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NATURAL CONDITIONS AT THE TIME OF PRIMARY HABITATION OF HIIUMAA ISLAND

Harri MOORA Jr[a] and Lembi LÕUGAS[b]

[a] Tartu Ülikooli geoloogia instituut (Institute of Geology, University of Tartu), Vanemuise 46, EE-2400 Tartu, Eesti (Estonia)
[b] Eesti Teaduste Akadeemia Ajaloo Instituut (Institute of History, Estonian Academy of Sciences), Rüütli 6, EE-0001. Tallinn, Eesti (Estonia)

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The paper is a summary of the results of an ongoing project of the Estonian Stone Age coastal habitation, geological, and faunal studies. The investigation is based on the archaeological excavations of the Early Neolithic Kõpu site, Hiiumaa Island, made in 1994.

The paper deals with the period when the first settlers could have arrived on the island, i. e. the Late Mesolithic/Early Neolithic (6500—5500 BP). The aim is to give an overview of the natural conditions of the area at that time. The topography of the Kõpu region is described and the geological, floral, and faunal evidence is discussed.

The development of Hiiumaa Island began more than 10 000 years ago, when the highest part of the Kõpu Peninsula emerged from the water and a small islet was formed. As a result of the glacioisostatic uplift, the island reached an area of about 5 km^2 approximately 6000 years ago. At that time the gently sloping coast in the south offered people better living conditions than the steeper northern coast. Signs of primary human habitation have been found precisely from the southern and southeastern parts of the island. An attempt is also made to establish the seasonal activity at these sites.

INTRODUCTION

Nowadays Hiiumaa Island is one of the biggest islands in the eastern part of the Baltic Sea. The central part of the Kõpu Peninsula was the first area of Hiiumaa to emerge from the sea more than 10 000 years ago. Since evidence of primary habitation has been found from this area, we discuss the geological development and natural conditions of only the Kõpu region.

The development of the Kõpu Peninsula dates back to the time when continental ice had retreated at the end of the Late Glacial period. Later, when the higher parts of the present Kõpu Peninsula emerged from the sea, the small island was exposed to strong wave action and heavy storms. Thus there existed ideal conditions for the redeposition of glacial sediments, which formed the series existing presently at the beach ridges and bluffs at different levels. Therefore, the Kõpu Peninsula serves as a stratotype area for solving problems of the postglacial history of the eastern Baltic Sea area.

Radiocarbon analyses place the primary occupation time of this small Kõpu Island in Early Neolithic time, for example 5330±90 BP (TA-1493) and 5698±70 BP (Tln-1901) (non-calibrated) which would correspond to about 4500 BC (calibrated). Several C^{14} dates have given similar results, but an earlier habitation of Kõpu Island (Late Mesolithic) is also possible (Kriiska, 1995).

The present work was carried out in cooperation with archaeologists, geologists, and biologists. Archaeological excavations at Kõpu were carried out in 1994 within the framework of the project of the Estonian Stone Age coastal habitation, geology, and faunal studies. This is also a part of the PACT (Physical, Chemical, Biological and Mathematical Techniques Applied to Archaeology) palaeoenvironmental research (Council of Europe, Division of Scientific Co-operation).

The main purposes of this investigation were to shed some light on how Hiiumaa Island developed, why people were interested in coming to the island, and how they used the available natural resources.

Geological background

Kõpu is the largest and westernmost peninsula of Hiiumaa Island. Its length is approximately 20 km from west to east with a width ranging between 3.5 and 7.3 km (Fig. 1).

Morphologically the Kõpu Peninsula can be described as a central upland surrounded by plains from east, south, and west. This upland lies at a height of 44—46 m rising in its southwestern part to 59—62 m above the present sea level. The highest point of the peninsula — Tornimägi, 66.2 m a. s. l. — is also situated here. Other high areas are the dunes located east and southwest from the central upland (Püha Andrese Hill, 63.0 m a. s. l.).

The upper part of the central upland of Kõpu can be described as a big glacial erratic, consisting of tills transported here by the continental ice at the time of the Palivere stadial of the Weichselian glaciation (Eltermann, 1993). Later this part of the central upland with older till beds and limnoglacial sediments of the Pandivere stadial was covered with fluvioglacial and other glaciolacustrine deposits left behind by the retreating glacier. This resulted in a ridge-like landform from east to west with several smaller branches (parts). These different till beds with accompanying aqueoglacial deposits are at their thickest (83 m) on the central upland of Kõpu. The soft erodible Quaternary deposits have been partly reshaped by the waves of the ancient stages of the Baltic Sea. Thus, there is an abundance of both accumulative (beach ridges) and erosional (bluffs) coastal formations.

