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ARTHROPODA (ACARINA, DIPTERA) FROM SUBFOSSIL LAYERS IN WEST GREENLAND

BY

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WITH 2 FIGURES AND 1 TABLE IN THE TEXT, AND 8 PLATES

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Abstract

At Sermermiut, Jakobshavn, W.-Grl., arthropods (mites and diptera) were collected from a section covering a period of app. 2000 years, beginning in the middle of the second millenium B. C. With the technique employed only well sclerotinized, darkcoloured species were obtained. The animals found are probably contemporaneous with the layer in which they were collected. Zoogeographically the population contained species with a present arctic or arctic-northern distribution and was ecologically connected with bogs and humid heaths. The three most numerous Oribatei reproduced viviparously.

The following species were new to Greenland: *Epidamaeus spp.*, *Mycobates consimilis*, *Eugamasus* sp.

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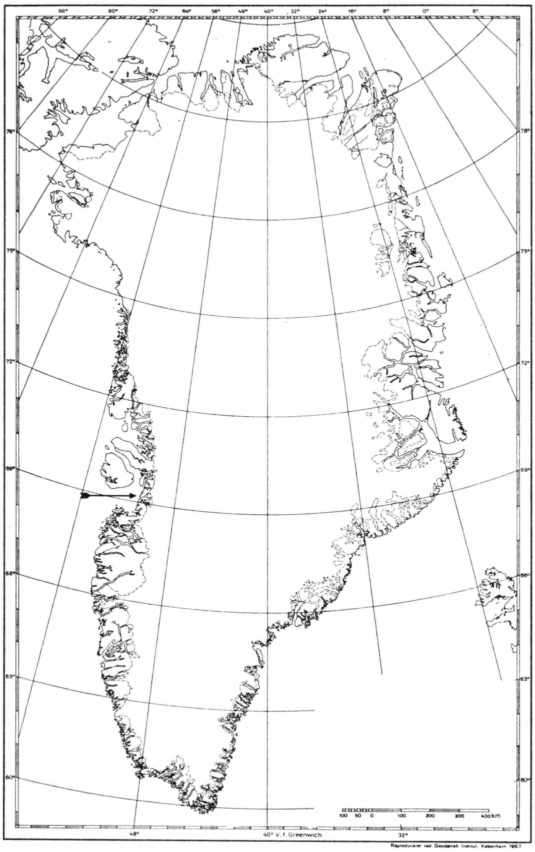

Fig. 1. Map of Greenland with the area of investigation indicated by an arrow.

INTRODUCTION

Ever since the end of the Second World War members of the staff of the Danish National Museum have been making excavations in Greenland almost every year in order to study former Norse and Eskimo cultures. Parallel with the archaeological investigations bog-geological investigations have been carried out, and quite a number of peat samples have been brought home. The main task was to elucidate possible relations between climate, environment, and cultural rise and disappearance.

Thus two palaeo-Eskimo cultures—the Sarqaq and the Dorset cultures—were studied in 1955 in a swamp in the former settlement Sermermiut near Jakobshavn, West Greenland (Fig. 1; 69° 12′ lat. N. 51° 08′ long. W.). In one of the sections examined (Plate 7 and 8 at Ø. 6. 75) chitinous remnants of arthropods were sorted out, and this material was kindly handed over to me for a systematic study, the results of which are found on the following pages. The results of analyses of other macrofossils like seeds, fruits, leaves, etc., and of microfossils—pollen and spores—have been published by FREDSKILD (1967).

From Greenland, subfossil mites have been studied by GRAVERSEN (1931), while outside this country lists have only been published by NORDENSKIÖLD (1901), WILLMANN (1927), SØGAARD ANDERSEN (1938), and KNÜLLE (1957).

The zoological material is stored at the Zoological Museum of the University of Copenhagen.

I am greatly indebted to Mr. B. FREDSKILD for this unique material and also for the much geological and botanical information he has given me in this connection. I also want to thank Professor K. G. WINGSTRAND, Ph. D., head of the Laboratory of Comparative Anatomy, the University of Copenhagen, for being allowed to use the photographic equipment of his laboratory, and to Dr. OLE MUNK for valuable instructions.

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LOCALITY

The area of investigation emerged in the middle of the second millenium B. C. Since then changes in the climate have caused changes in the plant communities, reflected in the different sediments of the layers in the section as shown on plates 7 and 8. Brief descriptions of these plant communities will be given below:

Layer 1 consisting of stony sand, is formed on a raised marine shore with *Elymus mollis* and *Stellaria humifusa.*

Layer 2–3 are stony sand with an increasing amount of humus upwards. The vegetation was dominated by grasses, first by *Elymus mollis*, later by *Alopecurus alpinus* and others. In these layers artefacts from the Sarqaq culture were found, denoted in the figures by small circles.

Layer 4 is slightly clayey sand of small extension horizontally as well as vertically.

Layer 5 is humified peat, consisting of rootlets and basal parts of grasses and other herbs, besides remnants of *Empetrum hermaphroditum*, and with a suggestion of sand.

Layer 6 resembles Layer 5. The vegetation was a *Betula nana* dwarf-shrub heath with grasses.

Layer 7 is humified peat with twigs, a sediment which was formed underneath a *Salix glauca* scrub.

Layer 8 is *Sphagnum squarrosum* peat. Grasses, Cyperaceae, *Montia fontana*, *Ranunculus hyperboreus*, and *R. lapponicus* were growing in the moss carpet.

Layer 9 is a swamp peat. The sample m 7 unfortunately comprises an older mesophilous community dominated by grasses and *Empetrum*, as well as a younger, more hygrophilous, grassy community with a few specimen of *Montia*, etc. Sample m 8 is from a somewhat drier heath, dominated by grasses, and with some *Betula*, *Salix*, and *Empetrum*. The moss layer, though only constituting one or a few per cent of the sediment, contained 10 species. In the upper part of this sample artefacts and other traces of the Dorset culture were found.

Layer 10 is swamp peat, resembling Layer 9 though not so humified. In the lowermost part there are Dorset traces.

Layer 11 is light-brown *Sphagnum squarrosum* peat with the same species as in Layer 8.

Layer 12 is swamp peat formed by a grassy plant community.

Layer 13 is the present moss carpet with *Sphagnum*. The vegetation of this part of the valley today is a hummocky, mossy dwarf-scrub heath with some grasses. *Empetrum hermafroditum* and *Poa arctica* are the dominant species, while *Ledum palustre* ssp. *decumbens*, *Vaccinium microphyllum*, and *Alopecurus alpinus* are of minor importance (Fredskild 1961).

In order to visualize the different sediments the layers on Pl. 8 and in Fig. 2 are filled in with symbols according to the system proposed by Troels-Smith (1955).

