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SREDNJI I RANI GORNJI PALEOLITIK U HRVATSKOJ

THE MIDDLE AND EARLY UPPER PALEOLITHIC IN CROATIA

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Članak donosi pregled glavnih nalazišta, interpretacija i spoznaja u proučavanju srednjega i ranoga gornjeg paleolitika Hrvatske. Posebna je pozornost posvećena rezultatima novijih istraživanja i novijim interpretacijama ranijih istraživanja, bitnima za rekonstrukciju ponašanja i prilagodbe neandertalaca, njihova nestanka te pojave ranih suvremenih Europljana. Neandertalci su se podjednako dobro prilagođavali različitu okolišu u kontinentalnoj (sjeverozapadnoj) i mediteranskoj Hrvatskoj (Dalmacija). Arheološki nalazi s područja sjeverozapadne Hrvatske (špilja Vindija) upućuju na prijelaz srednjega u gornji paleolitik, povezanost neandertalaca s inicijalnim gornjim paleolitikom i moguće susrete neandertalaca i ranih modernih ljudi. S druge strane između kasnoga srednjeg paleolitika (Mujina pećina) i ranoga gornjeg paleolitika (Šandalja II) istočnoga jadranskog područja postoji vremenska praznina veća od 10 000 godina, uz vidnu razliku u načinu proizvodnje i tipologiji alatki. Tijekom posljednjih 15-ak godina spoznaje o paleolitiku Hrvatske znatno su dopunjene i promijenjene, što je rezultat istraživanja više nalazišta uporabom suvremenih metoda, ali i provedbe detaljnijih analiza ranije iskopana materijala.

Ključne riječi: paleolitik, musterijen, orinjasijen, neandertalci, rani moderni ljudi, Hrvatska

The article provides an overview of the principle sites, interpretations and knowledge gained in the study of the Middle and early Upper Paleolithic in Croatia. Particular attention is accorded to the results of more recent research and newer interpretations of earlier research essential to the reconstruction of the behavior and adaptations of the Neandertals, their disappearance and the appearance of early modern Europeans. The Neandertals were equally capable of adapting to the different environments in continental (Northwestern) Croatia and Mediterranean Croatia (Dalmatia). Archeological materials from Northwestern Croatia (Vindija Cave) indicate the transition from the Middle to the Upper Paleolithic, the ties of the Neandertals to the initial Upper Paleolithic and possible encounters between Neandertals and early modern humans. On the other hand, there is a 10,000 year gap between the late Middle Paleolithic (Mujina Pećina) and the early Upper Paleolithic (Šandalja II) of the Eastern Adriatic region, with a visible difference in tool production methods and typology. Over the past fifteen years, knowledge on the Paleolithic in Croatia has been considerably supplemented and enhanced, which is the result of research at several sites using cutting-edge methods as well as thorough analyses of materials excavated previously.

Key words: Paleolithic, Mousterian, Aurignacian, Neandertals, early modern humans, Croatia

1. Uvod

Paleolitik ili starije kameno doba arheološko je razdoblje koje započinje pojavom prvih ljudskih izrađevina (artefakta), odnosno predmeta koji su ljudskom rukom bili prilagođeni određenoj radnji. Na temelju današnjih spoznaja, ponajprije datacije kamenih alatki s prostora Afrike, paleolitik započinje prije više od 2,5 milijuna godina (Semaw *et al.* 1997; Semaw 2000). No budući da se najranije etape čovjekova kulturnoga – kao i biološkoga – razvoja odvijaju na tlu Afrike, priča o boravku čovjeka na tlu Europe i naše domovine započinje puno kasnije. Prvi tragovi čovjekova boravka izvan afričke pradomovine stari su otprilike 1,8–1,6 milijuna godina prije sadašnjosti, no ograničeni su na tlo Azije (Gabunia *et al.* 2000). Prve tragove osvajanja Europe prepoznajemo u sporadičnim nalazima kamenih alatki starih nešto manje od milijun godina (npr. Le Vallonet u Francuskoj, Isernia La Pineta u Italiji, Stránská Skála i Prezletice u Češkoj i dr.) te u još skromnijim skeletnim ostacima prvih europskih osvajača (Ceprano u Italiji i Gran Dolina u Španjolskoj). Što se naše domovine tiče, razdoblje donjega paleolitika Hrvatske nije zastupljeno velikim brojem nalazišta i nalaza. U literaturi se navode tek četiri lokaliteta na kojima su pronađene alatke pripisane donjem paleolitiku, i to prije svega na temelju tipoloških odlika nalaza (Malez 1979). Tri su nalazišta na otvorenom (Donje Pazarište, Punikve i Golubovec), dok se naziv Šandalja I odnosi na izoliranu koštanu breču pronađenu na lokalitetu Šandalja kod Pule (usmeno priopćenje D. Rukavine). Unutar koštane breče, čiji su faunalni nalazi pripisani razdoblju donjega pleistocena, pronađeni su sjekač i oblutak koji je možda poslužio za njegovu izradbu (Malez 1974; 1975). Iz koštane breče izoliran je i nalaz zuba (sjekutić), koji je M. Malez (1975; 1980) pripisao ranomu pripadniku roda *Homo* ili čak nekomu ranijem homininu, no kasnije analize pokazale su da se ne radi o ljudskom, nego životinjskom zubu (Wolpoff 1996; 1999). Šandaljski sjekač, po tipologiji sličan sjekačima iz Valloneta (usmeno priopćenje H. de Lumleya), vjerojatno predstavlja najstariji trag ljudskoga boravka na prostoru Istre, no bez preciznije revizije tafonomije i sedimentacije koštane breče te podrobnije paleontološke analize taj nalaz nije moguće datirati preciznije od vremena donjega, odnosno starijega paleolitika.

Na drugim su lokalitetima nalazi prikupljeni s površine (Vuković 1962–1963; Malez 1979). Gubitak stratigrafske pozicije onemogućava bilo kakvu dataciju, osim one temeljene na tipološkim karakteristikama nalaza. Od triju lokaliteta koja se u literaturi navode Punikve sadrže nekoliko rukotvorina, među kojima se ističu dva ašelejenska šačnika, u Donjem

1. Introduction

The Paleolithic, or Old Stone Age, is an archeological period that began with the appearance of the first human artifacts, meaning items worked by human hands to serve a specific purpose. According to current knowledge, primarily based on dating of stone tools from Africa, the Paleolithic first began over 2.5 million years ago (Semaw *et al.* 1997; Semaw 2000). However, since the earliest stages of human cultural, as well as biological, development occurred in Africa, the story of human residence in Europe and in Croatia began much later. The first traces of human habitation outside the African cradle of humanity date to roughly 1.8 to 1.6 million years before the current era, but these traces are limited to Asia (Gabunia *et al.* 2000). The first traces of the conquest of Europe can be discerned in sporadic discoveries of stone tools a little less than a million years old (e.g. Le Vallonet in France, Isernia La Pineta in Italy, Stránská Skála and Prezletice in the Czech Republic, etc.) and in the even more meager skeletal remains of the first conquerors of Europe (Ceprano in Italy and Gran Dolina in Spain). As for Croatia, there are not a large number of sites or materials dated to the Lower Paleolithic. The literature specifies only four sites at which tools attributed to the Lower Paleolithic were found, above all based on the typological traits of the finds (Malez 1979). Three sites are open-air (Donje Pazarište, Punikve and Golubovec), while the term Šandalja I pertains to an isolated bone breccia found at the Šandalja site near Pula (oral communication from D. Rukavina). Within the bone breccia, in which the faunal remains have been attributed to the Early Pleistocene, a chopper was found together with a pebble which may have served to craft it (Malez 1974; 1975). A tooth (incisor) was also isolated from the bone breccia which M. Malez (1975; 1980) attributed to an early member of the genus *Homo* or even some earlier hominin, although subsequent analysis showed that it was not a human but rather an animal tooth (Wolpoff 1996; 1999). The Šandalja chopper, based on its typology, is similar to choppers from Vallonet (oral communication from H. de Lumley), and probably constitutes the oldest trace of human habitation in the territory of Istria, but without a more precise revision of the taphonomy and sedimentation of the bone breccia and a more thorough paleontological analysis, this artifact cannot be dated any more precisely than the earlier, Lower Paleolithic.

At other sites, materials were gathered from the surface (Vuković 1962–1963; Malez 1979). The loss of stratigraphic position prevents all but typology-based dating. Of the three sites specified in the li-

Pazarištu prikupljen je jedan šačnik, uz nekoliko komada koji vjerojatno nisu rukotvorine, a smještanje nalaza s Golubovca u donji paleolitik u potpunosti je dvojbeno. Dvojbeno je i pripisivanje površinskih nalaza s Dugog otoka donjemu paleolitiku, jer su pronađeni pomiješani sa srednjopaleolitičkima (v. Batović 1988).

