LANGS EENIGE VOORNAME RIVIEREN VAN HET

ZUID-OOSTELIJK GEDEELTE VAN DAT EILAND,

door

DE C. A. L. M. SCHWANER.

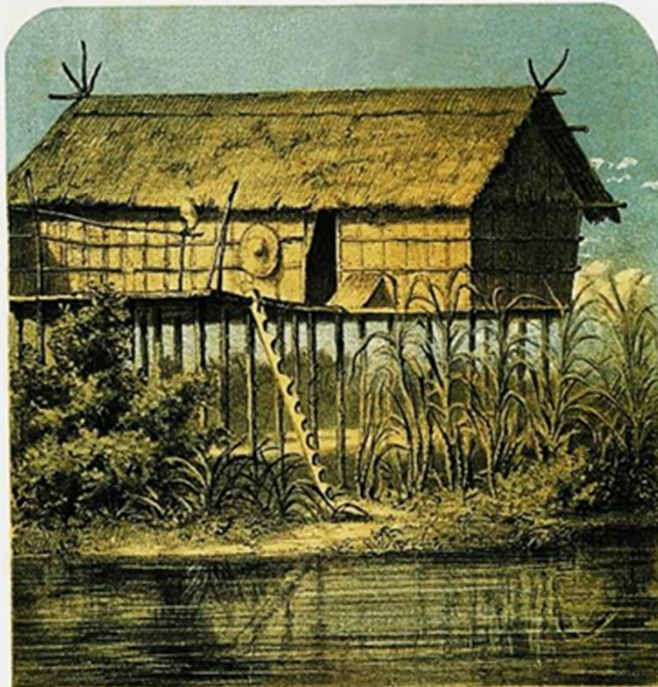
op last

van het Gouvernement van Nederl. Indië gedaan in

de Jaren 1843-1847.

met Platen en eene Kaart.

HET DEEL.



Uitgegeven van wege het Koninklijke Instituut  
voor de taal-land en volkenkunde van Neerl-Indië.

Te AMSTERDAM, bij

P. N. VAN KAMPEN.

1854.

(Schwaner 1854)

## Carl A.M. Schwaner (1817-1851)

- \* German naturalist (geographer-geologist), in the Indies from 1842-1851
- \* The first European to complete an overland traverse of Borneo, from Banjarmasin in the SE to Pontianak in the West, from October 1847- February 1848, with a contingent of 20 Dayaks
- \* Discovery of Eocene coal deposits at Riam Kiwa in SE Kalimantan in 1844 (described posthumously in Schwaner 1850, 1857), which led to opening of first coal mines in the Netherlands East Indies near in 1848-1849.
- \* Most of Schwaner's geological observations from Kalimantan remained unpublished due to his premature death from malaria in 1851, at age 34.





**Carl Schwaner**



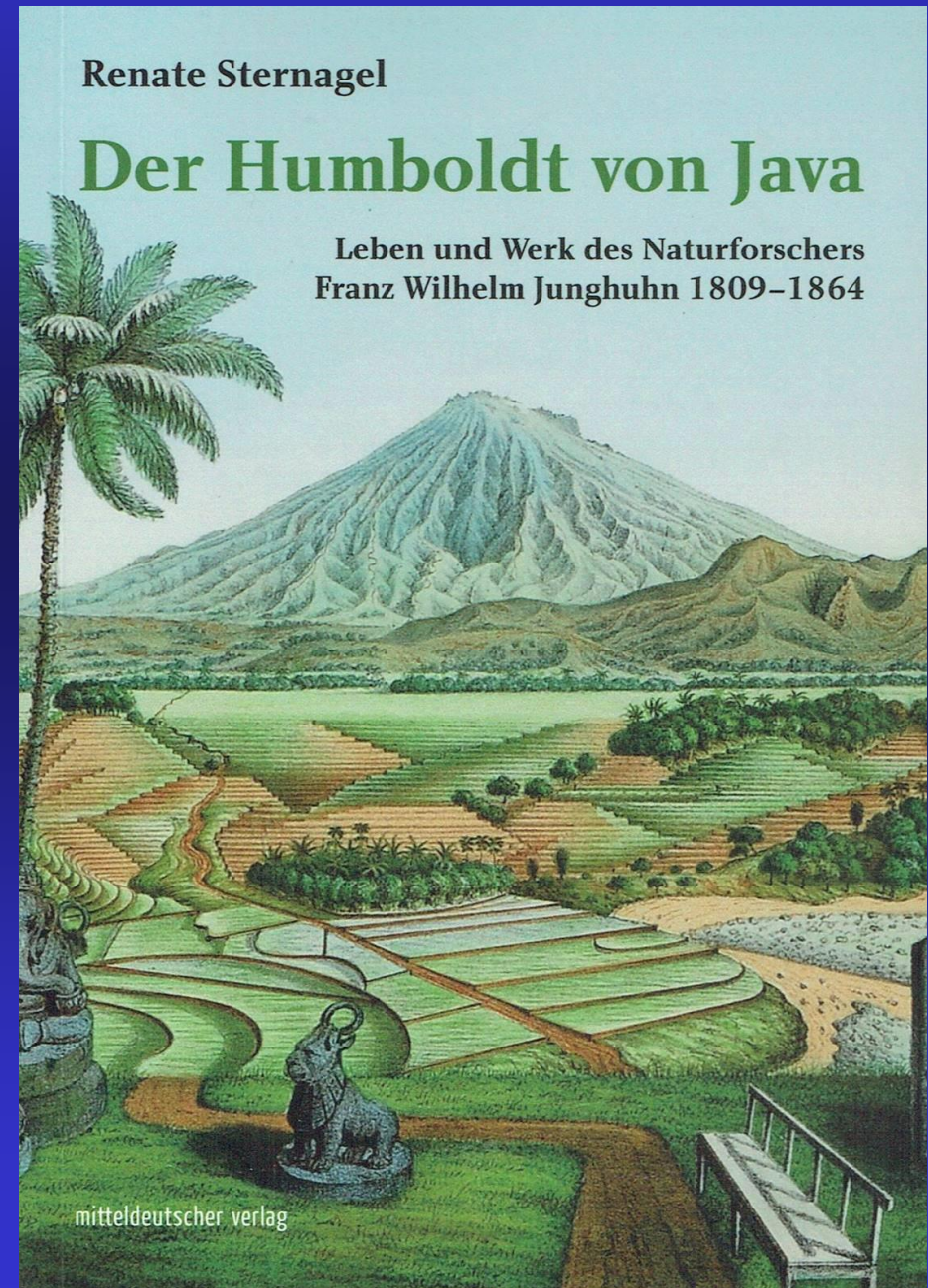
***Lithograph of an outcrop in the Barito River drainage area, in the posthumous book of Schwaner (1854).  
Made after a sketch by H. von Gaffron in the mid-1840s.***





**Franz W. JUNGHUHN (1809-1864)**

**\* Nicknamed "The Humboldt of Java"...**



- \* German national F. Junghuhn came to the Netherlands Indies as a medical doctor in 1835**
- \* Became a naturalist- geographer Member of the 'Naturkundige Commissie ' (1838-1848), traveled extensively across Java and Sumatra**



## Pioneers - Vol. 1: Early Naturalists - F. Junghuhn

- \* Junghuhns magnum opus was the 3-volume work 'Java, deszelfs gedaante, bekleeding en inwendige structuur' (1850)
- \* In it he described 37 volcanoes, but also dispelled the notion that Java was almost all volcanic (e.g. Horsfield, 1812); there are also widespread Tertiary sediments





## Pioneers - Vol. 1: Early Naturalists - F. Junghuhn

*By 1848 Junghuhn had mapped and described all of Java's 37 active or recently active volcanoes*



Junghuhn del.

Lith. Anst. v. Winckelmann & Söhne in Berlin

GUNUNG · GUNTUR.



**Pioneers - Vol. 1: Early Naturalists - F. Junghuhn**

***Gunung Gamping Eocene limestone ridge W of Yogyakarta, around 1840 (Junghuhn, 1850)***

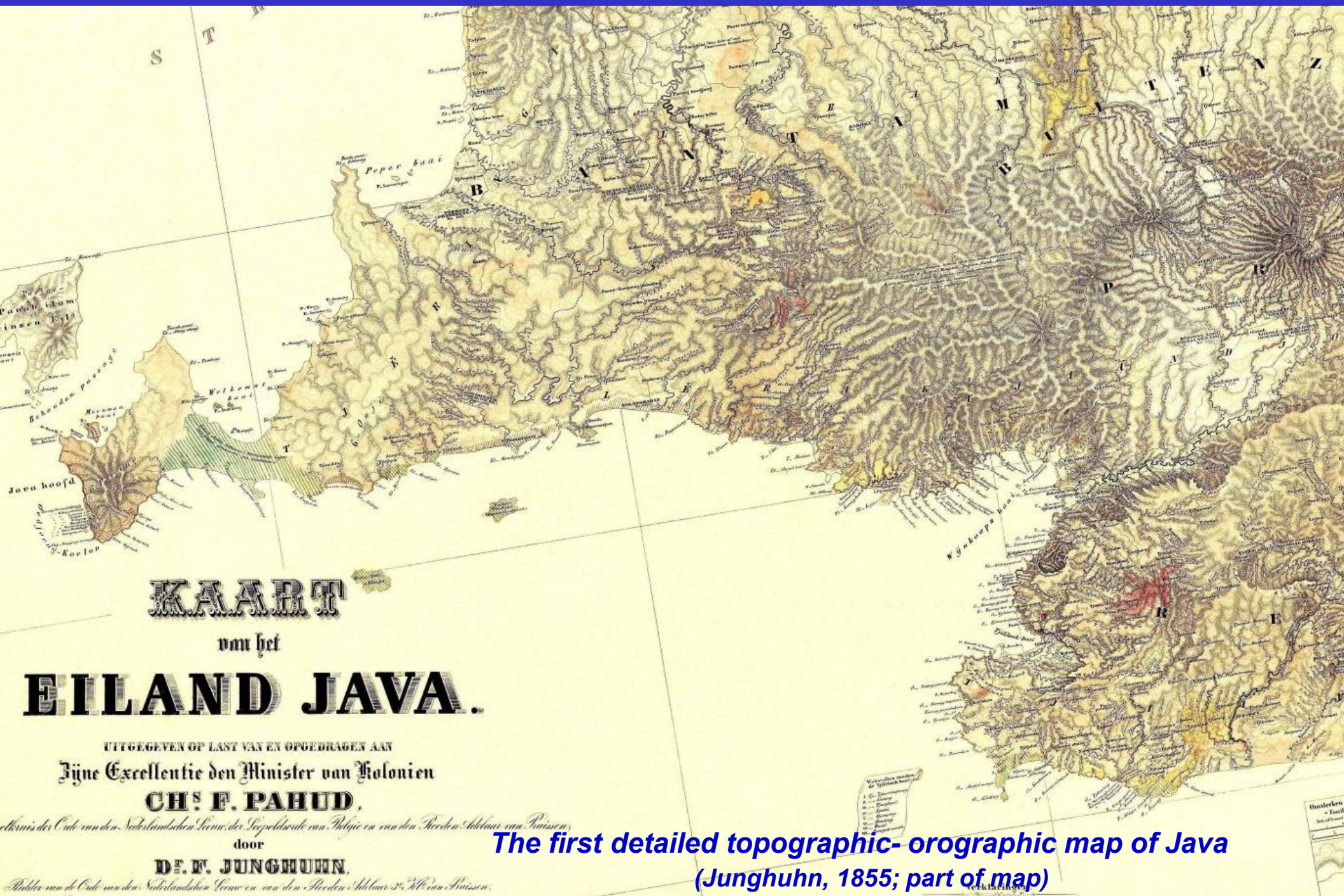






***Gunung Gamping W of Yogyakarta  
Earliest outcrop photograph from  
Indonesia ? (1860, by F. Junghuhn)***

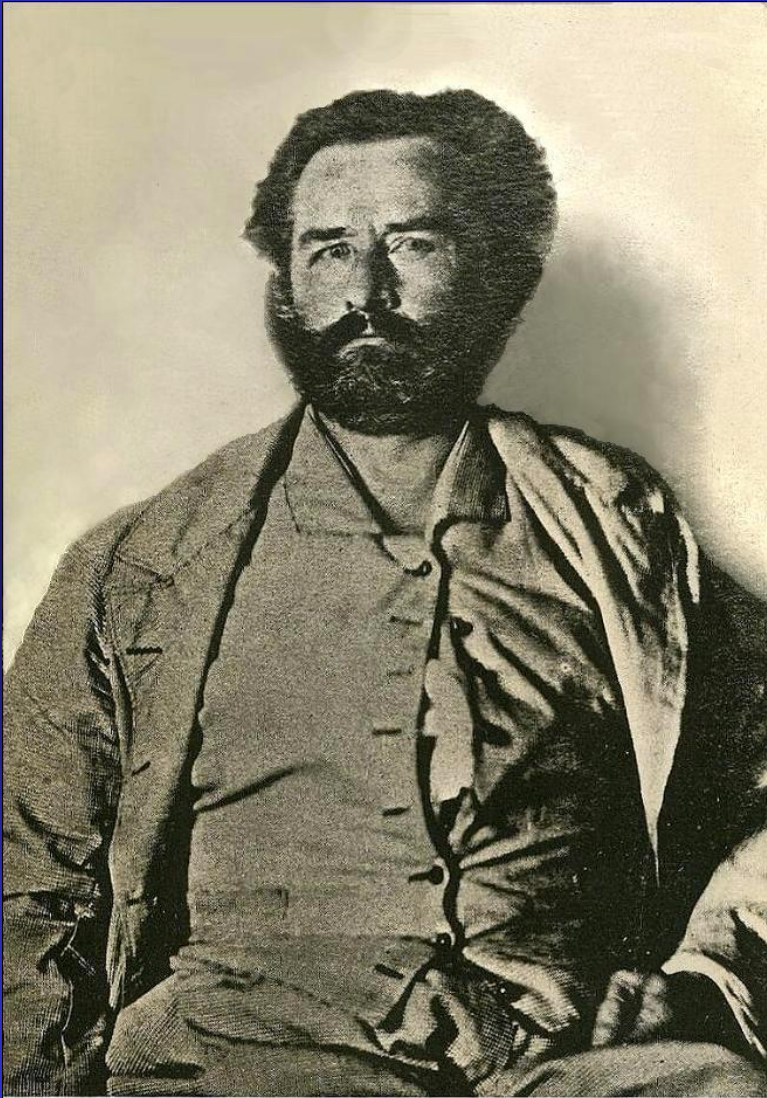






## Pioneers - Vol. 1: Early Naturalists - F. Junghuhn

After recovering from illness and completing his writings in The Netherlands, Junghuhn returned to Java as a developer of quinine plantations near Lembang from 1855 until his death in 1864.



*F. Junghuhn*



Grave-monument of Junghuhn near Lembang, 1865



## Pioneers – Vol. 1: Early Naturalists - Raden Saleh

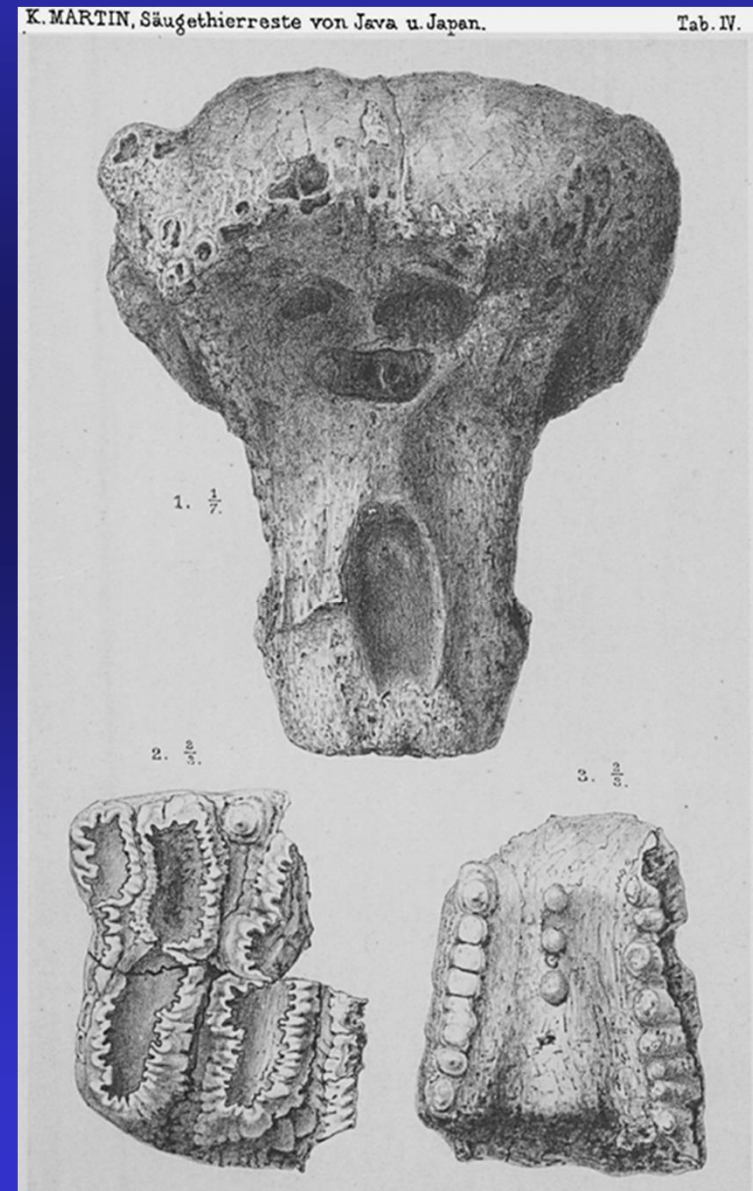


### Raden SALEH (1811-1880):

- \* Javanese romantic-style painter from a noble family in Semarang
- \* Spent 22 years in Europe (1829-1851), famous for painting portraits for European noble families

- \* R.S. was also an amateur naturalist, who in 1865-1866 discovered and collected Pleistocene mammal fossils in several localities of Central and East Java (Pati Ajam, Kedung Brubus).
- \* This info caused E. Dubois to move his excavations from caves in Sumatra and South Java to Pleistocene river deposits in Central Java in 1890, which led to the discovery of 'Java Man' (*Pithecanthropus erectus*) in 1891.

Stegodon fossils collected by Raden Saleh described by K. Martin (1886)







**Raden SALEH: Eruption of Merapi volcano, Central Java in 1865 - daytime**





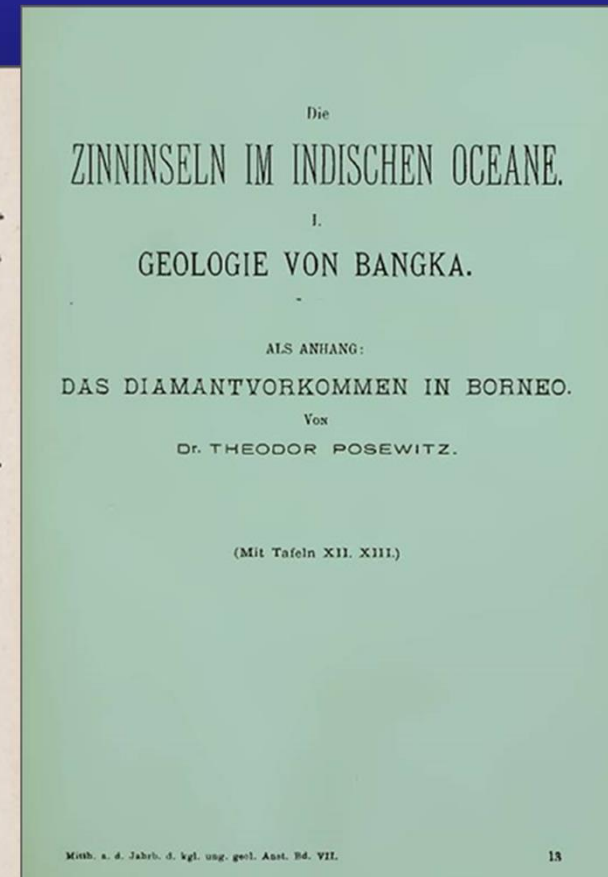
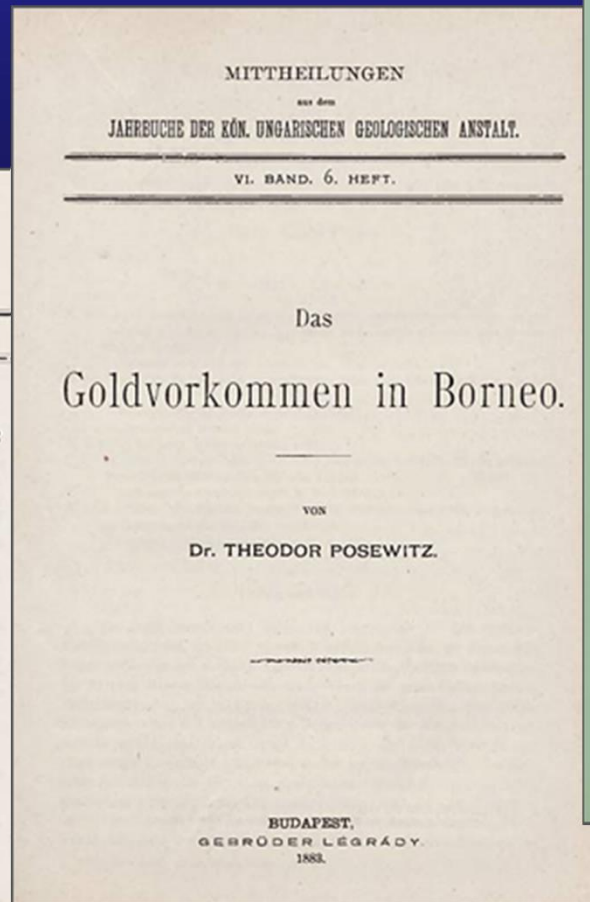
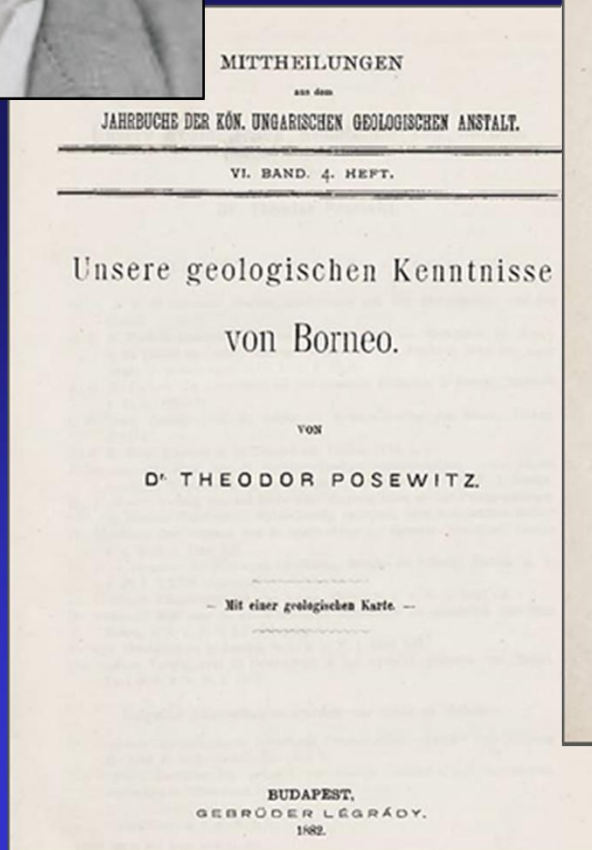
**Raden SALEH: Eruption of Merapi volcano, Central Java in 1865 - night time**





