

ROYAUME DE BELGIQUE
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MINISTÈRE DES AFFAIRES ÉCONOMIQUES
ADMINISTRATION DES MINES — SERVICE GÉOLOGIQUE DE BELGIQUE
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13, rue Jenner — 1040 Bruxelles
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Lithostratigraphy of Miocene sediments from temporary outcrops in the Antwerp city area

by

F. DE MEUTER — K. WOUTERS — A. RINGELE

Pl. Antwerpen 28 W
Pl. Borgerhout 28 E

PROFESSIONAL PAPER 1976 N° 3

Du Jonckhe

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*Lithostratigraphy of Miocene Sediments
from temporary outcrops
in the Antwerpen City Area*

(Planchette Antwerpen 28 W and Borgerhout 28 E)

by

F. DE MEUTER, K. WOUTERS and A. RINGELE

(Laboratorium voor Paleontologie, K.U.Leuven) *

SUMMARY: In this paper the most important data of a period of field study are presented. Twenty one sections in the Antwerpen city area are described and figured, with special reference to the lithostratigraphical interpretation. The succession of the distinguished members could be visualised on a longitudinal section.

RESUME: Les données les plus importantes résultant d'une étude de vingt-et-une coupes provenant de la région d'Antwerpen - ville, sont décrites et figurées. L'accent est mis sur l'interprétation lithostratigraphique des couches et la corrélation des unités lithologiques.

ACKNOWLEDGEMENTS: The authors are very grateful to Prof. W.P. VAN LECKWIJCK and Dr. L. VAN DE POEL for stimulating and coordinating the paleontological and stratigraphical study of the Neogene sediments of N-Belgium.
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INTRODUCTION

During the years 1965-'70 extensive digging works have been carried out for the "E 3-Kleine Ring" highway around Antwerpen city. This was an interesting occasion to study as accurately as possible the stratigraphy of this area. Under the direction of Prof. W.P. VAN LECKWIJCK and Dr. L. VAN DE POEL a broad paleontological program has been drafted. Numerous outcrops have been studied, described, drawn and sampled. Further investigation at the laboratory concerned following zoological groups : Foraminifera, Bivalvia, Gastropoda, Scaphopoda, Ostracoda and Bryozoa.

In this paper we want to reproduce the most important sections of the studied area, with a more or less elaborated description, and with special emphasis on the drawings.

STUDIED SECTIONS

I. General remarks

The deposits have been observed in numerous temporary exposures of the excavations for the "E 3-Kleine Ring" highway from the Schelde river to the Schijnpoort, and in temporary exposures for the construction of buildings in the city center. Following members and bed, all known from literature and defined in the neighbourhood of the Antwerpen area, have been recognized :

Chronostratigraphy	Lithostratigraphy	
<u>Series</u>	<u>Member</u>	<u>Bed</u>
Pliocene	Kattendijk Sands	
Miocene	Deurne Sands	
	Antwerpen Sands	
	Kiel Sands	
	Edegem Sands	Burcht Gravel
Oligocene	Boom Clay	

No formation names have been used or introduced here, because of the pending general restudy of the lithostratigraphy of the Miocene deposits in N-Belgium, including as well the sections described in this paper as the data from the numerous deepborings in the Antwerp and Limburg Kempen.

On the longitudinal section (fig. 24) the succession of the distinguished members has been figured. They have a slight slope to the NE, and they are characterized by marine, mostly fossiliferous sediments. With exception of the Boom Clay, all the members in the area consist of glauconiferous mostly unconsolidated sands.

A series of symbols has been introduced to draw the lithology of the sections. For the explanation of these symbols we refer to fig. 2.

A few terms have to be explained, such as :

- Filling up : deposits which have been disturbed by the action of men, e.g. the filling up of the canals, of the ancient fort girdle around Antwerpen city etc.
- " Q " : Quaternary or presumable Quaternary. In some cases these sediments might be reworked lithologic units, but we are unable then to recognize any specified member.
- Reworked Lillo Formation : very compact shell layer with reworked shell fragments, probably derived from the Luchtbal Sands, Oorderen (=Kallo) Sands and Merksem Sands (= Lillo Formation sensu LAGA, 1972).
- Reworked Deurne Sands and Kattendijk Sands : thin heterogenous layer with fossiliferous sandstones and nests of "*Terebratula*" specimens (probably derived from the Deurne Sands), and with reworked shell fragments (probably derived from the Kattendijk Sands).

The figures on the left column of the sections represent the depth in meters. These values are expressed in Oostende O.D. level. The topographic position of the sections is given in "Lambert coordinates". In many cases the land level is not indicated because it was no more visible during the excavation works. The numbers on the left side of the sections refer to the samples. These are deposited at the "Laboratorium voor Paleontologie, Katholieke Universiteit te Leuven, Belgium". The localisation of the studied sections is given on fig. 1.

II. Description

Twenty one sections are described and figured. Some of them are grouped together because they share many common traits.

A. The ANTWERPEN-Zuidstation sections (III A.R., VI A.R., IV A.R., V A.R. and A.R.)

(Figs. 3 - 7)

1. Localisation and sampling date : Pl. 28W nos. 389-393 ;
III A.R. : x = 150.520, y = 210.120 ; sampled April 1965
VI A.R. : x = 150.680, y = 210.020 ; sampled April 1966
IV A.R. : x = 150.710, y = 209.920 ; sampled May 1965
V A.R. : x = 150.700, y = 209.940 ; sampled May 1965
A.R. : x = 150.880, y = 210.190 ; sampled Oct. 1966.

2. Description :

"Quaternary" :

yellow brown very coarse heterogenous sand with more or less massive layers of reworked shells and shell fragments ; flint pebbles ; in the A.R. section the shell layers with sandstones and overlain by yellow brown coarse sand with clay streaks and fossil wood.

Edegem Sands :

dark green fine clayey fossiliferous glauconitic sand , decalcified and more oxydated at the top ; generally very rich in Mollusca, mostly dispersed in the sediment, rarely concentrated in nests (VI A.R. 7, A.R. 11) or thin layers (III A.R. 28-29), rare specimens of the guide fossil "*Panopaea menardi*" (= *Panope angusta inflata* GOLDFUSS, 1841) (VI A.R. 7 and 17, A.R. 5 and 14).

Burcht Gravel :

fairly well developed gravel with dark small rounded flint pebbles, from the underlying clay reworked septaria, concentrated shell fragments and dark small shark teeth.

Boom Clay :

dark green plastic silty clay.

B. The ANTWERPEN-Montignystraat section (A.M.) (Fig. 8)

1. Localisation : x = 151.470, y = 209.680 ; Pl. 28W394 ;
Sampled August 1966.

2. Description :

"Quaternary" :

yellow brown very coarse heterogenous sand with concentrated shell fragments, flint pebbles and clay streaks.

Edegem Sands :

dark green fine clayey fossiliferous glauconitic sand, very rich in Mollusca ;

samples 40-55 : shells concentrated in nests

sample 39 : thin shell layer with Gastropoda and
"*Isocardia lunulata*" (= *Glossus lunulatus* (NYST, 1835))

samples 30-38 : very fossiliferous with dispersed shells ; brownish oxydation streaks

samples 28-29 : rare specimens of Mollusca

sample 27 : fossiliferous ; brownish oxydation spots

samples 18-26 : fossiliferous with "*Panopaea menardi*" in situ

sample 17 : concentration of shells with "*Lucinoma borealis*" (= *Lucinoma borealis praecedens* VON KOENEN, 1868)

samples 7-16 : very fossiliferous ; shells concentrated in nests ; dark green glauconite spots

samples 2-6 : rare specimens of Mollusca.

Burcht Gravel :

fairly well developed gravel with dark small rounded flint pebbles, from the underlying clay reworked septaria, concentrated shell fragments and dark small shark teeth.

Boom Clay :

dark green plastic silty clay.

C. The ANTWERPEN-Van Rijswijcklaan (A.V.) and ANTWERPEN-Nachtegalenpark (A.N.) sections (Figs. 9 - 10)

1. Localisation and sampling date : Pl. 28W395 & 396 ;
A.V. : x = 152.240, y = 209.240 ; sampled August 1966
A.N. : x = 152.560, y = 208.770 ; sampled July 1966.

2. Description :

"Quaternary" :

yellow loamy sand, penetrating with narrow ice wedges into the underlying sediment ; heterogenous flint pebbles at the base.

Kiel Sands :

grey green medium fine to coarse very slightly clayey unfossiliferous glauconitic loose sand ; in the lower part (A.V. 41-60 ; A.N. 13-76) numerous dark brown and typical fine whitish bioturbations spots, sometimes concentrated in bands (A.V. 43-44, 51 and 60 ; A.N. 28 and 36), exceptionally vague shell replicas (A.N. 59-60) ; in the upper part (A.V. 61-73 ; A.N. 77-104) nearly absence of whitish spots, increasing dark brown oxydation streaks and dark green concentrations of glauconite ; locally levels of coarse sand (A.V. 61) and clay streaks (A.V. 62).

Edegem Sands :

dark green fine clayey fossiliferous glauconitic sand with increasing oxydation at the top (A.V. 37-40 ; A.N. 1-12) ; shells mostly dispersed, sometimes concentrated in thin layers (A.V. 33-34).

D. The BERCHEM-Grote Steenweg (A.G.) and BERCHEM-Station
(IV B.M. and B.M.) sections (Figs. 11-13)

1. Localisation and sampling date : Pl. 28W397 & 398 ; 28E494 ;
A.G. : x = 153.820, y = 209.030 ; sampled April 1967
IV B.M.: x = 153.870, y = 209.100 ; sampled March 1969
B.M. : x = 154.550, y = 209.560 ; sampled May 1966.

2. Description :

"Quaternary" :

very coarse heterogenous sand with flint pebbles,
reworked shell fragments, clay streaks, bones and
sandstones.

Antwerpen Sands :

dark green medium fine slightly clayey fossiliferous
very glauconitic sand ; typical variable shell layers
with the guide fossil "*Pectunculus pilosus*" (= *Gly-
cymeris lunulata baldi* (GLIBERT & VAN DE POEL, 1965));
concentration of friable sandstones at the base ; levels
with phosphatic concretions ;

a/ Section A.G. :

- sample 17 : thick shell layer, numerous bivalved
specimens of the guide fossil
- sample 16 : thin layer with fragile shells of the
guide fossil ; phosphatic concretions
- sample 15 : concentration of friable sandstones

b/ Section IV B.M. :

- sample 7b : thick shell layer with numerous bi-
valved specimens of the guide fossil
- sample 7a : thin shell layer with smaller speci-
mens and with "*Panopoea menardi*" in
situ
- samples 5-6 : dispersed shells
- sample 4 : thin layer with fragile shells ; phos-
phatic concretions
- sample 3 : nearly unfossiliferous
- sample 2 : dispersed sandstones and phosphatic
concretions

c/ Section B.M. :

- samples 33-34 : shell layer with bivalved specimens
of the guide fossil
- samples 28-32 : dispersed shells
- samples 23-27 : thick shell layer with bivalved
specimens of the guide fossil
- samples 14-22 : dispersed shells ; sandstones
- sample 120 : thin layer with fragile bivalved
specimens of the guide fossil
- sample 119 : sandstones
- samples 106-118 : nearly unfossiliferous, disper-
sed heterogenous bioturbation spots;
sandstones at the level 106.

Kiel Sands :

grey green medium fine to coarse very slightly clayey unfossiliferous glauconitic loose sand ; whitish and brownish bioturbation spots ; in section A.G. dark brown oxydation spots at the top (sample 14), locally very friable shell fragments preserved in clay streaks and sandstones (sample 8), larger brownish bioturbation spots at the base (samples 1-2).

E. The ANTWERPEN-Borsbeekse Poort sections (I and II B.P.)
(Figs. 14-15)

1. Localisation and sampling date : Pl. 28E495 and 496 ;
I B.P. : x = 154.850, y = 210.400 ; sampled October 1966
II B.P. : x = 155.010, y = 210.490 ; sampled March 1967.

2. Description :

"Quaternary" :

very coarse dark brown striated sand with flint pebbles, clay streaks and reworked fragile shell fragments ; occasionally in ice wedges deeply penetrating into the underlying sediments (I B.P.).

Reworked Lillo Formation :

very compact heterogenous shell layer with reworked shell fragments (probably derived from the Lillo Formation), flint pebbles and clay streaks.

Reworked Deurne Sands and Kattendijk Sands :

grey green heterogenous slightly clayey glauconitic sand ; fossiliferous sandstones and concentrations of "*Terebratula*" specimens (probably derived from the Deurne Sands) ; very rare reworked shell fragments (probably derived from the Kattendijk Sands) ; flint pebbles, bones and shark teeth.

Antwerpen Sands :

dark green medium fine slightly clayey fossiliferous glauconitic sand ; typical variable shell layers with the guide fossil "*Pectunculus pilosus*" ;

- a/ Section I B.P. : thin shell layer with loose valves of the guide fossil in samples 3 and 1 ; less fossiliferous clayey sand in sample 2 ; dark brown oxydation and sand concretions at the top
- b/ Section II B.P. : massive shell layer with numerous bivalved specimens of the guide fossil in sample 2 ; thin shell layer in sample 4 ; sandstones from sample 3 to the top ; clay streaks and less fossiliferous in sample 1.