Razdoblje srednjega paleolitika na tlu Europe vremenski se poklapa s trajanjem musterijenske kulture. Tom razdoblju s prostora Hrvatske pripisano je više nalazišta, pećinskih i lokaliteta na otvorenom (Malez 1979). Nekoliko vrlo značajnih pećinskih lokaliteta (primjerice Krapina, Vindija, Veternica) nesumnjivo pripada tom razdoblju, što potvrđuju rezultati više analiza. Vindijski su nalazi od velike važnosti za proučavanje prijelaza srednjeg u gornji paleolitik i složene arheološke i antropološke slike te smjene. Za razumijevanje razdoblja srednjega paleolitika Dalmacije ključno je nalazište Mujina pećina u zaleđu Kaštela i Trogira, jer je prvo musterijensko nalazište u tom dijelu Hrvatske koje je iskopavano suvremenom metodom i kronometrijski datirano.

Ovaj rad donosi pregled glavnih nalazišta (sl. 1), spoznaja i suvremenih razmišljanja o razdoblju srednjega paleolitika Hrvatske te prijelaza iz srednjega u

terature, Punikve contains several artifacts, among them two Acheulean hand-axes; one hand-axe was collected in Donje Pazarište together with several pieces that are probably not artifacts; dating of the materials from Golubovec to the Lower Paleolithic is entirely dubious. Also dubious is the attribution of the surface materials from the island of Dugi to the Lower Paleolithic, for these were found mixed with Middle Paleolithic items (see: Batović 1988).

The Middle Paleolithic in Europe corresponds chronologically to the Mousterian culture. Several sites in Croatia, both caves and open-air (Malez 1979), have been attributed to this period. Several very important cave sites (for example: Krapina, Vindija, Veternica) undoubtedly belong to this period, which has been confirmed by the results of a number of analyses. The Vindija materials are of great importance to the study of the transition from the Middle to the Upper Paleolithic and the complex archeological and anthropological picture of this change. The Mujina Pećina in the Kaštela and Trogir hinterland is a crucial site for an understanding of the Middle Paleolithic in Dalmatia, because this is the first Mousterian site in this part of Croatia excavated using contemporary methods and dated chronometrically.

Slika 1. Glavna nalazišta srednjega i ranoga gornjeg paleolitika u Hrvatskoj (autorica karte: R. Šošić).
Fig. 1. Main Middle and early Upper Paleolithic sites in Croatia (map by R. Šošić).

gornji paleolitik (uključujući rani gornji paleolitik). Nalazišta su podijeljena u dvije veće regije – kontinentalnu (sjeverozapadnu) Hrvatsku i mediteransku Hrvatsku – koje predstavljaju različite klimatske zone i koje su stoga nudile drukčije uvjete za prilagodbu paleolitičkih lovaca i sakupljača.

2. Nalazišta kontinentalne (sjeverozapadne) Hrvatske

2.1 Krapina (Hušnjakov brijeg)

Kao što je napomenuto, razdoblje srednjega paleolitika Hrvatske puno je bogatije nalazima i nalazištima od prethodnoga donjeg paleolitika. Uz brojne nalaze artefakata, faune, tragova života i dr. pronađeni su i ljudski skeletni nalazi koje pripisujemo neandertalskim populacijama. Prvi prepoznati nalazi neandertalaca, prema kojima čitava populacija dobiva ime, otkriveni su godine 1856. u maloj pećini Feldhofer (Kleine Feldhofer Grotte) u dolini Neander kraj Düsseldorfa u Njemačkoj (*Anonymus* 1856; Fuhlrott 1859; Schaaffhausen 1859; King 1864). To je vrijeme kad su razmišljanja o evoluciji već prisutna u intelektualnome svijetu Europe, premda će Darwinova knjiga *O podrijetlu vrsta* tek biti objavljena (1859). U atmosferi protivljenja evolucijskoj misli te nedostatku antropoloških nalaza dio znanstvenika bio je sklon nalaze iz Neandertala tumačiti kao patološkog modernog čovjeka (Virchow 1872). Nalazi iz pećine Spy u Belgiji pronađeni 1886. godine (Fraipont & Lohest 1887) te naše Krapine (1899–1905, Gorjanović-Kramberger 1899; 1906) predstavljaju prekretnicu u razmišljanju o neandertalcima te daju potvrde da se ne radi o patološkoj, nego normalnoj, premda anatomski nešto drugačijoj populaciji daleke prošlosti. Nadalje na obama nalazištima pronađene su i brojne kamene alatke te nalazi izumrle faune, što pokazuje istinsku starost nalaza. D. Gorjanović-Kramberger uporabom tada nove metode analize flora, pokazuje istovremenost ljudskih kostiju i nalaza izumrlih životinja (Radovčić 1988). Krapinski su nalazi imali važnu ulogu u razmišljanju o evoluciji čovjeka krajem 19. i početkom 20. stoljeća (v. Smith 1976; Radovčić 1988; Janković 2004; Henke 2006 i ondje navedenu literaturu).

Nalazište u Krapini (sl. 2) prepoznato je kao potencijalno zanimljiv paleontološki lokalitet 1895. godine, kada Gorjanović od lokalnog učitelja S. Rehorića dobiva sakupljene nalaze nosoroga i bivola (Gorjanović-Kramberger 1918). Spriječen brojnim obavezama Gorjanović dolazi na lokalitet tek 23. kolovoza 1899. godine i po prvom posjetu pronalazi ljudski zub (Radovčić 1988). Uspješno zaustavlja daljnju

This work presents an overview of the principal sites (Fig. 1), knowledge and contemporary views on the Middle Paleolithic in Croatia and the transition from the Middle to the Upper Paleolithic (including the early Upper Paleolithic). The sites are divided between two larger regions, continental (Northwestern) Croatia and Mediterranean Croatia, which are different climatic zones and which therefore offered differing conditions for adaptation by Paleolithic hunters and gatherers.

2. Sites in continental (Northwestern) Croatia

2.1 Krapina (Hušnjakovo Hill)

As mentioned, the Middle Paleolithic in Croatia is richer in materials and sites than the preceding Lower Paleolithic. In addition to numerous artifacts, animal remains, traces of life and so forth, hominin skeletal remains were also found which were attributed to the Neandertal populations. The first recognized Neandertal remains, which gave its name to the entire population, were found in 1856 in the small Feldhofer Cave (Kleine Feldhofer Grotte) in the Neander Valley near Düsseldorf in Germany (*Anonymous* 1856; Fuhlrott 1859; Schaaffhausen 1859; King 1864). This was a time when the idea of evolution was already present in European intellectual circles, even though Darwin's *On the Origin of Species* (1859) had yet to be published. In an atmosphere marked by opposition to evolutionary thought and given the lack of anthropological finds, some scientists preferred to interpret the Neandertal discoveries as a pathological form of modern man (Virchow 1872). The discoveries made in Spy Cave in Belgium in 1886 (Fraipont & Lohest 1887) and in Krapina, Croatia (1899–1905, Gorjanović-Kramberger 1899; 1906) signified a turning point in views on the Neandertals and confirmed that it was not a pathological but rather normal, albeit anatomically somewhat different population from the distant past. Furthermore, numerous stone tools and remains of extinct fauna were also found at both sites, which demonstrated the true age of the materials. Dragutin Gorjanović-Kramberger, using the flourine test, a new method at the time, proved that the human bones and remains of extinct animals were cotemporaneous (Radovčić 1988). The Krapina finds played a major role in the consideration of human evolution at the end of the nineteenth and early twentieth centuries (see: Smith 1976; Radovčić 1988; Janković 2004; Henke 2006 and the literature cited therein).

Slika 2. Nalazište na Hušnjakovu u Krapini u vrijeme istraživanja.
Fig. 2. Site at Hušnjakovo in Krapina during the research period.

Slika 3. Krapina 3 (Krapina C) (snimio: I. Janković).
Fig. 3. Krapina 3 (Krapina C) (photograph by: I. Janković).

devastaciju nalazišta (Hušnjakovo je u to vrijeme služilo kao izvor pijeska za građevinske radove pa nikada nećemo saznati koliko je važnih nalaza nepovratno izgubljeno) i ubrzo započinje sustavna istraživanja koja traju sve do 1905. godine.