**Theodor (Tivadar) POSEWITZ (1851-1917)**

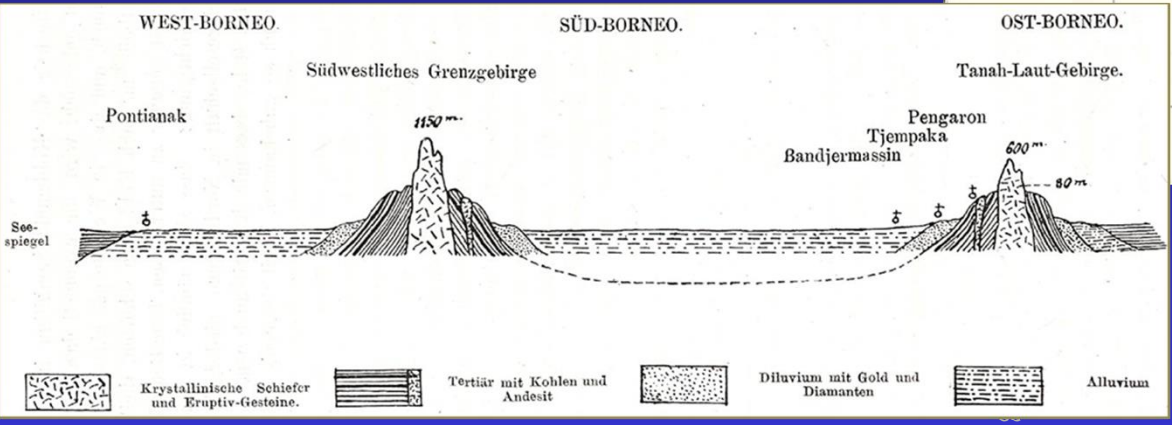
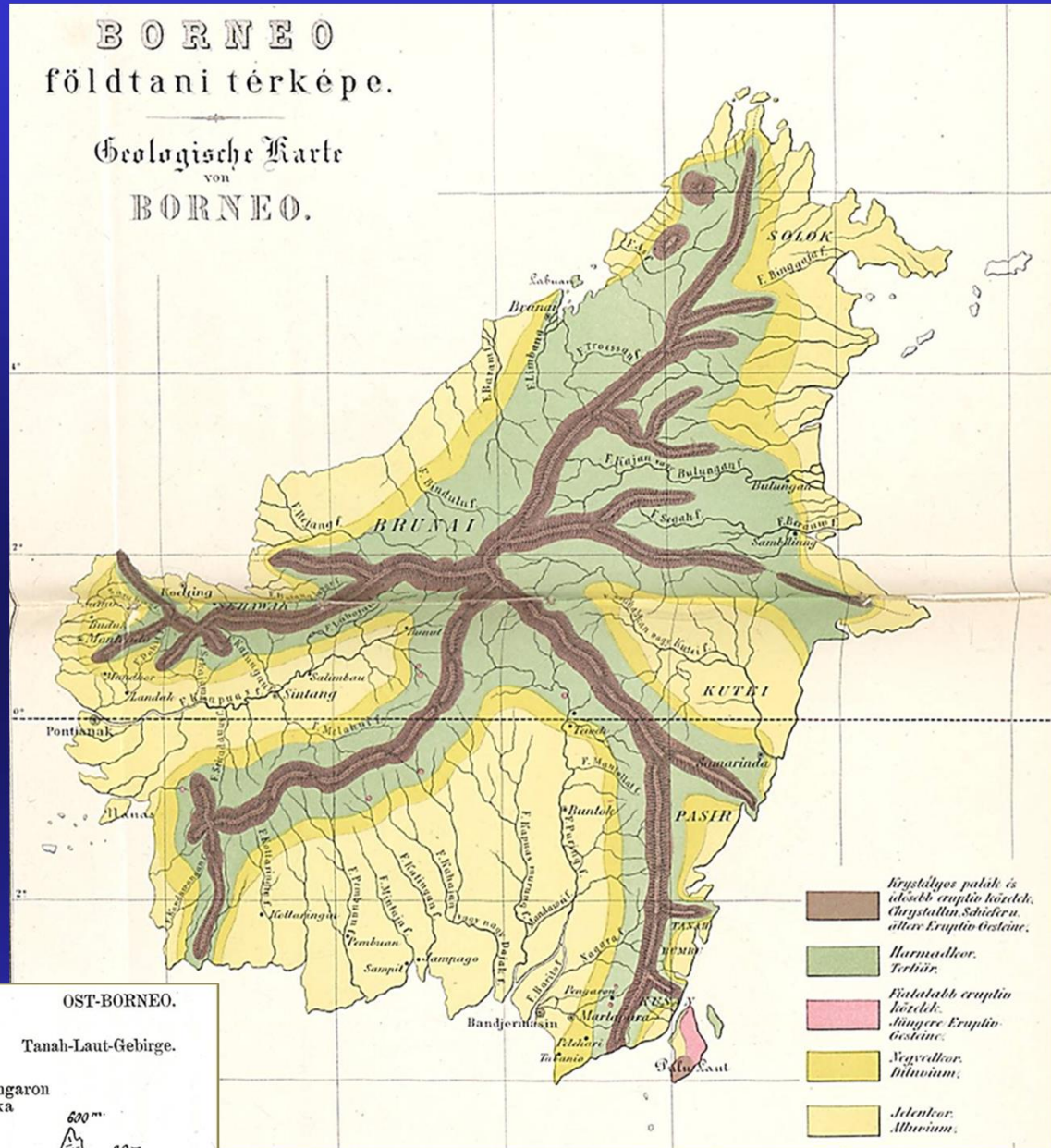
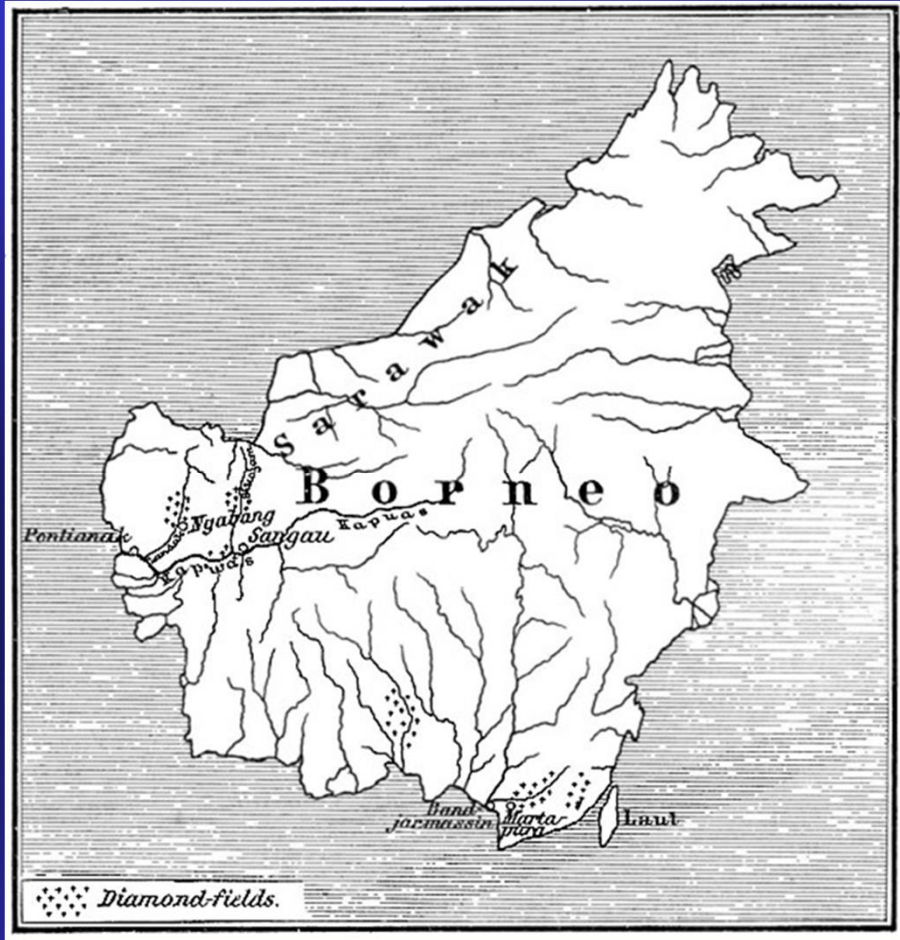
- \* **Hungarian military surgeon, stationed in Indies from 1879-1884 (incl. 3 years in Banjarmasin, Barabai and Teweh, Kalimantan)**
- \* **Studied at the Bergakademie of Freiberg, Saxony (1877 graduate)**
- \* **Geologic studies of Borneo and Bangka**
- \* **The first geologic maps of Borneo (Posewitz, 1882, 1892).**



**Three Posewitz papers, published in Hungary (1882-1885).**



Theodor POSEWITZ



The first regional geologic map and cross-section of Borneo (Posewitz, 1882).



**The second regional geologic map of Borneo (Posewitz, 1892).**

**BORNEO:**  
178  
**GEOLOGY AND MINERAL RESOURCES.**

BY  
**DR. THEODOR POSEWITZ,**  
MEMBER OF THE ROYAL HUNGARIAN INSTITUTE, BUDAPEST.

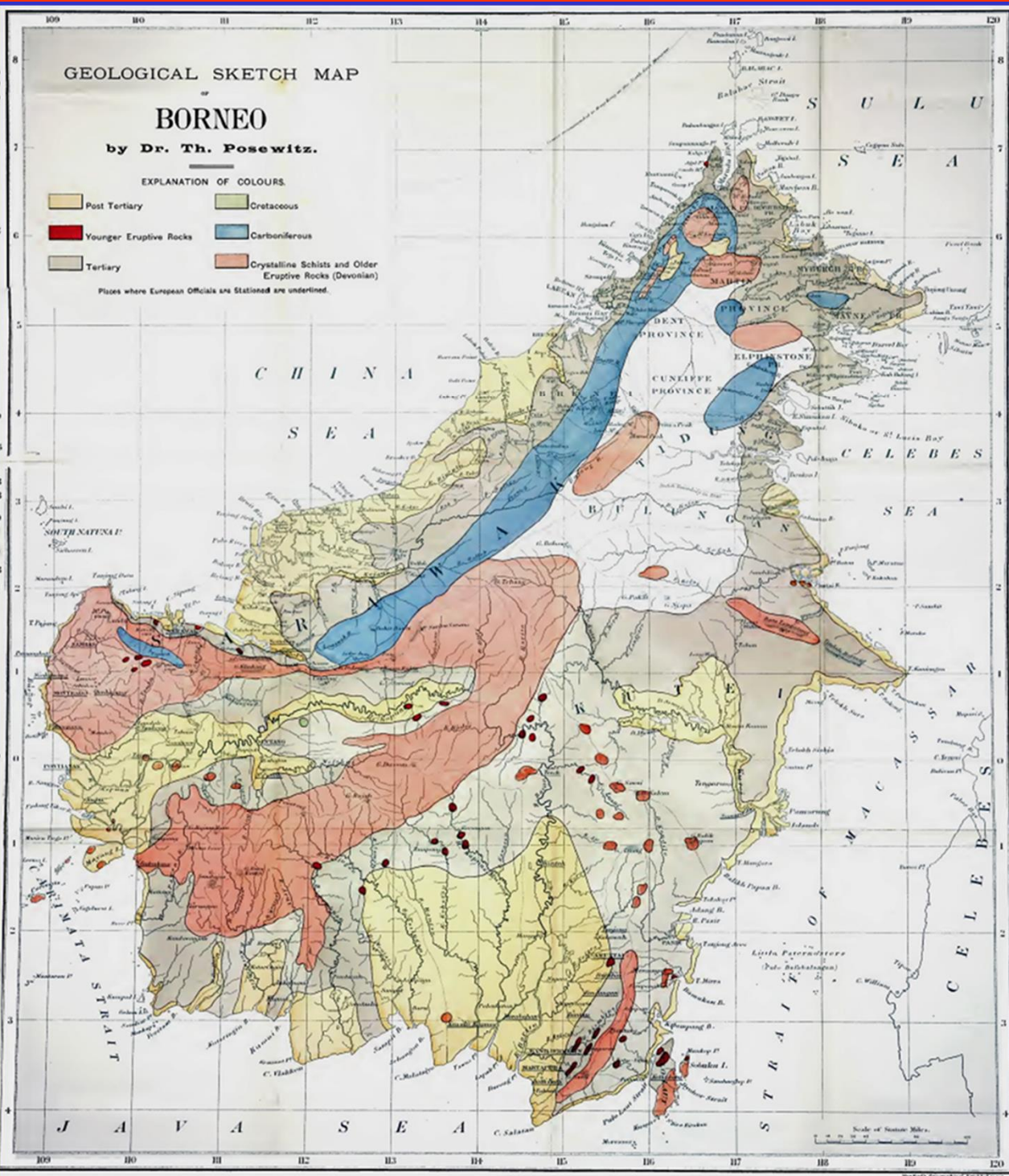
TRANSLATED FROM THE GERMAN  
BY  
**FREDERICK H. HATCH, Ph.D., F.G.S.**  
OF THE GEOLOGICAL SURVEY OF ENGLAND AND WALES.

**WITH MAPS AND ILLUSTRATIONS**

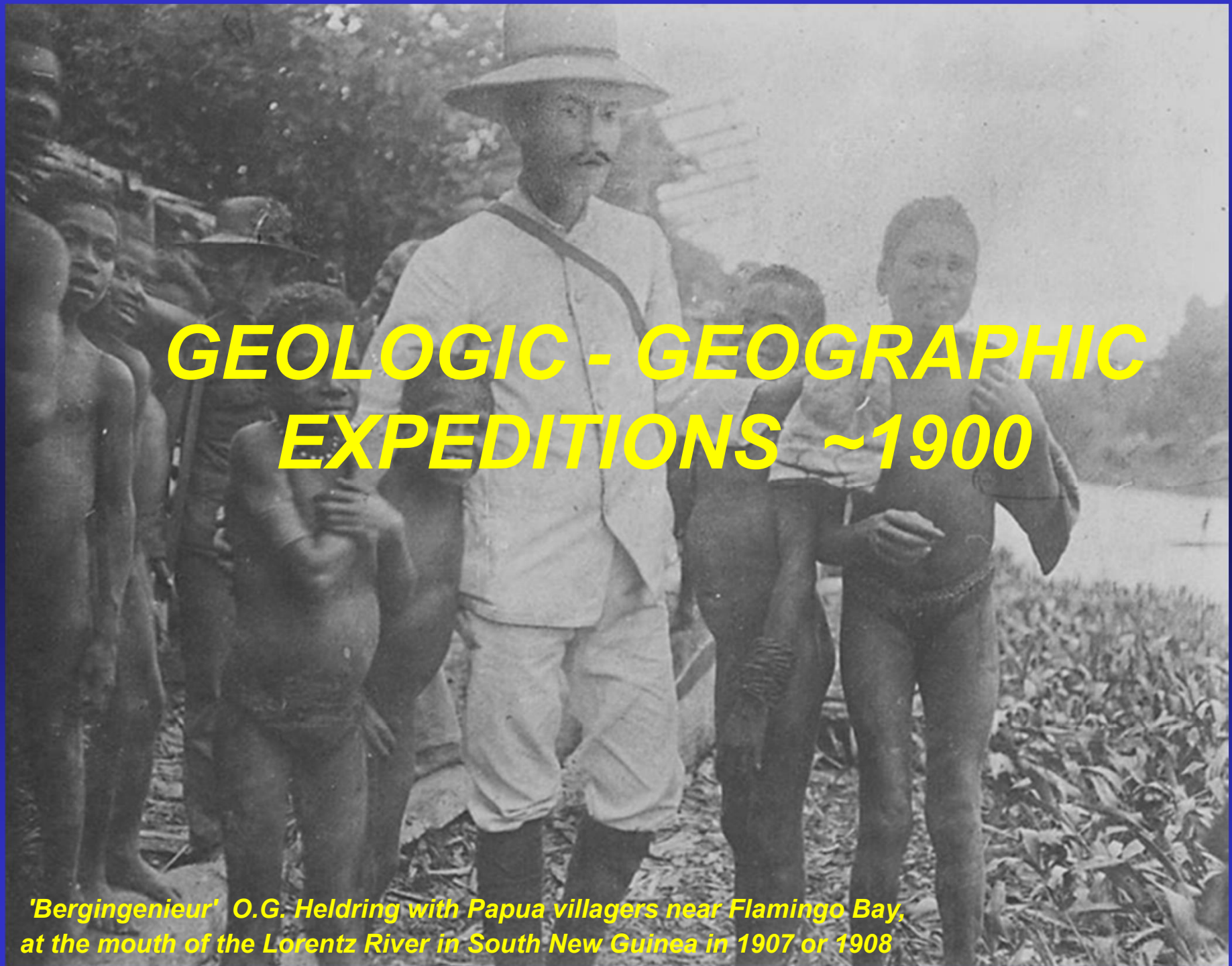
LONDON: EDWARD STANFORD,  
26 & 27 COCKSPUR STREET, CHARING CROSS, S.W.  
1892

[The right of translation reserved.]

**First English-language Geology of Borneo book (Posewitz, 1892) (translation of 1889 German original).**







**GEOLOGIC - GEOGRAPHIC  
EXPEDITIONS ~1900**

*'Bergingenieur' O.G. Heldring with Papua villagers near Flamingo Bay,  
at the mouth of the Lorentz River in South New Guinea in 1907 or 1908*



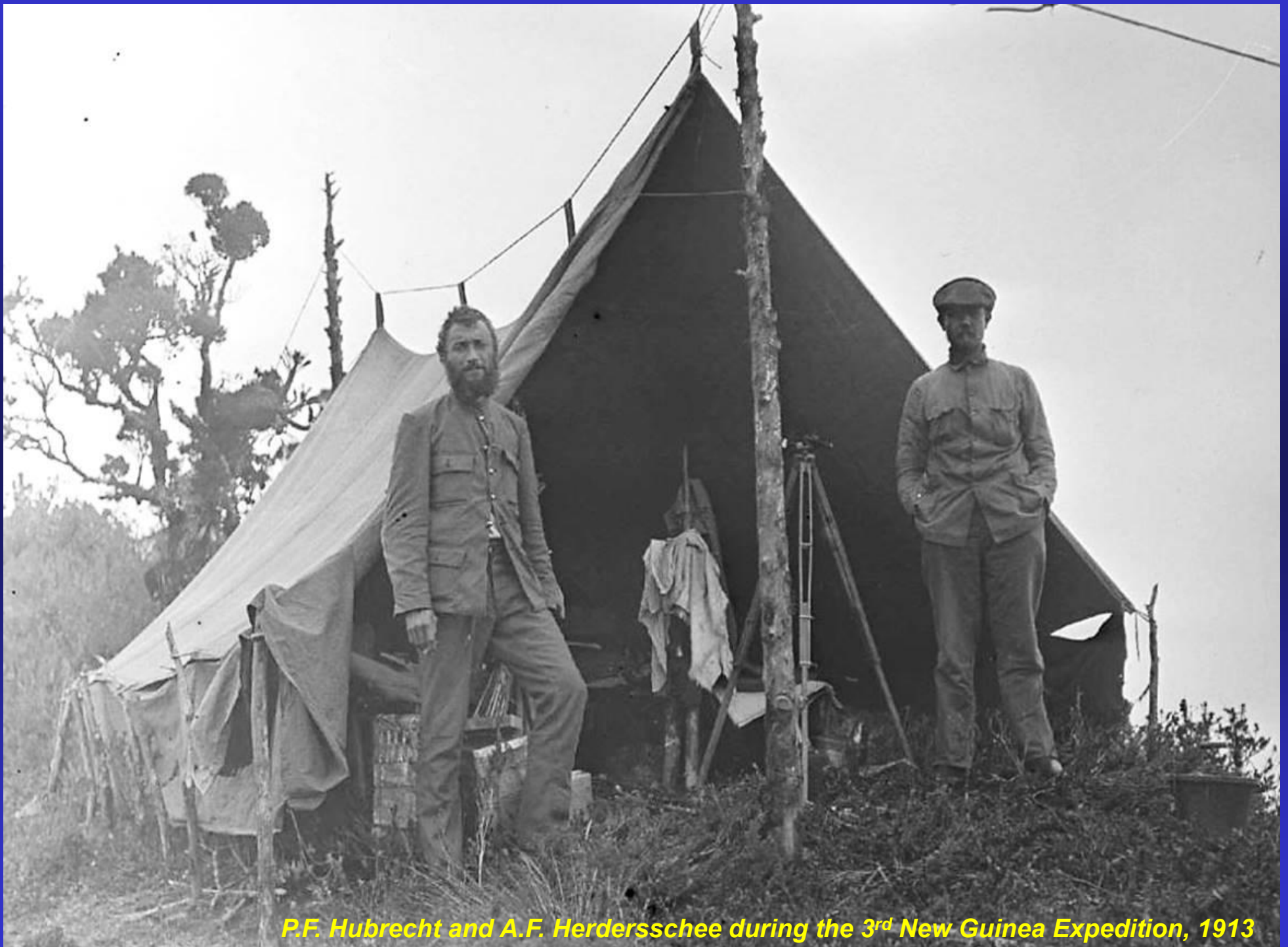
## GEOLOGIC-GEOGRAPHIC EXPEDITIONS FROM ~1900