F. The BORGERHOUT-Stenen Brug section (I S.B.) (Fig. 16)

1. Localisation : x = 155.510, y = 211.400 ; Pl. 28E497 ;

Sampled March 1967.

2. Description :

Reworked Lillo Formation :

very compact heterogenous shell layer with reworked shell fragments, flint pebbles and clay streaks.

Reworked Deurne Sands and Kattendijk Sands :

grey green heterogenous slightly clayey glauconitic sand ; fossiliferous sandstones and concentrations of "*Terebratula*" specimens (probably derived from the Deurne Sands) ; very rare reworked shell fragments (probably derived from the Kattendijk Sands) ; flint pebbles , bones and shark teeth.

Antwerpen Sands :

dark green medium fine slightly clayey fossiliferous very glauconitic sand ; typical variable shell layers with the guide fossil "*Pectunculus pilosus*" (= *Glycymeris lunulata baldii* (GLIBERT & VAN DE POEL, 1965)) ;

sample 17 : thin shell layer with "*Pecten tigerinus*" (= *Pseudamussium(Zygochlamys) tigerinum* (MULLER, 1776))

sample 16 : thin shell layer with the guide fossil

sample 15 : well developed compact shell layer with the guide fossil, very rare bivalved spec.

sample 14 : nests of fragile shells

samples 12-13 : dispersed small shells ; Gastropoda

sample 11 : shell layer with the guide fossil, sometimes bivalved

sample 10 : dispersed small shells

samples 8-9 : massive shell layer with the guide fossil; locally less fossiliferous sand between the samples 8 and 9

sample 7 : massive shell layer with fragile smaller specimens ; "*Panopoea menardi*" in situ

- sample 6 : thin shell layer with more dispersed specimens
- sample 5 : well developed shell layer with the guide fossil, rarely bivalved, orientated in all directions
- sample 4 : shell layer with "*Turritella*" passing into the shell layer of sample 5
- sample 3 : thin shell layer with the guide fossil, many bivalved specimens or loose valves, often with convex side upwards
- sample 2 : thin shell layer with dispersed often bivalved specimens of the guide fossil; clay streaks and sandstones at the base
- sample 1 : thin shell layer with loose valves of the guide fossil, convex side sometimes upwards.

G. The BORGERHOUT-Rivierenhof sections (VII and XIV B.R.)

(Figs. 17-18)

1. Localisation and sampling date : Pl. 28E498 and 500 ;
VII B.R. : x = 155.860, y = 211.910 ; sampled Nov. 1966
XIV B.R. : x = 155.660, y = 212.010 ; sampled Febr. 1967.

2. Description (see also DE MEUTER, F., P. LAGA, A. RINGELE & V. ROOSE, 1967) :

"Quaternary" :

dark brown clayey sand with rare reworked shell fragments and dispersed flint pebbles.

Reworked Lillo Formation :

very compact heterogenous shell layer with reworked shell fragments, flint pebbles, sand and clay streaks.

Kattendijk Sands :

grey green fine slightly clayey fossiliferous glauconitic sand ; shell layer with the guide fossil "*Iso-cardia cor*" (= *Glossus humanus* (LINNAEUS, 1758)); dark rounded flint pebbles ; at the undulating base gravel with dark rounded flint pebbles, bones, clay spots, sandstones often including "*Ditrupa*" and Gastropoda, and shark teeth.

Deurne Sands :

grey green medium fine locally fossiliferous glauconitic loose sand ; typical whitish bioturbation spots with dark contour of glauconite ; dispersed nests of Bryozoa, "*Ditrupa*" and "*Mannia nysti* (DEWALQUE)" (Brachyopoda) ; poorly developed gravel at the base with dark small flint pebbles, small bone fragments and rare shark teeth.

Antwerpen Sands :

dark green medium fine slightly clayey fossiliferous very glauconitic sand ; at the top rare specimens of the guide fossil, sandy concretions and cementation of the sediment (hard ground).

H. The BORGERHOUT-Rivierenhof section (XI B.R.) (Fig. 19)

1. Localisation : x = 155.770, y = 212.060 ; Pl. 28E499 ;
Sampled December 1966.

2. Description :

Reworked Lillo Formation :

very coarse dark brown sand with dispersed flint pebbles and rare reworked shell fragments ; thick gravel with dark small rounded flint pebbles and shark teeth at the base.

Kattendijk Sands :

grey green fine slightly clayey glauconitic sand with dispersed flint pebbles, nearly unfossiliferous; at the base gravel with flint pebbles, sandstones, bones and shark teeth (sample 19c).

Antwerpen Sands :

dark green medium fine slightly clayey fossiliferous very glauconitic sand ; typical variable shell layers with the guide fossil "*Pectunculus pilosus*" (= *Glycymeris lunulata baldi* (GLIBERT & VAN DE POEL, 1965));

samples 19a-b : nearly unfossiliferous except fragile shell layer with "*Pecten tigerinus*" ; bioturbation spots ; oxydation and cementation of the sediment at the top

sample 18 : at the top thin shell layer ; sandstones

samples 17a-b : thin shell layers

sample 16 : dispersed shells

sample 15 : very massive shell layer with loose valves of the guide fossil and nests of shell fragments

sample 14 : nearly unfossiliferous

sample 13 : thin layer with shell fragments

sample 12 : very thin shell layer

sample 11 : well developed shell layer with less specimens of the guide fossil but more specimens of smaller species of Mollusca

- sample 10 : nearly unfossiliferous
- sample 9 : fairly well developed shell layer,
sometimes bivalved specimens of the
guide fossil
- sample 8 : nearly unfossiliferous
- sample 7 : massive shell layer with very small
to large specimens of the guide fossil
- sample 6 : concentrations of shells with "*Pano-*
poea menardi" in situ
- sample 5a-b : dispersed shells ; bioturbation
spots
- sample 4 : thin shell layer with "*Turritella*"
and the guide fossil
- sample 3 : thin shell layer with the guide fossil
- sample 2 : dispersed fragile shells of the guide
fossil
- sample 1 : thin shell layer with small slightly
weathered specimens of the guide fossil;
sandstones.

I. The ANTWERPEN-Schijnpoort sections (II and V A.S.)

(Figs. 20-21)

1. Localisation and sampling date : Pl. 28E502 and 501 ;
II A.S. : x = 155.390, y = 213.040 ; sampled Nov. 1966
V A.S. : x = 155.770, y = 212.580 ; sampled May 1969.

2. Description :

"Quaternary" (V A.S.) :

dark brown coarse clayey sand, cross bedded, with rare reworked shell fragments.

Reworked Lillo Formation :

very compact heterogenous shell layer with reworked shell fragments, flint pebbles and clay streaks.

Kattendijk Sands :

grey green fine slightly clayey fossiliferous glauconitic sand ; thick shell layer near the base (II A.S. 2-4 ; V A.S. 1-2) with the guide fossil "*Isocardia cor*" (= *Glossus humanus* (LINNAEUS, 1758)); more dispersed shells, sometimes concentrated in nests ; well developed gravel with sandstones including "*Ditrupa*" and Gastropoda, heterogenous flint pebbles, bones and shark teeth.

Deurne Sands : (V A.S.)

grey green medium fine in the section nearly unfossiliferous glauconitic loose sand ; typical whitish bioturbation spots with dark contour of glauconite ; often nests of Bryozoa and "*Ditrupa*"; at the base very thin gravel with small rounded flint pebbles, small bone fragments and shark teeth.

Antwerpen Sands :

dark green medium fine slightly clayey very glauconitic sand ; in this section only the decalcified cementated top of the member visible.

J. The ANTWERPEN-Kievitstraat sections (II, V, VI A.K.)

(Fig. 22)

1. Localisation : x = 153.810, y = 211.590 ; Pl. 28W399 ;
Sampled August 1965.

2. Description :

Antwerpen Sands :

dark green medium fine slightly clayey fossiliferous
very glauconitic sand ; typical variable shell layers
with the guide fossil "*Pectunculus pilosus*" (= *Glycy-*
meris lunulata baldi (GLIBERT & VAN DE POEL, 1965));

samples 80-81 : red brown coarse sand with massive
shell layer, very rarely bivalved speci-
mens of the guide fossil

sample 79 : dispersed smaller shells

samples 77-78 : thick shell layer with the guide
fossil, often bivalved specimens

sample 76 : shell layer with smaller Bivalvia ;
"*Panopoea menardi*" in situ

samples 67-75 : dark brown oxydation spots and
dark green glauconite streaks ; rare
dispersed shells and shell fragments

samples 65-66 : thick shell layer with rarely bi-
valved specimens of the guide fossil
and with Gastropoda

sample 64 : very rare shells ; sandstones

sample 63 : very thin layer of the guide fossil

samples 53-62 : dispersed specimens of the guide
fossil ; nests of smaller Bivalvia

sample 52 : thin shell layer with fragile loose
valves of the guide fossil

samples 50-51 : dispersed fragile specimens of
the guide fossil

sample 49 : nearly unfossiliferous ; sandstones

samples 32-48 : brown oxydation spots, nearly un-
fossiliferous, clay streaks (sample 40)

sample 31 : thin shell layer with the guide fossil;
clay streaks

- sample 30 : bioturbation spots ; nearly unfossiliferous
- sample 29 : unfossiliferous ; sandstones
- samples 27-28 : bioturbation spots
- sample 26 : thin shell layer with fragile specimens of the guide fossil
- sample 25 : very thin layer of fragile specimens of the guide fossil
- samples 17-24 : unfossiliferous dark green sand with dispersed sandstones and bioturbation spots.

K. The ANTWERPEN-Italiëlei section (A.J.) (Fig. 23)

1. Localisation : x = 153.290, y = 212.220 ; Pl. 28W400 ;
Sampled November 1966.

2. Description :

Reworked Lillo Formation :

dark brown heterogenous clayey fossiliferous glauconitic sand ; dispersed nests of shell fragments, small Gastropoda and spines of Echinodermata ; well developed clay streaks.

Kattendijk Sands :

grey green fine slightly clayey fossiliferous glauconitic sand ;

sample 6 : brownish sand with thin shell layer with "*Isocardia cor*" and "*Pygocardia rustica rustica*"

sample 5 : brownish sand with numerous "*Turritella*" and "*Pecten tigerinus*"

sample 4 : compact shell layer ; at the base flint pebbles, sandstones, phosphatic concretions and fossil wood

sample 3 : massive shell layer with "*Glycymeris glycymeris*", orientated in all directions, sometimes bivalved ; with "*Isocardia cor*" and "*Pygocardia rustica rustica*" ; flint pebbles and shark teeth.

Antwerpen Sands :

dark green medium fine slightly clayey fossiliferous very glauconitic sand ; typical variable shell layers with the guide fossil "*Pectunculus pilosus*" ;

sample 2 : thin shell layer with the guide fossil and with rare specimens of "*Panopaea menardi*" in situ

sample 1 : rare dispersed shells ; "*Panopaea menardi*" in situ ; bioturbations spots.

REFERENCES

DE MEUTER, F., P. LAGA, A. RINGELE & V. ROOSE, 1967, Compte rendu de l'excurtion du samedi 29 octobre 1966, faite à Deurne près d'Anvers.
Bull. Soc. Belge Géol., Paléont., Hydrol., t. 75, fasc. 4, 1966, p. 392-396, fig. 1-3.

LAGA, P.G., 1972, Stratigrafie van de mariene Plio-Pleistocene afzettingen uit de omgeving van Antwerpen met een bijzondere studie van de Foraminiferen.
Doctoraatsproefschrift K.U.-Leuven.