The Kõpu Peninsula was the first part of Hiiumaa Island to emerge from the sea more than 10 000 years ago as a small island. This Kõpu Island was situated at a distance of 80 km from the mainland and was subject to the action of strong winds and storm waves. Today the highest shorelines of this island can be found between 53 and 62 m a. s. l., which are related to the Baltic Ice Lake Stage.

Kents (1939) grouped the Ancylus Lake and the Litorina Sea bluffs into 10 different series and the coastal ridges into 12 series. The beach formations (bluffs) of the Ancylus Lake transgression have been found at the Kõpu Peninsula 44—45 m a. s. l. At the time of the regression, which followed the maximum of the Ancylus transgression, and especially during the catastrophical lowering at the end of the Ancylus Stage (A VI), the land emerged from the water step by step primarily from the south, west, and east of its original point of emergence (Кессел & Раукас, 1967) (Fig. 1). A bay (inlet), later a lagoon, was formed in the place presently

known as the Kõivasoo Bog, bordered with coastal ridges of the Ancylus Lake. At the end of the Ancylus regression the water level in the Kõpu area dropped as low as 20 m a.s.l. (Raukas & Ratas, in press) and thus the lagoon became a lake, which for some time was isolated from the sea. The Ancylus Lake beach ridges nearby at a height of 28—42 m (in the village of Kõpuküla and at the Ristna—Ülendi crossroads) contain a rather rich Ancylus subfossil mollusc fauna.

Evidence of the Mastogloia/Litorina transgression is found earlier in Hiiumaa than in the other parts of Estonia (Кессел & Раукас, 1967). As a result of the rising water level at the beginning of AT 1, about 8000 years ago, a lagoonal lake of the Mastogloia Sea existed once again at the Kõivasoo Bog (Sarv et al., 1982). During the following regressive phases of the Litorina Sea the island of Kõpu grew remarkably in size (Fig. 1).