- SUMATRA:** *Wilhelm T.A.H. VOLZ (1897-1898, 1899-1900, 1904-1906)*
- EAST INDONESIA:** *C.E. Arthur WICHMANN (1888, 1903)*  
*Rogier D.M. VERBEEK (1899)*  
*Georg BOEHM (1900-1901), Karl DENINGER (1907, 1911)*  
*Johannes E.W. ELBERT (1909), L.M.R. RUTTEN (1917-1919)*
- BORNEO (Kalimantan)** *Gustaaf A.F. MOLENGRAAFF (1893-1894)*
- CELEBES (Sulawesi)** *Paul and Fritz SARASIN (1893-1896, 1902-1903),*  
*J.H.W. AHLBURG (1909),*  
*Eduard C. ABENDANON (1909-1910)*
- TIMOR:** *J. WANNER (1912), G. MOLENGRAAFF & H.A. BROUWER (1912)*  
*H.A. BROUWER, W.P. DE ROEVER, D. TAPPENBECK (1937)*
- NEW GUINEA** *Otto G. HELDRING (1907-1912)*  
*Paul F. HUBRECHT (1910-1913)*  
*Willem K.H. FEUILLETAU DE BRUYN (1911-1915)*  
*J. Jacques DOZY (1936)*

*\* In the late 1800s more and more Dutch geologists and mining engineers started to contribute to the study of the geology of the Netherlands Indies:*

- 1. First geology professors in the Universities of Leiden (Karl Martin, 1877), Groningen (F. van Calker, 1877) and Utrecht (A. Wichmann, 1879)*
- 2. Geology education of mining engineers from the Technische Hogeschool in Delft, by professors Prof. H. Vogelsang from 1864-1874 and G.A.F. Molengraaff after 1905*





***P.F. Hubrecht and A.F. Herdersschee during the 3<sup>rd</sup> New Guinea Expedition, 1913***

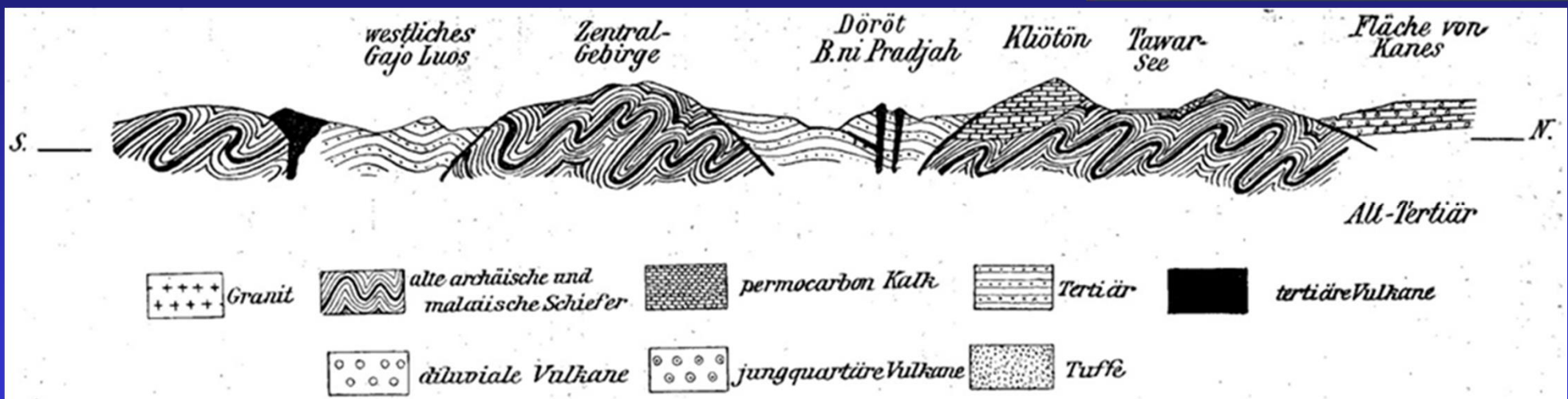
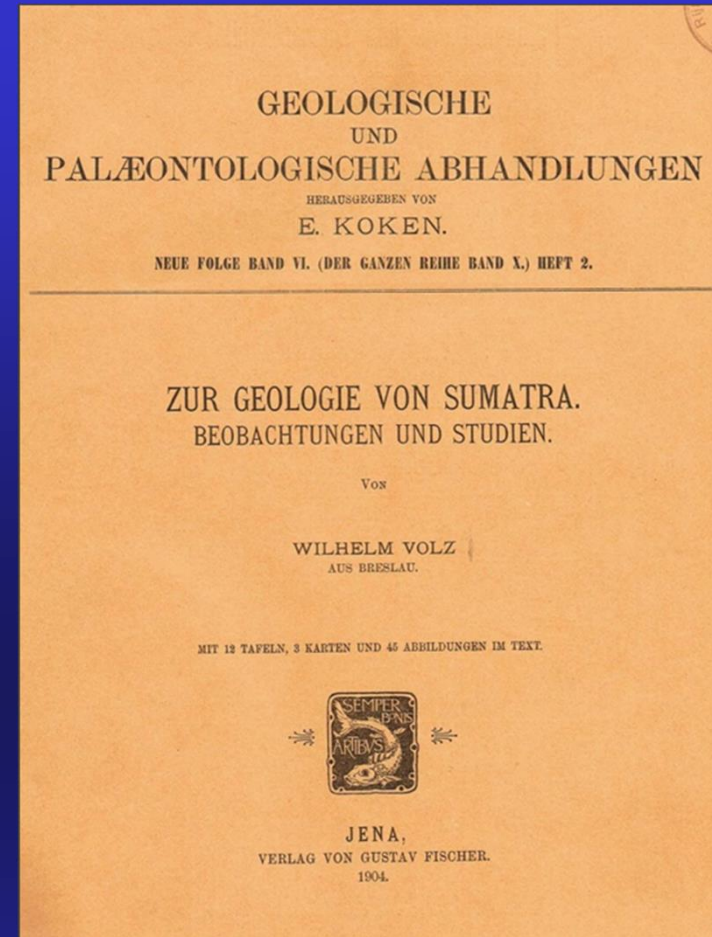


# Pioneers - Vol. 1: Scientific Explorers - W. Volz



## WILHELM VOLZ (1897- 1906)

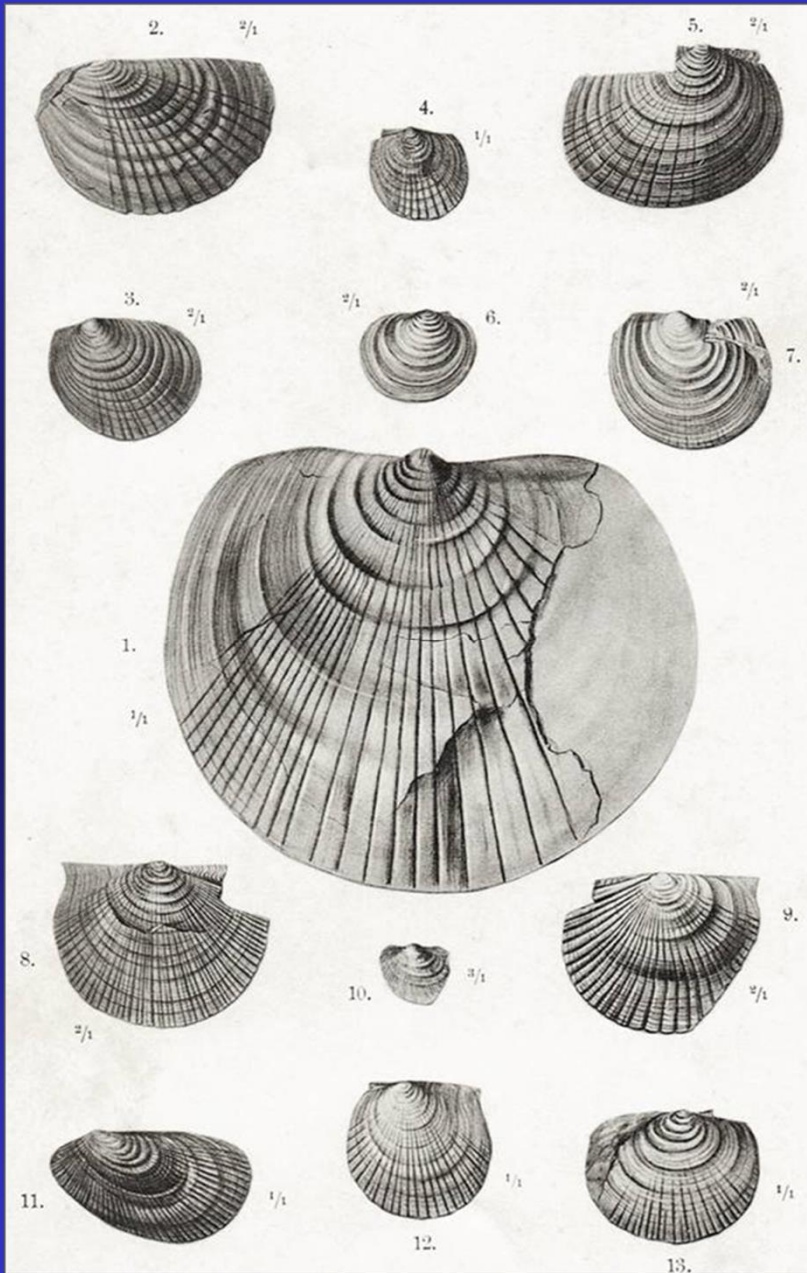
- \* German geographer- geologist
- \* 3 expeditions in North Sumatra between 1897-1906 ,
- two academic, one as consultant for August Janssen





# Pioneers - Vol. 1: Scientific Explorers - W. Volz

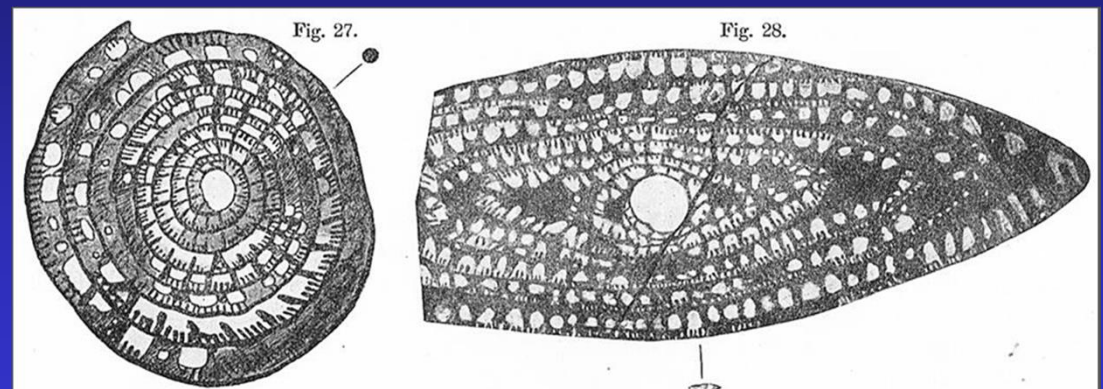
Volz demonstrated the presence of marine Permian and Triassic sediments in North Sumatra around 1900



**Middle-Late Triassic bivalve molluscs  
*Daonella* and *Halobia* (Volz 1889).**



**DR. VOLZ IN SUMATRA.**

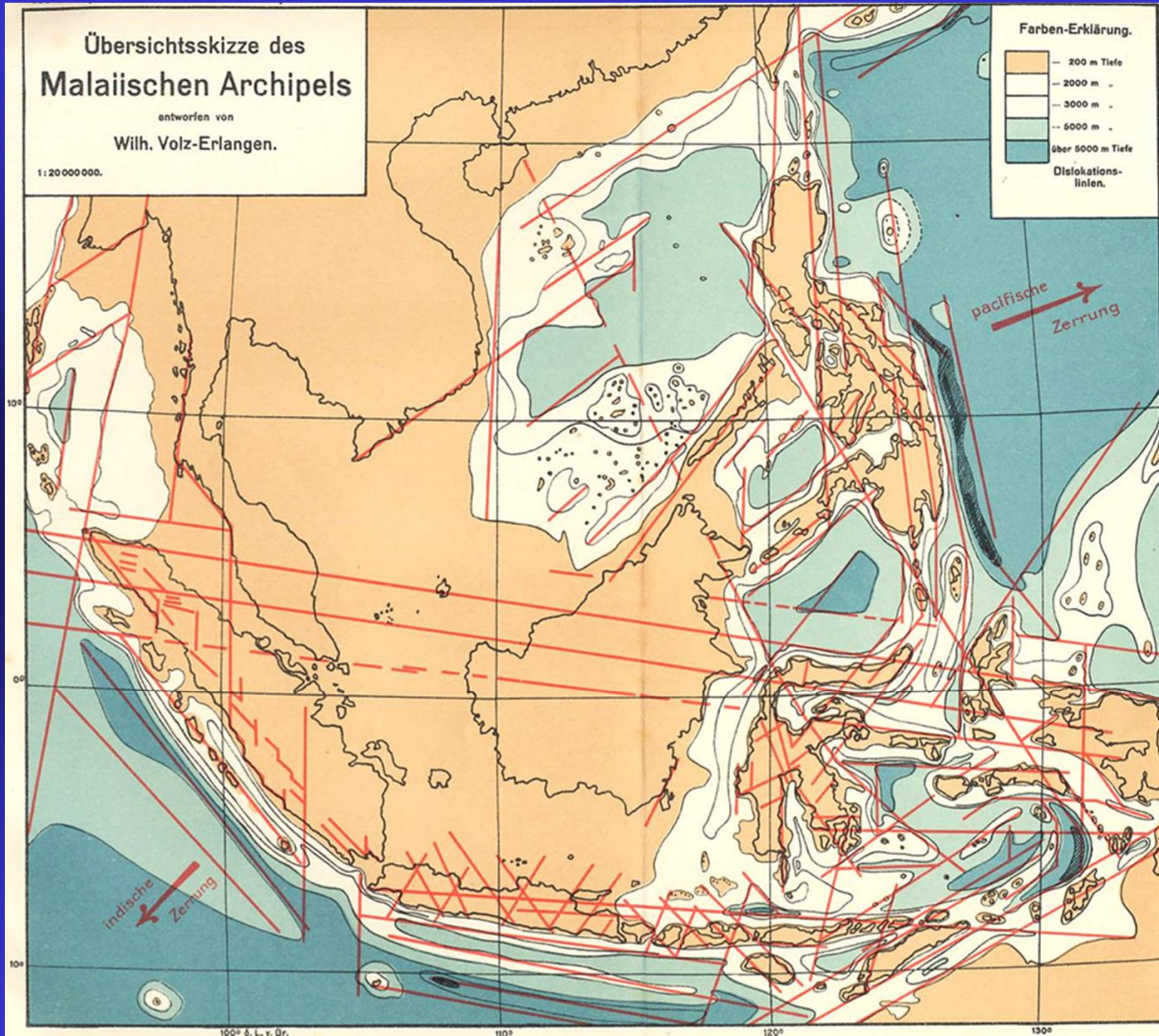


**Permian fusulinid *Sumatrina annae* (Volz 1904).**



Structure of the  
Malay Archipelago  
(Volz 1912).

**\*\* not so good \*\***





# Pioneers - Vol. 1: Geologic Expeditions around 1900 - G. Molengraaff

**Gustaaf MOLENGRAAFF (1860-1942)**

- \* **Geology professor in Amsterdam (1888-1895)**
- \* **Geologist in South Africa (1896-1905)**
- \* **Geology professor Delft (1906-1930)**

\* **Borneo Expedition , 1894**

\* **Timor expedition , 1911**



**BORNEO-EXPEDITIE**  
**GEOLOGISCHE**  
**VERKENNINGSTOCHTEN**

IN  
**CENTRAAL-BORNEO**  
(1893-94)

DOOR

**Dr. G. A. F. MOLENGRAAFF**

OND-BOOGLEERAAR A/D UNIVERSITEIT TE AMSTERDAM, STAATSGEOLOG DER ZUID-AFRIKAANSCH REPVLEK.

Met 3 Kaarten, 56 Platen en 89 Tekstfiguren

Uitgegeven door de Maatschappij ter bevordering van het Natuurkundig  
Onderzoek der Nederlandsche Koloniën

Met Atlas

BOEKHANDEL EN DRUKKERIJ  
VOORHEEN  
**E. J. BRILL**  
LEIDEN

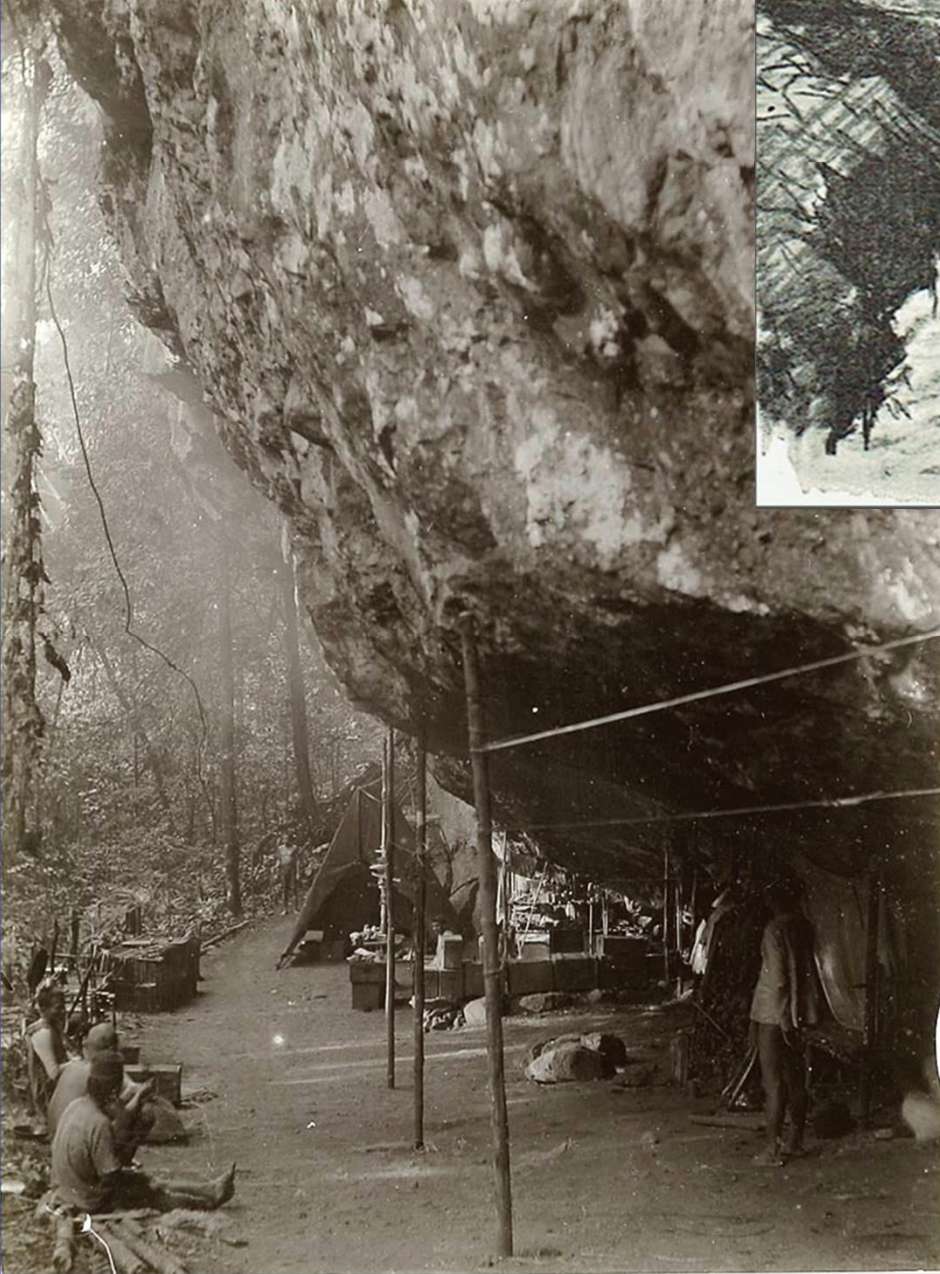
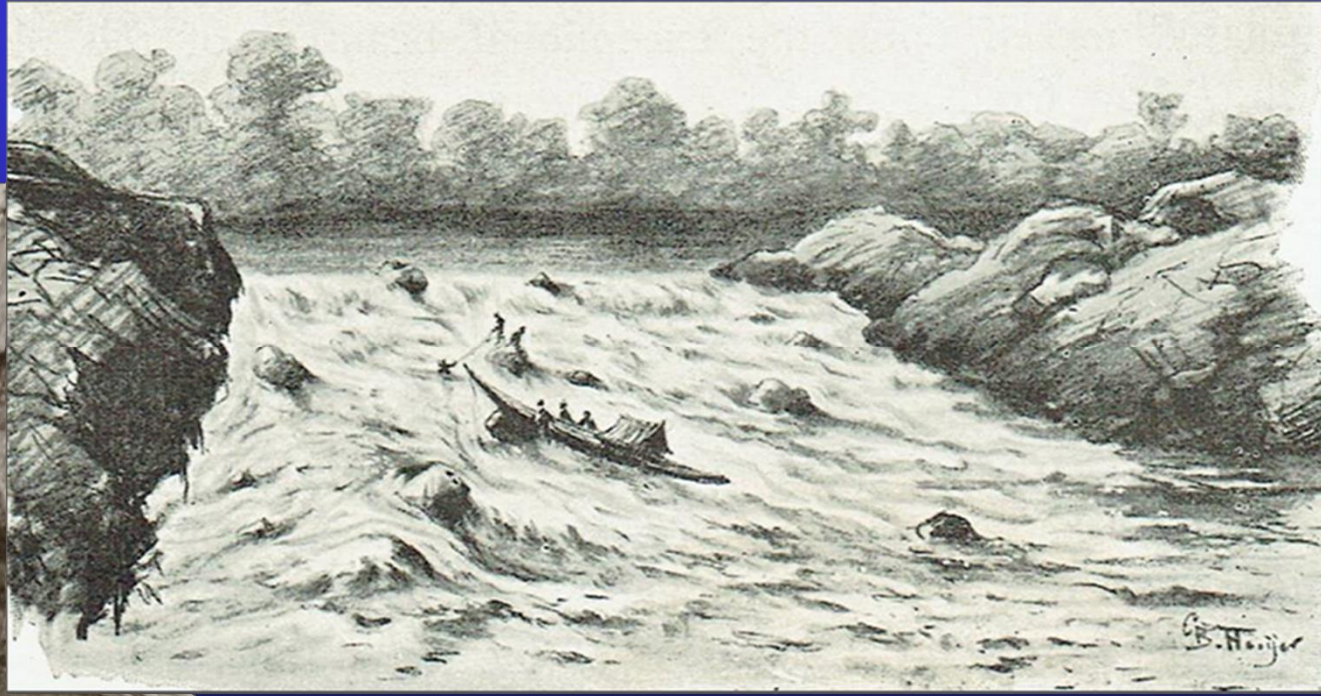
**H. GERLINGS**  
AMSTERDAM