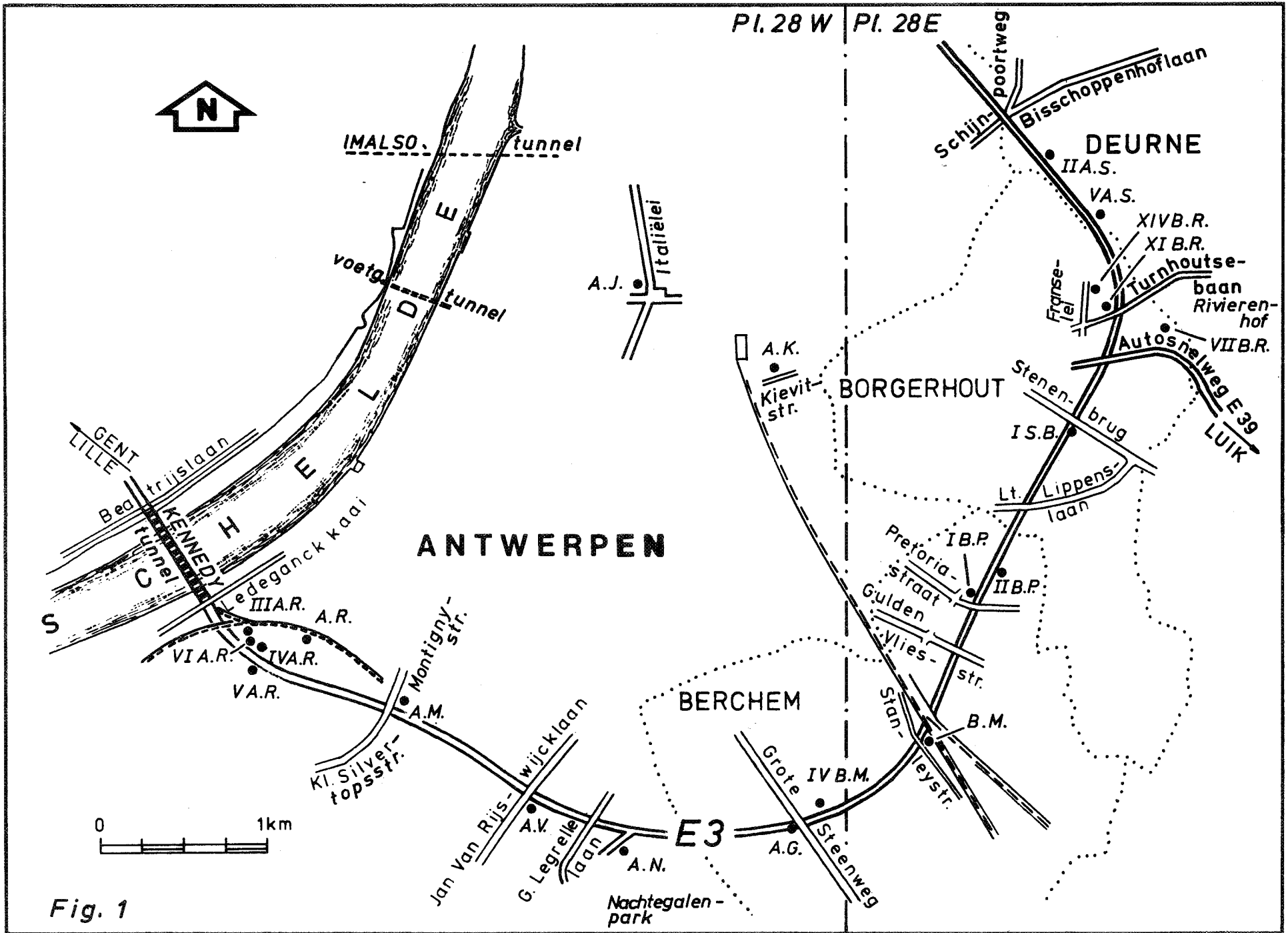


Fig. 1

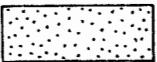

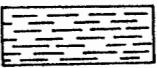


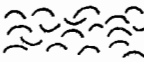

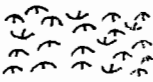

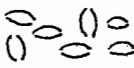
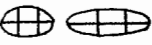
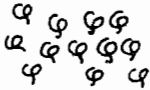
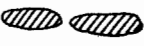
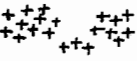




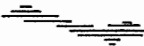

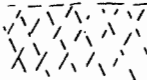
	<i>Sand</i>		<i>Filling up</i>
	<i>Clay</i>		<i>Oxydation spots</i>
	<i>Gravel</i>		<i>Shell layer</i>
	<i>Sandstone</i>		<i>Reworked shell fragments</i>
	<i>Clay spot</i>		<i>Bivalved specimens</i>
	<i>Septaria</i>		<i>Gastropods</i>
	<i>Bone</i>		<i>Concentration of <u>Ditrupa</u></i>
	<i>Wood</i>		<i>Vague shell replicas</i>
	<i>Phosphatic concretions</i>		<i>Bioturbation spots</i>
	<i>Clay streak</i>		<i>Bioturbation spots with dark contour (Deurne Sands)</i>
	<i>Hard ground</i>		

Fig. 2 - S Y M B O L S

ANTWERPEN - ZUIDSTATION (III A.R.)

Pl. 28 W - 389

DEPTH
in m

SAMPLE
N°

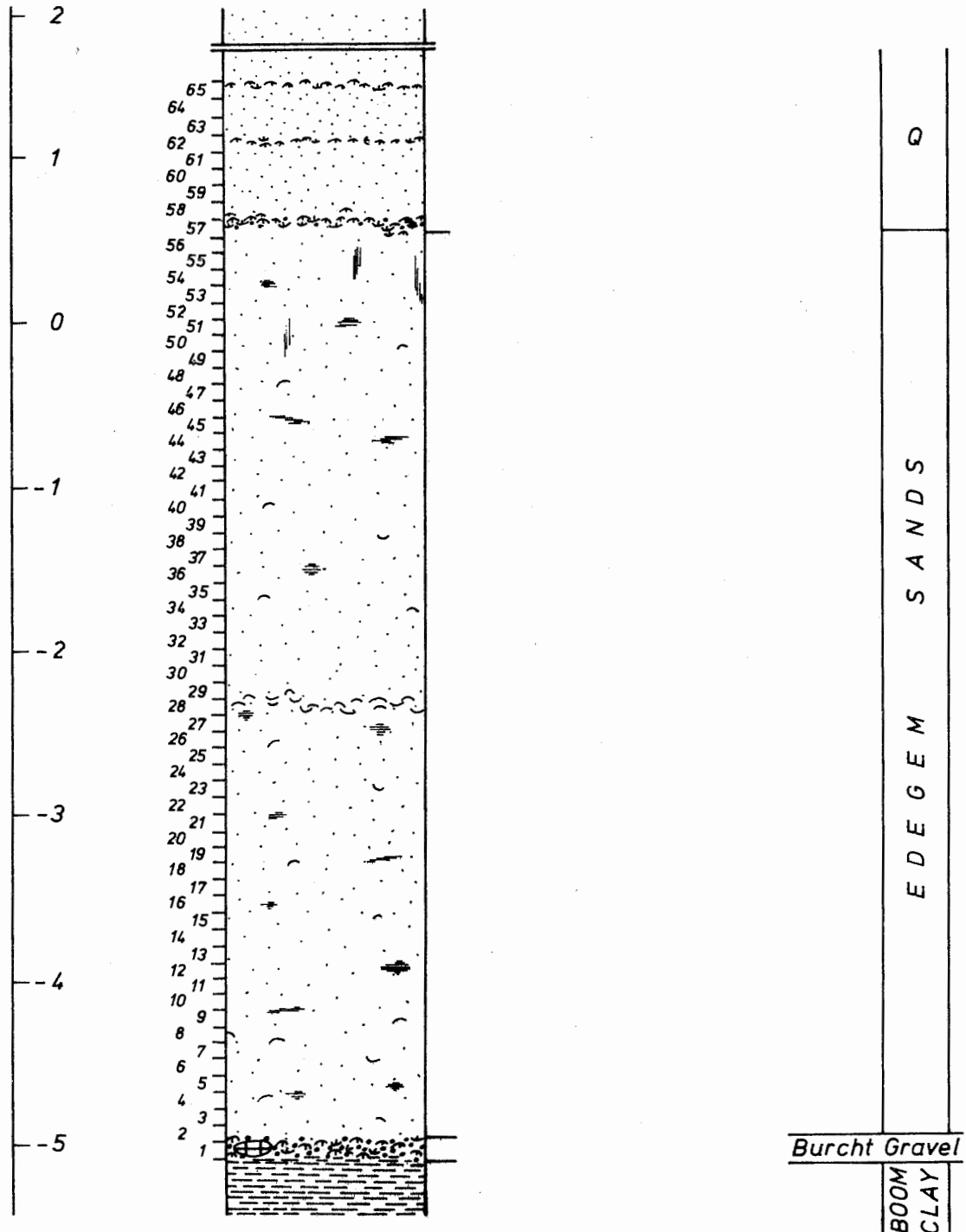


Fig. 3

ANTWERPEN - ZUIDSTATION (VI A.R.)

Pl. 28W - 390

DEPTH
in m

SAMPLE
N°

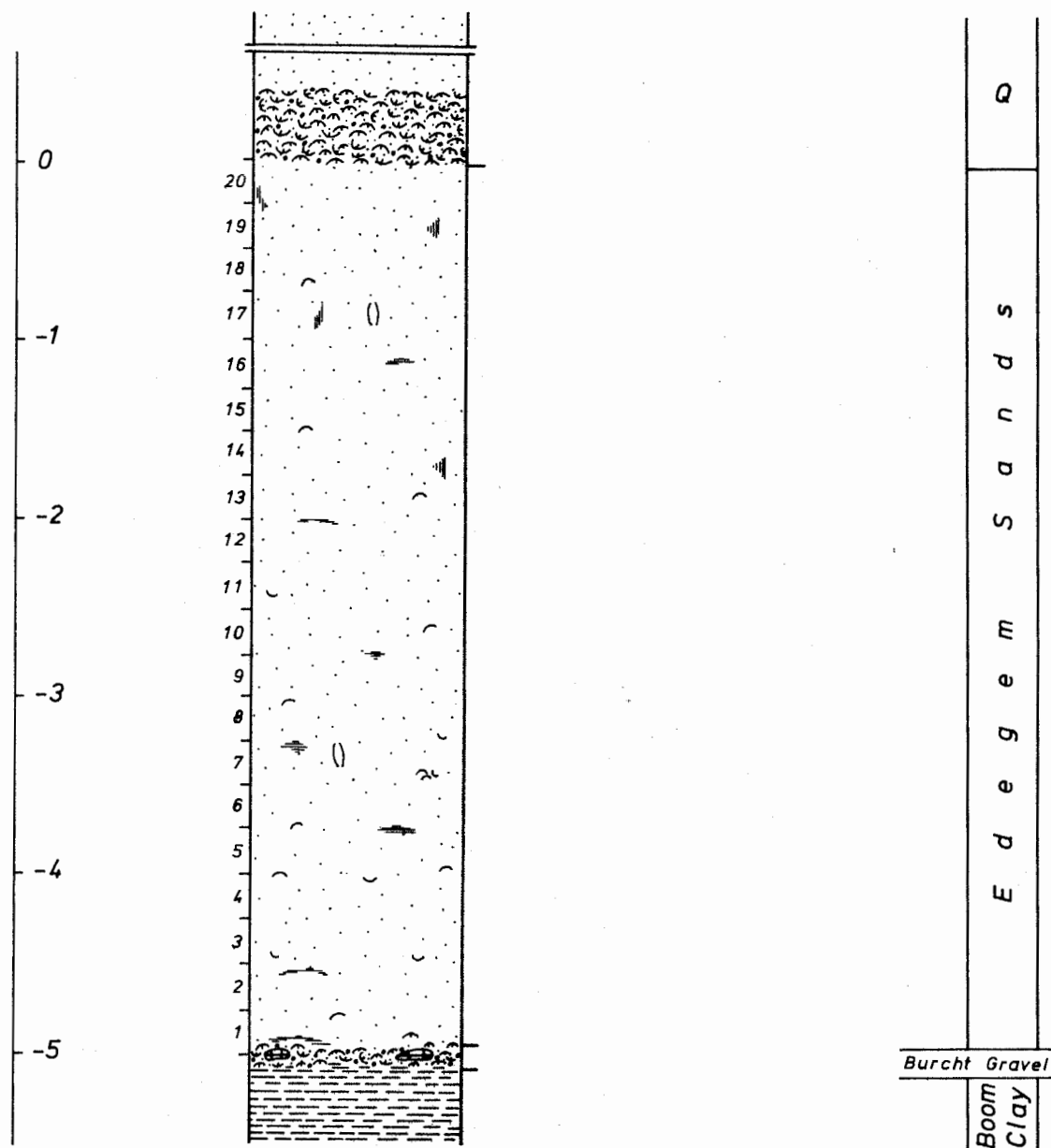


Fig. 4

K.W. 1974

ANTWERPEN - ZUIDSTATION (IV.A.R.)