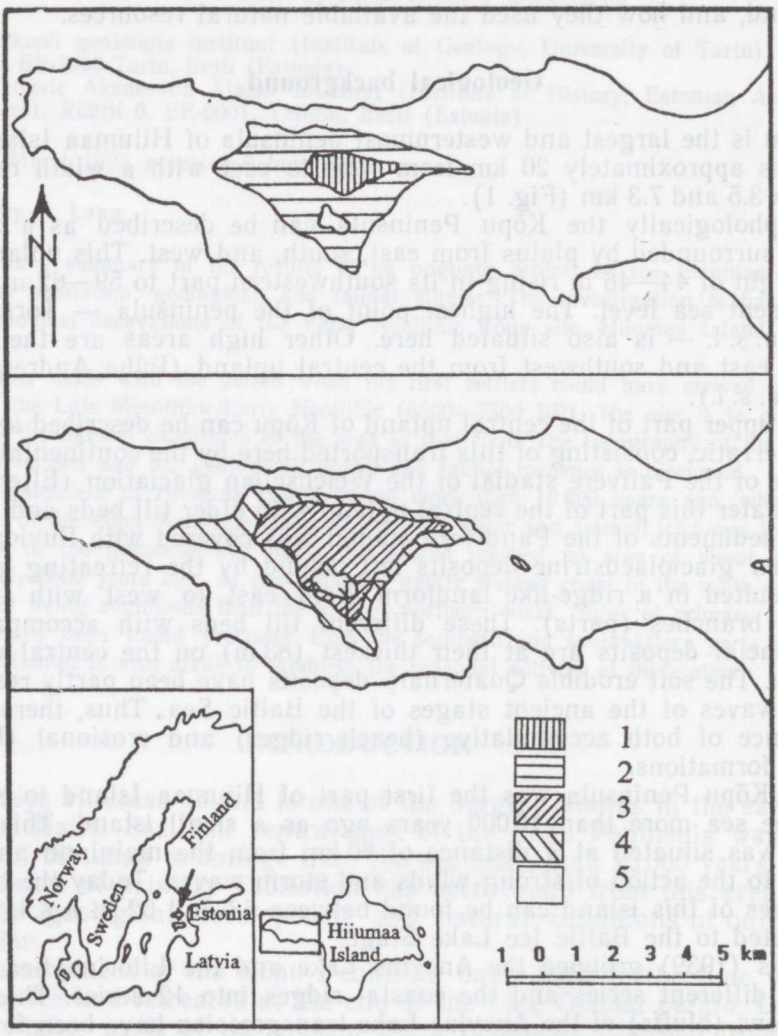

Fig. 1. Location of Hiiumaa Island and the development of the Kõpu Peninsula. *1* at the time of maximum transgression of the Ancylus Lake Stage (A I); *2* at the end of the Ancylus stage (A VI); *3* during the transgression of the Litorina Sea (L I); *4* during the regressive Litorina Stage (L III), at the time of the existence of the Kõpu I site; *5* the studied area.

Kents (1939) established the Litorina beach ridges and bluffs at a height of 15—27 m a.s.l. This is supported by the 1994 field work findings of brackish water subfossil mollusc fauna (identified by E. Tavast) *Cerastoderma glaucum*, *Hydrobia ulvae*, *Littorina litorea*, *Scrobicularia plana* (at 26 m a.s.l.) at the beach ridge located at the Kõpu I site as well as by findings of typical Ancylus fresh water mollusc fauna *Lymnaea balthica*, *Ancylus fluviatilis*, *Lymnaea palustris*, *Pisidium amnicum*, *Anisus contortus* (at 30 to 32 m a.s.l.) at the village of Kõpuküla. These findings confirm that the maximum level of the Litorina Sea exceeded 26 m above the present sea level, but was not as high as 30 m a.s.l. In the regressive phases of the Litorina Sea (L III 17—20, L IV 14—16 m a.s.l.) Kõpu Island grew considerably in size and also most of central Hiiumaa emerged from the sea. Lake Kõivasoo changed to a fen area 4800 BP (Sarv et al., 1982). Also, at that time the more intensive formation of the dunes began.

During the last 4000 years, at the time of the Limnea Sea Stage, the regression of the Baltic Sea continued. The coastal formations of that time can be found at 15 m or less above the present sea level. At the beginning of the Limnea Sea Stage (Lim I—II) a connection formed between Kõpu and Hiiumaa islands.

Flora

The modern climate of Hiiumaa Island is more maritime than that of the mainland, and this seems to have been the case throughout the whole Holocene.

The first plant immigrants to the island could have been spread with seed-eating birds and/or with wind. At the beginning grasses and bushes probably dominated among the island's flora while the distribution of trees was slower. At the end of the Ancylus Stage the forestation (*Corylus* and *Pinus*) could have begun on the upper part of Kõpu Island, where the carbonate-rich soil occurred. *Betula* and *Alnus* dominated on the lower areas, which surrounded the higher part of the island. According to palynological diagrams the development of forest started 8100—6500 years ago when the role of *Pinus* decreased while *Alnus*, broad-leaved species, and *Corylus* increased (Sarv et al., 1982). As the climate on the island stayed maritime during the following period, similar tendencies of the forest development continued.

There are some doubts in the interpretations of the palynological analyses, because the conditions for the distribution of trees to the young and small island were not favourable (absence of humus-rich soil, strong winds). It seems likely that the forest, nevertheless, was quite diverse by the time hunters and fishers first appeared on the island in the Late Mesolithic and/or the Early Neolithic period (6500—5500 BP), because they needed wood for fire. There are numerous ancient hearths on the coastal ridges of the Ancylus regression and the Litorina transgression in that region (Fig. 2).

Fauna

The distribution of wild terrestrial fauna to the small island, which was isolated from the mainland (80 km) and from another island, Saaremaa (40 km), by the sea was almost impossible. If some bigger species could cross this barrier then the formation of a local population is excluded because of a limited ecological niche. According to Timm (1991) several species, like the stone marten (*Martes foina*), the otter (*Lutra lutra*), and the badger (*Meles meles*), are common on mainland, but

missing on Hiiumaa nowadays. Some species, like the brown hare (*Lepus europaeus*), the roe deer (*Capreolus capreolus*), the red deer (*Cervus elaphus*), and the American mink (*Mustela vison*) have been introduced into the island during this century. This is evidence of isolation even today when the distance is smaller than in the past.