Stratigrafija krapinskoga nalazišta ukupne je visine oko 9 m, prema Gorjanoviću pripada interglacijalu Riss-Würm, a rata sedimentacije bila je relativno brza (Gorjanović-Kramberger 1913), što je kasnijim istraživanjima potvrđeno (Malez 1970; 1978a; Rink *et al.* 1995). Gorjanović-Kramberger (1906) stratigrafiju nalazišta dijeli u 9 slojeva: I = riječni sediment, 2–4 = zona *Homo sapiens*, 5–7 = zona *Rhinoceros mercki*, 8–9 = zona *Ursus spelaeus* (Gorjanović-Kramberger 1906; 1913; Malez 1978a; Radovčić *et al.* 1988). Većina neandertalskih nalaza pronađena je u slojevima 3 i 4, no valja spomenuti nalaz dječje lubanje (Krapina 1) iz gornjega sloja 8. U svim slojevima – izuzev najdonjega (I) – pronađeni su nalazi musterijenske industrije (Gorjanović-Kramberger 1906; 1913; Malez 1970a; 1978; 1979; Simek & Smith 1997). Analize stratigrafije upućuju na relativno brzu akumulaciju sedimenata. Radiometrijskim analizama starost ljudskih skeletnih ostataka određena je na otprilike 130 000 godina (OIS5e, Rink *et al.* 1995).

Krapinska kolekcija predstavlja najbrojnije nalazište neandertalskih skeletnih ostataka (sl. 3). Pronađeni su ostaci najmanje 24 osobe (Gardner & Smith 2006), dok dentalne analize M. Wolpoffa (1978; 1979; 1999; Wolpoff & Caspari 2006) upućuju na prisutnost 80-ak jedinki. Krapinska kolekcija velikim brojem nalaza individua različite starosti i spola omogućuje jedinstven uvid u varijaciju unutar populacije i stoga nije čudno da je i danas predmetom proučavanja paleoantropologa zainteresiranih za kasnije etape evolucije čovjeka. Veliku zaslugu u tome ima upravo Gorjanović, koji je u svojoj metodologiji istraživanja u mnogočemu bio ispred svojih europskih suvremenika. Njegove signature na ostacima krapinskih ljudi,

The site in Krapina (Fig. 2) was recognized as a potentially interesting paleontological locality in 1895, when Gorjanović received the collected remains of a rhinoceros and buffalo from a local schoolteacher named S. Rehorić (Gorjanović-Kramberger 1918). Prevented by numerous obligations, Gorjanović only managed to visit the site on 23 August 1899, and already during his first tour he found a hominin tooth (Radovčić 1988). He succeeded in halting further devastation of the site (Hušnjakovo at the time was used as a sand quarry for local construction, so there is no way of knowing how many important materials were irretrievably lost), and soon systematic research commenced and continued until 1905.

The stratigraphy of the Krapina site has a total height of 9 meters, and according to Gorjanović it belongs to the Riss-Würm Interglacial Stage, while the sedimentation was relatively rapid (Gorjanović-Kramberger 1913), which was confirmed by subsequent research (Malez 1970; 1978a; Rink *et al.* 1995). Gorjanović-Kramberger (1906) classified the site's stratigraphy into nine layers: I = riparian sediment, 2–4 = *Homo sapiens* zone, 5–7 = *Rhinoceros mercki* zone, 8–9 = *Ursus spelaeus* zone (Gorjanović-Kramberger 1906; 1913; Malez 1978a; Radovčić *et al.* 1988). Most of the Neandertal traces were found in layers 3 and 4, but the discovery of a child's skull (Krapina 1) in the upper layer 8 should be noted. In all layers, with the exception of the lowest (I), traces of Mousterian industry were found (Gorjanović-Kramberger 1906; 1913; Malez 1970a; 1978; 1979; Simek & Smith 1997). Analysis of the stratigraphy indicates the relatively quick accumulation of sediments. Based on radiometric analysis, the age of hominin skeletal remains has been determined to arround 130,000 years before present (OIS5e, Rink *et al.* 1995).

The Krapina site generated the most numerous collection of Neandertal skeletal remains (Fig. 3). The

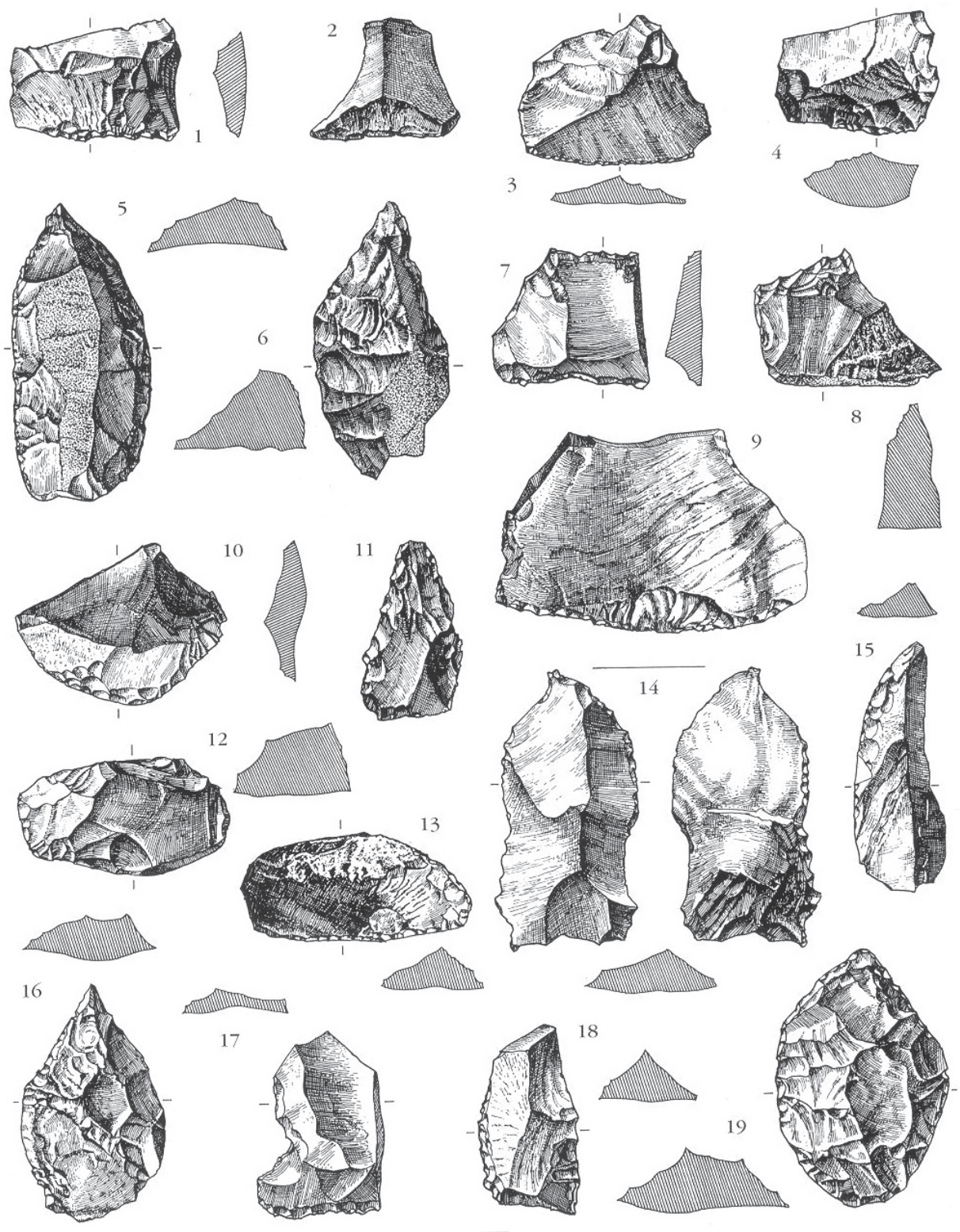
fauni i litičkim nalazima omogućuju primjenu mnogih suvremenih analiza jer je poznat njihov smještaj unutar stratigrafije nalazišta (za iscrpan pregled publikacija o krapinskim nalazima v. Frayer 2006).