Pl. 28W - 391

DEPTH
in m

SAMPLE
N°

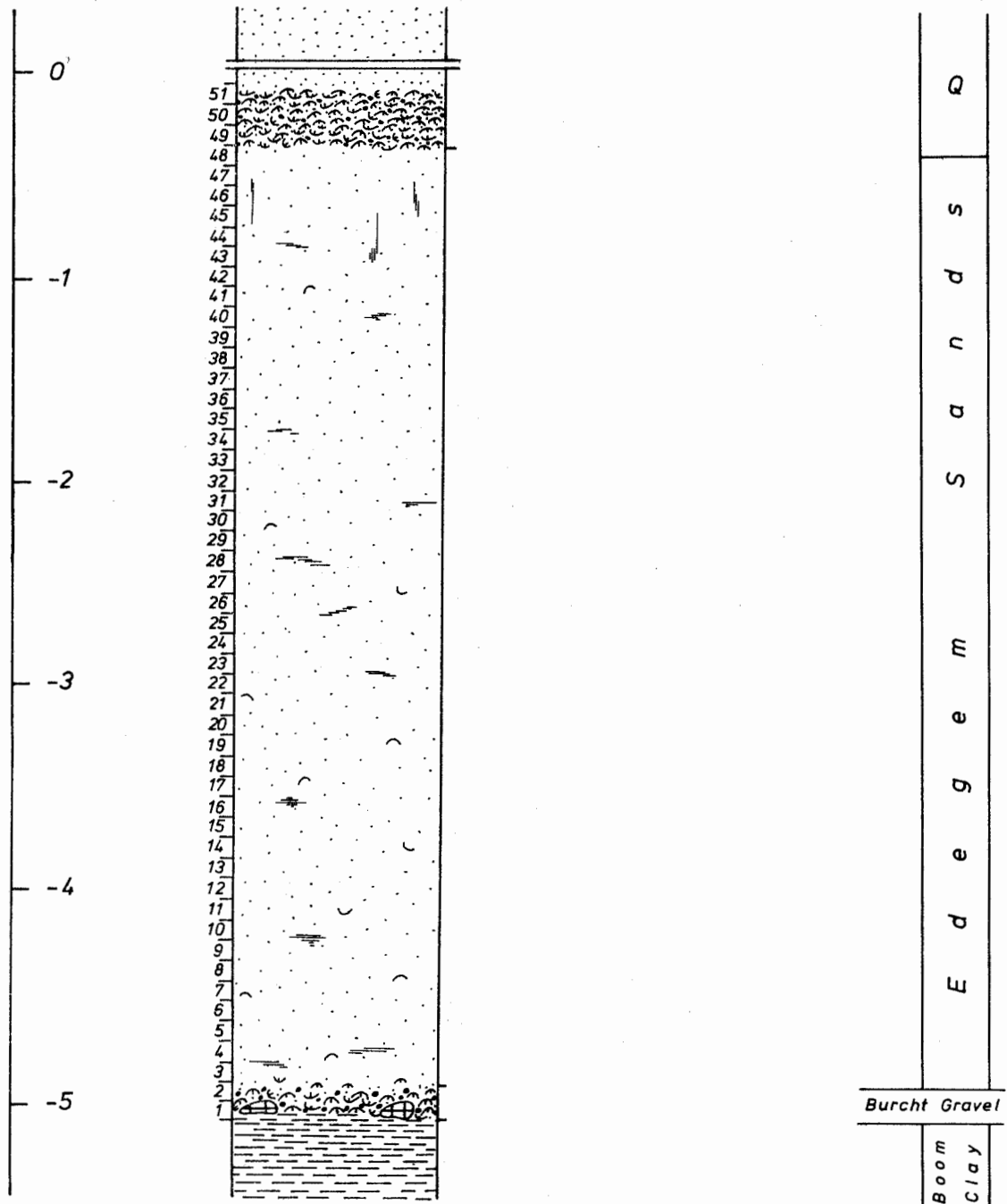


Fig. 5

ANTWERPEN - ZUIDSTATION (V.A.R.)

Pl. 28W - 392

Depth
in m

Sample
N°

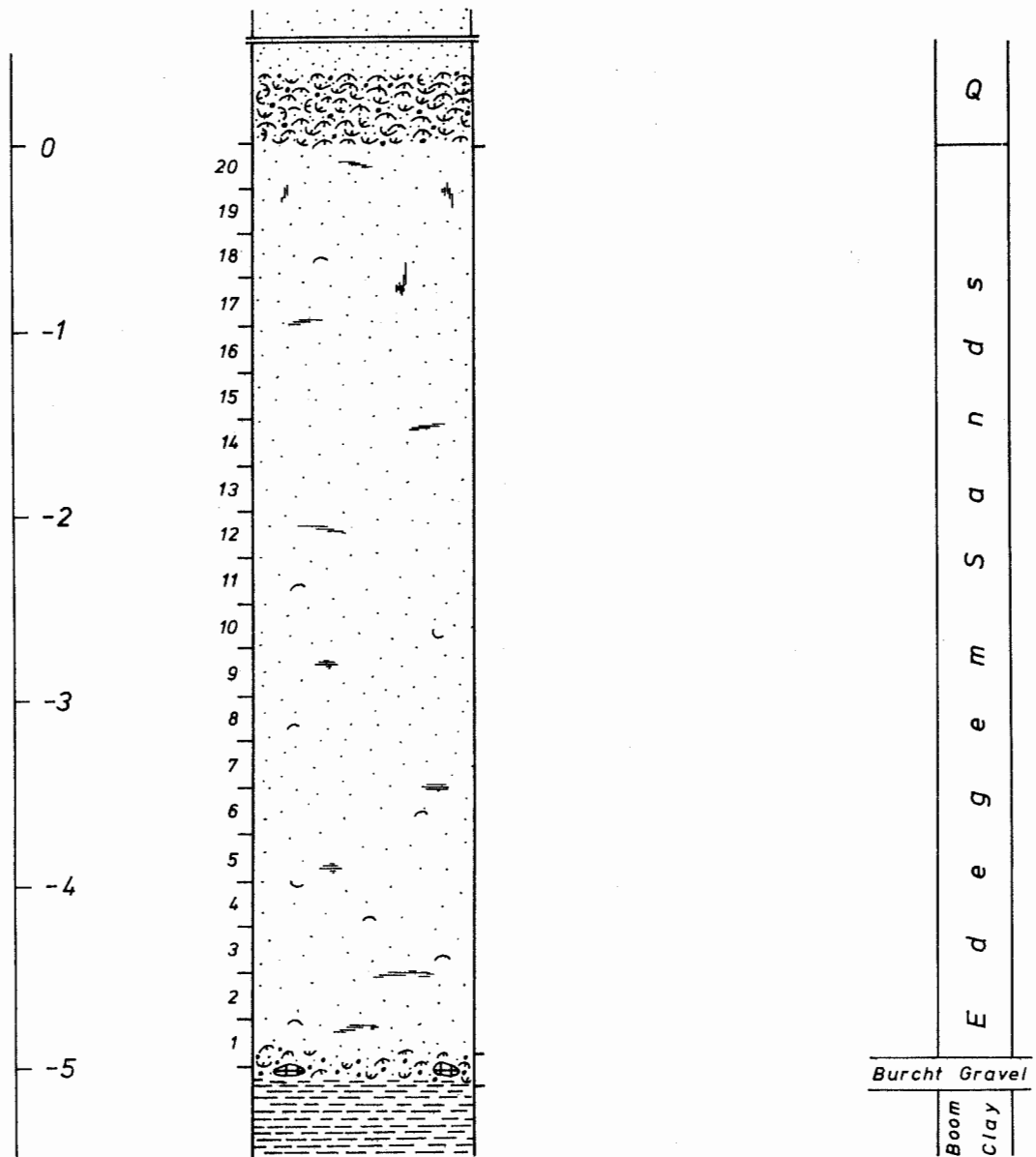


Fig. 6

ANTWERPEN - ZUIDSTATION (A.R.)

Pl. 28 W - 393

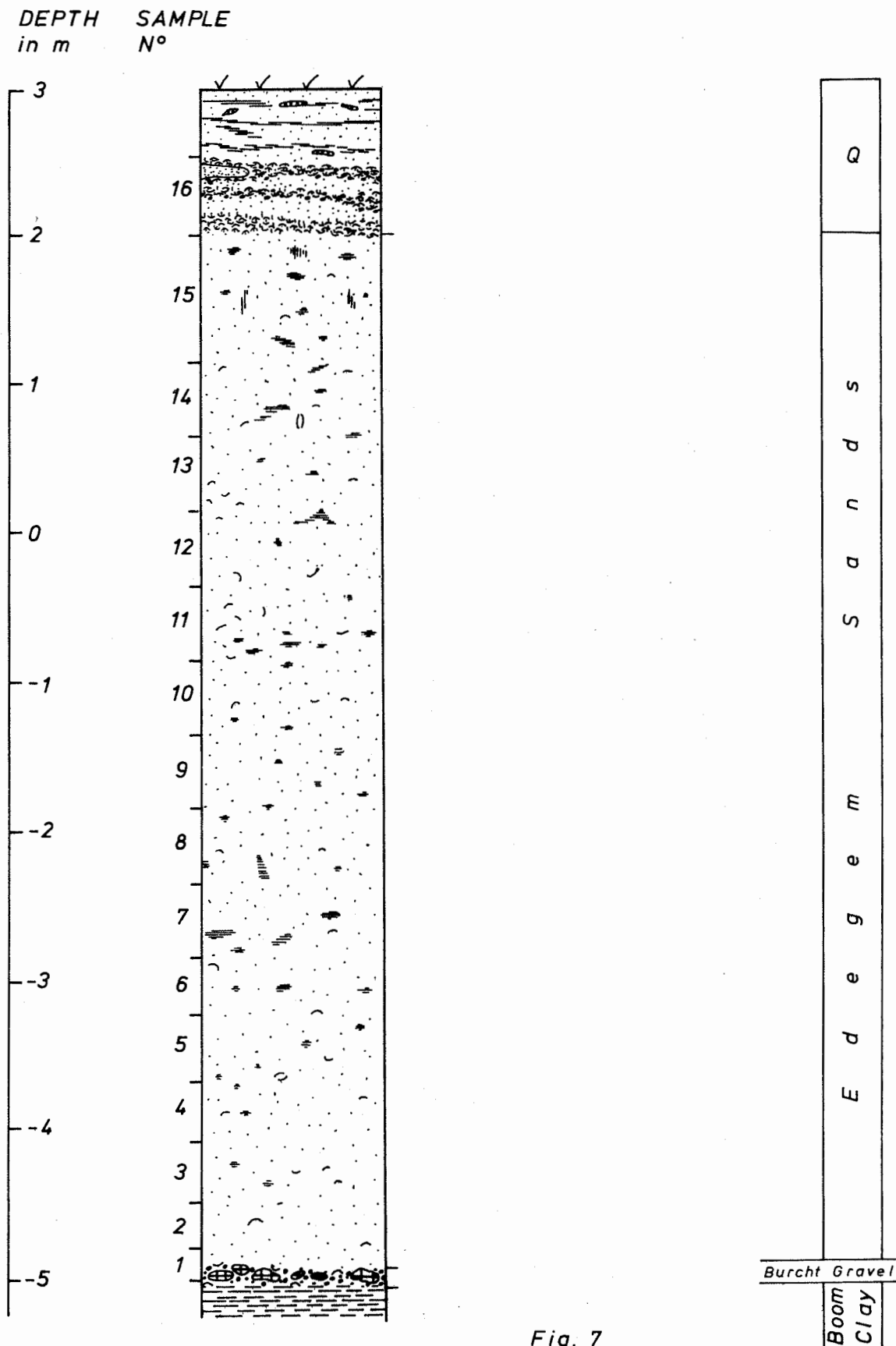


Fig. 7

ANTWERPEN - MONTIGNYSTRAAT (A.M.)

Pl. 28 W - 394

DEPTH
in m

SAMPLE
No

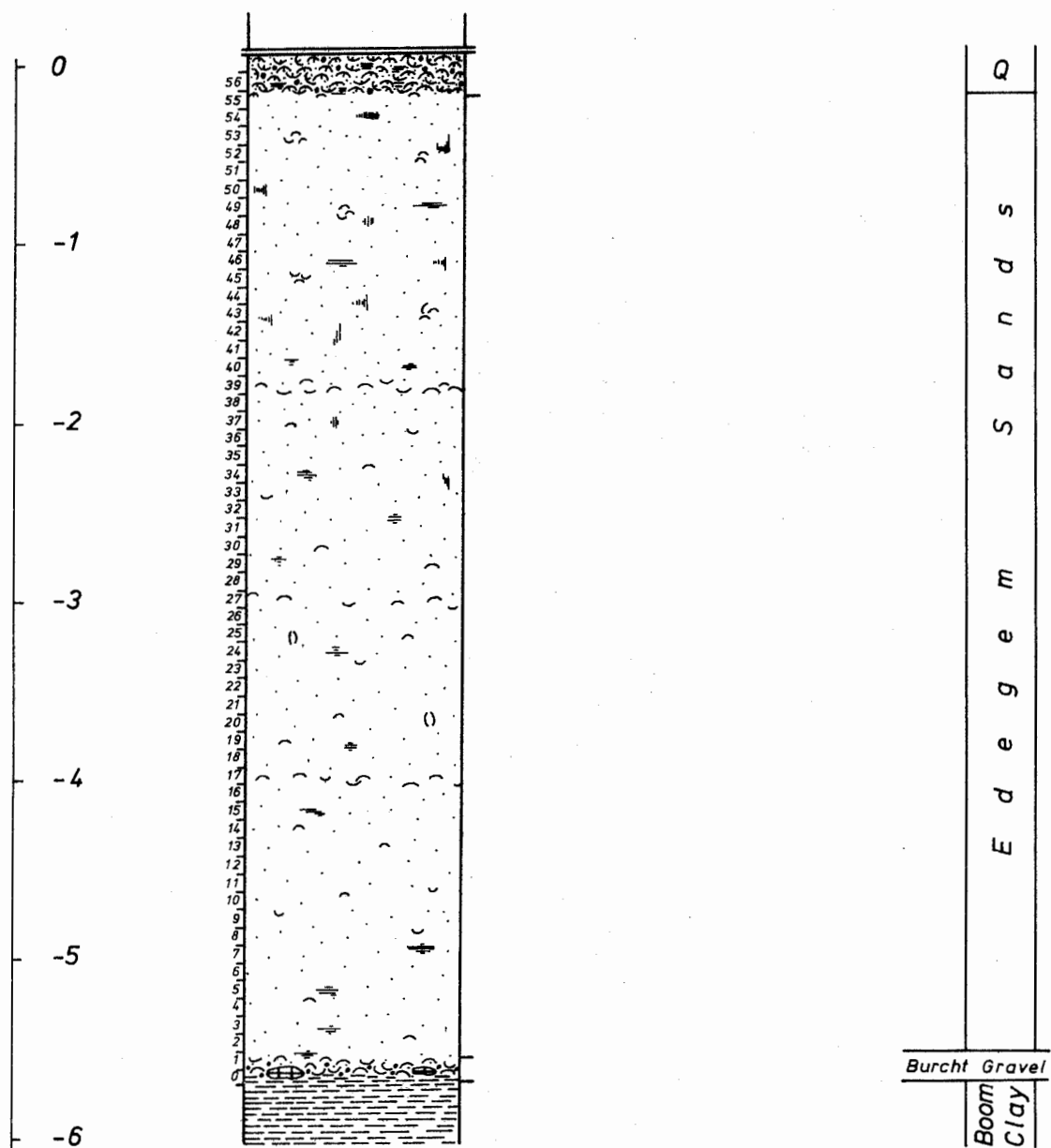


Fig. 8

ANTWERPEN - VAN RIJSWIJCKLAAN (A.V.)