Soil movements which are so common in arctic mineral soils can be excluded as all strata apart from Layers 1–3 are made of entangled organic matter, and also transport by soil animals. The upper surface of the permafrost is presently found at a depth of app. 25 cm at Sermermiut, which naturally is the lowest limit for downward penetration of soil arthropods.

In the section the vertical range of a species will of course be diminished according to the weight of new deposited vegetable matter. How much, however, in each case it is not possible to estimate exactly, but it will certainly not be wrong in the present case to correlate each species with the layer in which it was found (Table 1, fig. 4).

TECHNIQUE

From each layer of the section, samples divided into subsamples of varying volumes were cut out. In Copenhagen each of the subsamples was divided vertically, one half being dried and used for radiocarbon dating purposes while the other half was stored in a preserving fluid (18 parts 60 per cent. alcohol, 1 part formol, and 1 part acetic acid conc.) for later analyses of macro- and microfossils.

Prior to my determinations of the animals the subsamples had been placed for some days in dilute nitric acid to make the vegetable matter fall apart, and afterward washed with water on a fine-meshed sieve (openings 0.4×0.4 mm). What was left on the sieve was then sorted very carefully, but without magnification, on a white background, and stored in 70 per cent alcohol.

To check the effect of the treatment with nitric acid I placed some specimens of a dark coloured collembole (*Hypogastrura sp.*) in conc. HNO_3 at room temperature. After 5–6 days not only pigment but also all soft tissues had completely disappeared, so the animals were now quite transparent, throwing no shadow and therefore almost impossible to distinguish on a white background even when magnification was employed. In another week or so the sutures were dissolved and the specimens fell to pieces. The diluted nitric acid, which was used in practice, will of course show the same tendencies for depigmenting and tissue-dissolving effect.

That individuals must have been lost through the meshes of the sieve during the washing procedure can be proved indirectly from the fact that the collected material is dominated by relatively big and solidly sclerotinized species, while neither juvenile forms nor small species, which generally occur numerously, such as *Oppia* or *Brachychthonius* spp., nor Collembola are represented. The loss of legs of almost all the oribatid mites is certainly also to be seen mainly as a result of the washing process. When present, the legs had generally been protected by the tectopodia.

KNÜLLE (1957) on the other hand picked the oribatid mites directly off the *Sphagnum* leaves and obtained a number of the small and soft skinned species mentioned.

It should also be noted that sorting of mites without magnification and on a white background is a procedure which increases the risks of losing especially small—and unpigmented—species (TRÄGÅRDH and FORSSLUND 1932:25).

Thus the present material can unfortunately only be regarded as a section of the former populations of soil arthropods, which makes it impossible to discuss the results on a more general basis.

Before my examination of the animals I cleared them in warm lactic acid (90 per cent.) and mounted them in Faure fluid (*sensu* VIETZTHUM 1943:931) which further cleared and stretched them.

Besides mites, a number of well-preserved, but compressed, puparia of Diptera acalypterata and fragments of insects and spiders were found yet for the two last groups being so few in numbers that they were disregarded.

SYSTEMATIC ACCOUNT

ACARINA, ORIBATEI DUGÉS 1833

Diapterobates notatus (THORELL) STRENZKE 1955.

Pl. 1 fig. 1 gives habitus of a specimen, and inside the hysterosoma several hyphae (a) and an embryo (b); an embryo was found only in this individual; setae were broken off but present on another specimen (Pl. 1, fig. 3).

Pl. 1, fig. 2 shows the upper side of the propodosoma with cuspes, lamellar hairs, and translamella. The two intersecting interlamellar hairs (b) are seen somewhat indistinctly showing lengths typical of *D. notatus* as contrasted to *D. humeralis* (HERM. 1804) (GRANDJEAN 1936).

Pl. 1, fig. 3 shows the upper side of the hysterosoma with hairs and one of the areae porosae adalares (a) (HAMMER 1952: fig. 78).

On six of the individuals the lengths of the idiosoma could be measured while the breadths were only taken on three individuals. The result was: 720–640 μ–450–390 μ, which also corresponds better to *D. notatus* than to *D. humeralis*. The range of setae on the hysterosoma was 100–125 μ, clearly different from those of *D. humeralis* (25–70 μ) STRENZKE (1955: 50–51).

Thus the Greenland material must be referred to *Diapterobates notatus*.

D. notatus avoids dripping wet habitats like bogs, may be found on beaches, but is found most numerously in humid to semidry soil covered with mosses, grasses, heath-lige vegetation and sometimes also with scrub of villow or birch (TRÄGÅRDH 1910: 510, GRAVERSEN 1931: 5, HAMMER 1952: 50, STRENZKE 1955: 51). This is in good agreement with its distribution in the strata at Sermermiut.

D. notatus is known both from East and West Greenland (STRENZKE 1955: 51) and is now traced back to about 800 B. C.

Epidamaeus spp.

Pl. 1., fig. 4 shows the lateral side of the propodosoma of sp.[1] with the anterior apophysis (a) visible to the left, provided with a small knob on its forward projecting corner. On the right are seen anterior (b) and posterior (c) parastigmatic apophyses. In Pl. 2, fig. 1, the right spina adnata is visible pointing forward along the inner side of the external cuticular knob. The pseudostigmatic organ is slightly club-shaped.

Pl. 2, fig. 2 shows the habitus of sp.[2], while on Pl. 2, fig. 3 its propodosoma with spinae adnatae are seen, each with a cuticular knob (a), which may be the external one.

It has not been possible to identify these combinations of morphological characters with any of the so far described species of the genus *Epidamaeus*. (BULANOVA – ZACHVATKINA 1957 a, 1957 b. KUNST 1961 *et in litt.*).

Another *Epidamaeus* sp., did have the external knob but no spinae adnatae developed, which, however, may have been lost, as the result of maltreatment.

Both of the abovementioned species were traced back to 800 B. C.

The third *Epidamaeus* sp., was rather badly preserved, and need no further comments. It is traced back to about A. D. 400.

Hermannia reticulata THORELL 1871.

Two individuals of this species were found, both in the same sample. Pl. 2, fig. 4 shows habitus and the club-shaped and finely hairy pseudostigmatic organs. Pl. 3, fig. 1 shows the very characteristic reticulated dorsal side of the hysterosoma (MICHAEL 1888: 458–461).

This species has in arctic regions mostly been found in rather dry habitats with heathlike vegetation (HAMMER 1946: 13, 1952: 24).

H. reticulata has previously been recorded from Greenland (STRENZKE 1955: 27) and has now been traced back to about 300 B. C.

Liebstadia similis (MICH. 1888) OUDM. 1906.