1900





# Pioneers - Vol. 1: Geologic Expeditions around 1900 - G. Molengraaff



## **G. MOLENGRAAFF**

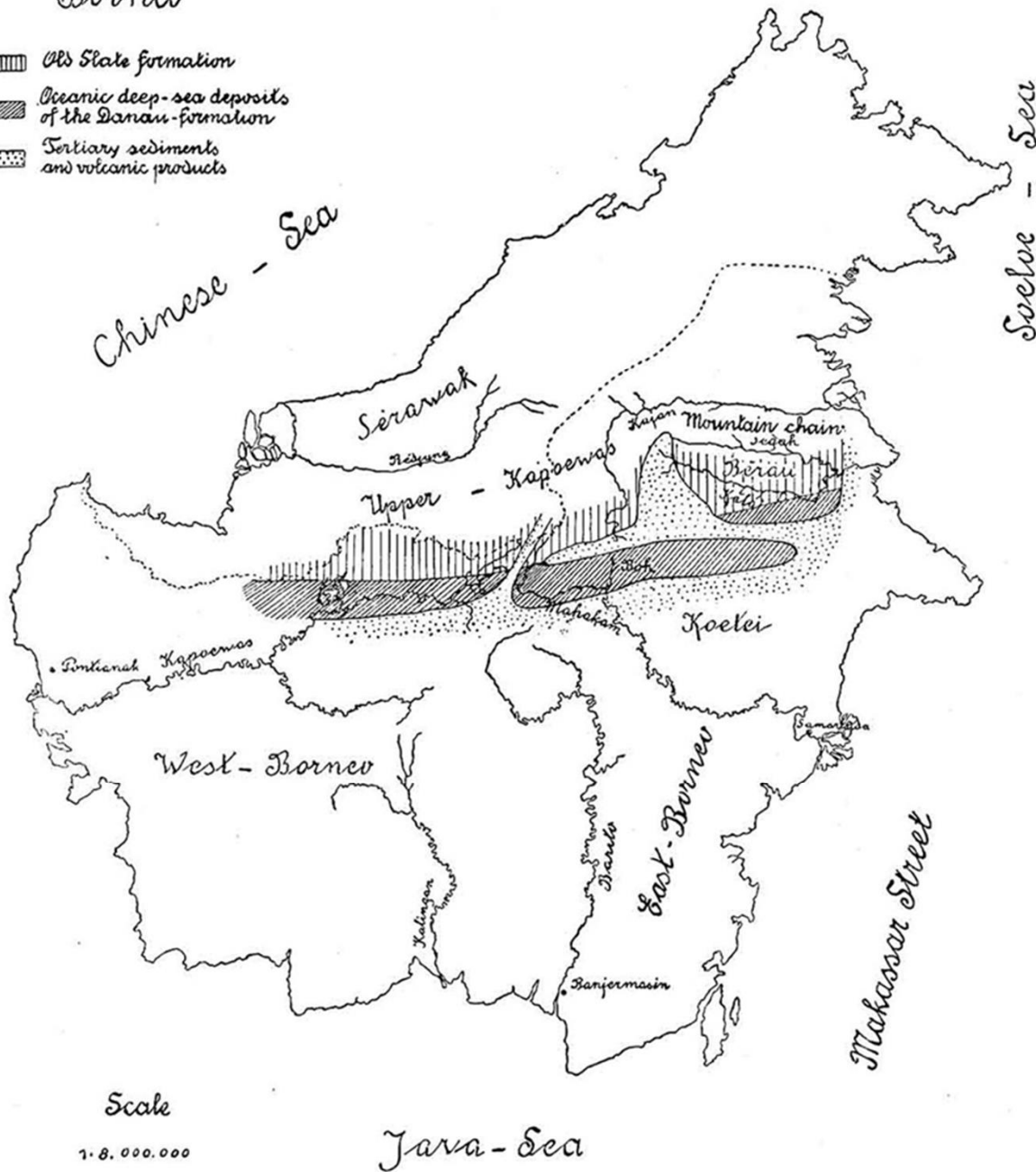
**\* West- to- SE traverse of Borneo from February-  
October 1894**

**\* Timor expedition in 1912**



Borneo

- Old Slate formation
- Oceanic deep-sea deposits of the Danau-formation
- Tertiary sediments and volcanic products



G. MOLENGRAAFF

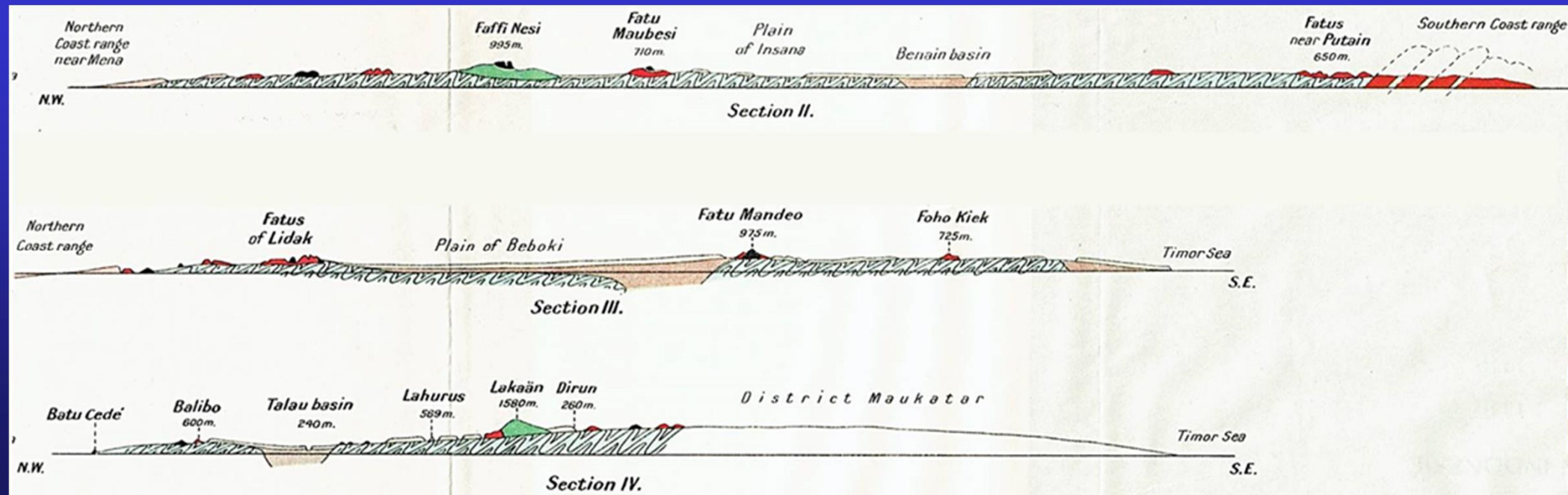
Borneo Expedition, February- October, 1894

- \* West- to- SE traverse from Pontianak
- \* Changed the notion that Borneo was an old continental cratonic area, due to lack of present-day volcanism and seismic activity:
  - presence of intensely folded Mesozoic oceanic formations (Danau Fm)
  - rel. widespread Tertiary volcanism, Mesozoic granite plutons

(Molengraaff, 1909)



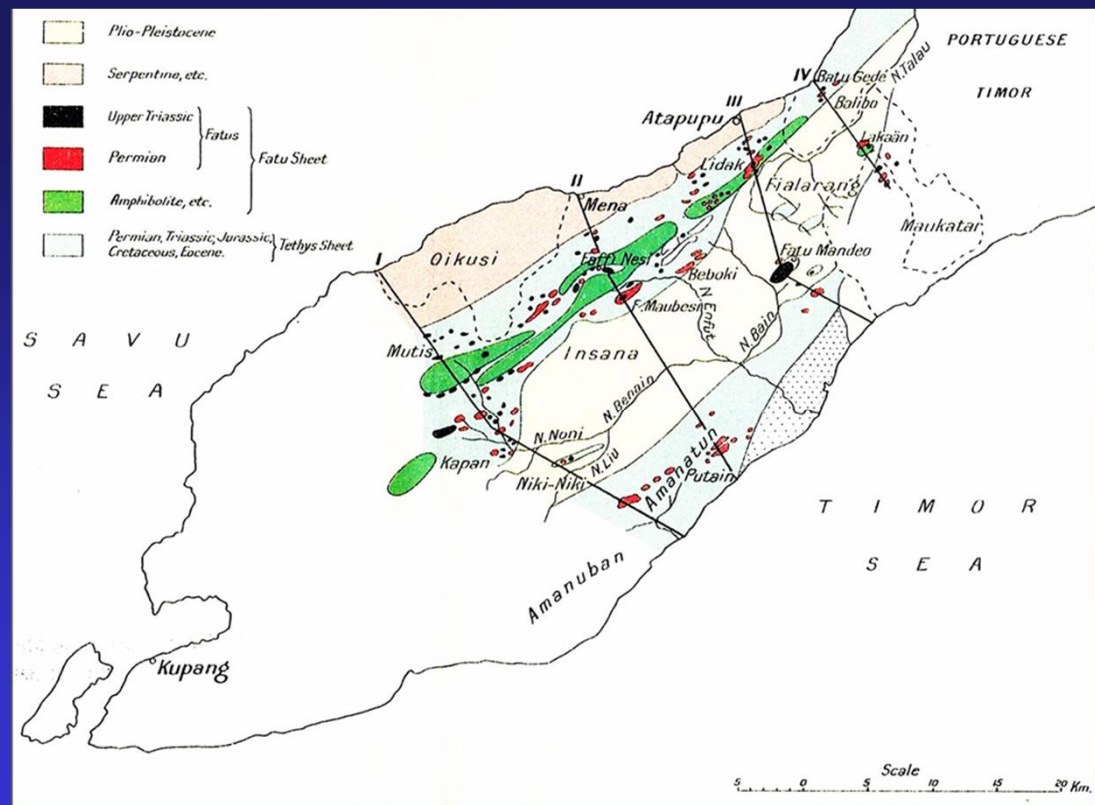
# Pioneers - Vol. 1: Geologic Expeditions around 1900 - G. Molengraaff



## G. MOLENGRAAFF

Timor expedition, December 1910- August 1911

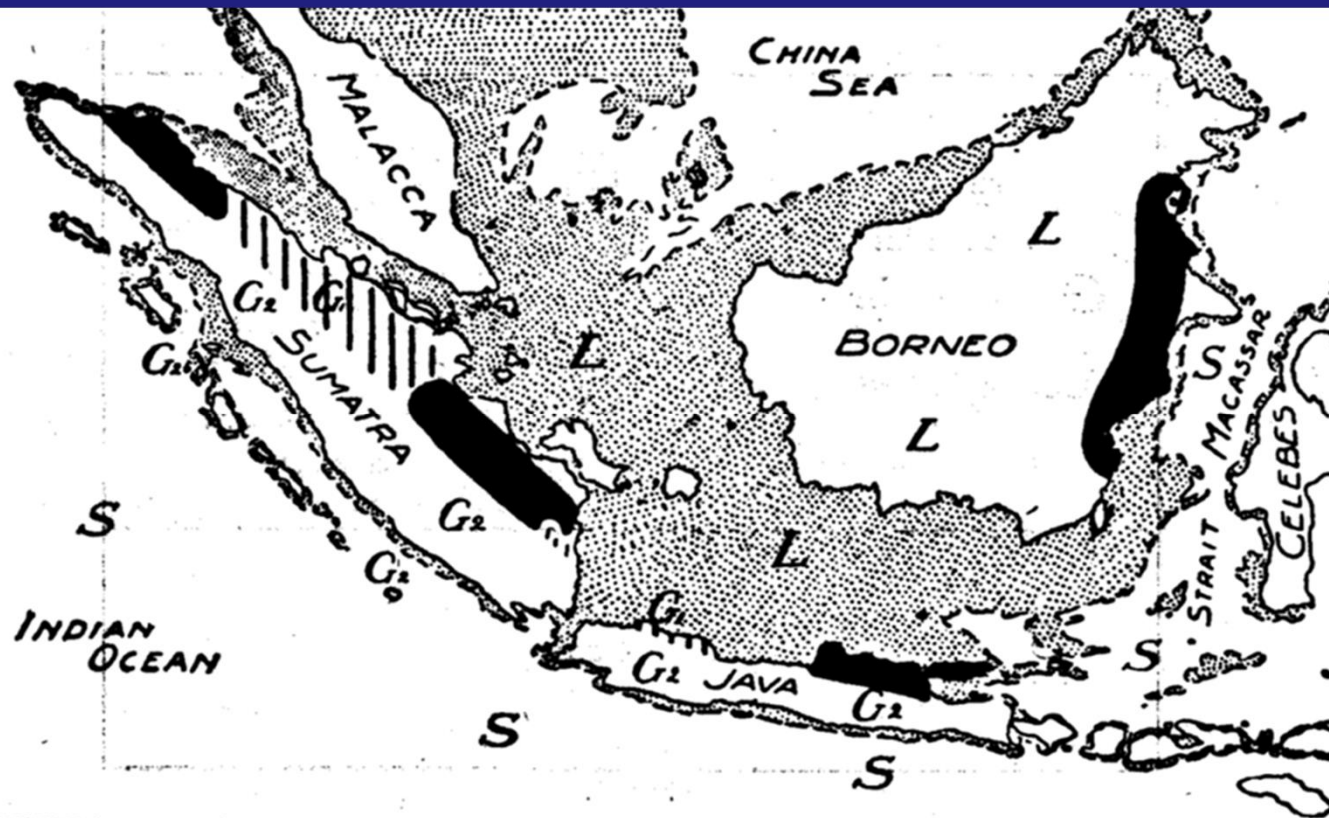
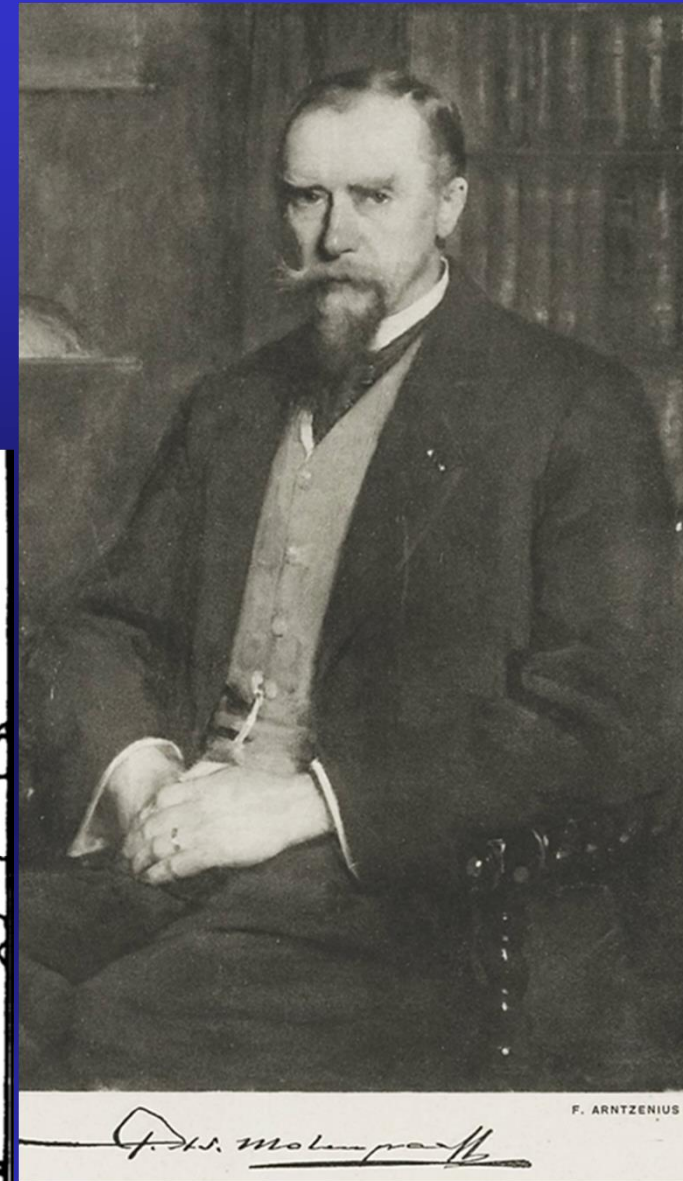
- \* Nappe tectonic model
- \* Marine and oceanic Mesozoic sediments and fossils of Timor and Eastern Indonesia represent remnants of the Tethys Ocean
- making Indonesia a continuation of Alpine-Himalayan orogenic belt





## Pioneers - Vol. 1: Geologic Expeditions around 1900 - G. Molengraaff

- \* *Distribution of oil and gas fields in the Netherlands Indies (Molengraaff, 1921)*
- \* *Incised river valleys on the Sunda Shelf (1920)*
- \* *Distribution of coral reefs of the Indonesian region (1922)*



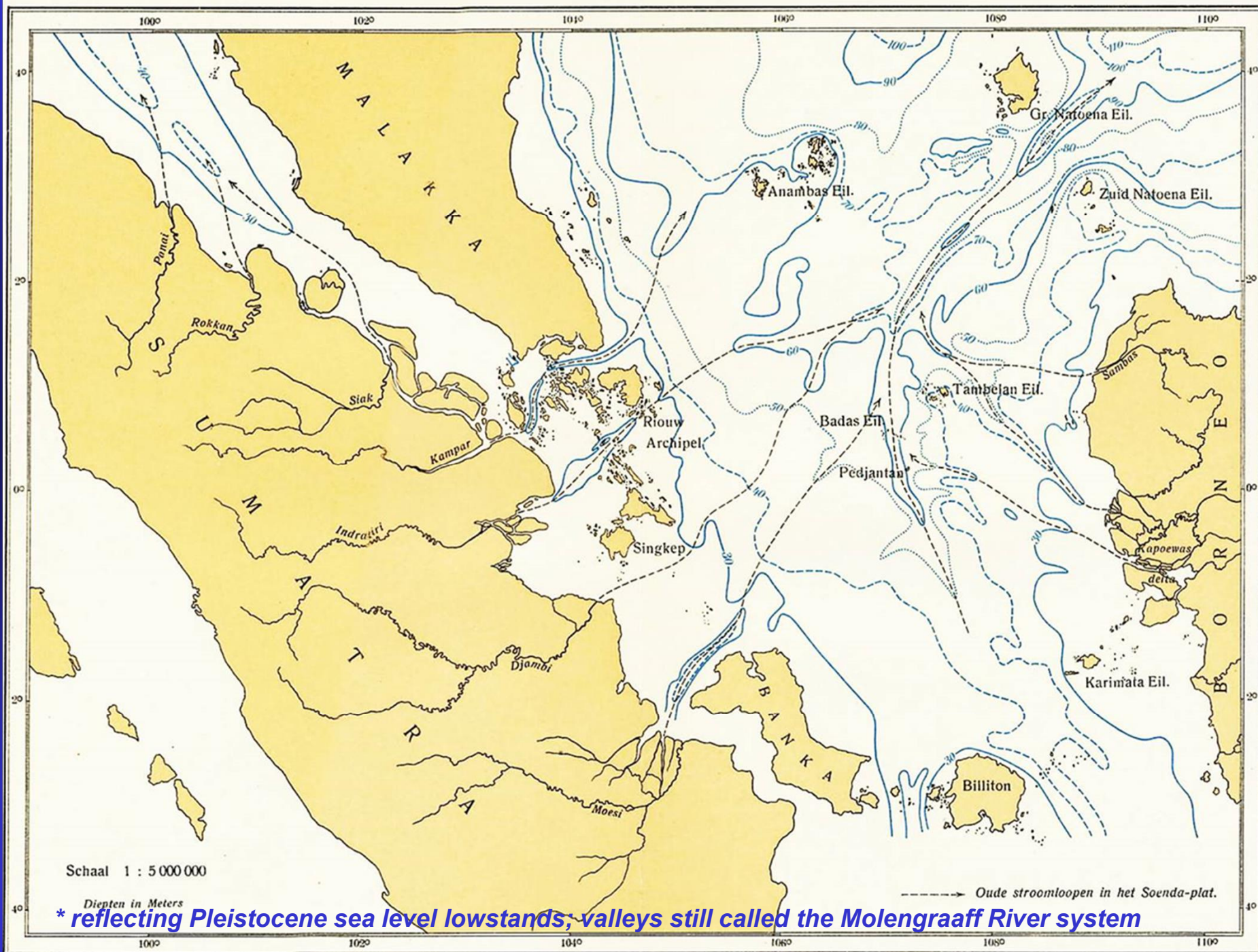
- \* *Neogene basins along the Sundaland margin (Molengraaf 1921):*
  - (1) *basins with oil fields in black*
  - (2) *basins in which oil has not yet been established in vertical line pattern*



# Pioneers - Vol. 1: Geologic Expeditions - G. Molengraaff - Sunda Shelf valleys

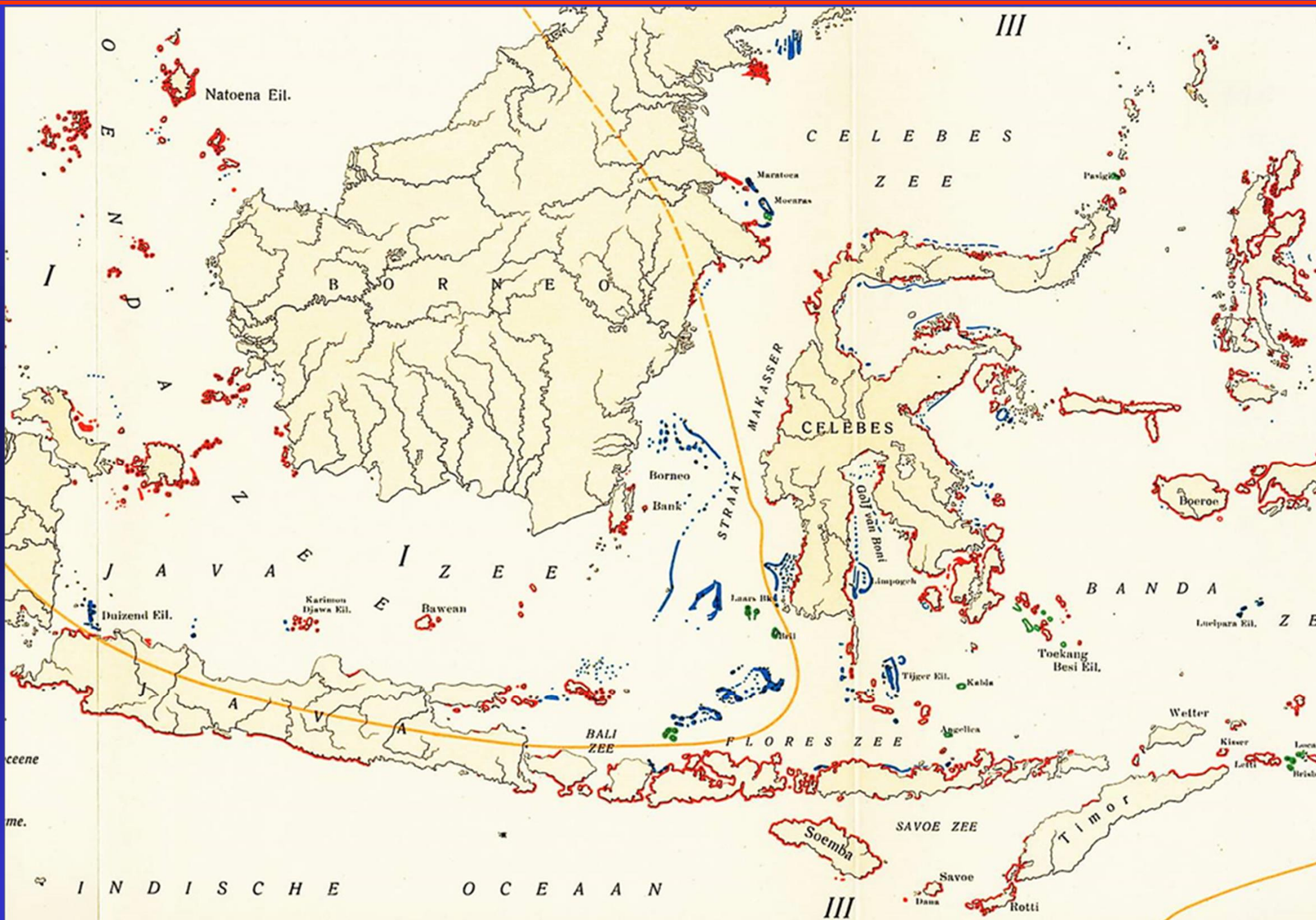
Zeeën van Nederlandsch Oost-Indië  
Geologie door G. A. F. Molengraaff