Pl. 28W-395

DEPTH
in m

SAMPLE
N^o

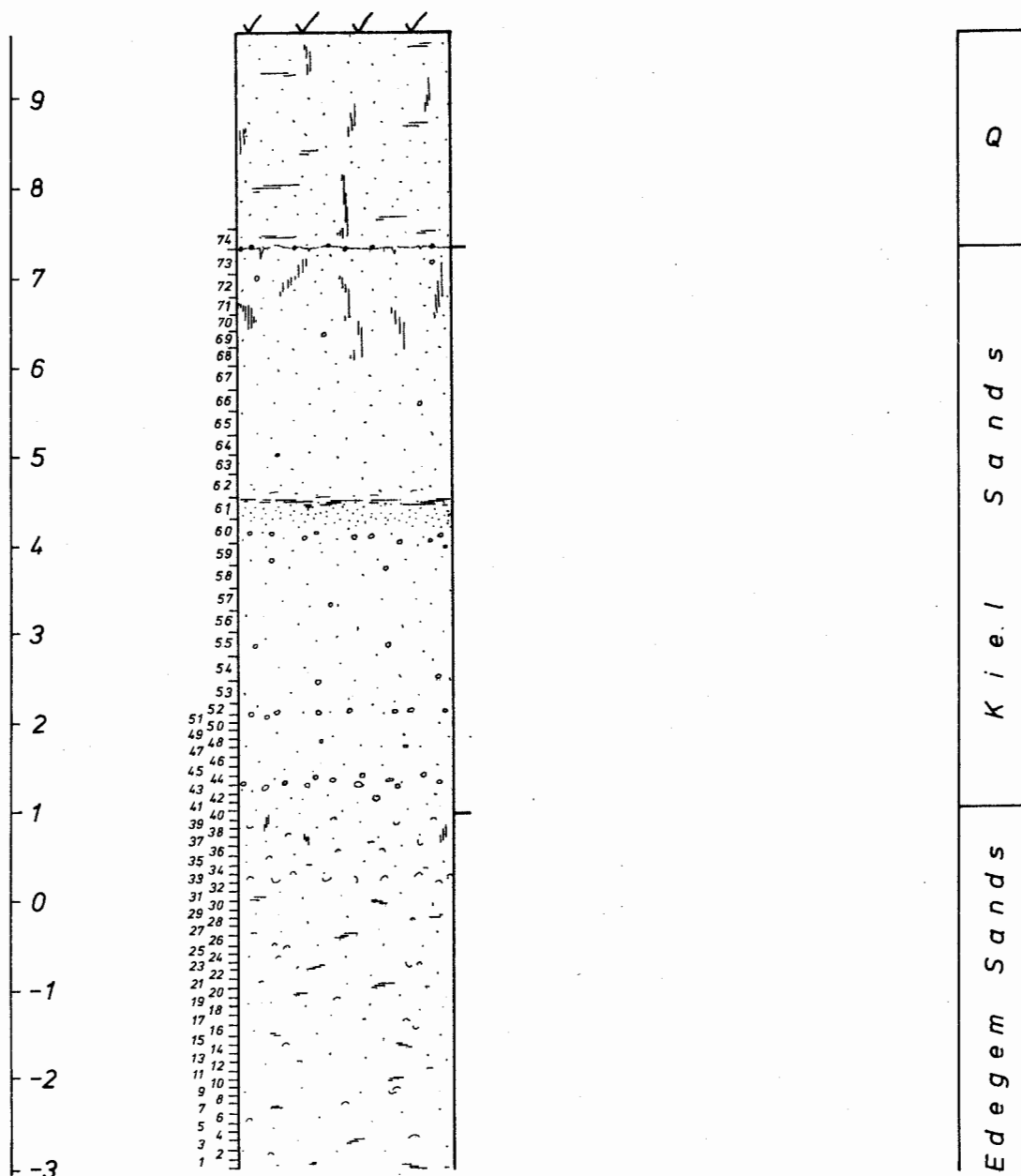


Fig. 9

ANTWERPEN - NACHTEGALENPARK

(A.N.)

Pl. 28 W - 396

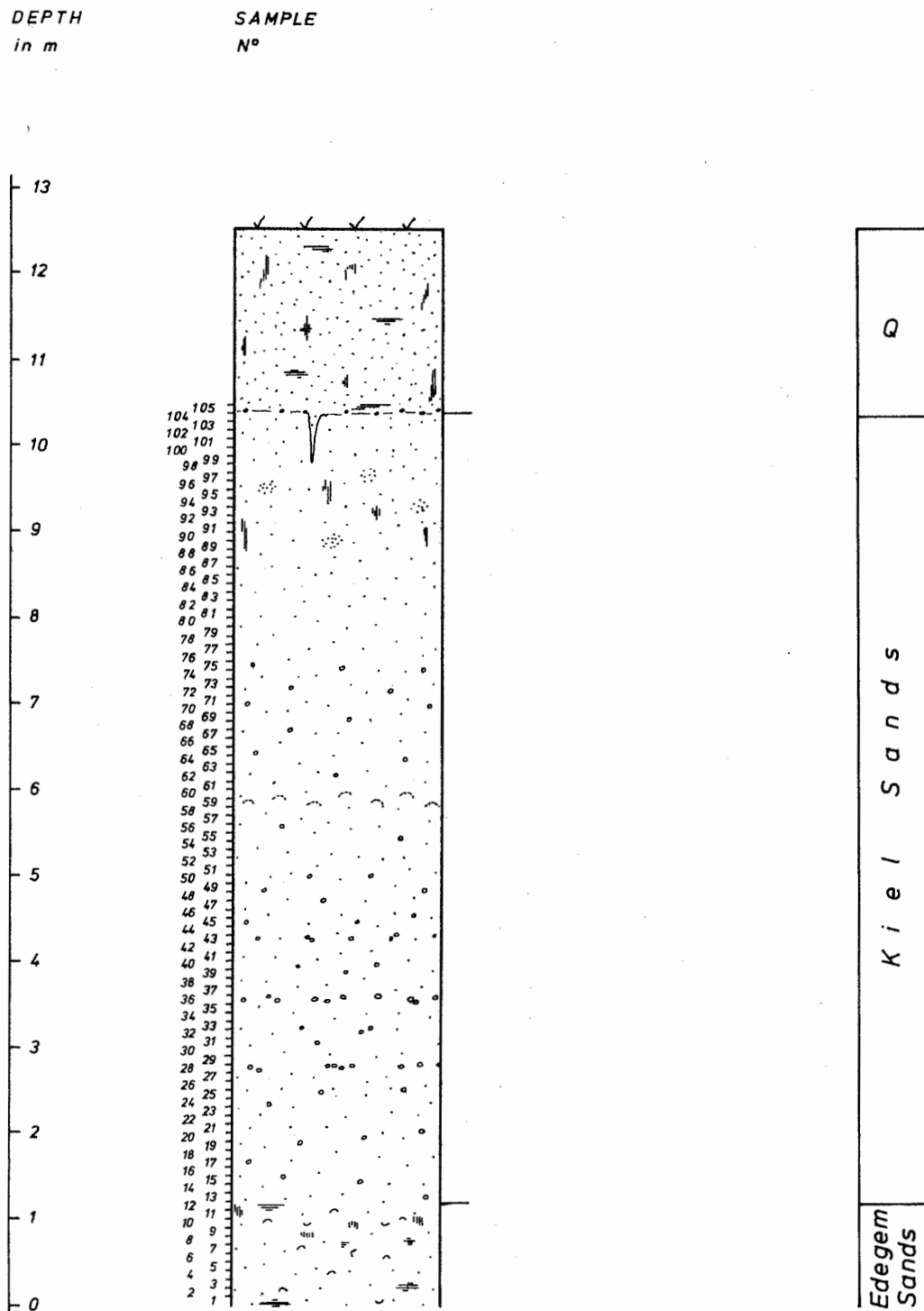


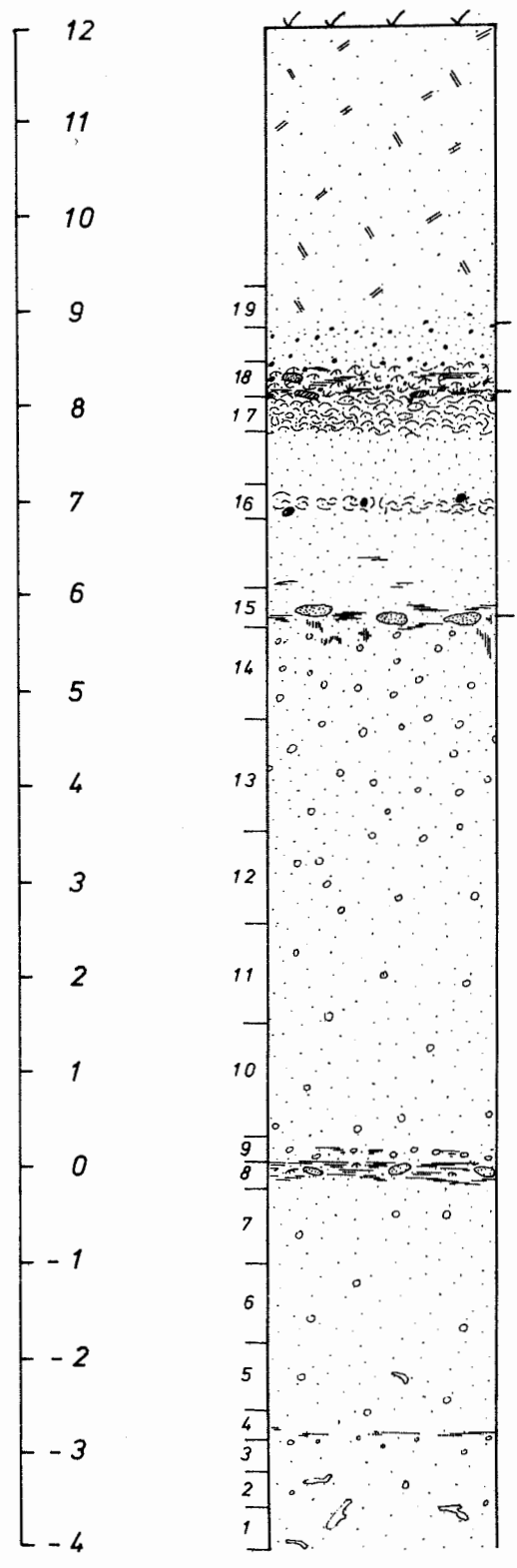
Fig. 10

BERCHEM - GROTE STEENWEG (A.G.)

Pl. 28 W - 397

DEPTH
in m

SAMPLE
N°



Filling up
Q
Antwerpen Sands
s a n d s
K i e l

Fig. 11

BERCHEM - STATION (IV B.M.)