Pl. 3, fig. 2 shows the only individual collected. Even if legs—as usual—were missing, the idiosoma was so well preserved that it could without doubt be referred to that species.

Liebstadia similis can be expected to occur on almost all types of habitats (HAARLØV 1957: 39) and is well-known from both East and West Greenland (HAMMER 1946: 19).

In the Sermermiut material it was traced back to about A. D. 50.

Melanozetes meridianus SELLN. 1928.

The habitus is shown in Pl. 4, fig. 3 and the characteristic femur of the genus (SELLNICK 1960: 60) in Pl. 4, figs. 1 (a) and 2 (a).

As there have been some difficulties in distinguishing the different species of this genus, it seems reasonable to discuss the systematic characters more closely. Important to the diagnosis is (1) the distance between lamellae and sides of the propodosoma, (2) the length of cuspes, (3) of the pseudostigmatic organ, and (4) of the tectopodia, (5) the dimensions.

Pl. 4, fig. 1 shows that the lamellae are distinctly separated with about twice their own breadth from the sides of the propodosoma, and that the cuspes stop behind the tip of the propodosoma, which clearly distinguishes the Greenland animals from *M. mollicomus* (C. L. KOCH) MICH. 1884 (SELLN. 1929: fig. 17, WILLMANN 1931: fig. 267). The translamellae may be less developed than seen on Pl. 4, fig. 1, but are never bent as in *M. interruptus* WILLM. 1953 (SCHWEIZER 1956: fig. 273).

The pseudostigmata organs are spatulate (Pl. 4, fig. 3), which excludes *M. mollisimilis* SCHW. 1956, while their relative shortness makes them different from *M. longesensillus* SCHW. 1956 (SCHWEIZER 1956: fig. 272) and from *M. mollicomus* according to a specimen determined by FORSSLUND.

As far as the shape of Tectopodium 1 is known, there seems to be some disagreement concerning its length (STRENZKE 1955: 52).

Pl. 3, fig. 3 shows that Tectopodium 1 of the Greenland specimens ends with a small free, and cone-shaped tip (a), which presumably agrees best with what is described for *M. meridianus.*

As may be seen from Pl. 4, fig. 3, the setae on the hysterosoma are not exceptionally long, which excludes *M. longisetosus* Hammer 1952. For the other species this need only be discussed as regards *M. meridianus* and *M. mollicomus.* SELLNICK (1960: 62) only states for *M. meridianus*: Rückenborsten im Verhältnis kürzer als bei *M. mollicomus.* I have shown in this connection how hairs, with very small individual variation, from the hysterosoma of *M. mollicomus* (FORSSLUND *det.*) measured 20–25 per cent. of the length of the idiosoma, while for *M. meridianus*, when illustrations were consulted (HAMMER 1952: fig. 74, SCHWEIZER 1956: fig. 270), it correspondingly measured 10–15 per cent. On three specimens from the Greenland material the animals were so well preserved that dimensions of hairs and idiosoma could be measured on the same animal and it was found that their relative lengths varied between 11–16 per cent., which corresponded best to the measurements of *M. meridianus.*

On two individuals lengths and breadths were measured at 665–595 μ – 435–385 μ, thus falling within the range of only *M. longisetosus* (650–390 μ) and *M. meridianus* (720–405 μ). As mentioned above, it will not be possible to refer the Greenland material to *M. longisetosus*.

Thus nothing seems to prevent referring the Greenland material to *Melanozetes meridianus*, with the reservation put forward by Strenzke (1955: 53) that a comparative study on a comprehensive material from different zoogeographical areas may unite species now considered as separate ones.

Four specimens contained embryos.

In the Greenland material *Melanozetes meridianus* was found in almost alle layers to be in good agreement with the apparently wide ecological range of this species (Tuxen 1943: 323, Hammer 1952: 48, Strenzke 1955: 53).

M. meridianus has already been reported from West Greenland by Strenzke (1952: 96) and has now been traced back to about 700 B. C.

Mycobates consimilis Hammer 1952.

Pl. 4, fig. 4 shows the only specimen found in the Greenland material. It has kindly been determined by Marie Hammer. The animal is somewhat bigger than the type species (480×310 μ).

The species has so far only been found in arctic Canada, where it was taken from lichens and mosses of heath-like vegetation, while, when it lived at Sermermiut, the vegetation was dominated by grasses like *Elymus mollis*, *Alopecurus alpinus* and others.

The species dates back to about 700 B. C. in Greenland.

Oromurcia lucens (L. Koch 1879) Hammer 1944.

Pl. 5, fig. 2 shows the habitus and Pl. 5, fig. 1 the upper side of the propodosoma with lamellae and one lamellar hair visible.

The determination has been made on the basis of the redescription of the genus by Sellnick (1960: 60) and the illustration of *Trichoribates* (*Oromurcia*) *lucens* by Hammer (1952: fig. 77).

Dimensions were measured on 3 individuals with lengths ranging from 645 to 600 μ and breadths from 500 to 455 μ. Graversen (1931: 10) found a similar range on seven specimens from West Greenland (625–575 μ, 480–415 μ). Tectopodium 1 has a multidentate tip.

One of the specimens contained an embryo.

In Canada and Greenland the species has been collected in fairly wet habitats like meadows and beaches (Hammer 1946: 24, 1952: 49–50). Trägårdh, however, (1910: 509) has found the species on humid to semidry habitats like south-exposed slopes covered with birch forest. This rather extensive ecological range is in good agreement with its occurrence in almost all strata at Sermermiut.

Oromurcia lucens has now in Greenland been traced back to about 800 B. C.

Platynothrus punctatus (L. Koch 1879) Selln. et Forssl. 1955.

Only one of the specimens showed the whole dorsal side of the idiosoma (Pl. 5, fig. 3).

The only species with which these individuals could be confused, is *Platynothrus peltifer*, but following Sellnick and Forsslund (1955) they must be referred to *P. punctatus* as (1) the pseudostigmatic organ is slightly club-shaped (Pl. 5, fig. 3), (2) the two well-developed air sacks (Pl. 5, fig. 4) are directed forwards (b) and backwards (a), (3) the structural pattern of the cuticula behind the pseudostigmatic organs (Pl. 4, fig. 3), and (4) the relatively long distance between dorsal setae C^2 and C^3.

Contrary to Sellnick et Forsslund (*loc. cit.*) it was found that (1) the number of setae on the genital plates varied between 11–15 (Pl. 6, fig. 1) thus covering both the number given for *P. punctatus* (11) and for *P. peltifer* (13), and (2) that the setae adg 1 and adg 2 seemed to be placed on separate sclerites (Pl. 6, fig. 1) as in *Neonothrus.*

P. punctatus has rather a strong preference for humid or even wet habitats (Hammer 1952: 23–24, Strenzke 1955: 26), which agrees with their distribution in the layers at Sermermiut.