Kaart II





# Pioneers - Vol. 1: Geologic Expeditions - G. Molengraaff - Coral Reef Distribution



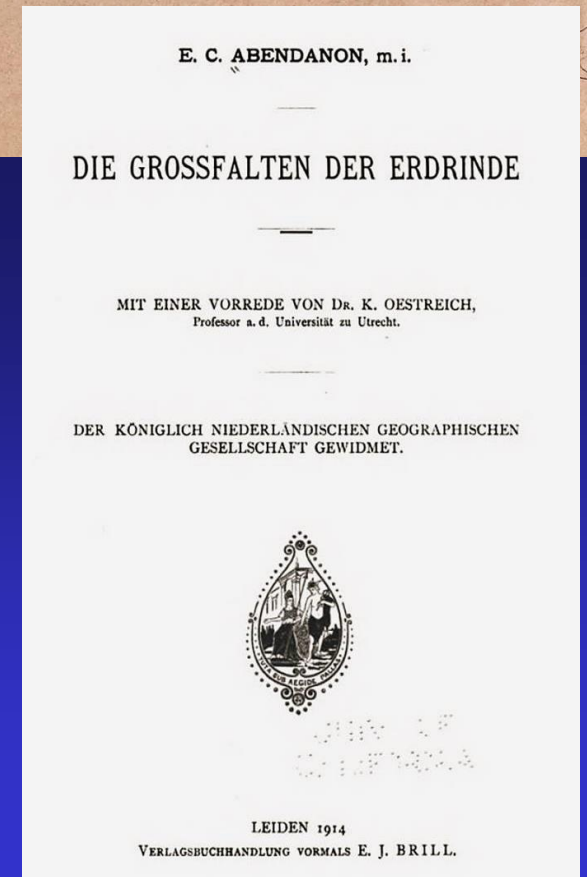
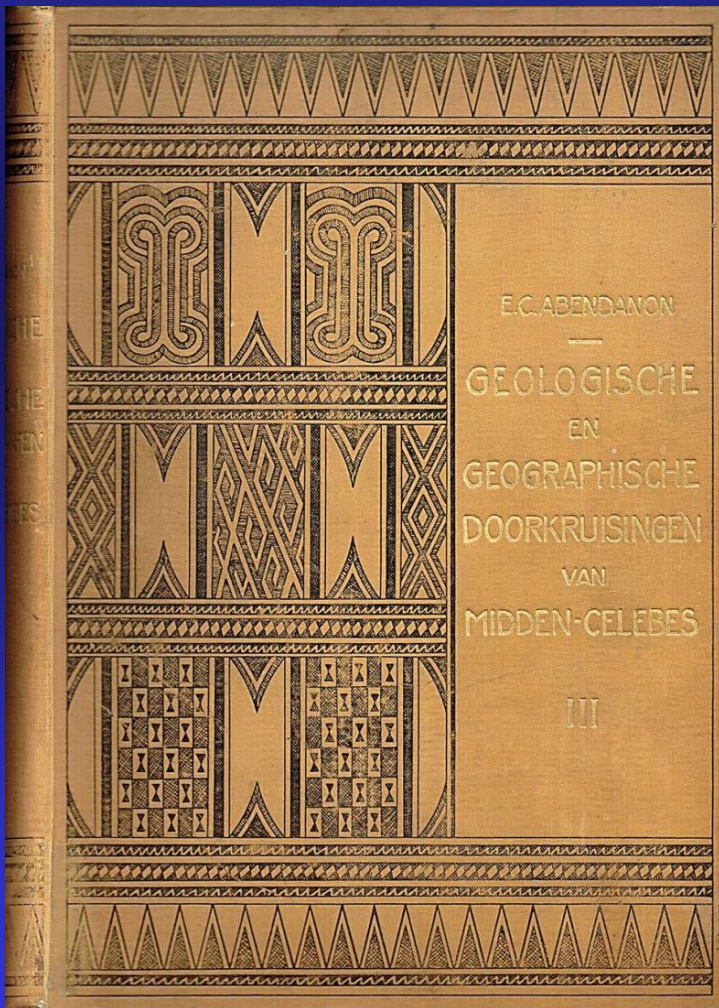
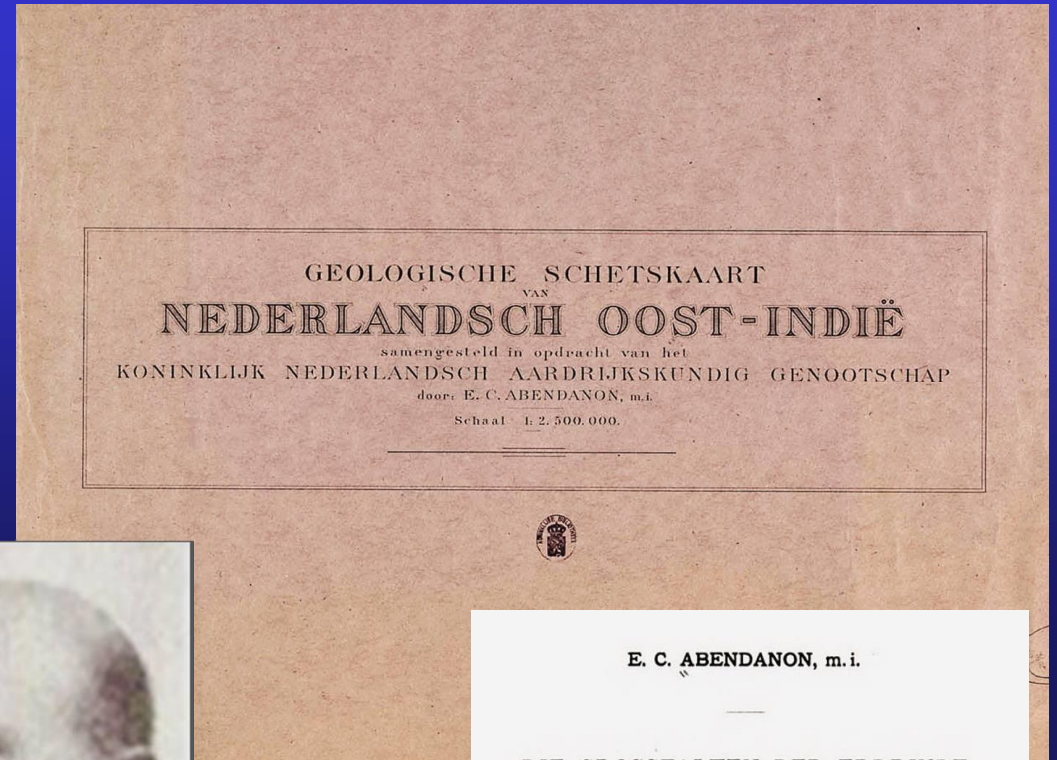
Molengraaff 1922, 1929)



# Pioneers - Vol. 1: Geologic-Geographic Expeditions around 1900: Abendanon

**Eduard C. ABENDANON (1878-1962)**

- \* *Mijnwezen* employee from 1901-1906
- \* *Central Celebes Expedition*, 1909-1910
- \* *First Geologic map of Netherlands Indies*, 1915
- \* *Geology professor in Amsterdam 1922-1925*, then 'disappeared' from geology



**Abendanon (1915-1917)**

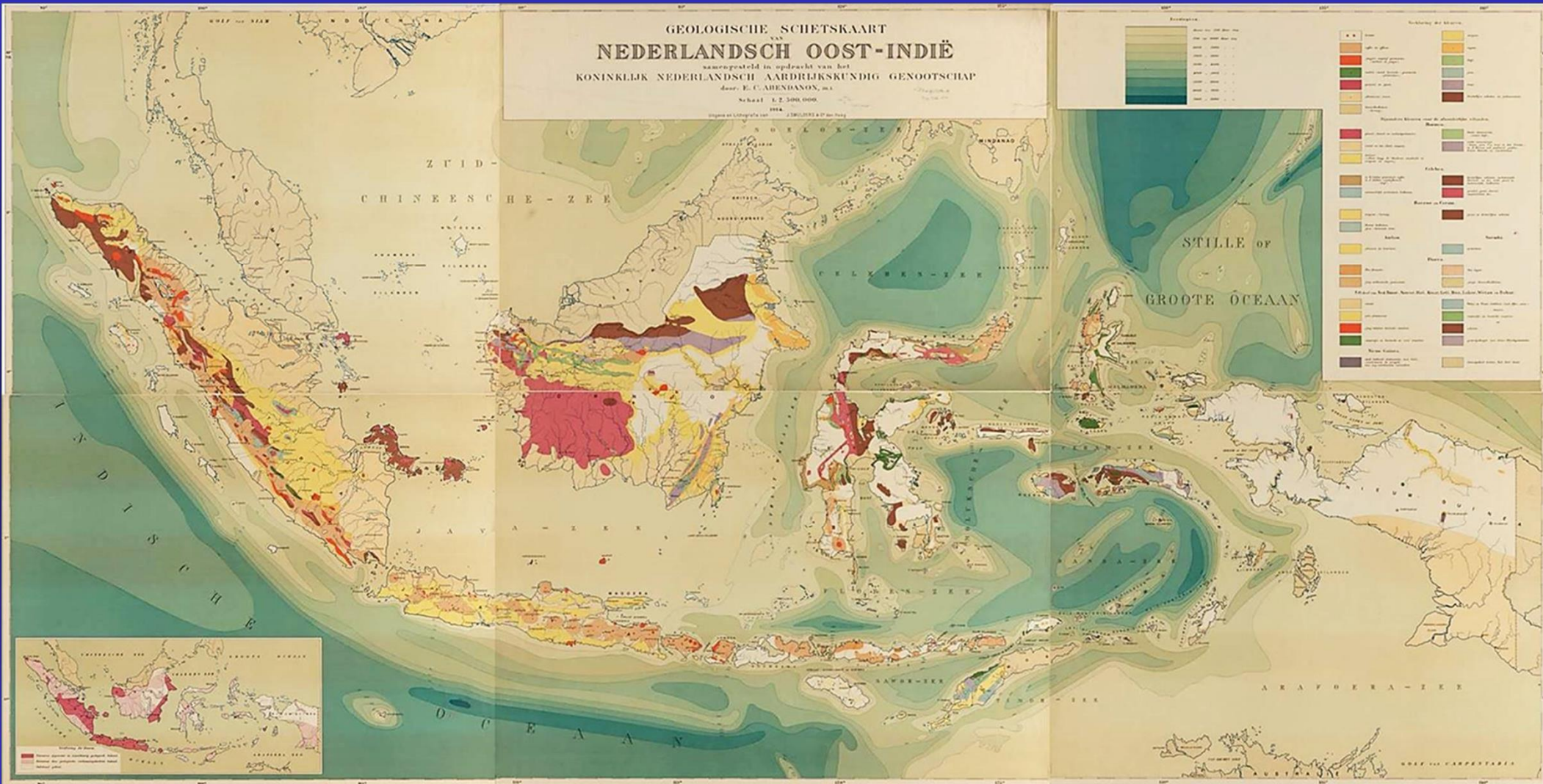
**"The large folds of the Earth's crust" (Abendanon, 1914)**



# Pioneers - Vol. 1: Geologic-Geographic Expeditions around 1900: Abendanon

First Geologic map of Netherlands Indies (Abendanon, 1915)

\* Eastern Indonesia still largely unmapped





# OCEANOGRAPHIC EXPEDITIONS



French Uranie Expedition under L. de Freycinet at Lawak, Waigeo, 1818

*Peinté par Garnier, d'après A. Pellion.*

*Gravé par Niquet.*

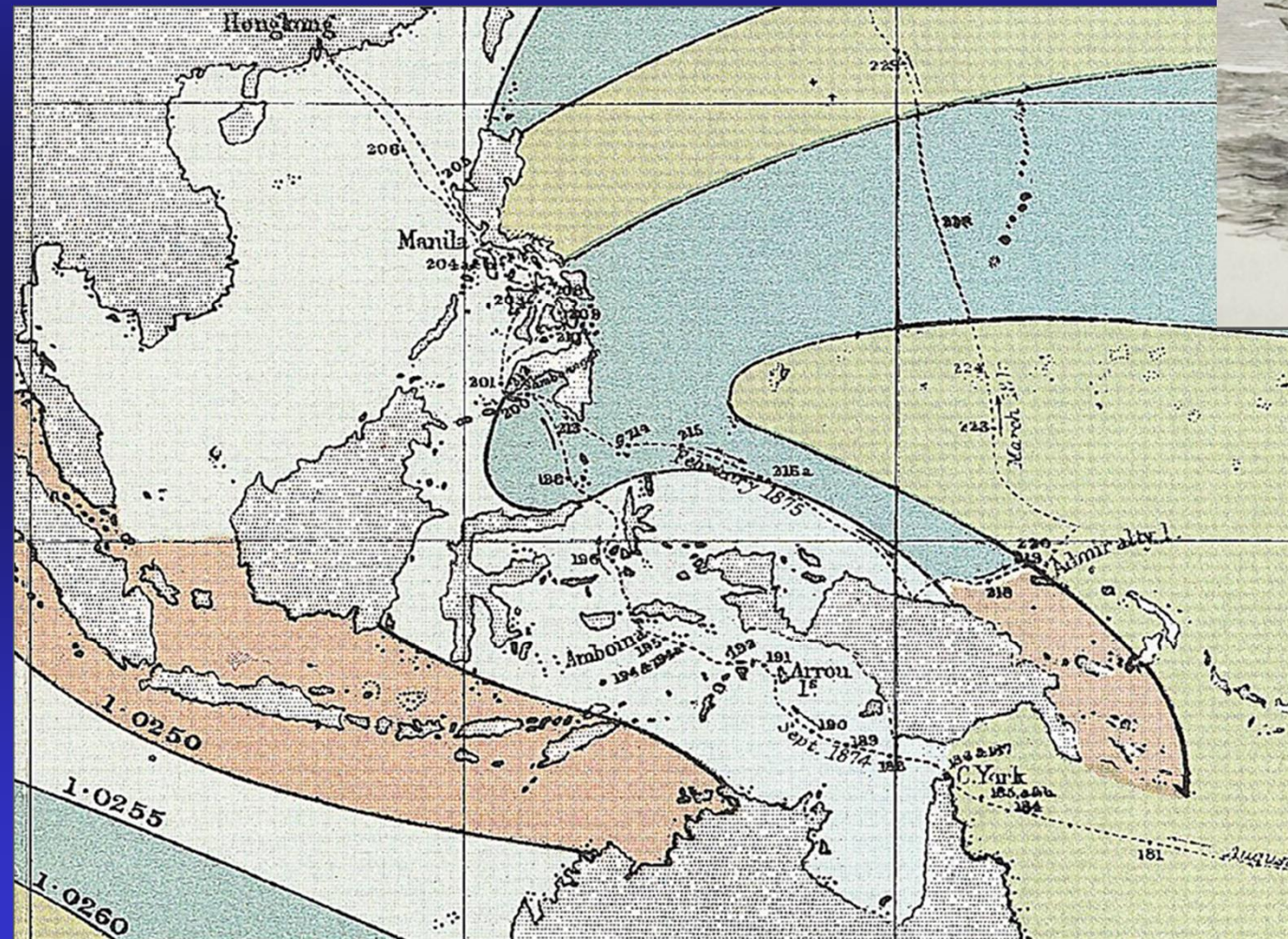
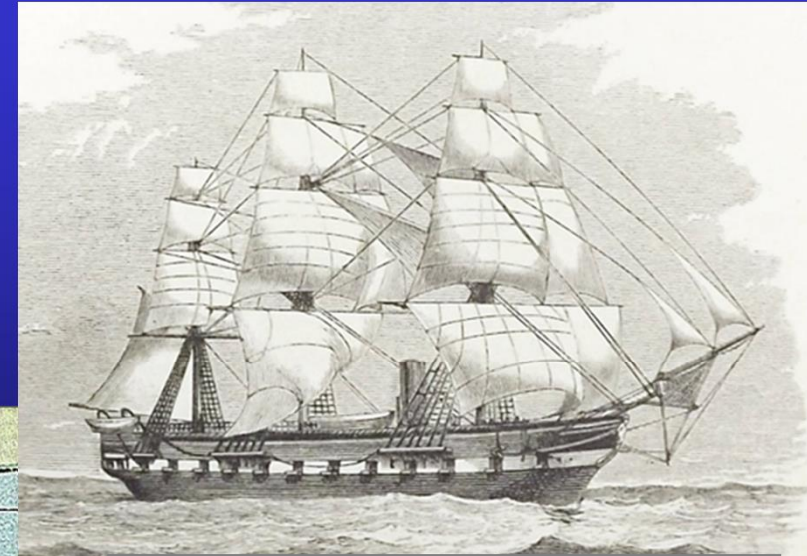
ÎLES DES PAPOUS: VUE DU MOUILLAGE DE L'URANIE SUR L'ÎLE RAWAK.



# Oceanographic Expeditions - Challenger, 1874

Many international/ global oceanographic expeditions visited (East) Indonesian waters

\* **British Challenger Expedition: major learnings on deep sea sediments and faunas and ocean water characteristics**



## REPORT OF THE SCIENTIFIC RESULTS OF THE VOYAGE OF H.M.S. CHALLENGER

DURING THE YEARS 1873-76

UNDER THE COMMAND OF  
CAPTAIN GEORGE S. NARES, R.N., P.R.S.  
AND THE LATE  
CAPTAIN FRANK TOURLE THOMSON, R.N.

PREPARED UNDER THE SUPERINTENDENCE OF  
THE LATE  
Sir C. WYVILLE THOMSON, Knt., F.R.S., &c.  
SERIES PROFESSOR OF NATURAL HISTORY IN THE UNIVERSITY OF EDINBURGH  
DIRECTOR OF THE CIVILIAN SCIENTIFIC STAFF ON BOARD  
AND NOW OF  
JOHN MURRAY, LL.D., Ph.D., &c.  
ONE OF THE PATRONISTS OF THE EXPEDITION

### DEEP-SEA DEPOSITS

Published by Order of Her Majesty's Government

PRINTED FOR HER MAJESTY'S STATIONERY OFFICE  
AND SOLD BY  
LONDON—EYRE & SPOTTISWOODE, EAST HARGREAVES STREET, FETTER LANE  
EDINBURGH—JOHN MENZIES & CO.  
DUBLIN—HOODES, FIOGIS, & CO.  
1891

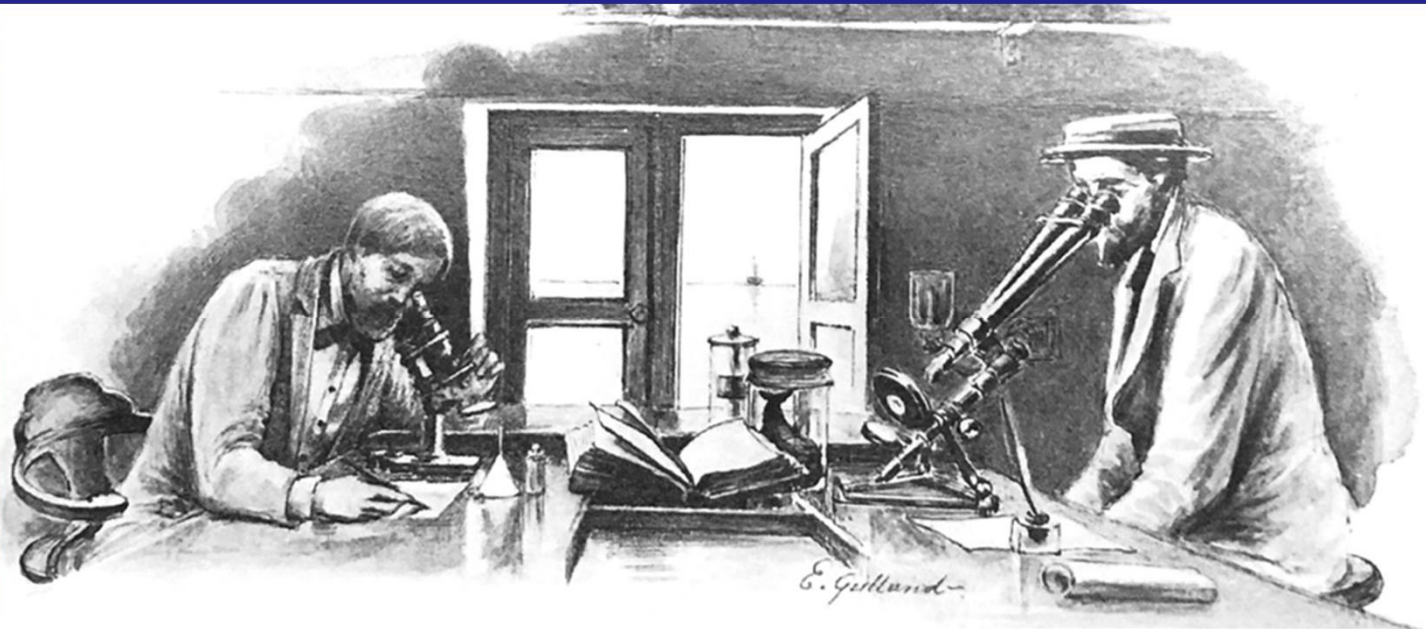
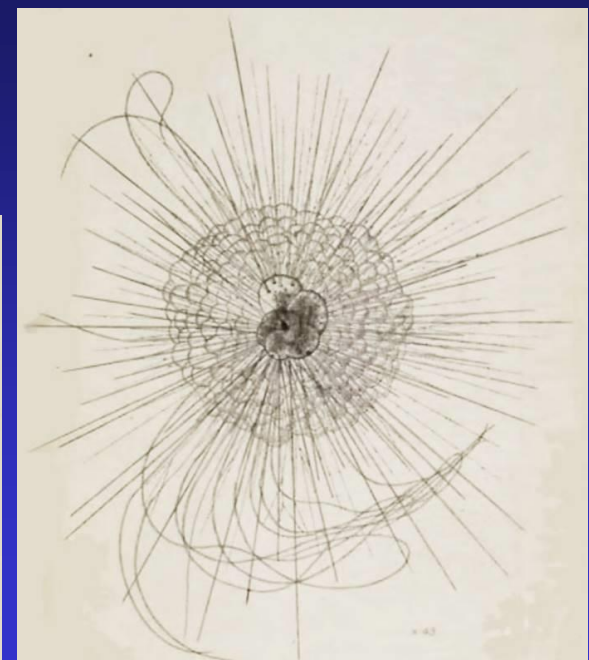
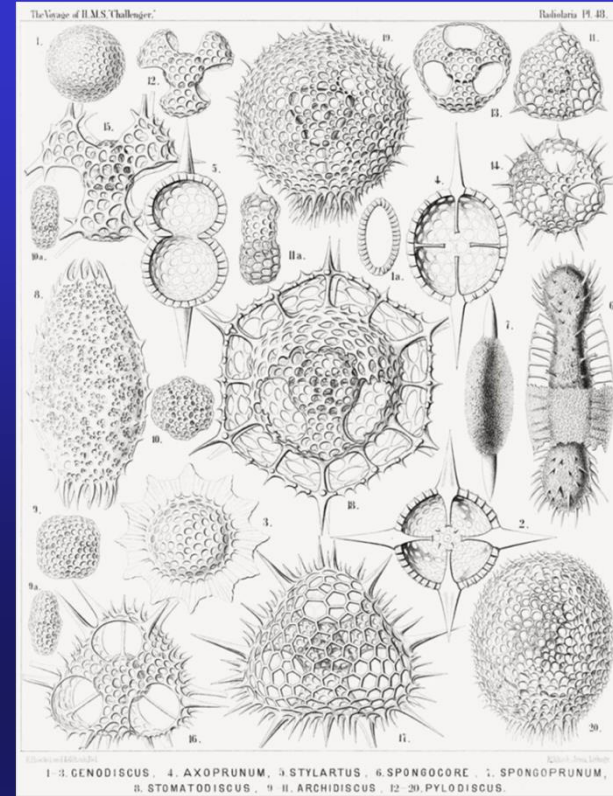
Price Forty-two Shillings.