Pl. 28 W - 398

DEPTH
in m

SAMPLE
N°

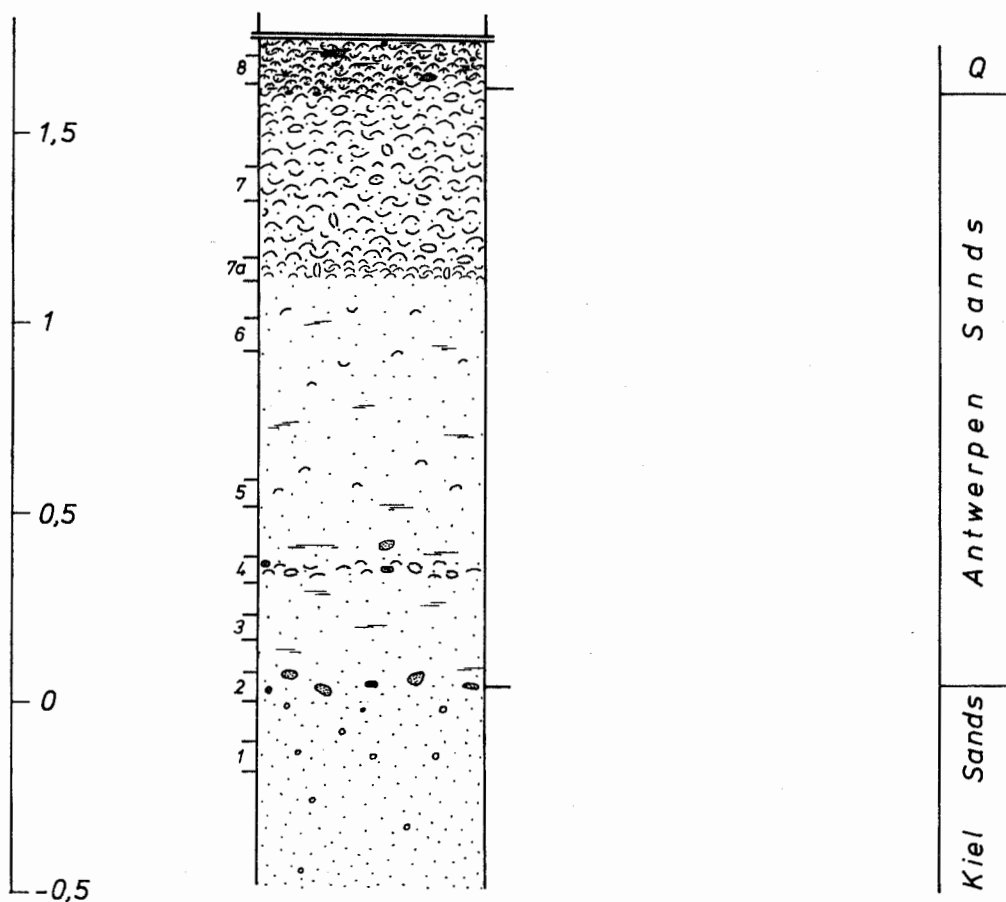


Fig. 12

BERCHEM - STATION (B.M.)

Pl. 28 E - 494

DEPTH
in m

SAMPLE
N°

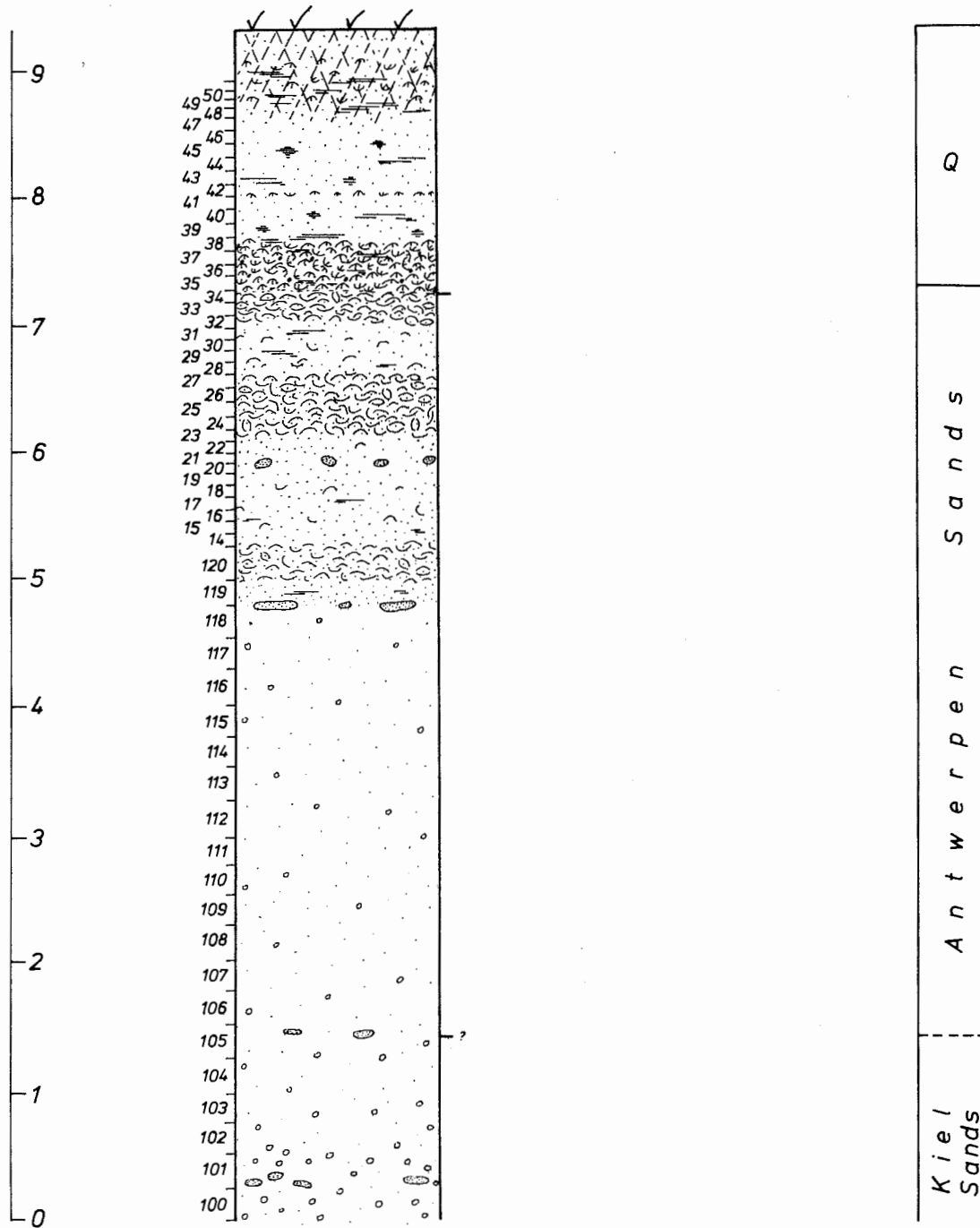


Fig. 13

ANTWERPEN - BORSBEEKSE - POORT (I B.P.)

Pl. 28 E - 495

DEPTH
in m

SAMPLE
N°

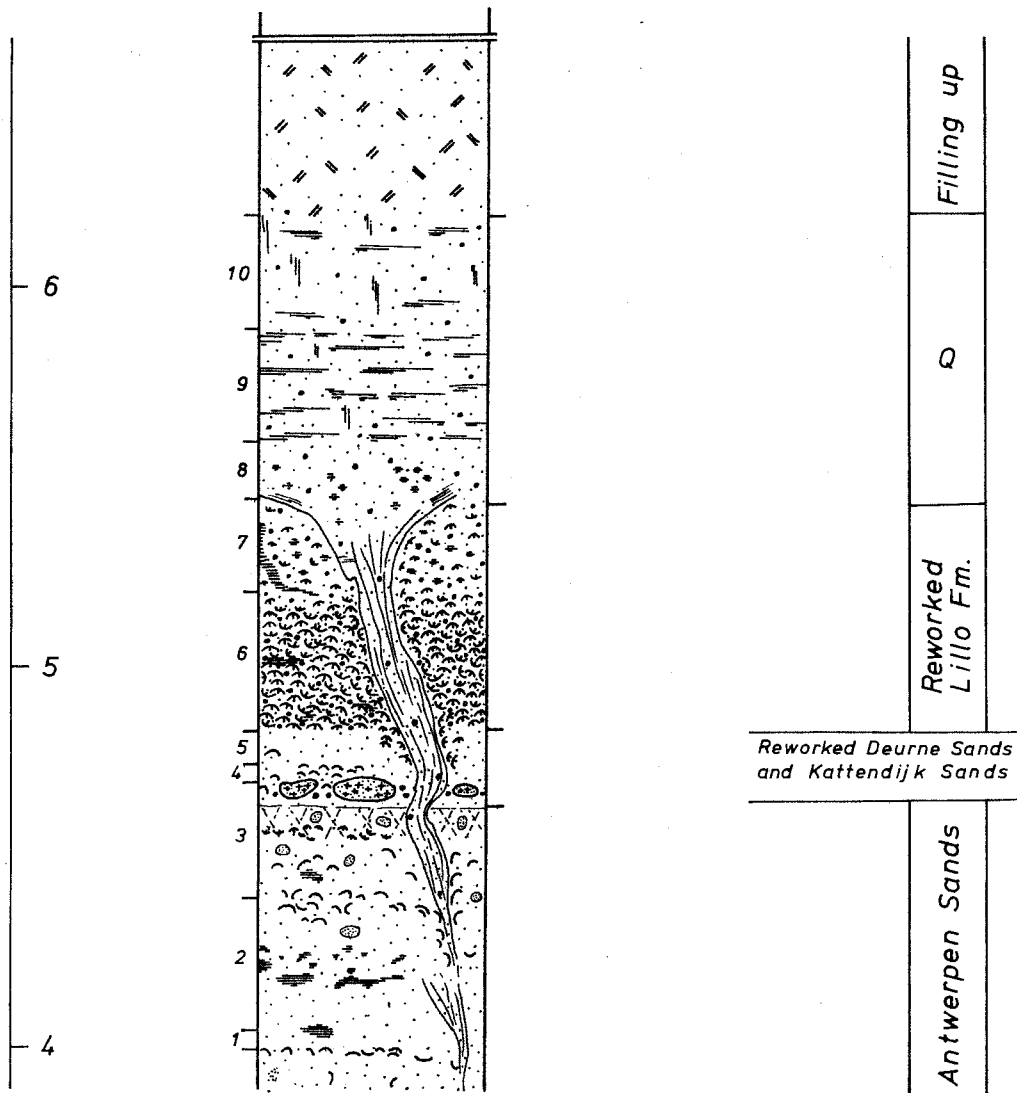


Fig. 14

K.W. 1974

ANTWERPEN - BORSBEEKSEPOORT (II B.P.)