P. punctatus has an arctic distribution (Block 1965: 247) including Greenland (Strenzke 1955: 26), where it has now been traced back to about 300 B. C.

ACARINA GAMASIDES LEACH 1815

Eugamasus sp.

Pl. 6, fig. 2 shows the only specimen of this genus, which is believed to be *Eugamasus* on account of (1) the course of the peritremata from between Coxae III and IV to the dorsal anterior margin of the propodosoma with no junction, however, in front, (2) the pattern of the cuticular structure in the sternal region, (3) a dorsal division of the idiosoma at the level of Coxa IV, and (4) a circular structure in the interior of the animal in the genital region (Sellnick 1940: 43, Schweizer 1949: fig. 11). No genital shields can be distinguished, so it is concluded that the animal is a tritonymph.

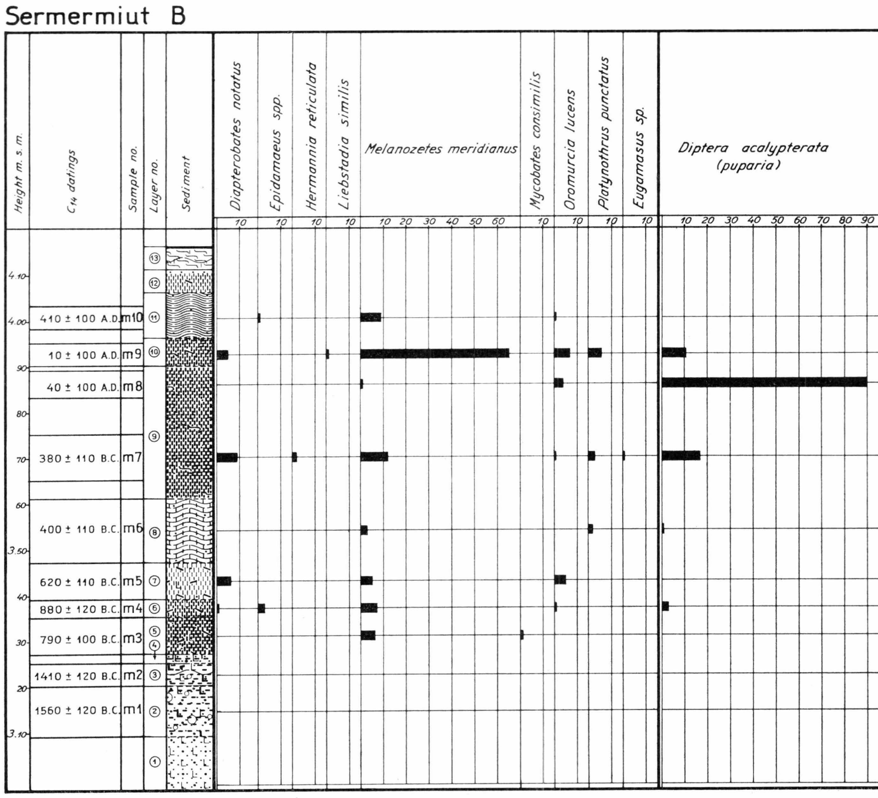

Fig. 2. Number of animals found in the layers of the profile at Sermermiut, indicated by length of the black horizontal columns. The symbols of the sediments are similar to those used in Pl. 7.

Species of the genus *Eugamasus* have not yet been recorded from Greenland (HAMMER 1937: 11, HAARLØV 1942), but indeed from other arctic regions (TRÄGÅRDH 1910).

The present species can be traced back to about 300 B. C.

INSECTA, DIPTERA ACALYPTERATA

123 puparia of acalypterate Diptera were found in the material. They were well preserved, yet none of them could be determined as to species, and only a few as to family: Agromyzidae (Pl. 6, fig. 3).

Several species of Agromyzidae are known from Greenland (GRIFFITHS, 1966).

VERTICAL ACCOUNT

With the above-mentioned reservations in mind (pp. 8–9), the number of individuals may be compared quantitatively only within each single subsample, which may be done on the basis of Table 1, where an account of the whole material has been given, besides including what has been found of fragments of spiders and insects.

Besides the immediate impression of the quantitative occurrences of the different species in the subsamples, Table 1 shows that the number of Diptera acalypterata seems to vary, contrarily to that of the mites, and that the most numerous oribatid mites were: *Melanozetes meridianus*, *Diapterobates notatus* and *Oromurcia lucens*, all commonly represented also in recent soil populations of arctic-boreal regions.

In layers 1 and 2 no animals were found obviously because these strata represent marine shore habitats. No distinction could be made between the other layers' specific composition, which as a whole must be referred to the "*Platynothrus – Melanozetes* community" characteristic for wet biotopes in Greenland (Hammer 1944: 90).

To make the chronological sequence of the mites and diptera found more comprehensible than can be done in Table 1, fig. 2 has been made where each of the black columns indicate a summary of individuals per layer from respective subsamples.

Table 1.

Samples incl. subsamples	Species										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
M 10	0	1	0	0	9	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
M 9	0	0	0	0	1	0	0	0	0	1	18
	0	0	0	0	0	0	0	0	0	10	4
	5	0	0	1	64	0	7	6	0	1	0
M 8	0	0	0	0	0	0	0	0	0	89	0
	0	0	0	0	1	0	4	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	4
	0	0	0	0	0	0	0	0	0	1	0
M 7	9	0	2	0	13	0	1	3	0	0	0
	0	0	0	0	0	0	0	0	0	17	0
	0	0	0	0	0	0	0	0	1	0	4
M 6	0	0	0	0	3	0	0	2	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
M 5	6	0	0	0	5	0	5	0	0	0	1
	0	0	0	0	0	0	2	0	0	0	2
M 4	1	3	0	0	7	0	1	0	0	0	1
	0	0	0	0	0	0	0	0	0	3	0
	0	0	0	0	0	0	0	0	0	0	12
	0	0	0	0	0	0	0	0	0	0	1
M 3	0	0	0	0	6	1	0	0	0	0	5
M 2	0	0	0	0	0	0	0	0	0	0	0
M 1	0	0	0	0	0	0	0	0	0	0	0
	21	4	2	1	109	1	21	11	1	123	53

(1) *Diapterobates notatus.* (2) *Epidamaeus* spp. (3) *Hermannia reticulata.* (4) *Liebstadia similis.* (5) *Melanozetes meridianus.* (6) *Mycobates consimilis.* (7) *Oromurcia lucens.* (8) *Platynothrus punctatus.* (9) *Eugamasus* sp. (10) *Diptera acalypterata.* (11) Fragments of spiders and insects.