Marine fauna could have been one of the main factors attracting early inhabitants to occupy Kõpu Island. Large amounts of seal bones in archaeological sites indicate intensive seal hunting among the coastal settlers. A great abundance of seal bones around the Baltic Sea is typical of the Neolithic period (Lepiksaar, 1964, 1986; Паавер, 1965; Forstén &

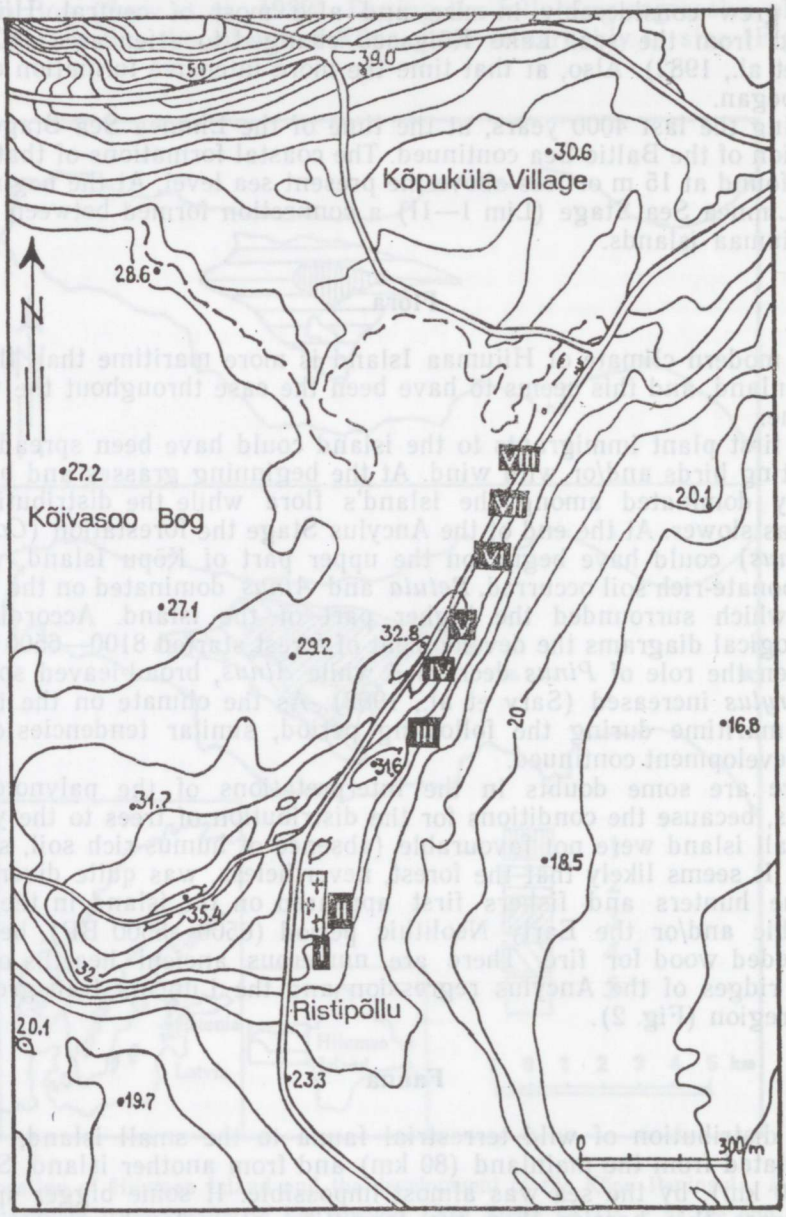

Fig. 2. Area studied in 1994 with the excavated site (Kõpu I) and newly found Stone Age sites (Kõpu II—VIII).

Alhonen, 1975; Ericson, 1989; Lõugas, 1993, in press). Four species of seals — the gray seal (*Halichoerus grypus*), the ringed seal (*Pusa hispida*), the harbour seal (*Phoca vitulina*), and the harp seal (*Pagophilus groenlandicus*) — and the porpoise (*Phocaena phocaena*) have been found from Estonian coastal areas dated to different periods of prehistory (Lepiksaar, 1940; Цалкин, 1952; Паавер, 1965; Lõugas, 1992, 1993, 1994). Three last species seem to be always migrating forms in Estonian waters.

The analysis of the archaeozoological material from the Kõpu I site shows a part of the fauna complex of that region in the Early Neolithic and the economic background of prehistoric settlers.