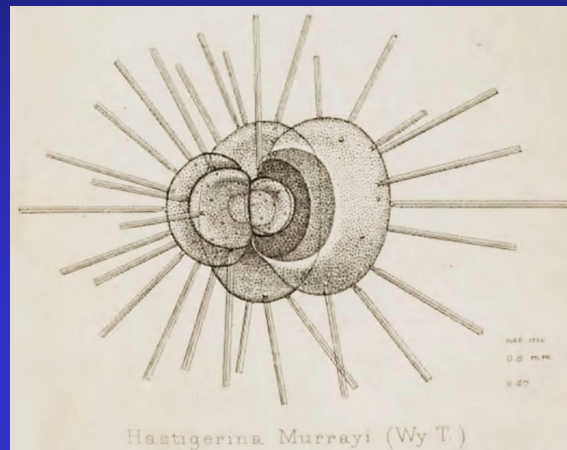
# Oceanographic Expeditions - Challenger, 1874

## Challenger Expedition

- \* 50 volumes of documentation of deep sea deposits and (micro-)faunas
- \* Major learning was that most of the Atlantic and Pacific Ocean floors are covered by *Globigerina* ooze (mainly calcareous pelagic micro-organisms), but that the deepest parts of the oceans are covered by siliceous radiolarian ooze and red clays without *Globigerina*. ('Carbonate Compensation Depth' at ~4-5km depth)



Chief scientist Wyville Thomson (left) examining samples in the Zoological Laboratory on the H.M.S. Challenger.

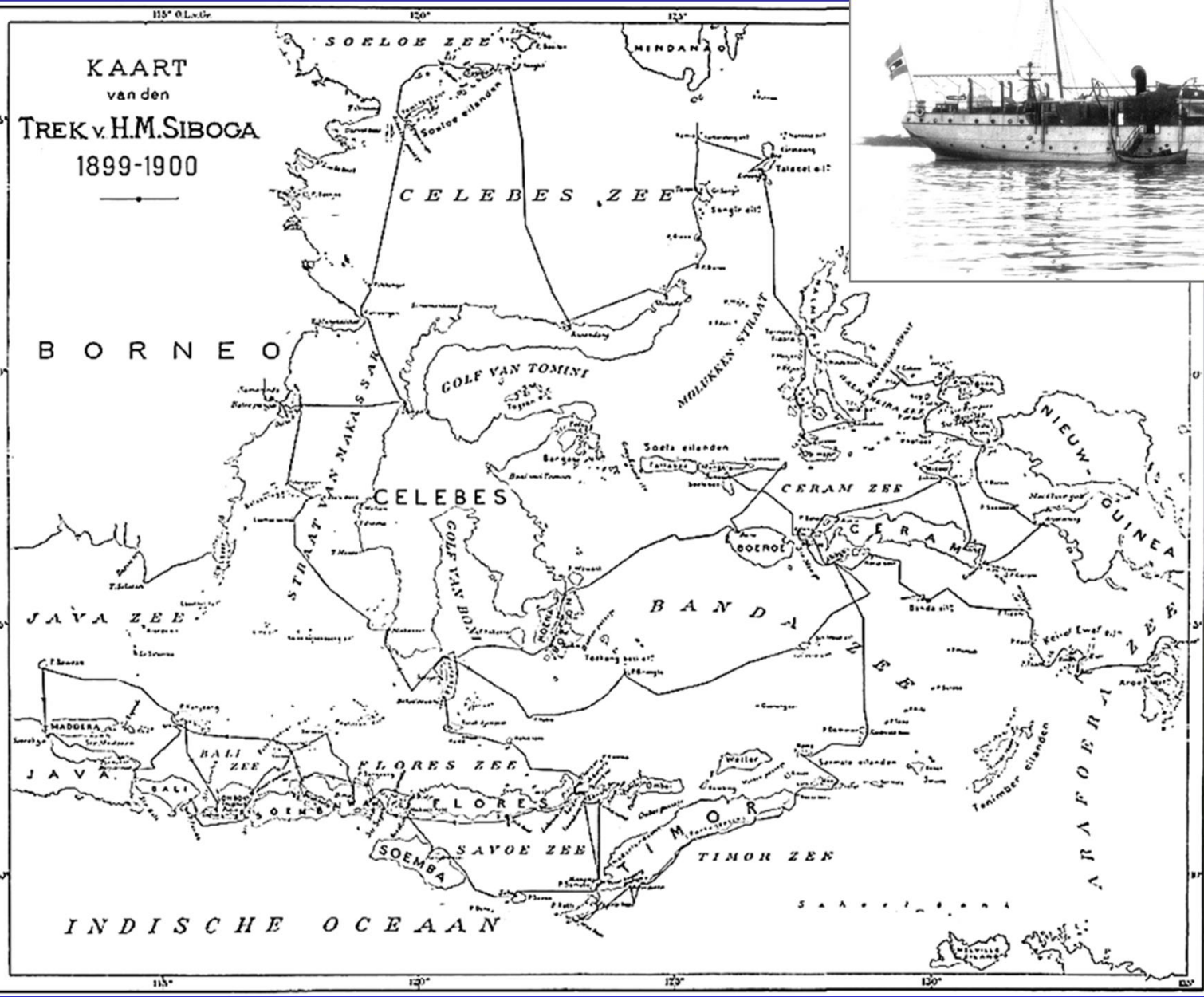


*Hastigerina murrayi* Wy. Thomson (1876)



# Oceanographic Expeditions - Siboga, 1899-1900

Two major Dutch oceanographic expeditions to East Indonesian waters: Siboga (1899-1900) and Snellius (1929-1930)

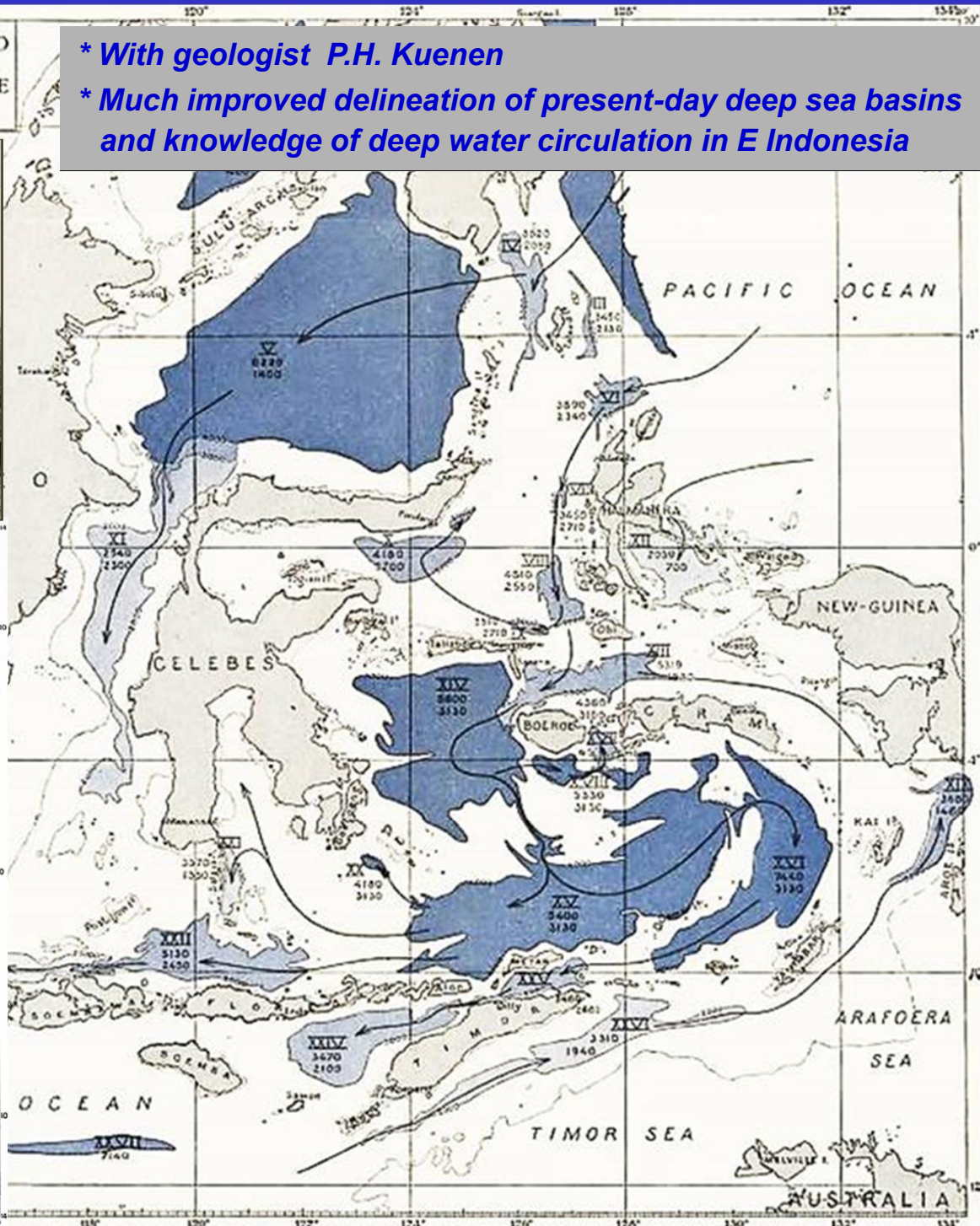
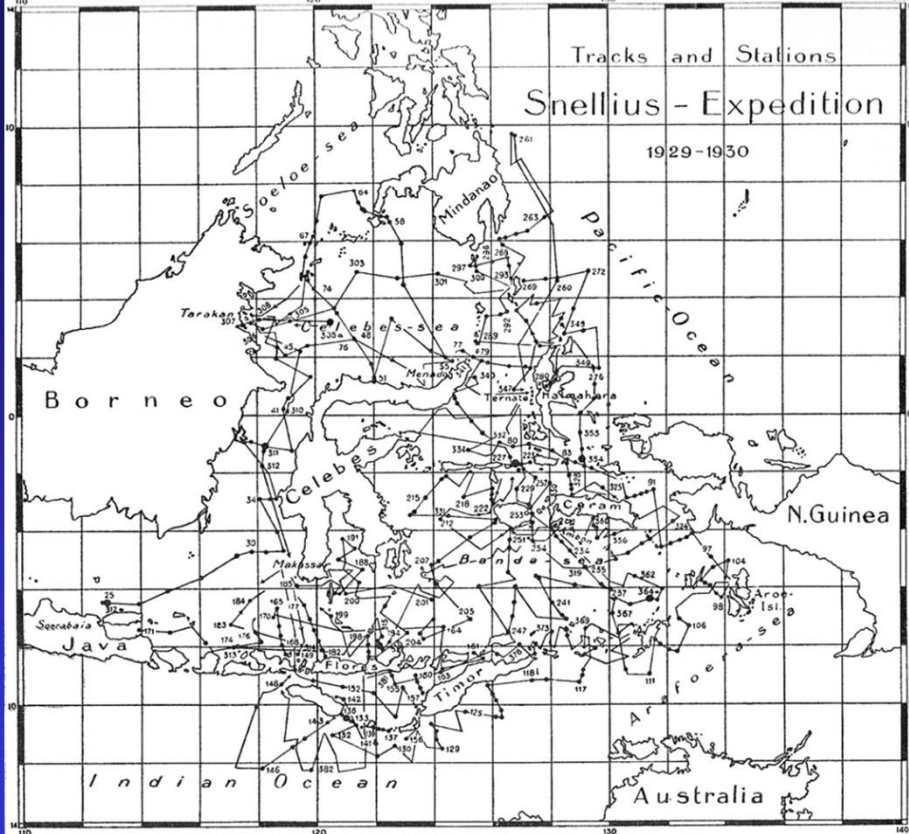
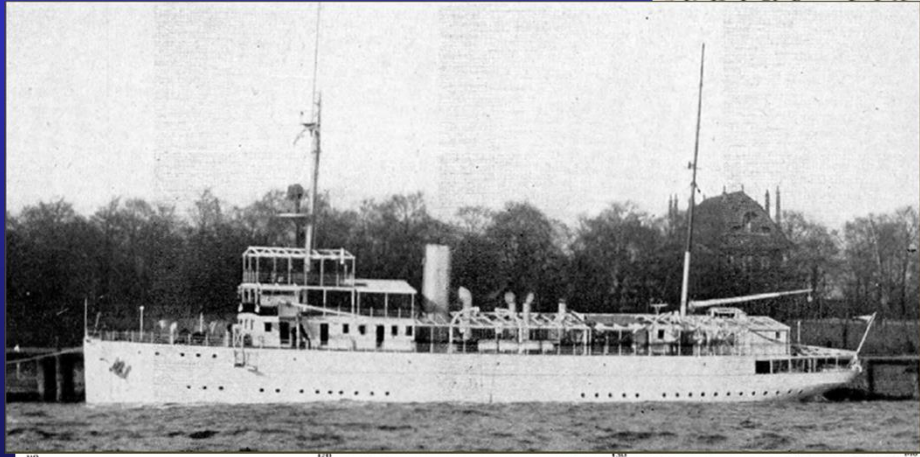




# Oceanographic Expeditions - Snellius, 1929-1930

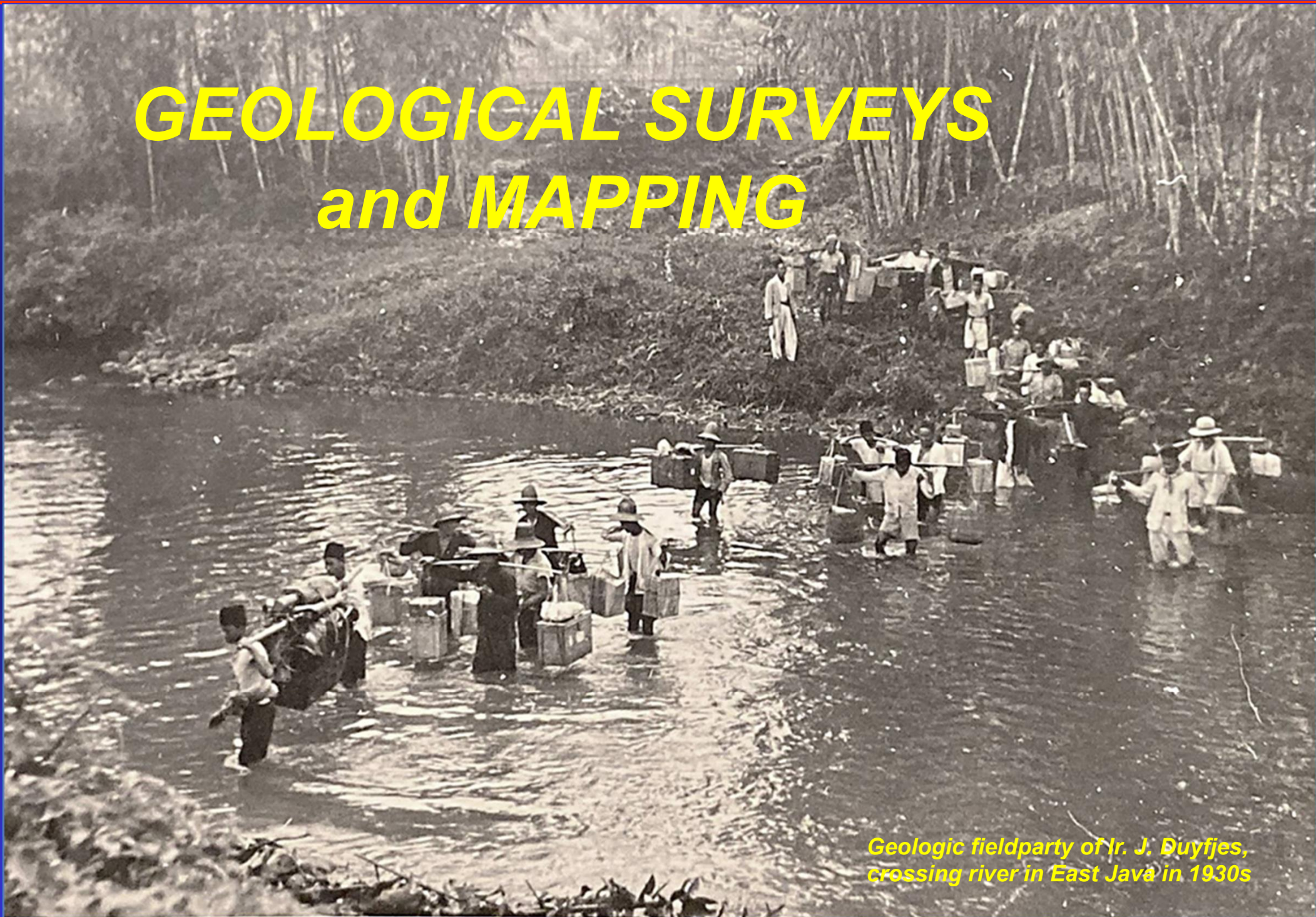
PRINCIPAL BASINS AND TROUGHS IN THE EASTERN PART OF THE ARCHIPELAGO

- \* With geologist P.H. Kuenen
- \* Much improved delineation of present-day deep sea basins and knowledge of deep water circulation in E Indonesia





# ***GEOLOGICAL SURVEYS and MAPPING***



*Geologic fieldparty of Ir. J. Duyfjes,  
crossing river in East Java in 1930s*



## **GEOLOGIC SURVEYING AND MAPPING - MAIN PHASES**

### **1. Before late 1800's**

*Only occasional, small maps produced in conjunction with areas of economic interest*

### **2. late 1800'- early 1900's**

*Some regional mapping, mainly around areas of (commercial) interest (Rogier Verbeek, A. Tobler (Sumatra), N. Wing Easton (Kalimantan) and J. Zwierzycki (Sumatra, New Guinea)). Later significant mapping by K. Musper, W. Leupold, etc..*

### **3. 1928-1941**

*Systematic geologic mapping programs by the Dienst van den Mijnbouw (Geological Survey) Initial focus on South Sumatra and Java. Programs never completed during the colonial period, due to budget reductions in the 1930's and Japanese Invasion in early 1942.*

### **4. 1942-1970:**

*Virtually no mapping activities, at first mainly due to political and safety conditions and later mainly to lack of budgets and adequately-trained staff;*

### **5. 1971-1995**

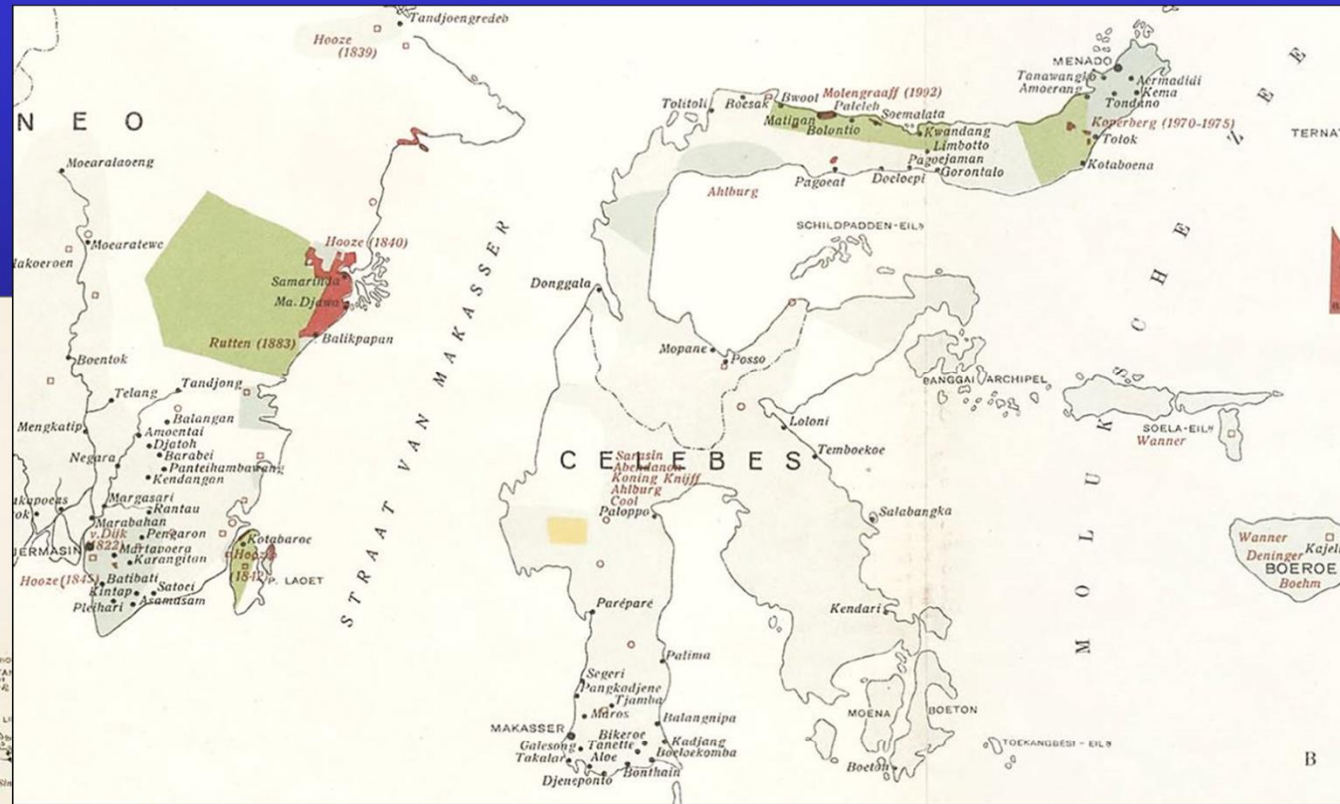
*Restart of systematic mapping programs by the Geological Survey, Bandung. Several regions were mapped with support from overseas: US Geological Survey, British Geological Survey (Sumatra) and the Australian Bureau of Mineral Resources (Irian Jaya, Kalimantan).*

*The 1:250k scale mapping program was officially completed by January 1996.*



# Pioneers and Milestones of Indonesian Geology

## GEOLOGIC SURVEYING & MAPPING OF INDONESIA, 1915



Status of geologic mapping in 1915  
(van Waterschoot van der Gracht, 1915)

\* Much unknown outside of Java and Sumatra !