Gledajući u cjelini, krapinski neandertalci pokazuju "tipične" neandertalske odlike (Smith 1976), poput velikih dimenzija zuba, taurodontizma kutnjaka i tipičnog "lopatastog" oblika sjekutića gornje čeljusti, nedostatka brade (*mentum osseum*), retromolarnoga prostora na donjim čeljustima i sl. (v. Gorjanović-Kramberger 1906; Smith 1976; Kallay 1970; 1970a; 1970b; Wolpoff 1978; 1979; Radovčić *et al.* 1988; Bailey 2006). Kranijalna anatomija također pokazuje tipične neandertalske odlike u kombinaciji izdužene lubanje niska čela i naglašene supraorbitalne regije koja oblikuje dvostruki luk, izbočenja na zatiljnoj kosti i udubine nad inionom, karakterističnoga prognatizma središnjega dijela lica, velike nosne regije, kranijalnoga kapaciteta koji je u vrhu vrijednosti živućih ljudskih populacija i mnogih drugih anatomskih detalja koji neandertalce, barem u postotku zastupljenosti, razlikuju od živućih pripadnika naše vrste (*Homo sapiens sapiens*) (Smith 1976; 1982; Smith & Paquette 1989; Trinkaus 1978; Radovčić *et al.* 1988; Caspari 2006; Wolpoff & Caspari 2006). Građa tijela i jaka mišićna hvatišta upućuju na visok stupanj tjelesne aktivnosti i prilagodbu na hladniji okoliš (za detaljan opis i uvid u anatomske odlike krapinskih neandertalaca i karakteristike neandertalske anatomije v. Gorjanović-Kramberger 1906; Boule 1911; 1912; 1913; Coon 1962; Smith 1976; 1982; 1984; Trinkaus 1981; 1983; Radovčić *et al.* 1988; Aiello & Dean 1990; Stringer & Gamble 1993; Conroy 1997; Wolpoff 1999; Bailey 2002; Janković 2004 i ondje citiranu literaturu). Analize krapinskih ostataka upućuju na tipičnu neandertalsku populaciju, iako je ranije spomenut nalaz dječje lubanje iz gornjega sloja nalazišta (Krapina A) bio predmetom neslaganja. B. Škerlj (1958) smatra da se radi o modernom čovjeku, dok se M. Wolpoff (1999) zalaže za svojevrsnu prijelaznu morfologiju prema modernijim populacijama kasnoga pleistocena. Naknadne analize ipak su pokazale da taj nalaz nije moguće isključiti iz varijacije prisutne unutar neandertalskih populacija (Minugh-Purvis *et al.* 2000).

Jednu od neobičnosti krapinskih nalaza prepoznajemo u stanju pronađenih ljudskih kostiju – vrlo su fragmentirane. Gorjanović-Kramberger (1901; 1906) to je pokušao objasniti kanibalizmom, što naravno ima velik odjek u popularizaciji slike o neandertalcima kao kanibalima. Za takvo objašnjenje zalažu se i Ullrich (1978), Tomić-Karović (1970), White i Toth (1991), Chiarelli (2004). Naknadne analize krapinskih kostiju upućuju međutim i na moguća drugačija tumačenja. Prirodni procesi, no i kulturna praksa,

remains of a minimum of 24 individuals were found (Gardner & Smith 2006), while dental analysis by M. Wolpoff (1978; 1979; 1999; Wolpoff & Caspari 2006) indicated the presence of roughly 80 individuals. The Krapina collection, thanks to a large number of remains of individuals of various ages and sexes, facilitates an unique insight into the variation within the population, so it is no surprise that even today it is studied by paleoanthropologists interested in the later phases of human evolution. A great contribution in this regard was made by Gorjanović himself, who was in many ways a step ahead of his European contemporaries in terms of research methodology. His markings on the remains of the Krapina hominin, animal and lithic remains facilitated the application of many modern analyses, for their position of the site's stratigraphy is known (for an exhaustive account of publications on the Krapina finds, see Frayer 2006).

Viewed as a whole, the Krapina Neandertals exhibit "typical" Neandertal qualities (Smith 1976), such as large teeth, taurodontism of the molars and the typical "shovel" form of the maxillary incisors, the lack of chin (*mentum osseum*), a retromolar space on the mandible, etc. (see Gorjanović-Kramberger 1906; Smith 1976; Kallay 1970; 1970a; 1970b; Wolpoff 1978; 1979; Radovčić *et al.* 1988; Bailey 2006). The cranial anatomy also demonstrates typical Neandertal traits such as elongated skull with low forehead and a robust supraorbital region which is characterized by a double arch, bunning on the occipital bone and *suprainiac fossa*, the characteristic prognathism of the midfacial region, a large nasal region, a cranial capacity at close to the peak values for living human populations and many other anatomic details that distinguish Neandertals, at least in terms of frequency, from living members of our own species (*Homo sapiens sapiens*) (Smith 1976; 1982; Smith & Paquette 1989; Trinkaus 1978; Radovčić *et al.* 1988; Caspari 2006; Wolpoff & Caspari 2006). The build and sturdy muscular attachments indicate a high degree of physical activity and adaptation to a cooler environment (for a detailed description and overview of the anatomical features of Neandertals and the typical Neandertal anatomy, see Gorjanović-Kramberger 1906; Boule 1911; 1912; 1913; Coon 1962; Smith 1976; 1982; 1984; Trinkaus 1981; 1983; Radovčić *et al.* 1988; Aiello & Dean 1990; Stringer & Gamble 1993; Conroy 1997; Wolpoff 1999; Bailey 2002; Janković 2004 and the works cited therein). Analysis of the Krapina remains indicates a typical Neandertal population, even though the aforementioned child's skull from the site's upper layer (Krapina A) has been the subject of disagreement. B. Škerlj (1958) believes that it is a modern human, while M. Wolpoff (1999) calls for something of a



Slika 4. Musterijenske alatke s krapinskoga nalazišta (više primjeraka nije orijentirano prema pravilima) (prema Dimitrijević et al. *1998: T. 3).*
Fig. 4. Mousterian tools from the Krapina site (several examples not oriented according to standards) (after Dimitrijević et al. *1998: P. 3).*

mogli su rezultirati takvim stanjem krapinskih kostiju (Trinkaus 1985; Russel 1987). Russel (1987a), Ullrich (1989; 2006) te Frayer *et al.* (2006) smatraju da su zarezi prisutni na brojnim krapinskim kostima mogli nastati kao rezultat odvajanja mekog tkiva, no

transitional morphology toward the more modern populations of the Late Pleistocene. Subsequent analysis has nonetheless shown that this find cannot be excluded from the variation present within Neandertal populations (Minugh-Purvis *et al.* 2000).

ne u svrhu kanibalizma, nego sekundarnog ukopa. Na mnogim nalazištima neandertalaca zamijećene su česte traume na skeletima (Trinkaus 1983), mnoge od kojih su zaliječene. Krapina nije izuzetak (Gorjanović-Kramberger 1906; Smith 1976; Radovčić *et al.* 1988; Kricun *et al.* 1999; Gardner & Smith 2006; Underdown 2006; Mann & Monge 2006) i govori o tešku životu te populacije. No zanimljiv je podatak da su katkad ozljede tolika razmjera da je ozdravljenje najvjerojatnije zahtijevalo brigu zajednice (Trinkaus 1983). Fragment desne tjemene kosti (*os parietale*) Kr-34.7 jedan je od najekstremnijih primjera zaliječene kranijalne ozljede (Kricun *et al.* 1999; Gardner & Smith 2006; Mann & Monge 2006).

Budući da je broj individua pronađenih na Hušnjakovu brijegu velik, da su unutar jedinstvene populacije akumulirane u relativno kratku vremenu zastupljena oba spola i individue različite životne dobi, moguće su analize populacijske varijacije, no i individualnoga tjelesnog razvoja, što će dalje pridonijeti razumijevanju ontogenetičkoga razvoja tih ljudi (v. npr. Busby 2006; Wolpoff & Caspari 2006; Sansilbano-Collilieux & Tillier 2006).

Osim nalaza skeletnih ostataka neandertalaca te nalaza pleistocenske faune s Hušnjakova potječe i velik broj kamenih alatki (sl. 4). Gorjanović-Kramberger (1906; 1913) industriju je odredio kao musterijen, što se naknadnim analizama pokazalo ispravnim (Malez 1970a; 1978; 1978; Simek 1991; Simek & Smith 1997). Litičkih nalaza ukupno ima 1191 (Simek & Smith 1997). Analiza J. F. Simeka (1991; Simek & Smith 1997) pokazuje uporabu levaloaške metode izradbe odbojaka, posebice u starijim slojevima, dok u mlađima prevladava metoda proizvodnje odbojaka razbijanjem oblutaka, tzv. *cobble wedge*-metoda. Među lomljevinom stoga obično dominiraju prirodni noževi hrptenjaci i levaloaški odbojci (Simek & Smith 1997). Sirovinski materijal uglavnom je lokalnoga podrijetla i moguće ga je pronaći u obližnjem potoku Krapinici. To su razni tufovi (58,2% oruđa i 55,4% odbojaka), silificirane stijene (18,8% oruđa i 27,1% odbojaka) i rožnjaci (10,3% oruđa i 5,9% odbojaka) (za detaljniji pregled analize sirovinskoga materijala v. Zupanič 1970). Među alatkama velik je postotak zastupljenosti strugala, a industrija se prema Bordesovoj podjeli pobliže može odrediti kao šarentijenski musterijen (Simek & Smith 1997).