All the excavated soil from Kõpu I site was sieved by 1- and 2-mm hand sieves. The number of bone and teeth fragments analysed or counted was 3618. Macromammal bone fragments smaller than 0.5 cm^2 were not included here. About 24% of the bones were burnt. Only 549 fragments in the material were successfully identified to the species or as an unidentified seal bone. Archaeozoological analyses show that most animal remains come from seals with only the ringed seal and the gray seal hunted (Table). The former is represented by 54 fragments from at least six individuals and the latter by 45 fragments from four individuals. Bad preservation conditions in sandy and stony soil prevented the identification of a large number of seal bones (433).

Animal remains found from the Kõpu I site

(MNI = minimum number of individuals)

MAMMALIA

Unit	*Pusa hispida*	*Halichoerus grypus*	*Phocidae indet.*	*Erinaceus europaeus*
Calvarium			15	
Os temporale	12	5	10	
Mandibula	1	2	3	4
Dentes	16	29	6	
Vertebrae			33	
Costae			9	
Humerus	4		11	
Radius	11	1	6	
Ulna	3	5	9	
Os coxae			8	
Femur	1		5	
Patella			1	
Os cruris			10	
Astragalus			1	
Calcaneus	2		2	
Ossa carpalia et tarsalia		1	23	
Metacarpalia	1		22	
Metatarsalia	1	1	33	
Phalanges	2	1	226	
Total	54	45	433	4
MNI	6	4	12	3

AVES

Species	Unit	Number of fragments
Somateria mollissima	*Coracoid et Furcula*	2
Phalacrocorax carbo	*Mandibula*	1
Clangula hyemalis ? / *Bucephala clangula* ?	*Carpometacarpus et Ulna*	2
Mergus serrator	*Coracoid*	1
Haliaëtus albicilla	*Phalanx* II/3	1
Aves indet.		173

PISCES

Species	Unit	Number of fragments
Esox lucius	*Vertebra praecaudales*	1
Gadus morhua	*Articulare; Branchiostegale* (I): *Vertebrae praecaudales* (III) *et caudales*	4
Scophthalmus maximus	*Vertebra praecaudales*	1
Pisces indet.		8

The hedgehog (*Erinaceus europaeus*) is a very interesting find, because this species cannot populate isolated islands itself. Hedgehog must have carried a magic meaning for prehistoric people. The four fragments of mandibles (Table), found from a hearth of the site, could have been imported to the island with skin or as a part of a complete skull. The site seems to have been used only during the seal-hunting season in early spring when the hedgehog is in hibernation, thus, it is doubtful that a living animal had been brought to the site.

Bird bones were very badly preserved occurring in the form of small fragments. The location of the ancient Kõpu Island was very favourable for birds of passage as a resting place during their south—north migrations. This island, with a lake (later bog) in the central part, offered good conditions especially for waterfowl. Probably large numbers of ducks and gulls nested on that island and hunters could have used their eggs for food in spring. The remains of the eider (*Somateria mollissima*), ducks (*Clangula hyemalis/Bucephala clangula*?), the cormorant (*Phalacrocorax carbo*), and the red-breasted merganser (*Mergus serrator*) are evidence of waterfowl hunting. One phalanx of the white-tailed eagle (*Haliaëtus albicilla*) has been found (Table), but it does not prove this species was hunted on the island, because the leg of the bird could have been used in some ritual ceremony.

Though the excavated soil was sieved, very few fish bones were found and species (Table) identified: only the pike (*Esox lucius*), the cod (*Gadus morhua*), and the turbot (*Scophthalmus maximus*). The finds of the cod and the turbot indicate the existence of Atlantic fish forms in Estonian waters at that time. The small amount of fish remains can be explained by bad preservation conditions or by an absence of fishing among prehistoric settlers in Kõpu. The main reason for coming to the island was most likely seal hunting. It is also possible that these few fragments of fish bone came from the entrails of seals.

DISCUSSION

An increase in the salinity of water during the beginning of the Litorina Stage allowed an abundance of marine fauna to develop in the Baltic. This increased people's interest to inhabit the islands.

The southern coast of the ancient Kõpu Island offered more favourable conditions for the prehistoric seal hunters than the northern coast. During the regressive phases, which followed the Mastogloia/Litorina transgression, Kõpu Island expanded mostly southwards. In the southern part of the island a small coastal lake existed, which is presently known as the Kõivasoo Bog (Fig. 1). The gently sloping southern coast offered better resting and breeding conditions for seals in winters of poor ice formation than the steeper northern coast.