Pl. 28 E - 496

Depth
in m

Sample
N°

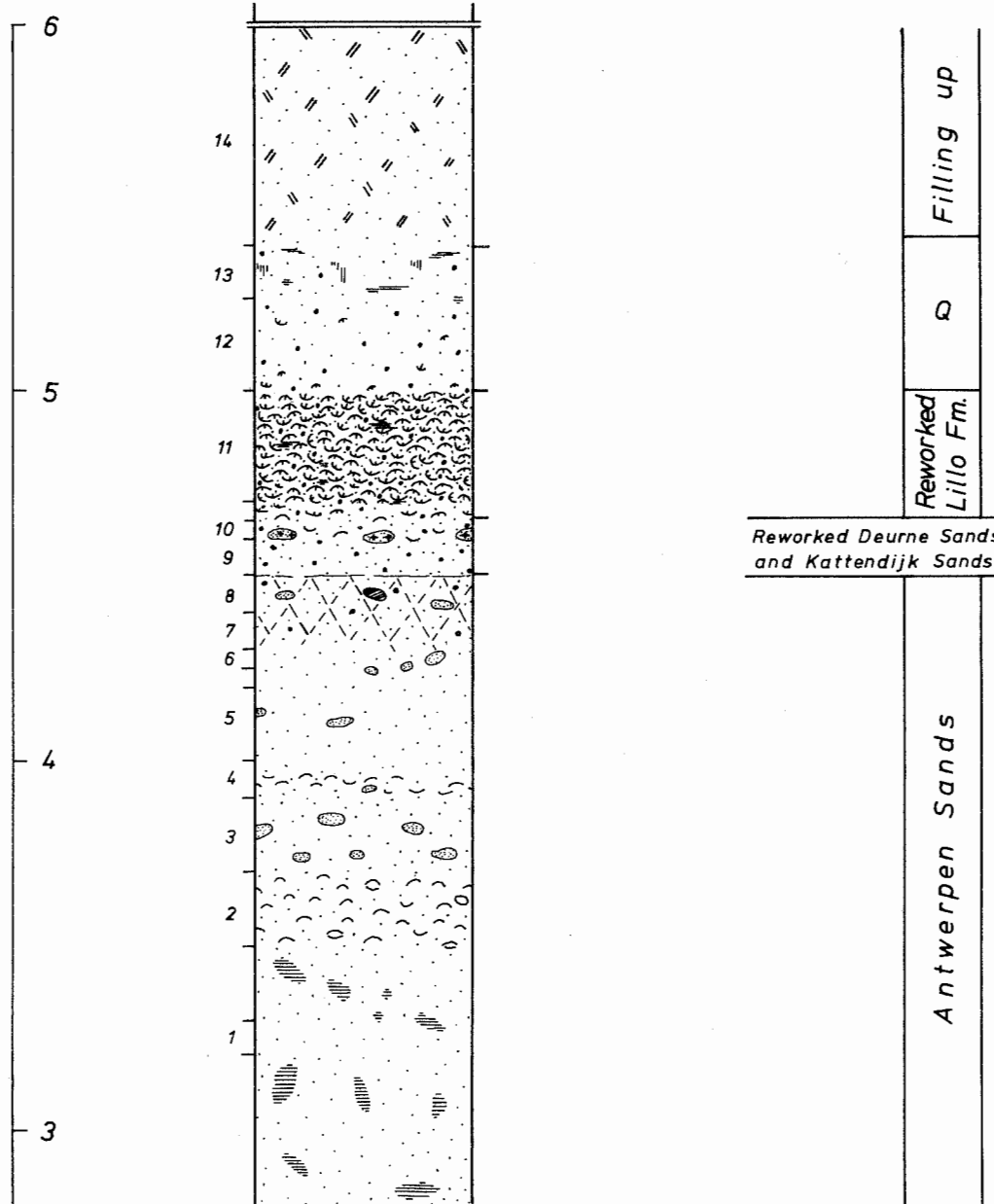


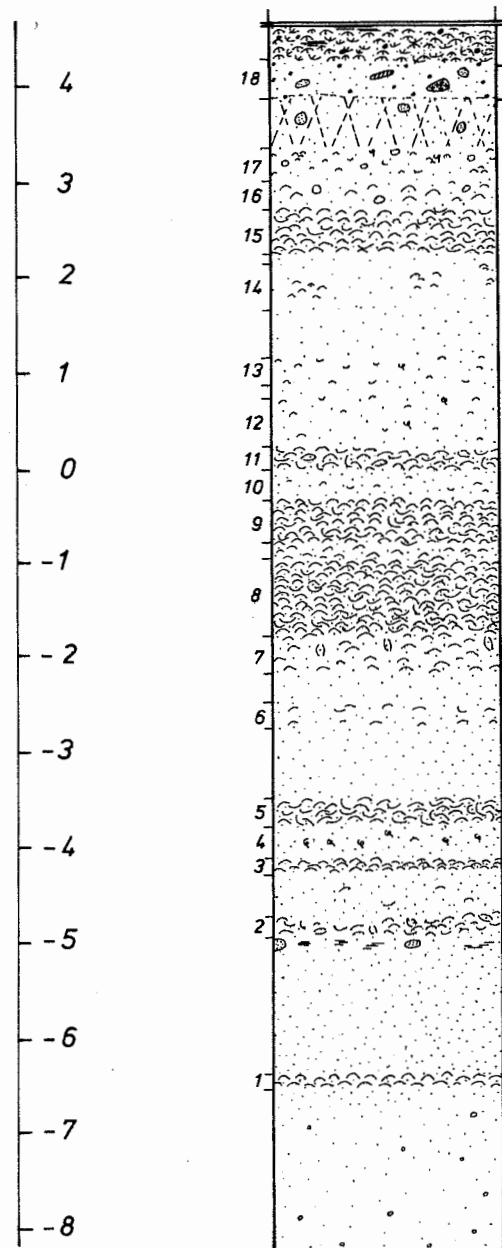
Fig. 15

BORGERHOUT - STENEN BRUG (I S.B.)

Pl. 28 E - 497

DEPTH
in m

SAMPLE
N°



Reworked Lillo Formation
Reworked Deurne & Kattend. Sds.

A n t w e e r p e e n S a n d s

Fig. 16

BORGERHOUT - RIVIERENHOF (VII B.R.)

Pl. 28E - 498

DEPTH
in m

SAMPLE
N°

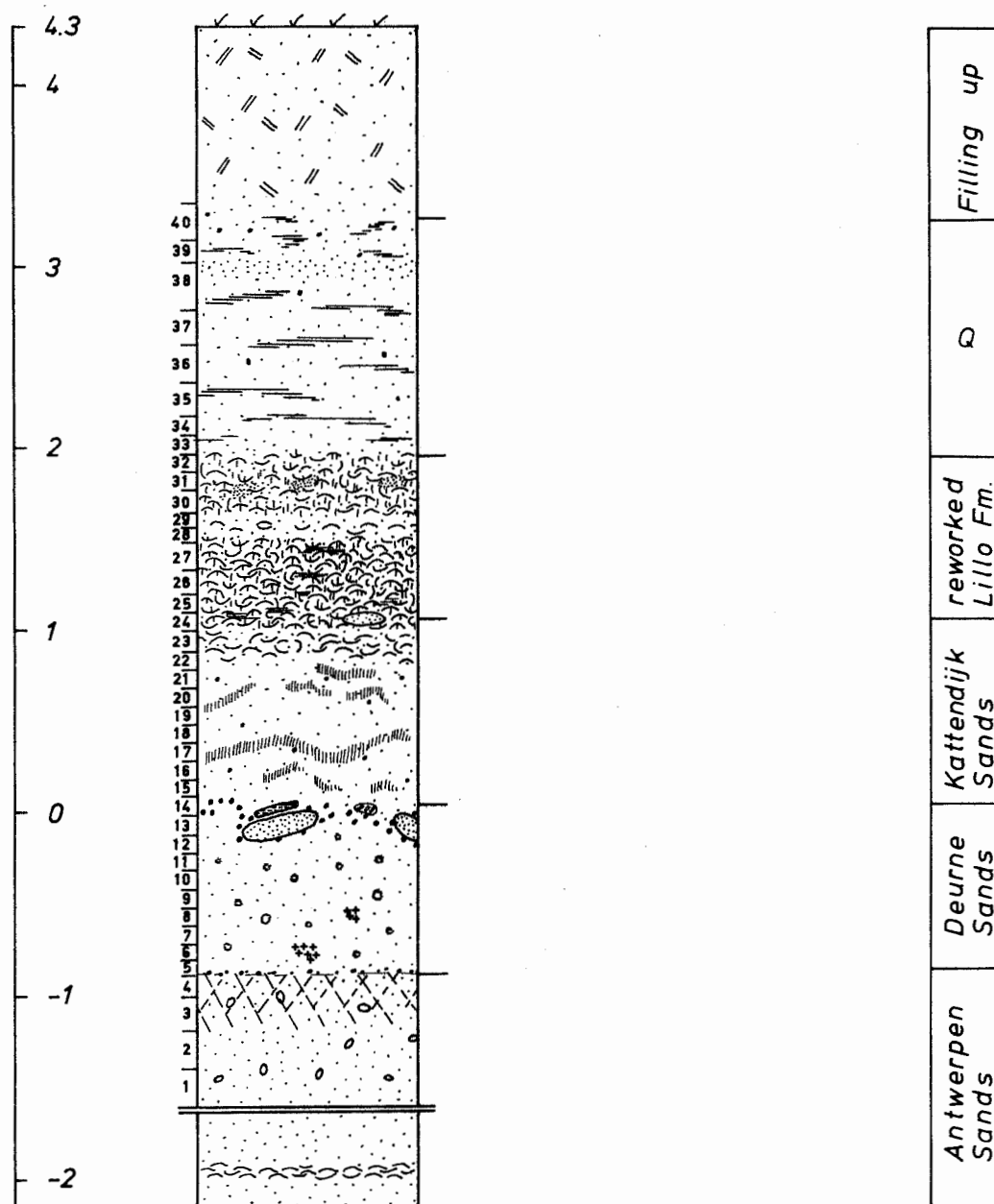


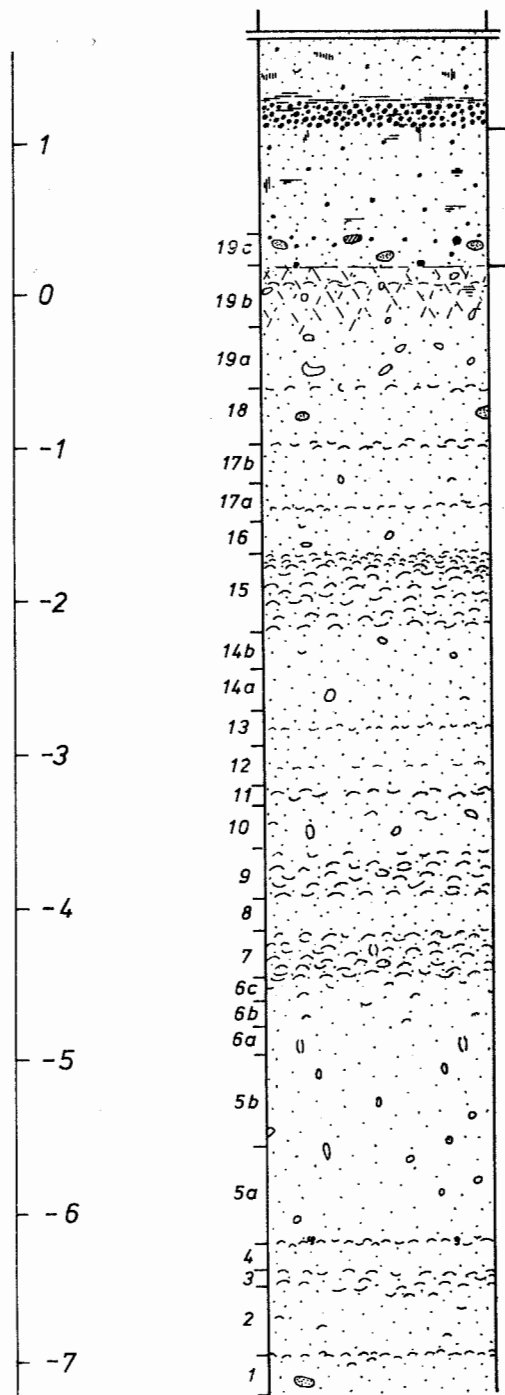
Fig. 17

BORGERHOUT - RIVIERENHOF (XI B.R.)

Pl. 28E - 499

DEPTH
in m

SAMPLE
N°



Katten-
dijk
Sands

Reworked
Lillo Fm.

A n t w e r p e n S a n d s

Fig. 18

BORGERHOUT - RIVIERENHOF (XIV B.R.)

Pl. 28 E - 500

DEPTH
in m

SAMPLE
N°

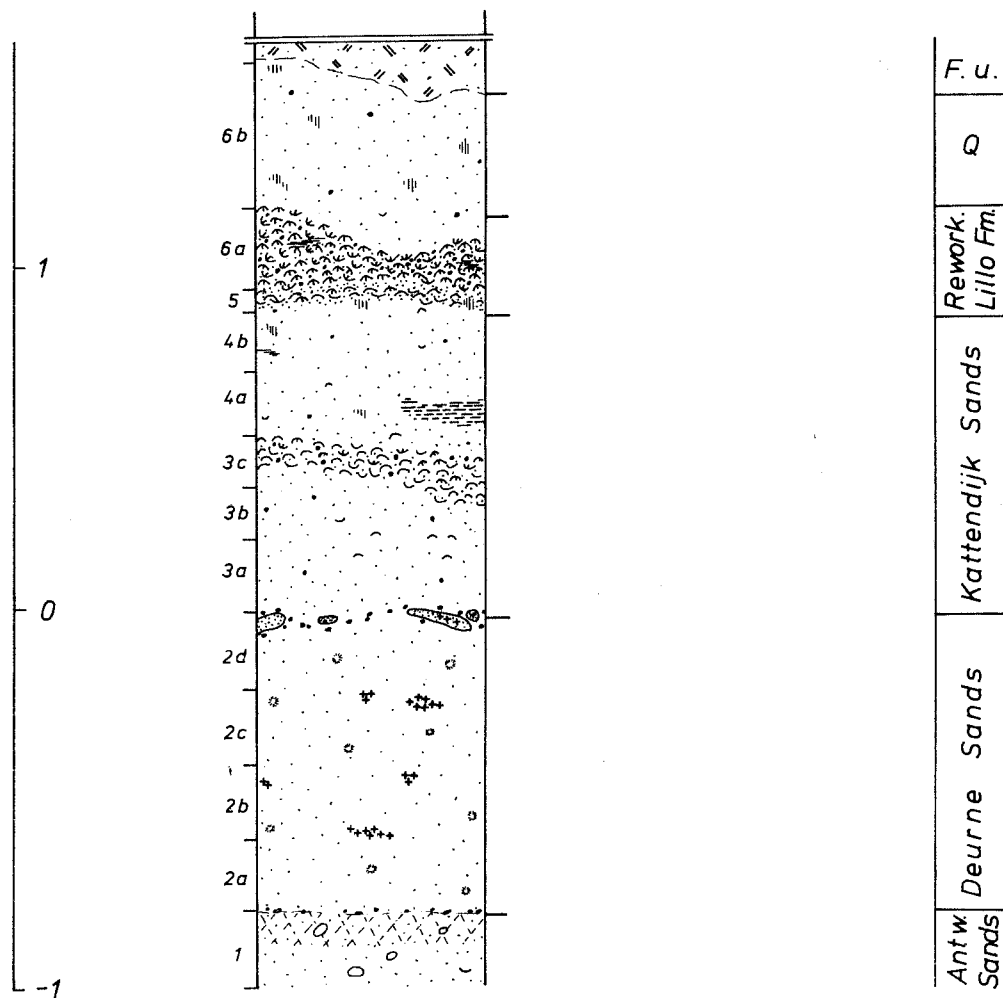


Fig. 19

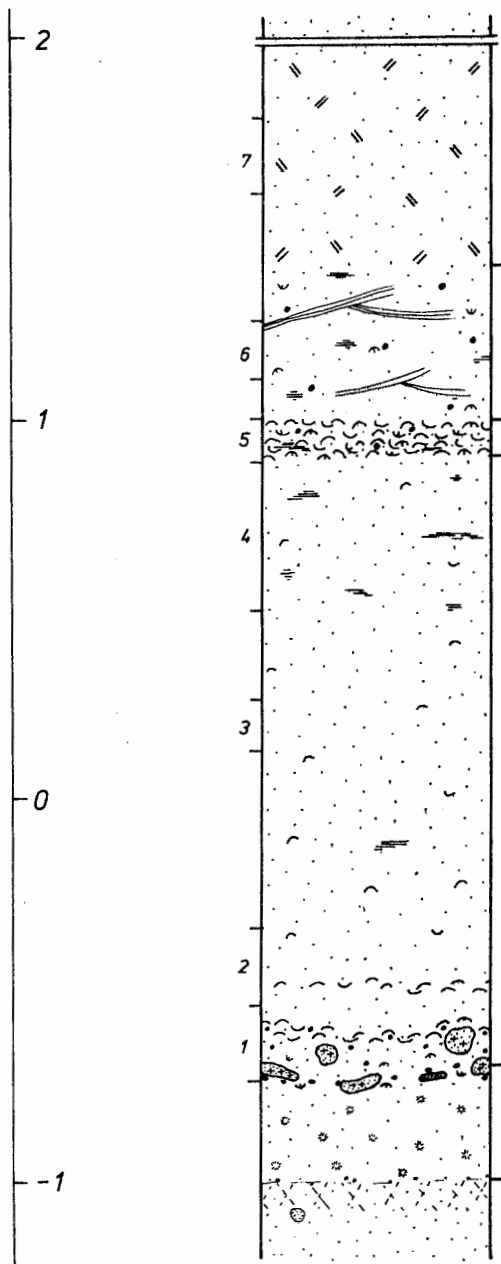
K.W. 1974

ANTWERPEN - SCHIJNPOORT (V.A.S.)