2.2 Velika pećina

Velika pećina smještena je između Krapine i Vindije, nedaleko od sela Goranca na Ravnoj gori. Prva iskopavanja ondje je 1948. godine započeo M. Malez, a s

One of the unusual aspects of the Krapina finds is the very fragmentary state of the hominin bones found. Gorjanović-Kramberger (1901; 1906) attempted to explain this by cannibalism, which naturally led to the popularization of the image of Neandertals as cannibals. Such an explanation was also favored by Ullrich (1978), Tomić-Karović (1970), White and Toth (1991), and Chiarelli (2004). However, subsequent analyses of the Krapina bones indicate a possible different explanations. Natural processes as well as cultural practices may have resulted in the condition of the Krapina bones (Trinkaus 1985; Russel 1987). Russel (1987a), Ullrich (1989; 2006) and Frayer *et al.* (2006) believe that the cuts present on numerous Krapina bones may have resulted from the removal of soft tissue, but not for cannibalism but rather for secondary burial. At many Neandertal sites, frequent skeletal trauma has been noted (Trinkaus 1983), and much of this trauma had healed. Krapina is no exception (Gorjanović-Kramberger 1906; Smith 1976; Radovčić *et al.* 1988; Kricun *et al.* 1999; Gardner & Smith 2006; Underdown 2006; Mann & Monge 2006), and it testifies to the arduous life of this population. However, it is interesting that some injuries were so extensive that healing probably required nursing by the community (Trinkaus 1983). A right parietal fragment (*os parietale*) Kr-34.7 is one of the most extreme examples of a healed cranial injury (Kricun *et al.* 1999; Gardner & Smith 2006; Mann & Monge 2006).

Since the number of individuals found at Hušnjakovo Hill is large and individuals of both sexes and various ages accumulated within a single population over a relatively short time, it is possible to analyze populational variation as well as individual development, which will continue to further the understanding of the ontogenic development of these people (see, for example, Busby 2006; Wolpoff & Caspari 2006; Sansilbano-Collilieux & Tillier 2006).

Besides the Neandertal skeletal and Pleistocene fauna remains, a large number of stone tools (Fig. 4) were also found at Hušnjakovo. Gorjanović-Kramberger classified (1906; 1913) this industry as Mousterian, which was proven correct by subsequent analysis (Malez 1970a; 1978; 1978; Simek 1991; Simek & Smith 1997). There are a total of 1,191 lithics (Simek & Smith 1997). Analysis conducted by J. F. Simek (1991; Simek & Smith 1997) has identified the use of the Levallois technique to produce flakes, particularly in the older layers, while in the younger layers the so-called cobble-wedge method predominates. The debitage is therefore dominated by the naturally-backed knives and Levallois flakes (Simek & Smith 1997). The raw materials were usually of local origin and can be found in the nearby Krapinica

prekidima je istražuje između 1957. i 1979. godine. Kao što joj ime dade naslutiti, špilja je većih dimenzija i prostire se 25 m u dubinu. Na nekim je mjestima stratigrafija nalazišta deblja od 10 m, a sastoji se od 16 slojeva koji su nataloženi u vremenu od kraja glacijacije Riss (stadij izotopa kisika 6 ili ranije) do holocena. Arheološku industriju najdonjih slojeva – *p* do *k* – Malez (1979) određuje kao musterijen. Međutim iako Malez (1967: 28) rukotvorine iz donjega dijela sloja *k* smatra musterijenom, industriju iz gornjega dijela istoga sloja odredio je kao protoorinjasijen ili musterijen. Kasnija revizija artefakata nije opravdala pripisivanje dviju industrija sloju *k* (Karavanić & Smith 1998). Nalaze iz donjega dijela sloja *k* uistinu možemo pripisati musterijenu, dok su oni iz gornjega dijela vjerojatno samo pseudoalatke (za pseudoalatke v. Bordes 1961). Sve alatke malih su dimenzija, kao kod tzv. mikromusterijena. Mali broj nalaza u slojevima Velike pećine upućuje na više kratkotrajnih boravaka na nalazištu.

Jedan od najpoznatijih nalaza Velike pećine nesumnjivo je čeona kost (*os frontale*) otkrivena u sloju *j*. Budući da je taj sloj neposredno ispod sloja *i*, koji je radiokarbonskom metodom datiran na 33 850±520 godina prije sadašnjosti (Vogel & Waterbolk 1972), tako je i za nalaz čeone kosti starost pretpostavljena na više od 33 000 godina prije sadašnjosti. Malez (1963; 1965; 1967; 1980) tu kost pripisuje neandertalcu, s čime se u osnovi slažu i Mann i Trinkaus (1974). Zanimljivo je da ju F. Smith (1976; 1982) smatra u osnovi anatomski modernom, a kao moguće objašnjenje "neandertalskih odlika" dopušta genetsko naslijeđe od ranijih populacija. Time je taj nalaz u znanstvenim raspravama postao jedan od najranijih anatomski modernih Europljana i imao je važno mjesto u raspravama o mjestu neandertalaca unutar rodoslovlja anatomski modernoga čovjeka. Međutim datiranje provedeno radiokarbonskom metodom s akceleratorom (AMS) na uzorku uzetom iz same kosti izazvalo je nemalu senzaciju – dobiven je rezultat od 5 045±40 (nekalibriranih) godina prije sadašnjosti (Smith *et al.* 1999), čime postaje jasno da se radi o holocenskome čovjeku, a ne ranom anatomski modernom Europljaninu. Gornji slojevi Velike pećine sadrže eneolitičku keramiku i mnogobrojne ljudske kosti pa "glasovita" frontalna kost očito pripada čovjeku iz eneolitika.

2.3 Vindija

Pećina Vindija (sl. 5) smještena je u Hrvatskome zagorju, otprilike 9 km od sela Ivanec i 20-ak km od centra Varaždina. Špilja je duboka otprilike 50 m, široka 28 m, visine preko 20 m. Na potencijalno zna-

Creek. These are various tuffs (58.2% of implements and 55.4% of flakes), silicified rock (18.8% of implements and 27.1% of flakes) and chert (10.3% of implements and 5.9% of flakes) (for a more detailed review of raw material analyses, see Zupanič 1970). Among the tools, sidescrapers account for a large percentage, while according to the classification by Bordes, the industry can be rather proximately defined as Charentian Mousterian (Simek & Smith 1997).

2.2 Velika Pećina

Velika Pećina ('Big Cave') is situated between Krapina and Vindija, not far from the village of Goranec at Ravna Gora. The first digs there were launched in 1948 by M. Malez, and they were also conducted with some interruptions from 1957 to 1979. As its name indicates, the cave is rather large with a depth of 25 meters. At some places, the site's stratigraphy is thicker than 10 m, and consists of 16 layers which settled from the end of the Riss Glaciation (oxygen isotope stage 6 or earlier) to the Holocene. The archeological industry of the lowest layers – *p* through *k* – were determined by Malez (1979) as Mousterian. However, although Malez (1967: 28) considers the artifacts of layer *k* Mousterian, he designated the industry of the upper portion of that same layer as proto-Aurignacian or Mousterian. The later revision of artifacts did not justify the classification of two industries in layer *k* (Karavanić & Smith 1998). The finds from the lower portion of layer *k* can truly be described as Mousterian, while those from the upper portion are probably only pseudo-tools (for pseudo-tools see Bordes 1961). All of these implements have small dimensions, as in the so-called Micro-Mousterian. The small number of finds in the layers in Velika Pećina indicate a number of brief visits to the site.

One of the better known discoveries made in Velika Pećina is certainly the frontal bone (*os frontale*) found in layer *j*. Since this layer is directly beneath layer *i*, which was dated to 33,850 ± 520 years before present by radiocarbon dating (Vogel & Waterbolk 1972), the frontal bone is assumed to be over 33,000 years old. Malez (1963; 1965; 1967; 1980) classified this as a Neandertal bone, with which Mann and Trinkaus essentially agreed (1974). It is interesting that F. Smith (1976; 1982) basically considered it anatomically modern, and allowed for the genetic inheritance of earlier populations as a possible explanation of its "Neandertal features". Thus, in scientific debate, this material signified one of the earliest anatomically modern Europeans and played an important role in discussions on the position of Ne-

čenje toga lokaliteta ukazuje D. Hirc još krajem 19. stoječa (Hirc 1878), a manja iskopavanja počevši od 1928. godine vrši S. Vuković (Vuković 1935; 1949; 1950). Sustavna iskopavanja započinje pokojni akademik M. Malez, pod čijim je vodstvom između 1974. i 1986. iskopan veći dio paleontoloških i arheoloških nalaza, kao i sav ljudski skeletni materijal (Malez 1979; 1983; Malez *et al.* 1980; Wolpoff *et al.* 1981; Smith *et al.* 1985).

Slika 5. Unutrašnjost špilje Vindije (snimio: I. Karavanić).
Fig. 5. Interior of Vindija Cave (photograph by: I. Karavanić).