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Færdig fra trykkeriet den 31. december 1967.

PLATES

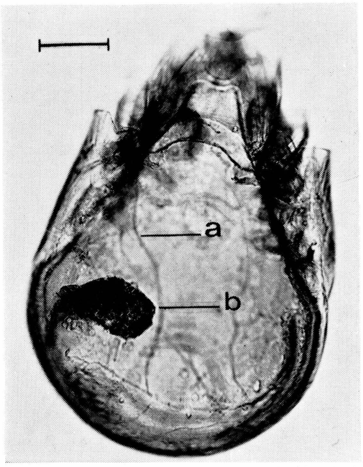
Plate I

Fig. 1. *Diapterobates notatus.* Habitus. a: hyphae, b: embryo.

Fig. 2. *Diapterobates notatus.* Propodosoma. a: left cuspis. b: interlamellar hair below translamellae.

Fig. 3. *Diapterobates notatus.* Left anterior corner of hysterosoma. a: area porosa adalaris.

Fig. 4. *Epidamaeus* sp.[1] Propodosoma. a: anterior apophysis. b: anterior parastigmatic apophysis. c: posterior parastigmatic apophysis.



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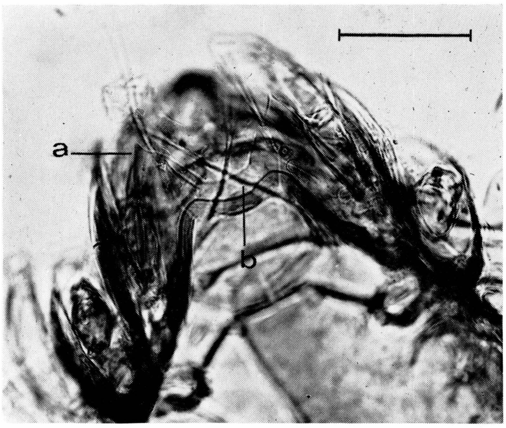

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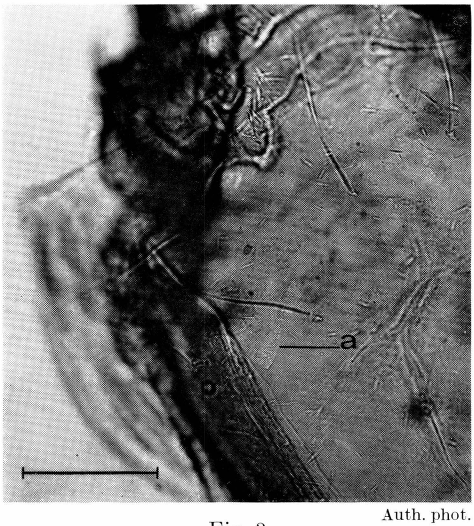

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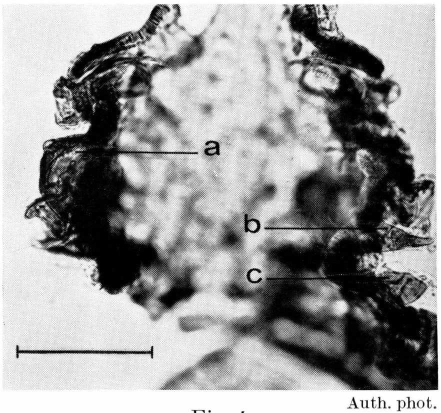

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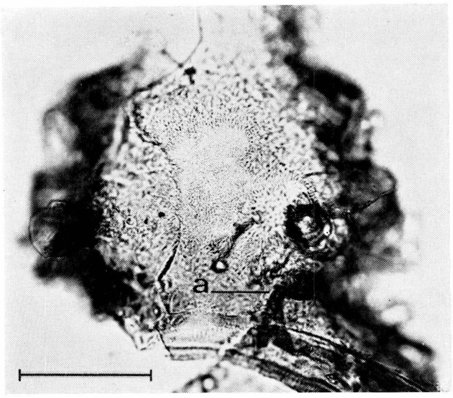
Plate II

Fig. 1. *Epidamaeus* sp[1]. a: spina adnata.

Fig. 2. *Epidamaeus* sp.[2] Habitus.

Fig. 3. *Epidamaeus* sp.[2] Propodosoma. a: cuticular knob at base of spina adnata.

Fig. 4. *Hermannia reticulata*. Habitus.



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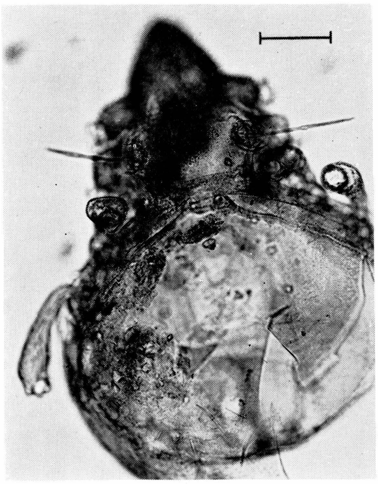

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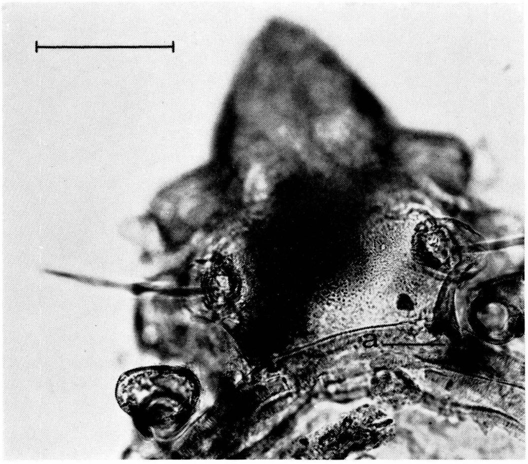

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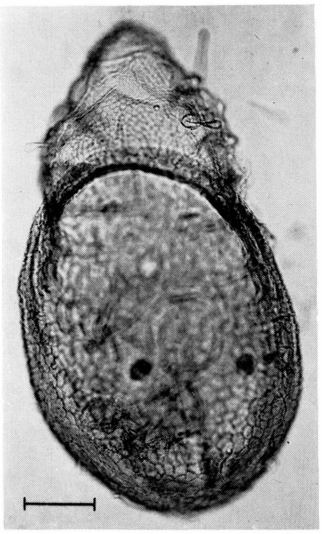

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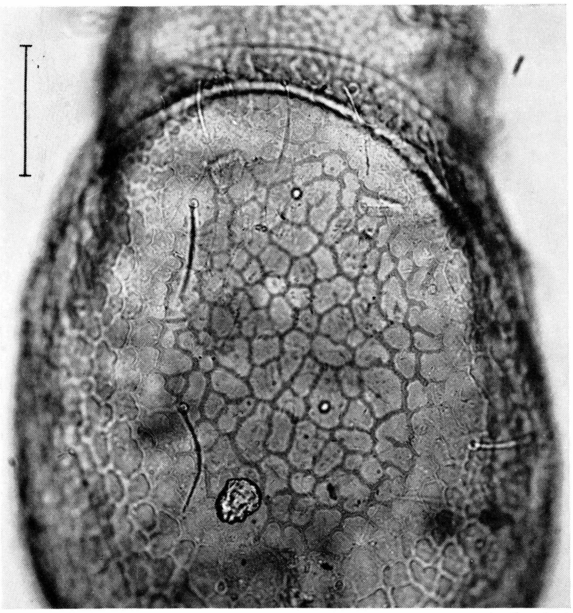
Fig. 4.