At the time of the existence of the Kõpu I site the sea level was approximately 20—22 m above the present sea level (Fig. 2). The hunters chose a place for stopping on a higher (25—27 m a.s.l.) dry sandy coarse-grained beach ridge, which was strategically good for finding material (quartz) for tools, slaughtering seals, and boiling blubber, as well as for getting a good view of the surrounding areas.

The year-round occupation of this small island is doubtful, but the seasonal use of the site is plausible. There is some evidence that the Kõpu I site (probably all sites, I through VIII) was used only in early spring. First, this is the best time for seal hunting. One subfossil femur of a ringed seal was of the same size as the femur of a recent individual — about 10 kg. This specimen could be only some days, maximum a week old, and thus hunted at the end of March or at the beginning of April. Another reason why the year-round use seems doubtful, is that the about 5 km^2 island did not offer good possibilities for finding food, except for fish and seal, which are more likely seasonal food. The hazelnut shells and some bigger tubular bone fragments (elk and/or wild boar?), which were found from the Kõpu I site, seem to have been brought to the island by man. It is plausible that the nutshells originated from local hazels, but the distribution of the big terrestrial mammals to the isolated small island, where the ecological niche was limited, is almost impossible.

One seasonal dating method is based on fish vertebrae. The annual rings allow of the determination of the approximate season in which the fish died (Casteel, 1976). The annuli on the vertebral centrum of pike and turbot (both three years old) from Kõpu I indicated that the fish had been caught in March or April.

Briefly, the small Kõpu Island was seasonally occupied by prehistoric seal hunters and successive generations returned to the same place for thousands of years to hunt seals in early spring.

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LOODUSOLUDEST HIIUMAA ESMASE ASUSTAMISE AJAL

Harri MOORA jun., Lembi LÕUGAS

Käesolev artikkel on kokkuvõte projekti «Eesti kiviaja ranniku asustus, geoloogia ja fauna kujunemine» esialgsetest tulemustest. Uurimistöö aluseks on 1994. aasta arheoloogilised väljakaevamised Hiiumaal varaneoliitilisel Kõpu asulakohal.

Artikkel käsitleb perioodi, mil esimesed inimesed võisid saarele tulla, s. t. hilismesoliitikumi/varaneoliitikumi (6500—5500 aastat tagasi). Töö eesmärk on anda ülevaade saare loodusoludest sel ajal. On kirjeldatud Kõpu ümbruse topograafiat ja arutletud geoloogia ning taimestiku ja loomastiku kujunemise üle.

Kõpu poolsaar on vanim osa Hiiumaast, mille kõrgemad kohad kerkisid merest välja ligikaudu 10 000 aastat tagasi. Mesoliitikumi lõpuks (u. 6000 aastat tagasi) oli kujunenud umbes 5 km² suurune saareke. Selle madal ja lauge lõunakallas oli inimestele soodsam randumispaik kui järsk põhjakallas ning esmase asustamise jälgi leidubki just saare lõuna- ja kaguosas. On püütud kindlaks teha ka võimalik sesoonne tegevus asulapaikades.

О ПРИРОДНЫХ УСЛОВИЯХ В ПЕРИОД РАННЕГО ЗАСЕЛЕНИЯ О-ВА ХИЙУМАА

Харри МООРА (мл.), Лембит ЛЫУГАС

В статье приводятся предварительные результаты археологического исследования ранненеолитической стоянки Кыпу на о-ве Хийумаа в рамках проекта «Заселение, геология и формирование фауны побережья Эстонии в каменном веке». Рассматриваются период, когда люди впервые могли попасть на остров, т. е. поздний мезолит—ранний неолит (6500—5500 лет назад), природные условия того времени, топография окрестностей Кыпу, геология, а также формирование здесь растительного и животного мира.

П-ов Кыпу, древнейшая часть о-ва Хийумаа, местами поднялся над уровнем моря приблизительно 10 000 лет назад. В конце мезолита (около 6000 лет назад) образовался островок площадью примерно в 5 кв. км. Его низкий и пологий южный берег, в отличие от обрывистого северного, был очень благоприятен для обустройства человека. Поэтому следы первоначального заселения остались именно в южной и юго-восточной частях острова. Сделана также попытка выяснить характер сезонной стоянки.