## Pioneers- Vol. 2: Geological Survey (Dienst van het Mijnwezen)

### MIJNWEZEN '1st GENERATION' (from 1850)

\* All Dutch mining engineers , educated in Delft

Cornelis DE GROOT (VAN EMBDEN)    Aquasi BOACHI

Johannes E. AKKERINGA

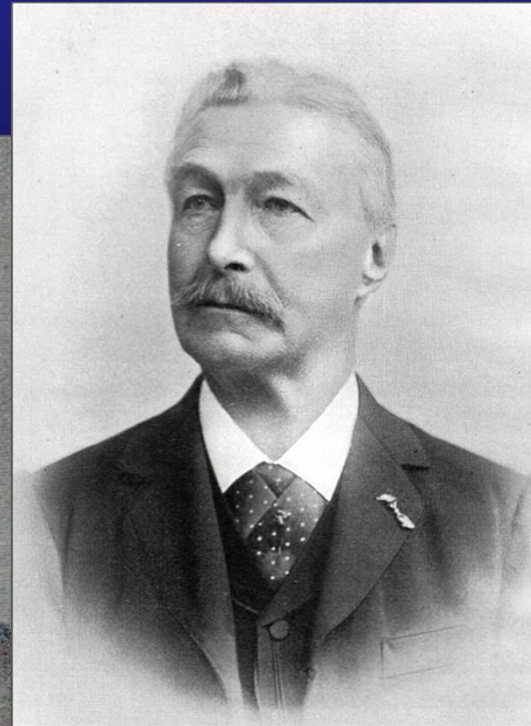
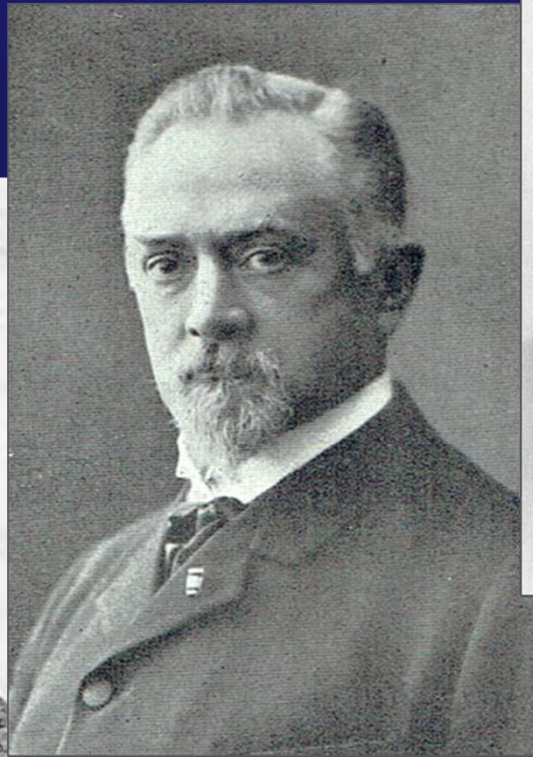
Roeland EVERWIJN

Pieter VAN DIJK

Pieter H. VAN DIEST

G.P.A. RENAUD

Carel Jan VAN SCHELLE





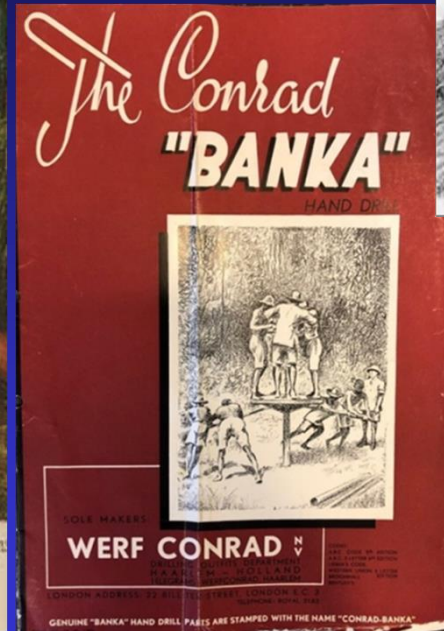
**Johannes E. AKKERINGA (1829-1863)**

- \* With Bangka tin mines from 1853-1860
- \* Inventor of the Akkeringa or Banka Drill
- \* Died in 1863, from typhoid contracted on Pulau Kundur (Karimun islands), at young age of 34.



Maarb. Nijwezen Ned. O. Indië 1874 d. II. Treshing & C<sup>o</sup> Hof Lith. Amst. Uitgeg. bij C. F. Sternler. Amst.

HET BOREN MET DE GROOTE EN KLEINE BOOR NAAR TINERTS OP BANGKA.





# Geological Survey - R. Everwijn

Roeland EVERWIJN (1827-1886)

\* Mining engineer in Netherlands Indies from 1852-1881

\* One of the first geologic maps of West Kalimantan; geological knowledge limited to major river traverses

BIDRAGE TOT EENE GEOLOGISCHE KAART

DER RESIDENTIE

WESTER AFDEELING VAN

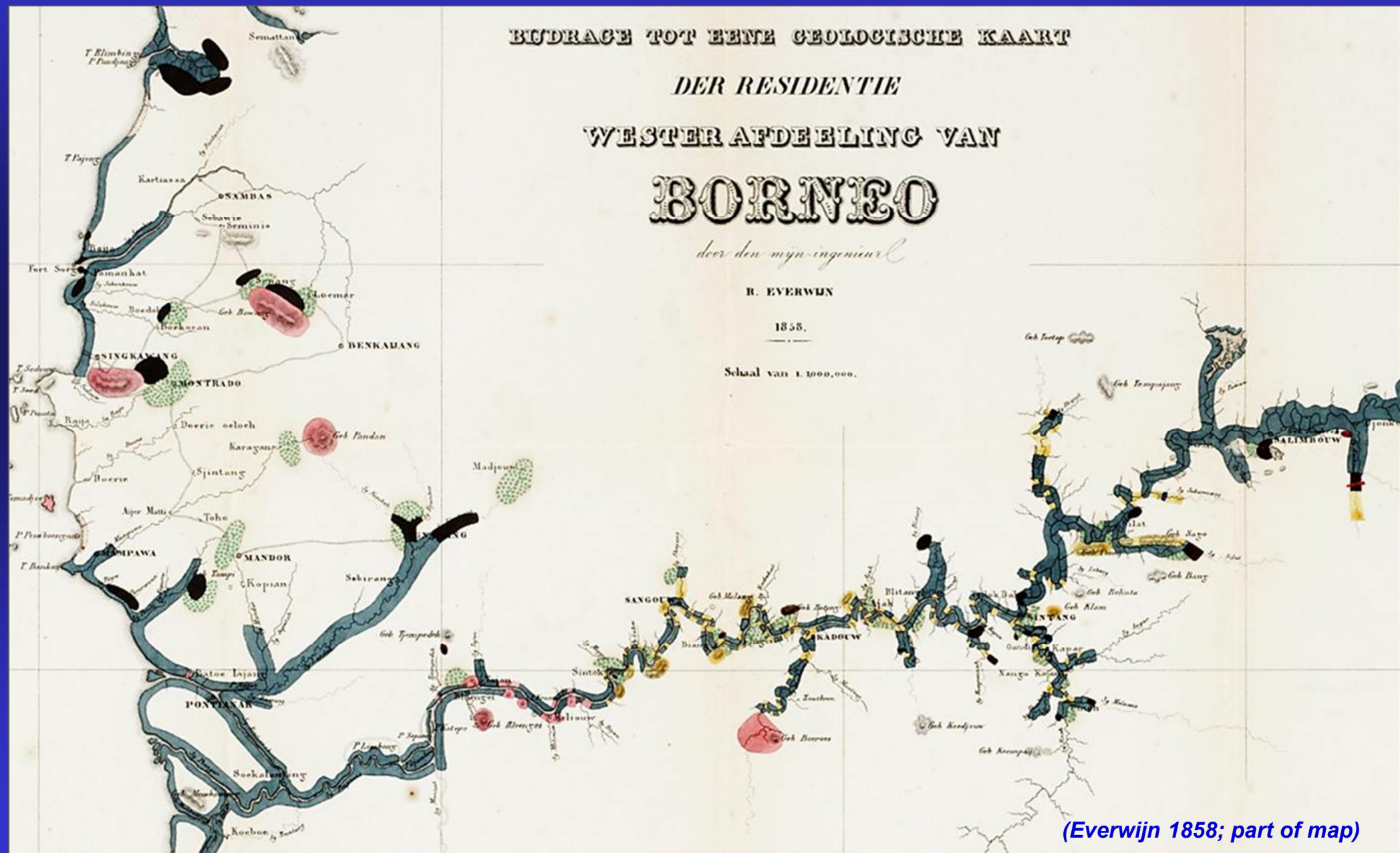
BORNEO

door den mijn-ingenieur

R. EVERWIJN

1855.

Schaal van 1:1000,000.



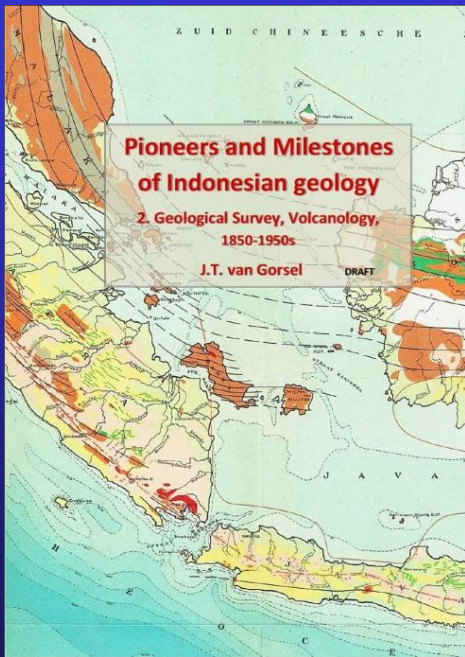
(Everwijn 1858; part of map)



## MIJNWEZEN- '2nd GENERATION' – REGIONAL GEOLOGY (from 1870s)

*Rogier D.M. VERBEEK*  
*Reinder FENNEMA*  
*Nicolaas WING EASTON*  
*Eduard HARTMANN*  
*E.R.D. GOLLNER*  
*C. MOERMAN*

*Jan A. HOOZE*  
*Marcus KOPERBERG*  
*Hendrik A. BROUWER*  
*Walter DIECKMANN*  
*Pieter HOVIG*



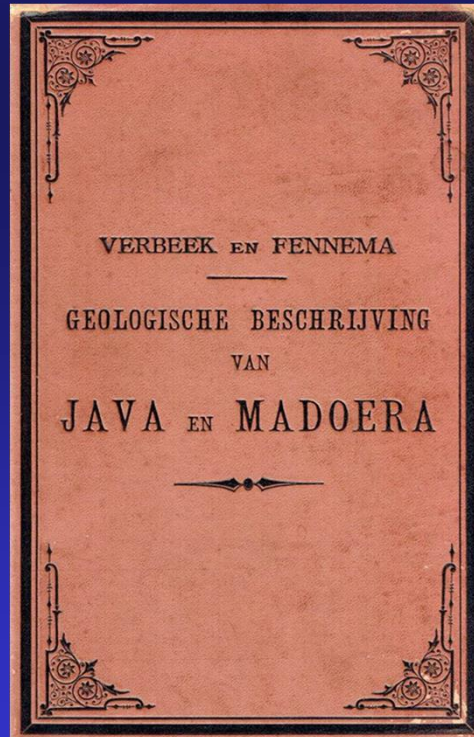
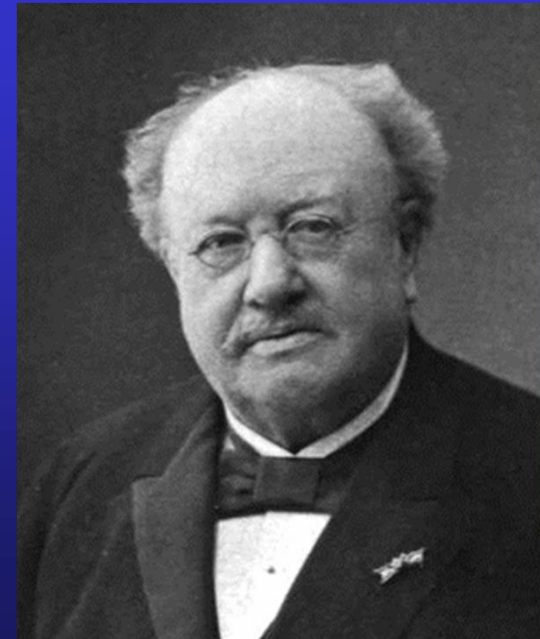
*Head office of Mijnezen at Molenvliet (Jl. Gadjah Mada 111) in Weltevreden (Jakarta), 1870s- 1925 (in 1925 turned into 'Lands Archief', now Gedung Arsip Nasional RI museum)*



**Rogier D.M. VERBEEK (1845-1926)**

**'Founding father of Regional Geology of Indonesia'**

- \* **An unusually long career as geologist- mining engineer in Netherlands Indies, from 1868-1901**
- \* **Verbeek was rumored to avoid potentially economic mineral deposits, as time-consuming evaluations would distract from his work on regional geology**
- \* **A veritable 'geological mapping machine', who produced voluminous geological monographs on:**
  - **SE Kalimantan (1875)**
  - **West Sumatra (1875)**
  - **South Sumatra (1881)**
  - **Krakatau 1883 eruption (1885)**
  - **Java and Madura (1896)**
  - **Bangka and Belitung (1897)**
  - **Ambon (1899)**
  - **Moluccas Report (1908).**



OVER DE GEOLOGIE VAN AMBON.

DOOR

R. D. M. VERBEEK.

Verhandelingen der Koninklijke Akademie van Wetenschappen te Amsterdam.

(TWEDE SECTIE.)

Deel VI. N<sup>o</sup>. 7.

(Met één plaat.)

AMSTERDAM,  
JOHANNES MÜLLER.  
1890.

OPGAVE VAN GESCHRIFTEN  
OVER GEOLOGIE EN MIJNBOUW  
VAN NEDERLANDSCH OOST-INDIË

(TIENDE VERVOLG)

DOOR

Dr. R. D. M. VERBEEK,

Oud-Hoofdingenieur van het Mijnwezen in Nederlandsch-Indië.

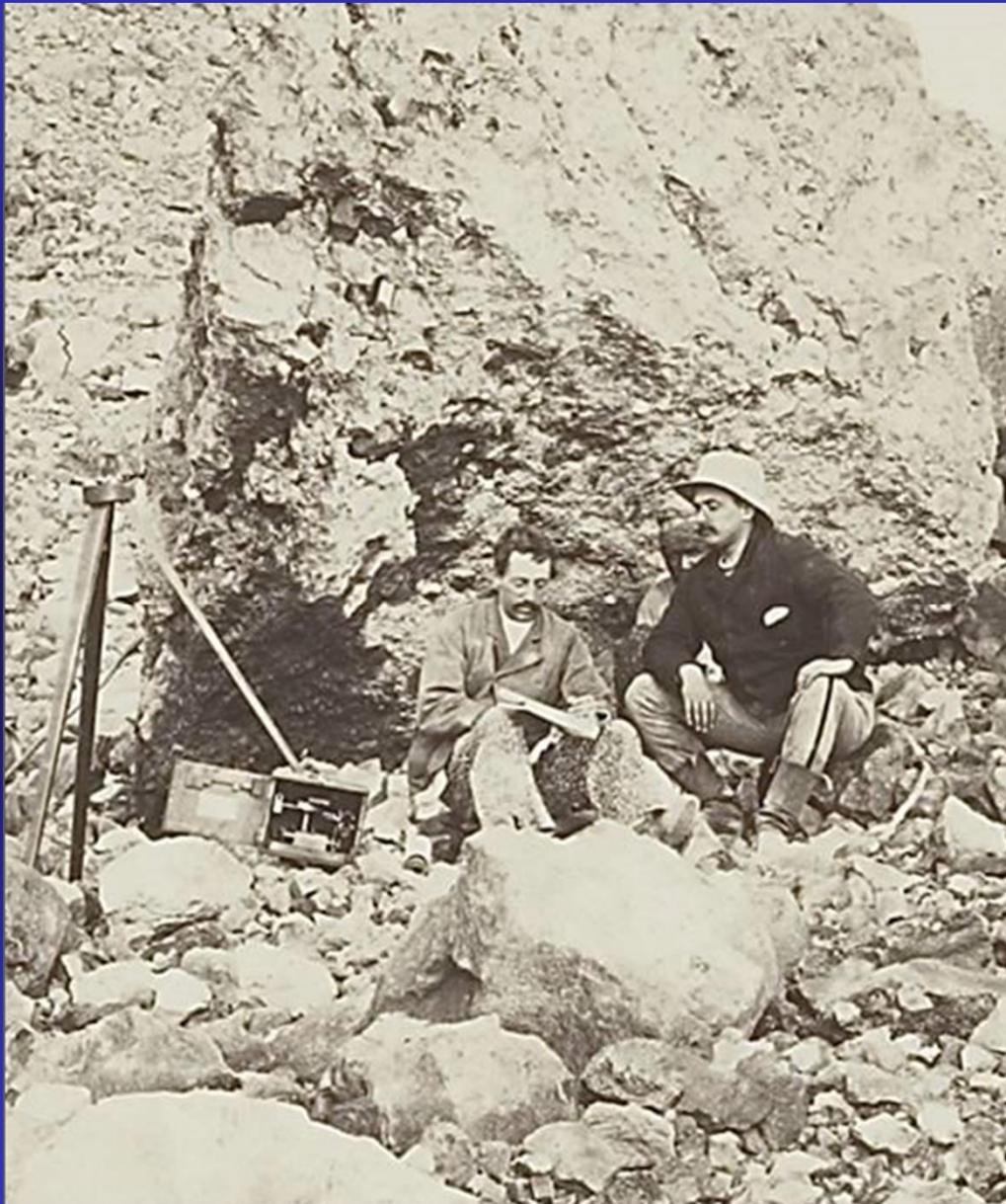
OVERGEDRUKT UIT DE VERHANDELINGEN VAN HET GEOLOGISCH-  
MIJNBOUWKUNDIG GENOOTSCHAP VOOR NEDERLAND EN KOLONIËN.  
GEOLOGISCHE SERIE. — DEEL VII, BLADZ. 57—72; FEBRUARI 1923.

's-GRAVENHAGE — MOUTON & Co. — 1923.