Plate III

Fig. 1. *Hermannia reticulata*. Reticulated dorsal side of hysterosoma.

Fig. 2. *Liebstadia similis*. Habitus.

Fig. 3. *Melanozetes meridianus*. Lateral view of propodosoma. a: tectopodium 1.



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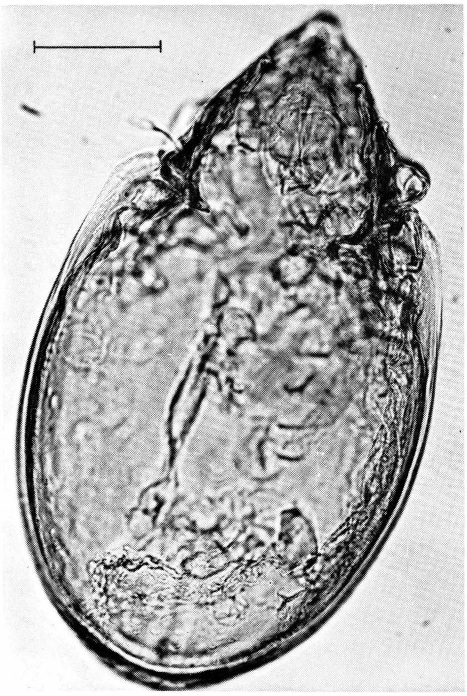

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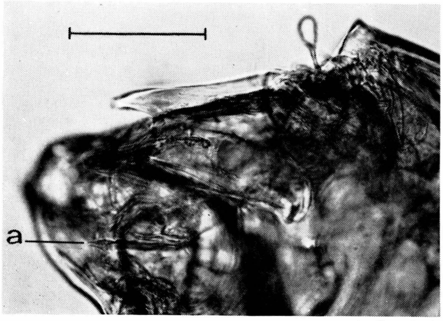

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Fig. 3.

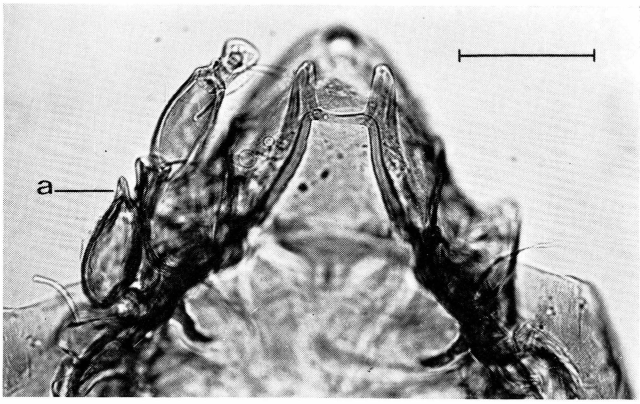
Plate IV

Fig. 1. *Melanozetes meridianus.* Propodosoma. a: dorsal view of edge of femur 2.

Fig. 2. *Melanozetes meridianus.* Hysterosoma with left pteromorphae. a: lateral view of femur 2.

Fig. 3. *Melanozetes meridianus.* Habitus.

Fig. 4. *Mycobates consimilis.* Habitus.



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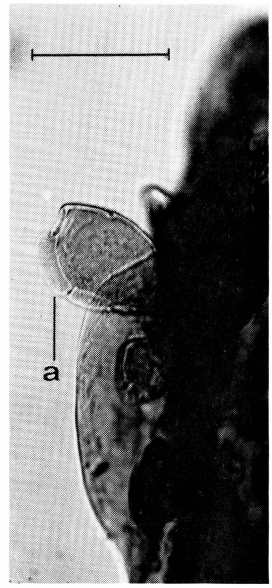

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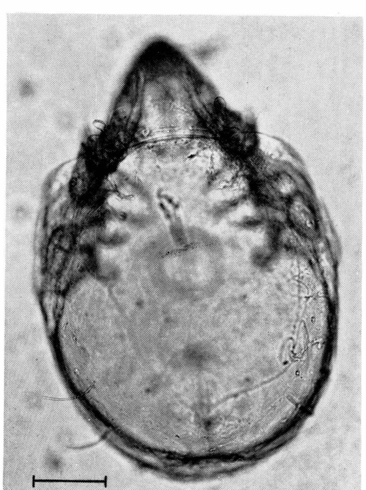

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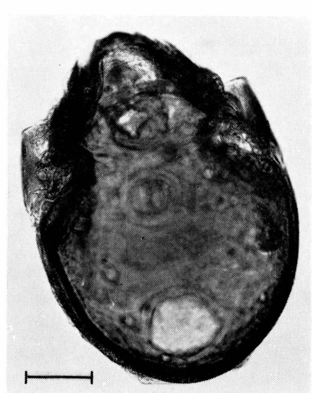

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Fig. 4.

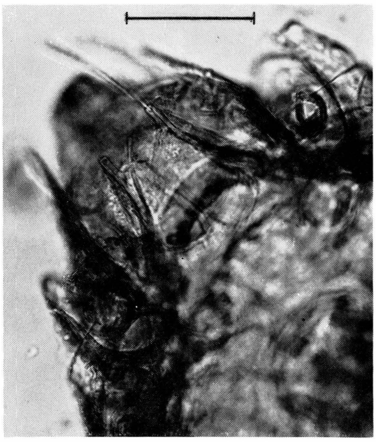
Plate V

Fig. 1. *Oromurcia lucens*. Propodosoma.

Fig. 2. *Oromurcia lucens*. Habitus.

Fig. 3. *Platynothrus punctatus*. Habitus.

Fig. 4. *Platynothrus punctatus*. Propodosoma. a and b: air sacks.