Stratigrafija Vindije sastoji se od više od 12 m sedimenta podijeljena u 13 osnovnih stratigrafskih jedinica (A–M), pri čemu su kompleksi F, G i K dodatno podijeljeni (F_g, F_s, $F_{d/s}$, F_d, $F_{d/d}$, G_1–G_3, K_1–K_3) (Malez & Rukavina 1979; Paunović *et al.* 2001; Ahern *et al.* 2004). Slojevi A–D pripadaju holocenu, dok su stariji slojevi E–M pleistocenski. Uz brojne faunalne nalaze nalazi špilje Vindije uključuju brojne rukotvorine srednjeg i gornjeg paleolitika te nalaze kultura kasnijih prapovijesnih i povijesnih razdoblja. Svjetski poznati nalazi neandertalaca nisu jedini ljudski skeletni ostaci otkriveni na tom lokalitetu. Analize nalaza anatomski modernih ljudi koji potječu iz sloja D još uvijek traju.

Općenito rečeno, arheološki nalazi s lokaliteta Vindija važni su za razumijevanje srednjega paleolitika Hrvatske, kao i pitanja vezanih uz način života kasnih neandertalaca te prijelaza srednjega u gornji paleolitik i dolaska prvih skupina anatomski modernih populacija na tlo Europe. Arheološka industrija starijih slojeva (posebice sloja K) predstavlja musterijen uz uporabu levaloaške metode izradbe i dominaciju lokalnoga sirovinskog materijala slabije kvalitete (kvarc) (Montet-White 1996; Kurtanjek & Marci 1990; Blaser *et al.* 2002). Budući da su u sloju G_3 uz musterijenske alatke prisutni i elementi gornjega paleolitika (npr. grebala), a vidljiva je i veća zastupljenost nešto kvalitetnijega sirovinskog materijala (rožnjak) (Karavanić & Smith 1998; Kurandertals within the lineage of anatomically modern humans. However, AMS radiocarbon dating of a sample taken from the bone itself caused something of a sensation – the result was 5,045±40 (uncalibrated) years before present (Smith *et al.* 1999), which means that this was a Holocene man, and not an earlier anatomically modern European. The upper layers of Velika Pećina contained Eneolithic pottery and many human bones, so the "famous" frontal bone obviously belonged to an Eneolithic man.

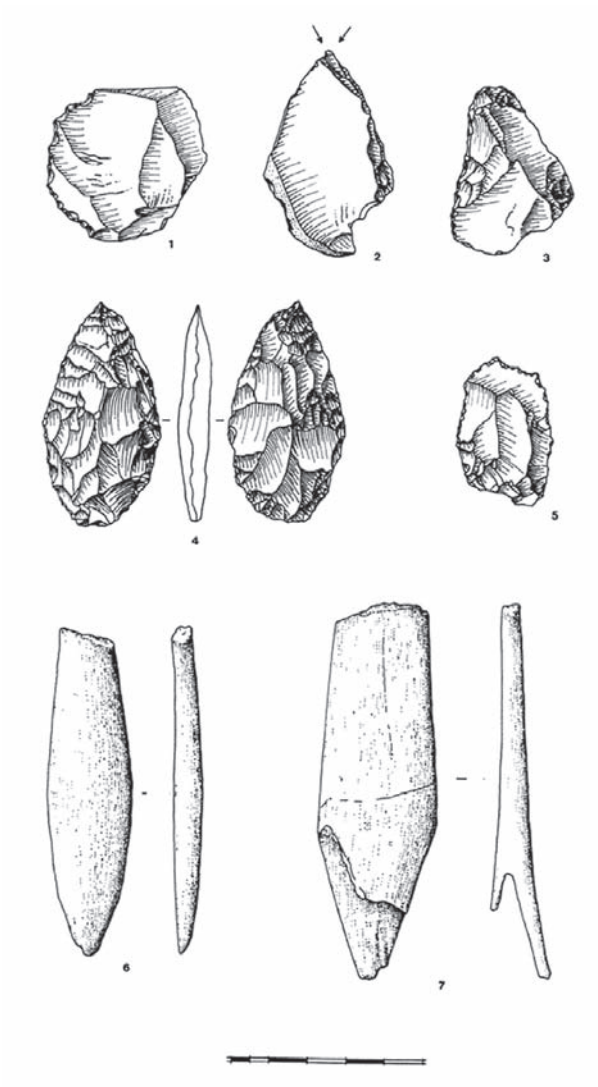
2.3 Vindija

Vindija Cave (Fig. 5) is located in the Hrvatsko Zagorje region, approximately 9 km from the village of Ivanec and roughly 20 km from downtown Varaždin. The cave is approximately 50 m deep, 28 m wide, and over 20 m high. D. Hirc indicated the potential importance of this site at the end of the nineteenth century (Hirc 1878), and minor excavations, beginning in 1928, were conducted by S. Vuković (Vuković 1935; 1949; 1950). Systematic excavations were launched by the late M. Malez, under whose leadership most of the paleontological and archeological items, as well as all human skeletal remains, were excavated between 1974 and 1986 (Malez 1979; 1983; Malez *et al.* 1980; Wolpoff *et al.* 1981; Smith *et al.* 1985).

The stratigraphy of Vindija consists of over 12 m of sediment divided into 13 basic stratigraphic units (A–M), wherein the F, G and K complex are additionally broken down (F_g, F_s, $F_{d/s}$, F_d, $F_{d/d}$, G_1–G_3, K_1–K_3) (Malez & Rukavina 1979; Paunović *et al.* 2001; Ahern *et al.* 2004). Layers A–D are Holocene, while the older layers E–M are Pleistocene. In addition to numerous faunal remains, Vindija Cave also produced numerous artifacts of the Middle and Upper Paleolithic, and cultural finds of later prehistoric and historical periods. The internationally known Neandertal remains are not the only hominin skeletal remains discovered at this site. Analysis of anatomically modern human remains from layer D is in progress.

Generally the archeological finds from the Vindija site are vital to the understanding of the Middle Paleolithic in Croatia, and to unraveling questions pertaining to the lifestyle of the later Neandertals and the transition from the Middle to Upper Paleolithic and the arrival of the first groups of anatomically modern populations in Europe. The archeological industry of the older layers (particularly layer K) is Mousterian, with use of the Levallois technique and domination of local raw materials of poorer quality (quartz) (Montet-White 1996; Kurtanjek & Marci 1990; Blaser *et al.* 2002). Since layer G_3 con-

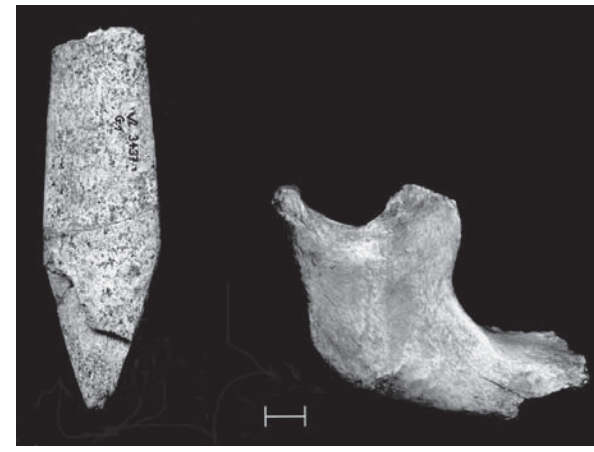
tanjek & Marci 1990; Blaser *et al.* 2002), kompleks G upućuje na složeniju sliku. Pri izradbi oruđa srednjeg i gornjeg dijela kompleksa G nije zamijećena uporaba levaloaške tehnike (Karavanić & Smith 1998). Selektivno biranje kvalitetnijega sirovinskog materijala još je vidljivije u sloju G_1, gdje je veći dio kamenih izrađevina izrađen od rožnjaka, dok oruđa na kvarcu, premda kvarc čini oko polovine sveukupna lomljevinskog materijala iz tog sloja, sasvim nestaju (Ahern *et al.* 2004; Kurtanjek & Marci 1990; Blaser *et al.* 2002).



Slika 6. Odabrani nalazi iz sloja G_1 špilje Vindije: 1. pseudoalatka, 2. ravno dvopovršinsko dubilo, 3. jednostavno ravno strugalo, 4. listoliki obostrano obrađen šiljak, 5. odbojak sa sitnom obradbom, 6. koštani šiljak s punom bazom, 7. koštani šiljak s rascijepljenom bazom. Mjerilo je u centimetrima (crtež: M. Perkić, modificirano prema Karavanić: 1995: sl. 3).