# *Geological Survey - R.D.M. Verbeek*

*In West Sumatra in ~1880, with J.H. de Corte*



*Ambon in 1899, with J.H. de Corte*



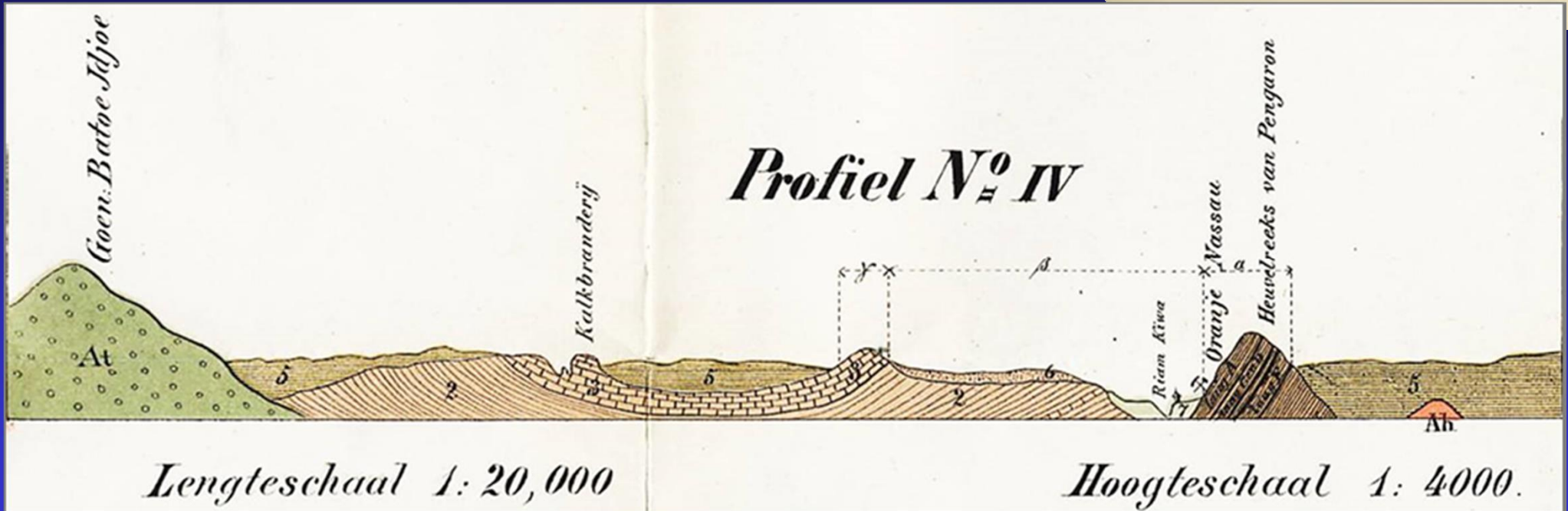
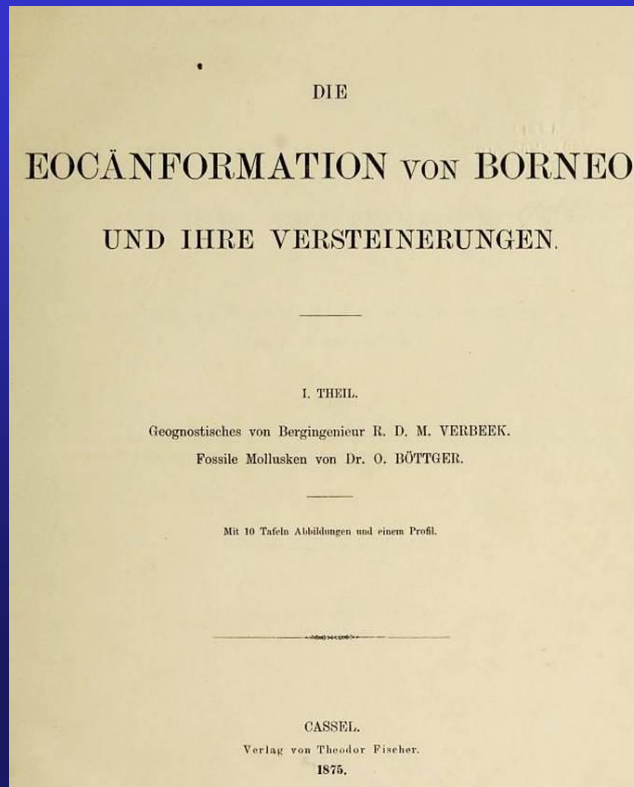


# Geological Survey - R.D.M. Verbeek

**Rogier D.M. VERBEEK**

**Head of the Pengaron coal mine, SE Kalimantan, 1868-1870**

- \* Verbeek's first assignment was to manage the small government coal mine at Pengaron, Barito Basin margin
  - more interested in the regional geology around the mine area
  - discovered the first Eocene Nummulites limestones in the Indonesian region (Verbeek 1871, 1874).
- \* Verbeek engaged several European expert paleontologists to describe the first fossil plants, molluscs, etc. from SE Kalimantan (Verbeek, 1875)

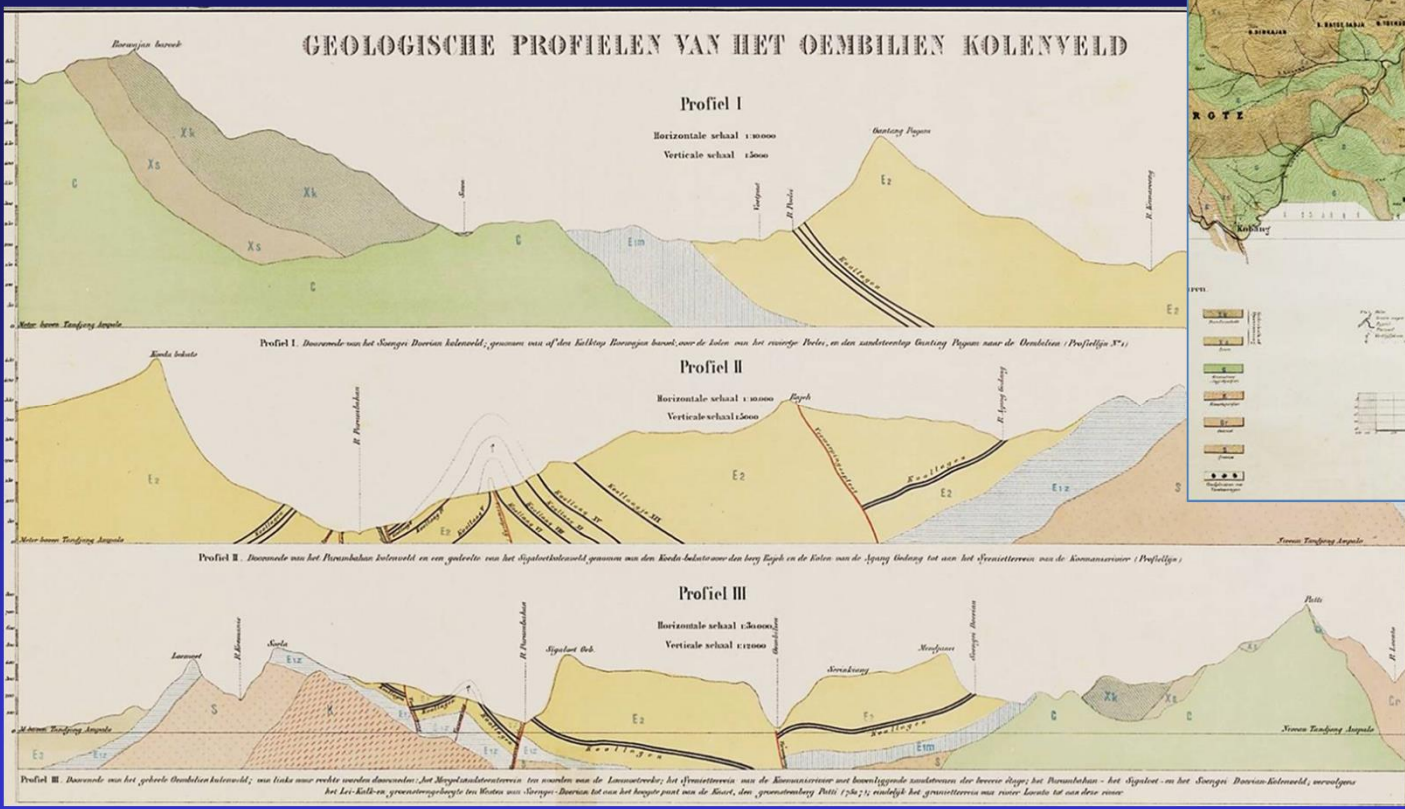




Rogier D.M. VERBEEK

## Ombilin coal field and West Sumatra mapping, 1870- 1879

- \* Verbeek's second assignment from 1870-1875 was to evaluate coal deposits in the Ombilin basin (Sawahlunto), W Sumatra, that had been discovered by W.H. de Greve in 1868 (Verbeek, 1875 report).
- \* Followed by a multi-year West Sumatra regional geological study from 1875-1879 (Verbeek 1883 , 675 pages, 19 maps, profiles)





# Geological Survey - R.D.M. Verbeek

## West Sumatra regional geologic mapping, 1875- 1879

(Verbeek 1881; part of map)

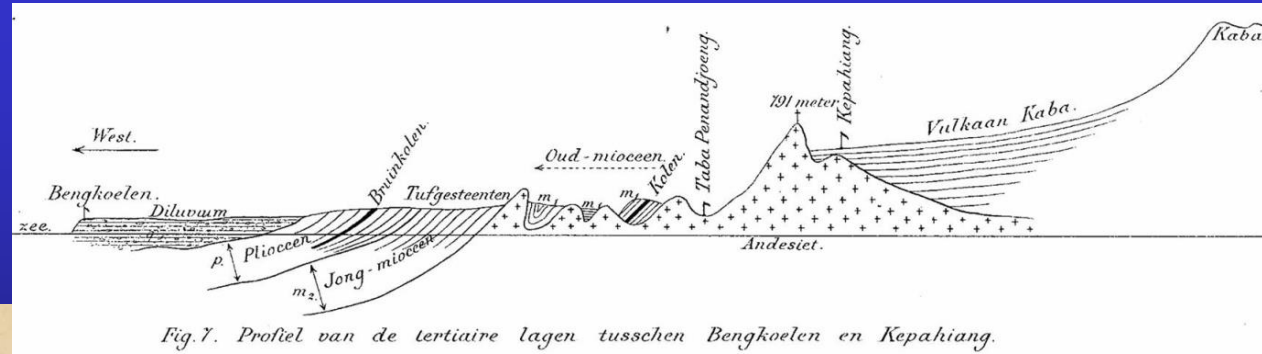
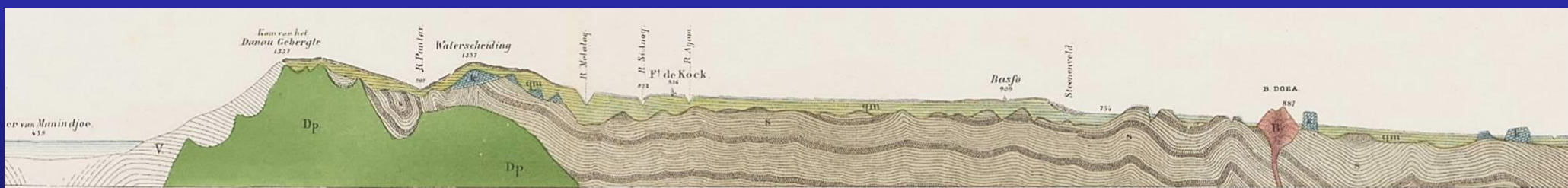


Fig.7. Profiel van de tertiaire lagen tusschen Bengkoelen en Kepahiang.

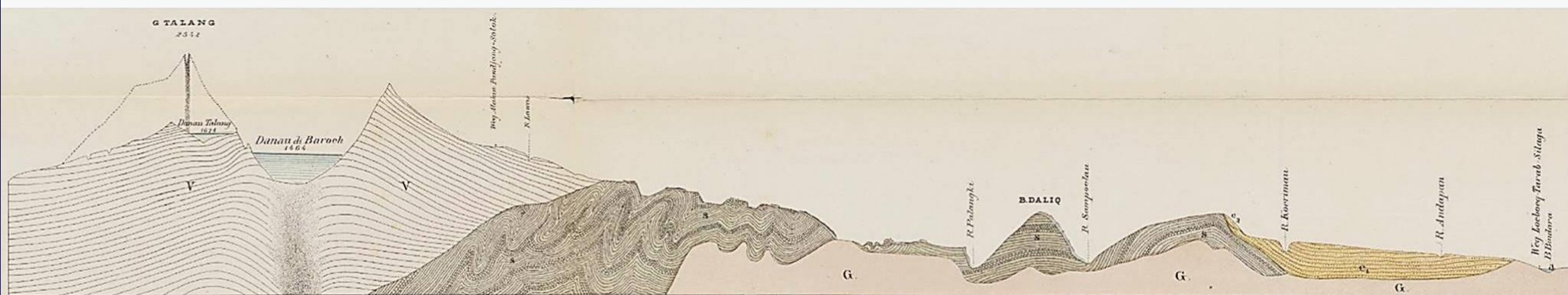




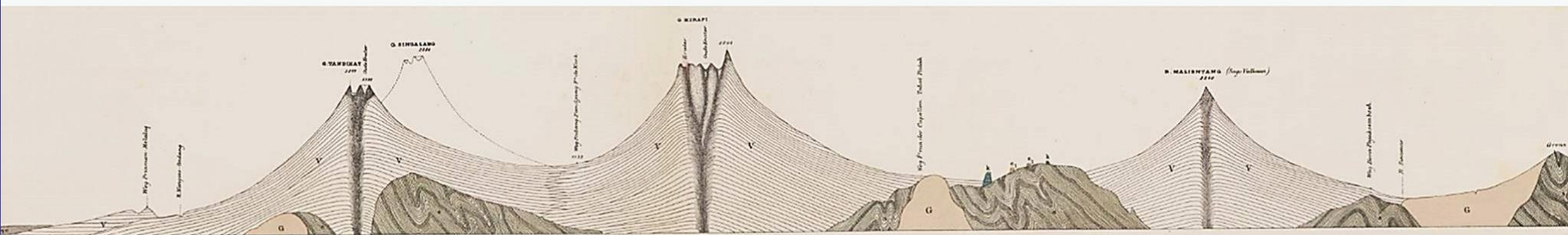
## West Sumatra regional geologic mapping, 1875- 1879



s. Oude Schiefer k. Kolenkalk e<sub>1</sub> Eocen 1° Etage qz. Zoodiluvium qm. Meerdiluvium a. Rivieralluvium G. Gesteenten der granietgroep Dp. Proterobaas B. Bazalt V. Vulkanmantels



s. Oude Schiefer k. Kolenkalk e<sub>1</sub> Eocen 1° Etage e<sub>2</sub> Eocen 2° Etage a. Rivieralluvium G. Gesteenten der granietgroep V. Vulkanmantels



s. Oude Schiefer k. Kolenkalk e<sub>1</sub> Eocen 1° Etage qz. Zoodiluvium G. Gesteenten der granietgroep V. Vulkanmantels

(Verbeek 1883)



## Krakatau eruption of August 1883

- \* The 560-page Krakatau report and Atlas of Verbeek (1885) was completed in a remarkably short time and it made Verbeek an instant internationally famous geologist

### KRAKATAU

R. D. M. VERBEEK.

### ALBUM

CONTENANT 25 PLANCHES CHROMOLITHOGRAPHIQUES DES RÉGIONS DÉVASTÉES

DU DÉTROIT DE LA SONDE.

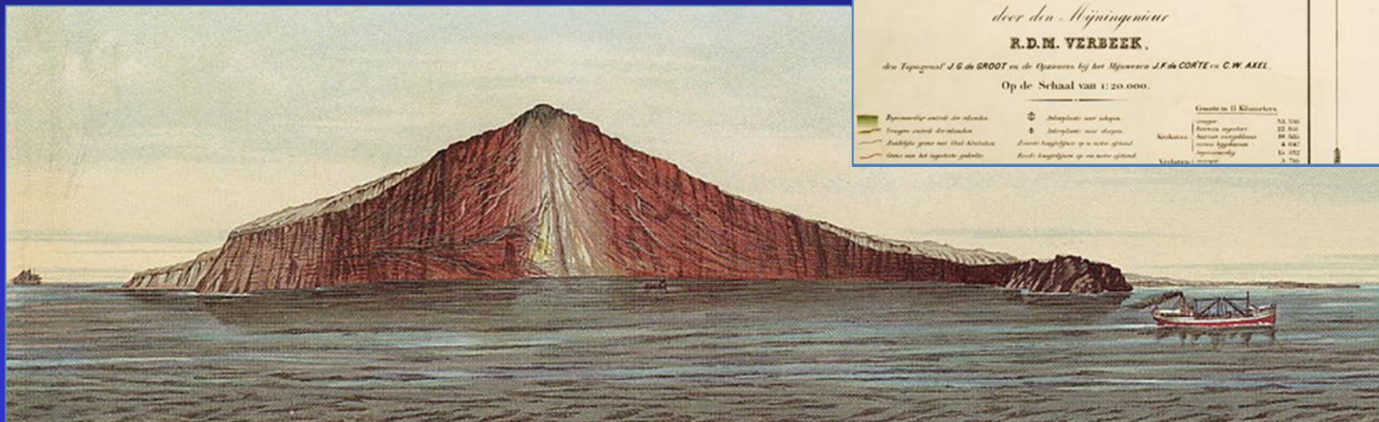
PRISES DEUX MOIS APRÈS L'ÉRUPTION DE KRAKATAU.

Publié par ordre de Son Excellence le Gouverneur-Général des Indes orientales néerlandaises.

BRUXELLES.

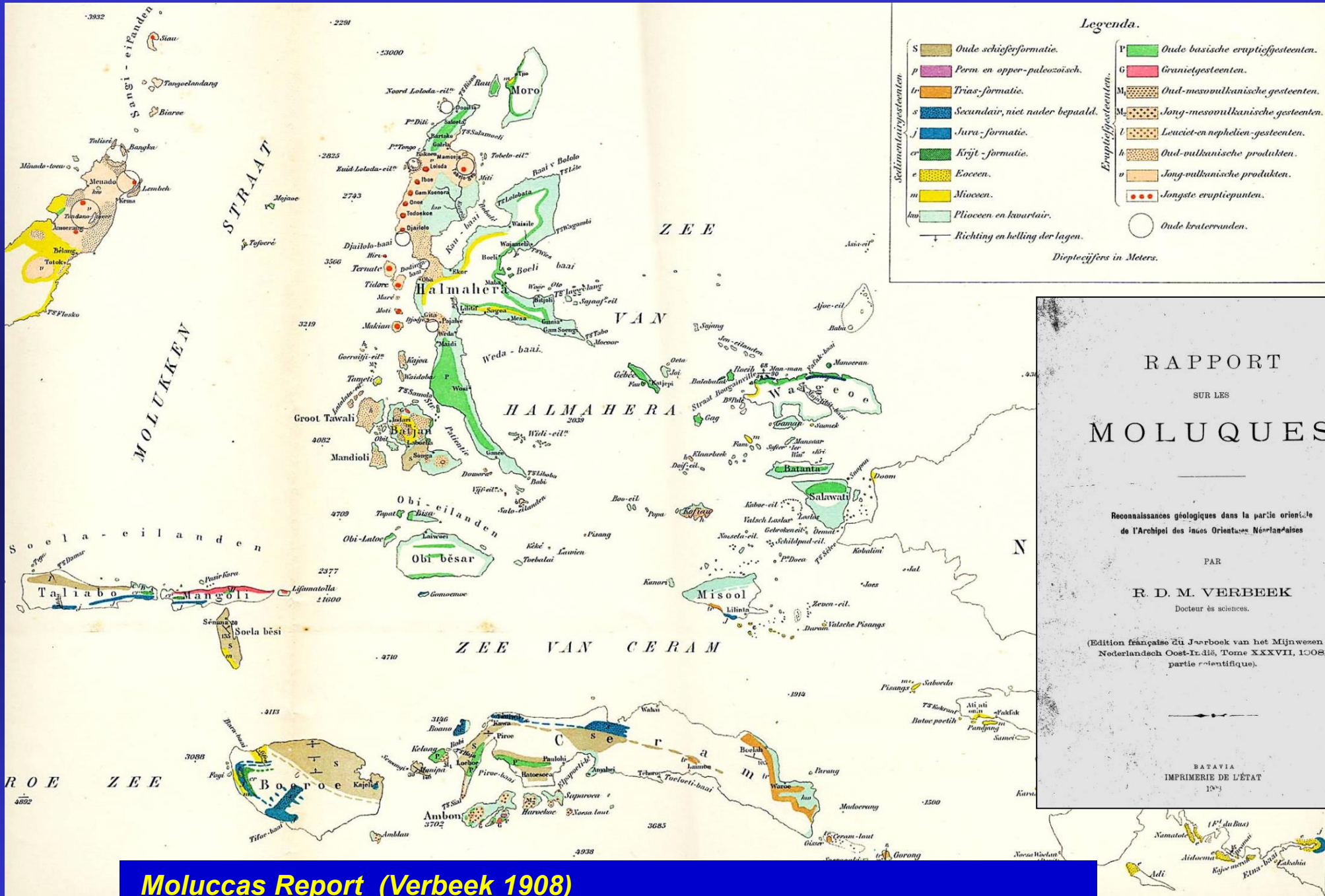
INSTITUT NATIONAL DE GÉOGRAPHIE.

Verbeek described activity before, during and after the main eruption, the scale of destruction, the nature and distribution of tuffs. Estimated volume of eruption ejecta of 1883 eruption as 12 km<sup>3</sup>.





# Geological Survey - R.D.M. Verbeek



Moluccas Report (Verbeek 1908)

Verbeek's final field survey was island-hopping in eastern Indonesia in 1899



# Geological Survey - H.A. Brouwer

## Hendrik A. BROUWER (1886-1973)

\* A world-class Dutch geologist, who made significant contributions to the geology of Indonesia in early 1900s, particularly the North Moluccas, Sulawesi and Timor in the 1910s - 1930s.

- with Dienst van het Mijnwezen in Batavia, 1910-1916

- Professor of Historical Geology in Delft, 1917-1928

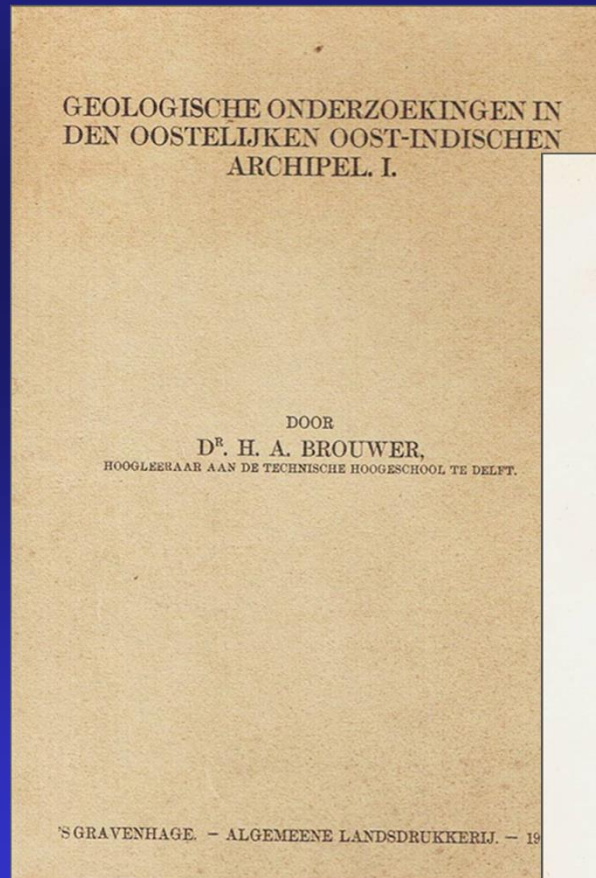
- Professor of Geology in Amsterdam, 1929-1956

\* 1929 Celebes (Sulawesi) Expedition

\* 1937 Timor Expedition (also in 1912, 1916)



H.A. Brouwer in 1925



Brouwer (1921-1925) early papers and text-book