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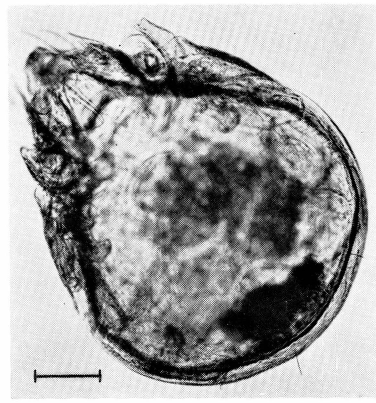

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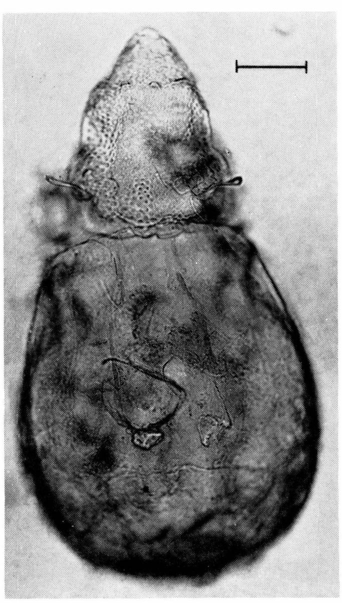

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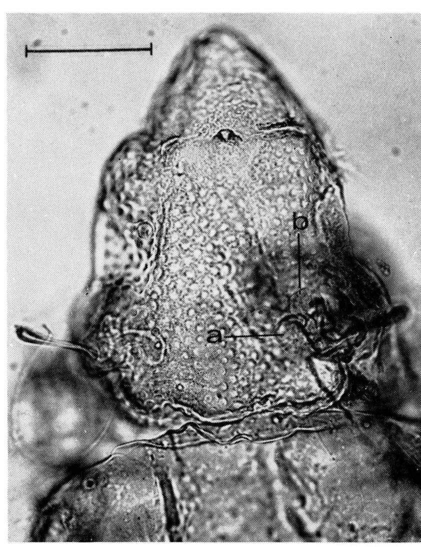

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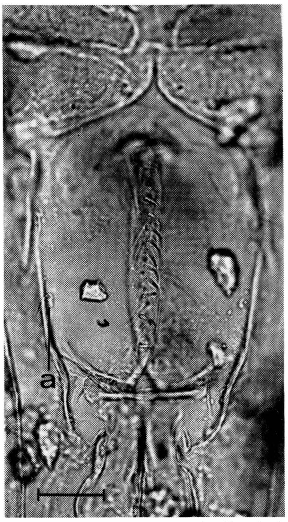
Fig. 4.

Plate VI

Fig. 1. *Platynothrus punctatus*. Genital region. a: adg 1.

Fig. 2. *Eugamasus sp*. Ventral side of idiosoma. a: genital region.

Fig. 3. Agromyzidae larva (Dipt. acalyptr.). Posterior part of abdomen.



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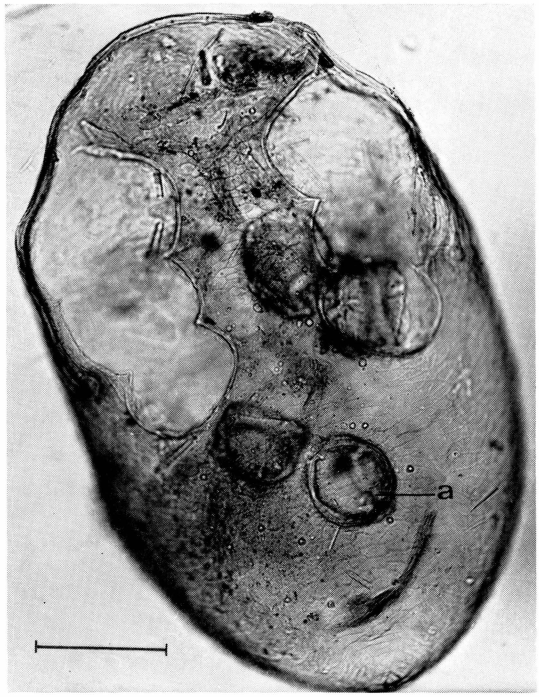

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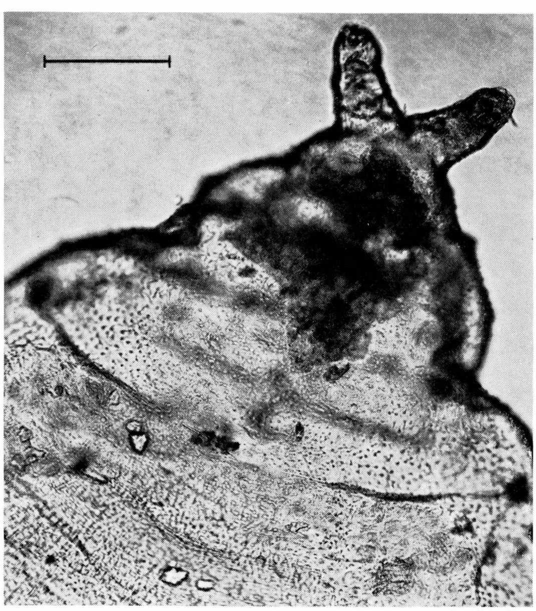