Fig. 6. Selected materials from layer G_1 of Vindija Cave: 1. pseudotool, 2. straight dihedral burin, 3. simple straight sidescraper, 4. leaf-shaped bifacial point, 5. finely-retouched flake, 6. massive base bone point, 7. split-base bone point. Scale in centimeters (drawing by Marta Perkić, modified after Karavanić: 1995: Fig. 3).

tains, besides Mousterian tools, elements of the Upper Paleolithic (e.g. endscrapers), and a greater presence of somewhat higher quality raw materials (chert) is notable (Karavanić & Smith 1998; Kurtanjek & Marci 1990; Blaser *et al.* 2002), complex G presents a more complicated picture. Use of the Levallois technique was not observed in the production of tools in the middle and upper portions of the G complex (Karavanić & Smith 1998). Discriminating selection of higher quality raw materials is still more visible in layer G_1, where a larger portion of the stone tools are made of chert, while quartz tools, even though quartz composes over half of the total debitage from this layer, completely disappear (Ahern *et al.* 2004; Kurtanjek & Marci 1990; Blaser *et al.* 2002). Besides Mousterian types, the stone industry of layer G_1 also contains elements of the Upper Paleolithic (Fig. 6), and Upper Paleolithic bone points also appear for the first time (Karavanić 1993; 1995; Karavanić & Smith 1998).



Slika 7. Koštani šiljak Vi-3437 i donja čeljust neandertalca Vi-207 (prema Janković et al. 2006: sl. 3).
Fig. 7. Bone point Vi-3437 and the Neandertal mandible Vi-207 (based on Janković et al. 2006: Fig. 3).

Due to the characteristic split-base point, as well as massive base points, the industry of Vindija layer G_1 was described as Aurignacian on a number of occasions (Malez 1979; Karavanić 1993; 1995). Among the stone tools, those with Mousterian features (sidescrapers, denticulates) predominate, so this interpretation has been refuted several times (Karavanić & Smith 1998; Miracle 1998). A very lovely leaf-shaped bifacial point was also found; these are otherwise typical of the Szeletian culture (Fig. 6, no. 4). However, since it is made a non-local material (red radiolarite), it is possible that it was imported, and it cannot be a reliable cultural indicator (Montet-White 1996). Perhaps in layer G_1, it is matter of a regional transitional industry (Olschewian), i.e. the initial industry of the Upper Paleolithic, which

Uz musterijenske tipove prisutni su u kamenoj industriji sloja G_1 i elementi gornjega paleolitika (sl. 6), a po prvi put javljaju se i gornjopaleolitički koštani šiljci (Karavanić 1993; 1995; Karavanić & Smith 1998).

Zbog karakteristična šiljka s rascijepljenom bazom i više njih s punom bazom industrija vindijskoga sloja G_1 više je puta pripisana orinjasijenu (Malez 1979; Karavanić 1993; 1995). No među kamenim alatkama prevladavaju one musterijenskih karakteristika (strugala, nazupci), pa je to tumačenje više puta opovrgnuto (Karavanić & Smith 1998; Miracle 1998). Pronađen je i jedan vrlo lijep obostrano obrađen listoliki šiljak, inače tipičan za seletijensku kulturu (sl. 6, br. 4). No budući da je načinjen na materijalu koji nije lokalni (crveni radiolarit), postoji mogućnost da je importiran, te stoga ne može biti pouzdan kulturni indikator (Montet-White 1996). Možda je u sloju G_1 riječ o regionalnoj prijelaznoj industriji (olševijenu), tj. početnoj industriji gornjega paleolitika, koja dolazi i u Velikoj pećini te na nekim nalazištima u Sloveniji – Mokriškoj jami i Divjim Babama I, dok je industrija Potočke zijalke orinjasijenska (v. Brodar & Brodar 1983). Također je moguće da je riječ o manifestaciji orinjasijena uvjetovanoj funkcionalnom specijalizacijom, kao što je primjerice lovna aktivnost, pri čemu tipične orinjasijenske kamene alatke nisu bile potrebne. Do blaga povećanja orinjasijenskih elemenata dolazi u kamenoj industriji donjih slojeva kompleksa F špilje Vindije, pa njima srednjoeuropski orinjasijen možemo pripisati s većom sigurnošću (Karavanić 1995; Kozłowski 1996; Montet-White 1996).

U sloju G_1 pronađena je uz koštani šiljak s rascijepljenom bazom (Vi-3437) donja čeljust neandertalca (Vi-207) (sl. 7). Ta asocijacija neandertalaca i industrije gornjega paleolitika bila je predmetom neslaganja stručnjaka (Karavanić & Smith 1998; 2000; D'Errico *et al.* 1998; Zilhão & D'Errico 1999; Strauss 1999). Krioturbacije i zastarjele tehnike iskopavanja bile su glavni prigovor prihvaćanju vindijskih neandertalaca kao tvorca te "modernije" industrije. Krioturbacije međutim nisu zamijećene u dijelu pećine gdje su mandibula i šiljak pronađeni, a vrlo karakterističan i prepoznatljiv crvenkast sediment sloja G_1 bio je uglavljen u koštani šiljak s rascijepljenom bazom (usmeno priopćenje J. Radovčića) i još je danas vidljiv na nalazima neandertalaca i na jednome koštanom šiljku s punom bazom iz istoga sloja. Valja još jednom istaknuti da iz sloja G_1 dolazi više neandertalskih skeletnih ostataka, kao i nalaza koštanih šiljaka s punom i rascijepljenom bazom, koji se tradicionalno vežu za orinjasijensku industriju gornjega paleolitika, pa se i njihova izradba obično pripisivala anatomski modernim populacijama, a ne

also came to Velika Pećina and some sites in Slovenia – Mokriška Jama and Divje Babe I, while the industry of Potočka Zijalka is Aurignacian (see Brodar & Brodar 1983). It is also possible that this is a manifestation of the Aurignacian conditioned by functional specialization, such as, for example, hunting, wherein typical Aurignacian stone tools were not needed. A slight increase in Aurignacian elements came in the stone industry of the lower layers of the F complex at Vindija, so they can be classified as Central European Aurignacian with greater certainty (Karavanić 1995; Kozłowski 1996; Montet-White 1996).

Besides a split-base bone point (Vi-3437), the mandible of a Neandertal (Vi-207) was also found in layer G_1 (Fig. 7). This association between Neandertals and the industry of the Upper Paleolithic has been the subject of disagreement among experts (Karavanić & Smith 1998; 2000; D'Errico *et al.* 1998; Zilhão & D'Errico 1999; Strauss 1999). Cryoturbation and obsolete excavation techniques were the principal objections to acceptance of the Vindija Neandertals as creators of "more modern" industry. However, cryoturbation was not noted in that part of the cave in which the mandible and point were found, and the very characteristic and recognizable reddish sediment of layer G_1 was embedded in the split-base bone point (oral communication from J. Radovčić) and is even today visible on the Neandertal remains and on a massive-base bone point from the same layer. It should once more be stressed that layer G_1 has resulted in more Neandertal skeletal remains, and split-base and massive-base bone points, which are traditionally tied to the Aurignacian industry of the Upper Paleolithic, so their production is usually associated with anatomically modern populations rather than Neandertals. In recent years, however, additional analyses have shown that the Aurignacian does not constitute a homogenous and geographically widely distributed industry (Allsworth-Jones 1986; Oliva 1993; Svoboda 2004; Karavanić & Smith 1998; Miracle 1998). Artifacts of Upper Paleolithic (Châtelperronian) industry were found together with Neandertal remains at two French sites (Arcy sur Cure and St. Cesaire) (Lévêque & Vandermeersch 1980; Hublin *et al.* 1996), while the source of several initial Upper Paleolithic industries in Europe (Szeletian, Uluzzian, etc.) is within the local Mousterian and does not constitute a foreign element (Harrold 1989; Allsworth-Jones 1986; Gioia 1988; Otte 1990; Kozłowski 1990; 2004; Anikovich 1992; Svoboda 1993; 2004; Clark 2002; Clark & Lindly 1989; Churchill & Smith 2000; Golovanova & Doronichev 2003; Janković *et al.* 2006). Furthermore, the typological approach, wherein split-base

neandertalcima. U posljednje vrijeme međutim više analiza upućuje na to da orinjasijen ne predstavlja homogenu i geografski široko rasprostranjenu industriju (Allsworth-Jones 1986; Oliva 1993; Svoboda 2004; Karavanić & Smith 1998; Miracle 1998). Nalazi gornjopaleolitičke industrije (šatelperonijen) pronađeni su uz nalaze neandertalaca na dvama francuskim lokalitetima (Arcy sur Cure i St. Cesaire) (Lévêque & Vandermeersch 1980; Hublin *et al.* 1996), dok je ishodište nekih inicijalnih gornjopaleolitičkih industrija u Europi (szeletijen, ulicijen itd.) unutar lokalnoga musterijena i ne predstavlja strani element (Harrold 1989; Allsworth-Jones 1986; Gioia 1988; Otte 1990; Kozłowski 1990; 2004; Anikovich 1992; Svoboda 1993; 2004; Clark 2002; Clark & Lindly 1989; Churchill & Smith 2000; Golovanova & Doronichev 2003; Janković *et al.* 2006). K tome tipološki pristup prema kojemu koštani šiljci s rascijepljenom bazom arheološku industriju određuju kao orinjasijen za prostor središnje Europe vrlo je upitan (v. Miracle 1998).