Pl. 28 E-501

DEPTH
in m

SAMPLE
N°



Filling up
Q
Reworked Lillo Fm.
Kattendijk Sands
Antw. Deurne Sds. Sands

Fig. 20

ANTWERPEN - SCHIJNPOORT (II A.S.)

Pl. 28 E - 502

DEPTH
in m

SAMPLE
N°

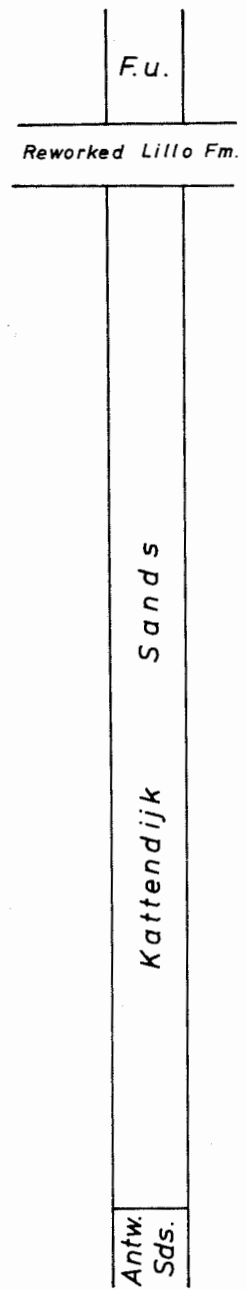
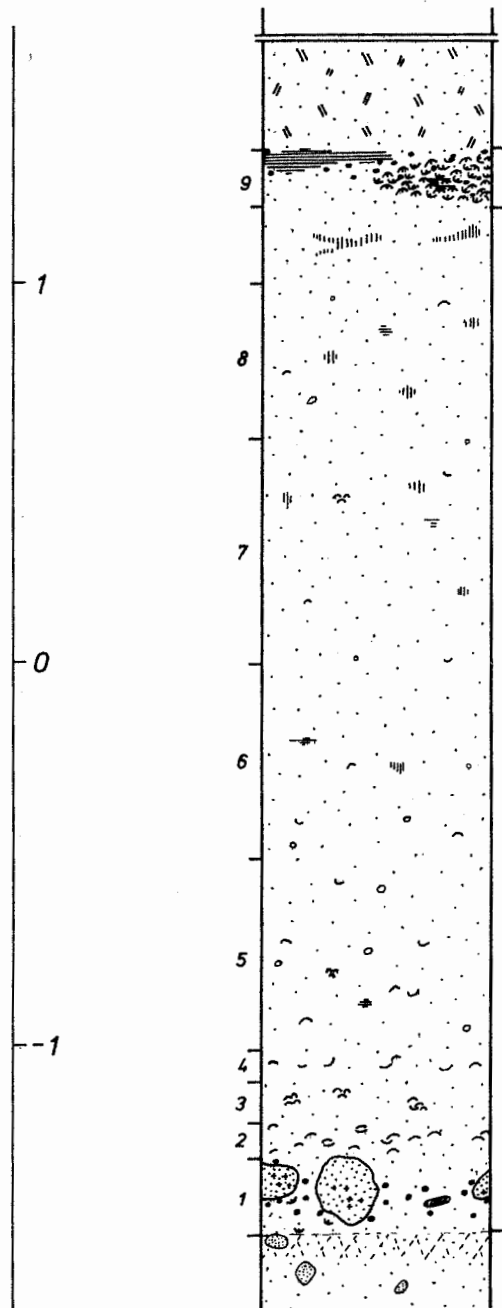


Fig. 21

ANTWERPEN - KIEVITSTRAAT (II, V, VI A.K.)

Pl. 28 W - 399

DEPTH
in m

SAMPLE
N°

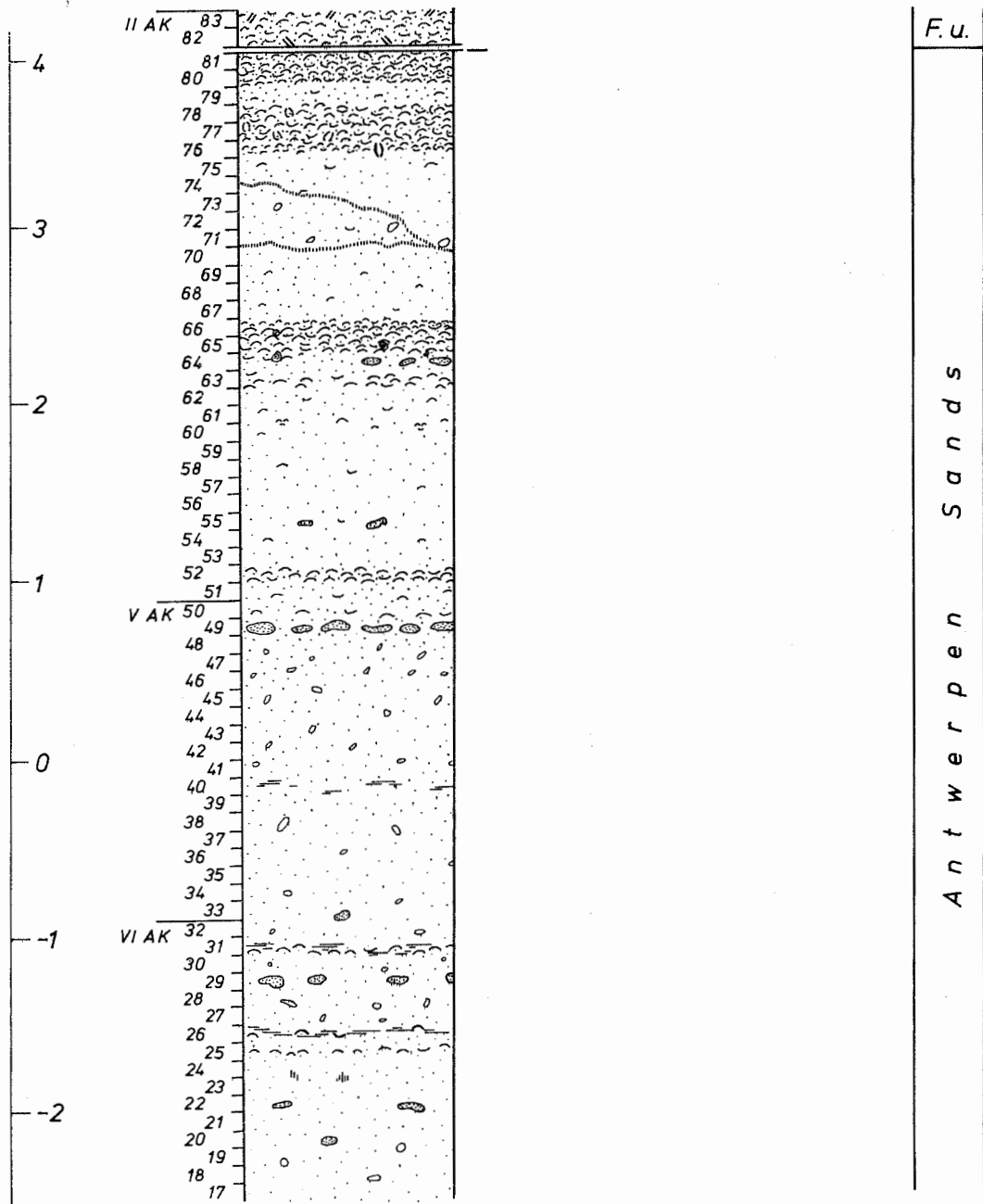
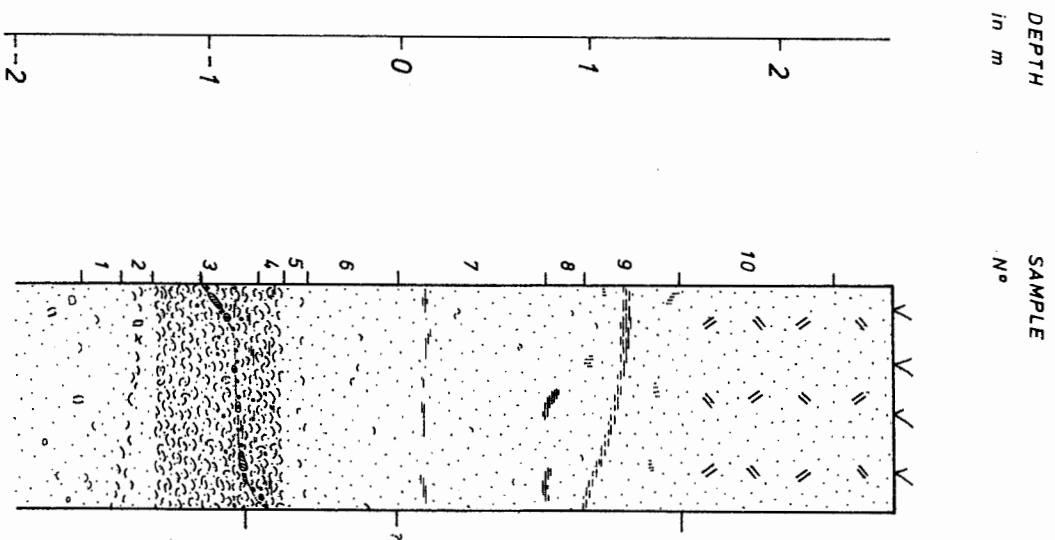


Fig. 22

ANTWERPEN - ITALIELEI (A.J.)

Pl. 28W-400



Antwerpen Sands	Kattendijk Sands	Reworked Lillo Formation	Filling up
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Fig. 23

K.W. 1974

ANTWERPEN - KLEINE RING (E3)
GENERAL SCHEME OF THE STUDIED SECTIONS

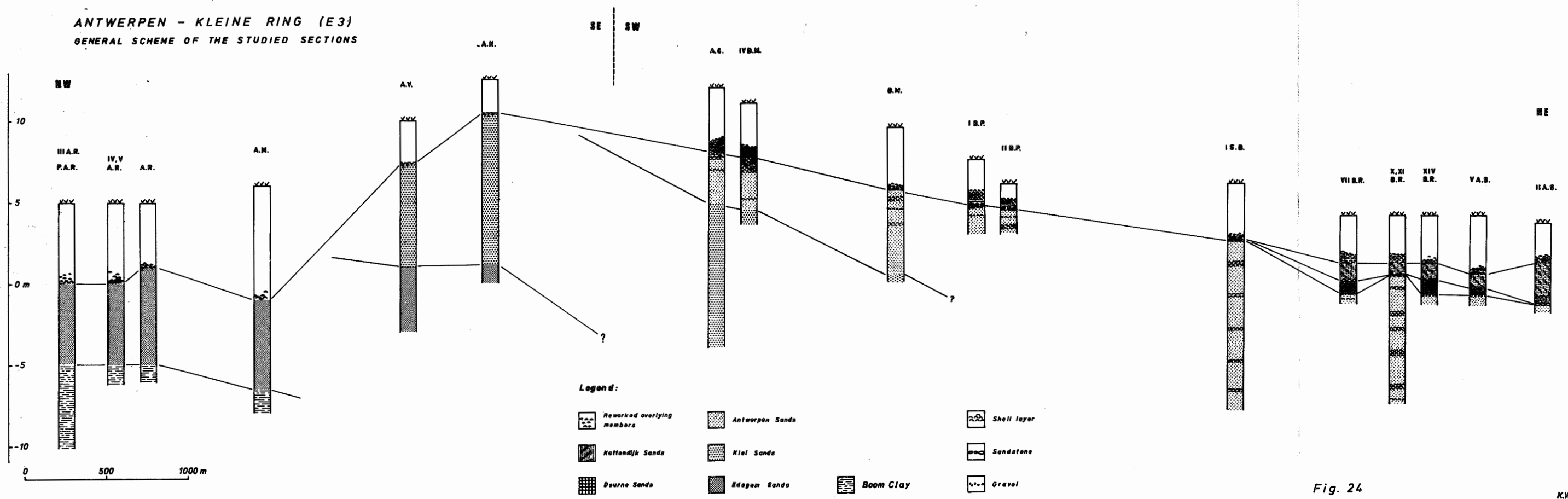


Fig. 24