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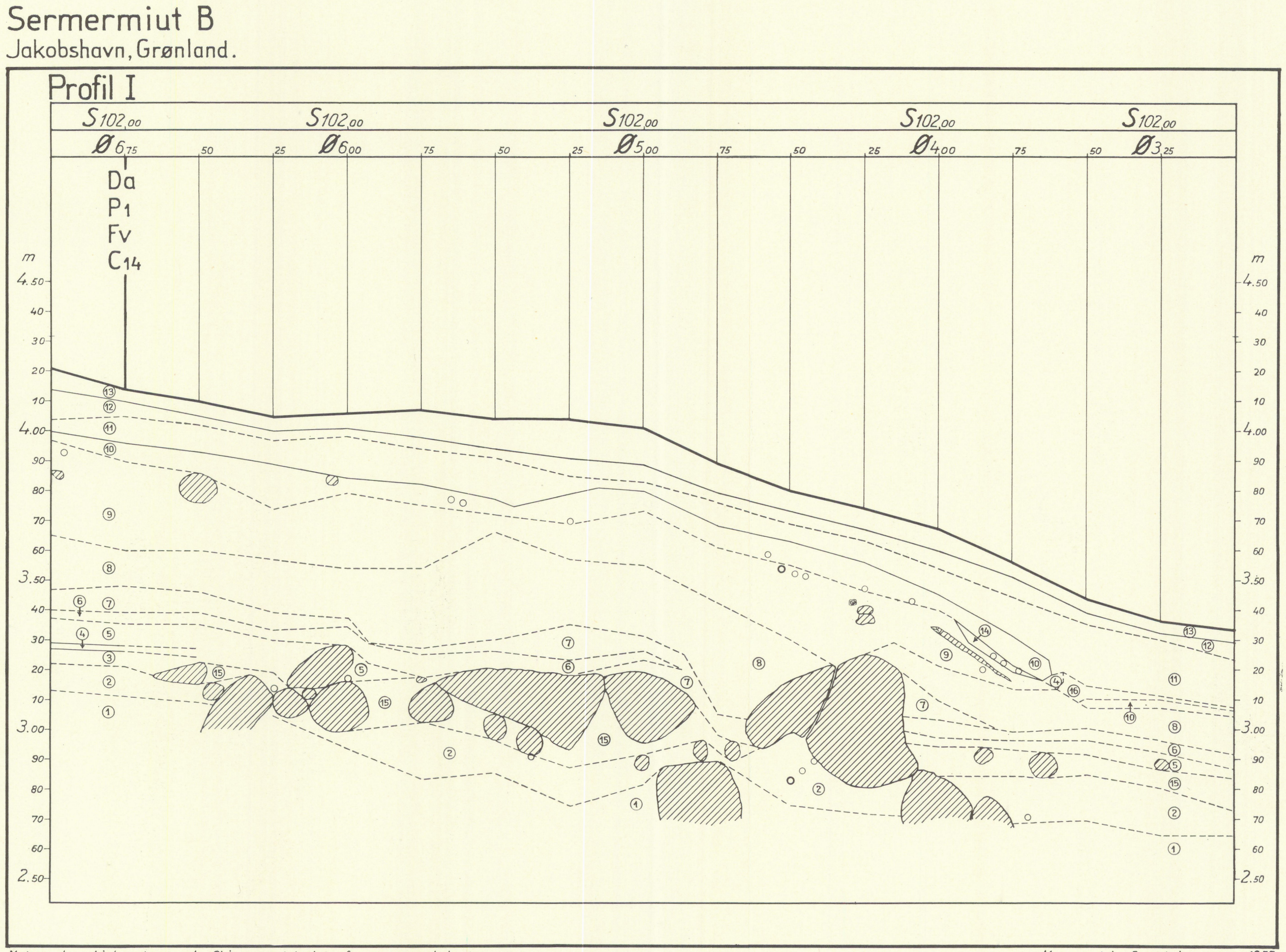
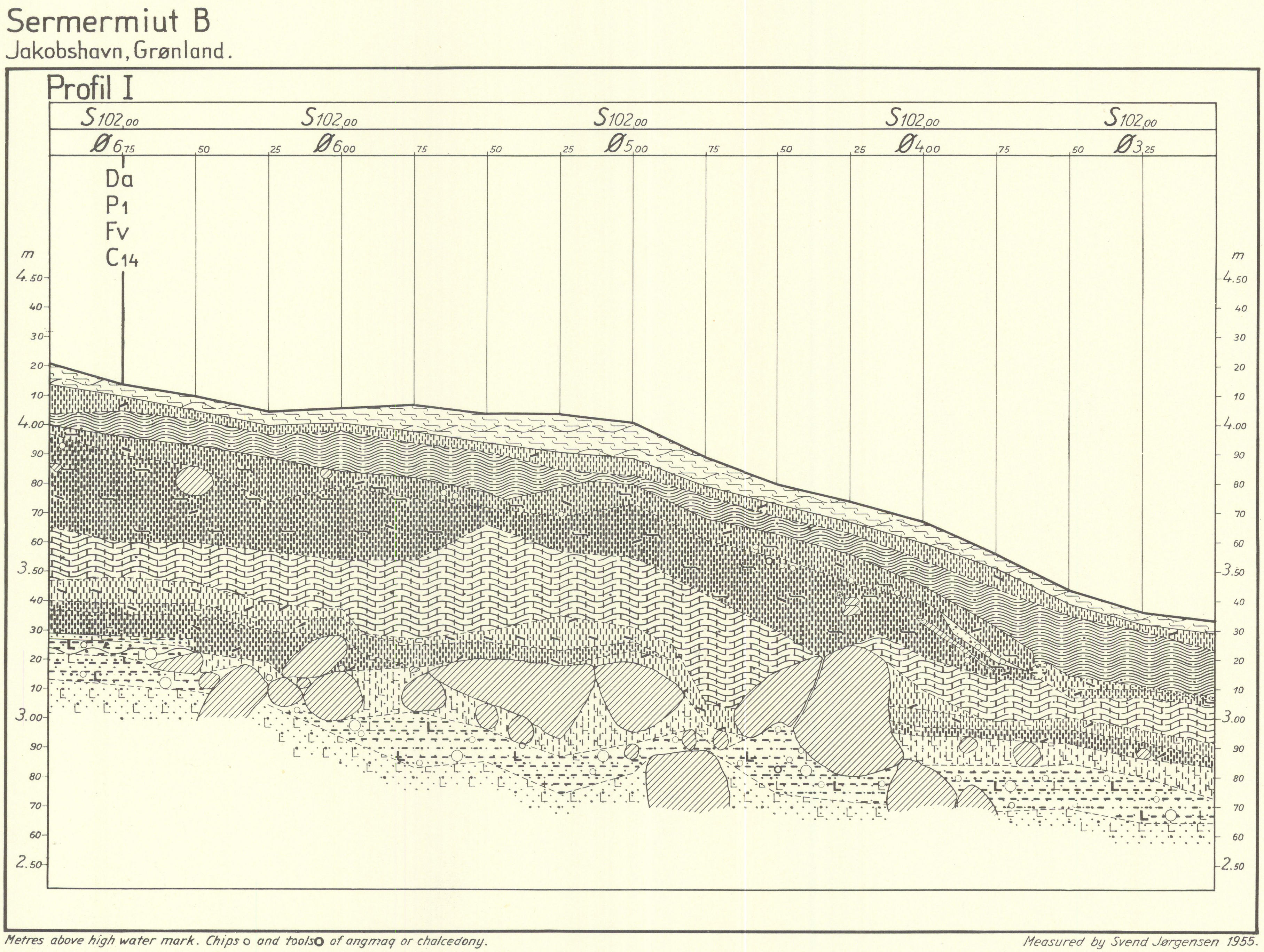


Metres above high water mark. Chips ○ and tools ● of angmaq or chalcedony. *Measured by Svend Jørgensen 1955.*

The profile at Sermermiut with layers indicated by different symbols. Stones are marked with inclined lines (from FREDSKILD 1967).



The same profile at Sermermiut as that of Pl. 7 with layers indicated by their respective figures and with borders between them shown with broken lines. Stones are marked with inclined lines (from FREDSKILD 1967).