Vindijski ljudski skeletni nalazi iz kompleksa G nesumnjivo predstavljaju neandertalsku populaciju (Malez *et al.* 1980; Wolpoff *et al.* 1981; Smith 1982; 1984; Smith *et al.* 1985; Ahern & Smith 1993; Smith & Ahern 1994; Ahern *et al.* 2004), no usporedbe s vremenski starijim neandertalcima krapinskoga nalazišta otkrivaju zanimljive razlike tih dvaju uzoraka, pri čemu je na vindijskim nalazima vidljiva gracilnija morfologija koja je u određenim detaljima bliža anatomski modernim populacijama nego krapinskim neandertalcima. Ta gracilnost i "modernija" morfologija posebno je uočljiva na donjim čeljustima i u nadočnoj regiji vindijskih fosila (Smith & Ranyard 1980; Smith 1984; 1994; Ahern 1998; Ahern *et al.* 2002; 2004). Nadalje gracilnost i anatomske odlike vindijskog uzorka nisu rezultat dominacije žena i mlađih jedinki ni tjelesne građe uzorka (Trinkaus & Smith 1985; Ahern & Smith 1993; Smith 1994; Kesterke & Ahern 2007). Direktno datiranje neandertalskoga fosila iz sloja G_1 između 28 i 29 tisuća godina prije sadašnjosti (Smith *et al.* 1999) ukazalo je na mogućnost da vindijska populacija predstavlja posljednje poznate neandertalce iz vremena kad anatomski moderni došljaci već više tisuća godina obitavaju na europskom kontinentu. Nedavno je uporaba preciznije tehnike ultrafiltracije uzorka za vindijske nalaze iz sloja G_1 pokazala nešto drugačiji rezultat: oko 32–33 000 godina prije sadašnjosti (Higham *et al.* 2006). To međutim ne umanjuje njihovo značenje – ista se tehnika mora upotrijebiti i za dataciju drugih nalaza i nalazišta kasnoga srednjeg i ranoga gornjeg paleolitika prije no što bude moguće postaviti precizniju kronologiju tog zanimljivog razdoblja prapovijesti. Vindijski su neandertalci iz sloja G_1 zasad najmlađi neandertalci.

bone points lead to classification of the archeological industry as Aurignacian in Central Europe, is highly questionable (see Miracle 1998).

The Vindija hominin skeletal remains from complex G represent a Neandertal population (Malez *et al.* 1980; Wolpoff *et al.* 1981; Smith 1982; 1984; Smith *et al.* 1985; Ahern & Smith 1993; Smith & Ahern 1994; Ahern *et al.* 2004), but comparisons with the chronologically older Neandertals of the Krapina site reveal interesting differences between the two samples, in which the Vindija materials exhibit a visibly more gracile morphology which is, in certain details, closer to anatomically modern populations than the Krapina Neandertals. This gracility and "more modern" morphology are particularly notable on the mandibles and supraorbitals of the Vindija fossils (Smith & Ranyard 1980; Smith 1984; 1994; Ahern 1998; Ahern *et al.* 2002; 2004). Moreover, the gracility and anatomical features of the Vindija sample is not a result of predominance of women and younger individuals nor the body size in the sample (Trinkaus & Smith 1985; Ahern & Smith 1993; Smith 1994; Kesterke & Ahern 2007). Direct dating of the Neandertal fossils from layer G_1 to between twenty-eight and twenty-nine thousand years before present (Smith *et al.* 1999) indicates the possibility that the Vindija population constituted the last known Neandertals at a time when anatomically modern newcomers had been living on the European continent for over a thousand years. Recently the use of more precise ultrafiltration techniques for the Vindija remains from layer G_1 has shown something of a different result: approximately 32–33,000 years before present (Higham *et al.* 2006). This, however, does not diminish their significance as the same technique must also be used to date other materials and sites of the late Middle and early Upper Paleolithic before a more precise chronology of this interesting prehistoric period can be established. The Vindija Neandertals from layer G_1 are for now the youngest Neandertals in Central and Eastern Europe, and it was precisely the lower Danube Basin and Central Europe that were first settled by anatomically modern newcomers (e.g. Oase, Mladeč, Kostenki, etc., see the discussion in Janković *et al.* 2006 and the literature cited therein). If the typological approach and acceptance of the Aurignacian as a unified cultural complex are rejected, and if one takes into account the anatomical details visible on late Neandertal remains (such as Vindija) and certain characteristics that are Neandertal traits which appear on anatomically modern humans only after their arrival in Europe (e.g. the morphology of the mandibular foramen of Oase 1, features of the supraorbital and occipital region in the remains from

talci u središnjoj i istočnoj Europi, a upravo su donje Podunavlje i središnja Europa prvi europski prostori koje su naselili pripadnici anatomski modernih došljaka (npr. Oase, Mladeč, Kostenki itd. – v. raspravu u Janković *et al.* 2006 i ondje navedenu literaturu). Ako odbacimo tipološki pristup i prihvaćanje orinjasijena kao jedinstvena kulturnog kompleksa – a u obzir uzmemo anatomske detalje vidljive na nalazima kasnih neandertalaca (poput Vindije) te određene karakteristike koje su odlike neandertalaca, a na anatomski modernim ljudima javljaju se tek nakon njihova prvog dolaska na tlo Europe (npr. morfologija mandibularnoga foramena Oase 1, odlike nadočne i zatiljne regije nalaza Mladeč, Predmosti i sl.) – moguća su i drugačija objašnjenja od onih koja se u literaturi obično navode. Naime moguće je pretpostaviti razmjenu gena i kulturnih informacija između neandertalskih starosjedilaca i modernih došljaka (v. Smith *et al*. 2005).

Ne treba iz vida gubiti činjenicu da za većinu odlika koje su u visokoj frekvenciji prisutne u neandertalskih skupina ne vidimo oštar prekid, nego smanjivanje njihove zastupljenosti kroz vrijeme, od kasnih neandertalaca, preko ranih skupina anatomski modernih ljudi gornjega paleolitika, skupina mezolitičkih, neolitičkih i drugih kasnijih populacija. Uzevši u obzir rezultate novijih analiza određen genetički kontakt neandertalaca i anatomski modernijih ljudi predstavlja realnu mogućnost (v. Smith 1982; 1984; Frayer 1986; 1992; 1997; Frayer *et al.* 1993; Kidder *et al.* 1992; Smith *et al.* 1989; 2005; Wolpoff 1999; Trinkaus *et al.* 2003; 2003a; Churchill & Smith 2000 te raspravu i literaturu u Janković *et al.* 2006).

2.4 Veternica

Špilja Veternica smještena je na jugozapadnoj padini Medvednice, na zapadnome rubu grada Zagreba. Ulaz u špilju širok je oko 8 m, visok oko 4 m, a ulazna dvorana pruža se oko 15 m u dužinu i oko 7 m u širinu (Miracle & Brajković 1992). Iskopavanja Veternice započeo je M. Malez 1951. godine, a s prekidima su trajala sve do 1971. Tijekom istraživanja pronađeno je mnoštvo arheološkog i paleontološkog materijala koji je objavljen u više radova (Malez 1963; 1981; Miracle & Brajković 1992). P. T. Miracle i D. Brajković (1992) na temelju rezultata revizije ungulata i gornjopleistocenske stratigrafije pripisuju najstariji sloj (*j*) s paleontološkim i arheološkim nalazima razdoblju između podstadija izotopa kisika 5c do 5a. Litičke nalaze iz tog sloja Malez (1979: 269) je pripisao "primitivnom" musterijenu, dok je u mlađim (gornjim) slojevima prepoznao "tipični" i "razvijeni" musterijen. "Primitivni" aspekt vjerojatno je posljedica sirovinskih resursa (vulkanski tuf, bazalt, kvarcit), koji su najvjerojatnije prikupljani na savskim terasama i drugim nalazištima u blizini (Miracle & Brajković 1992). Musterijen Veternice zaslužuje temeljitu tehnološku i tipološku analizu koja bi omogućila usporedbu s drugim nalazištima.

Zanimljiv je kult špiljskog medvjeda u Veternici (Malez 1983). Nažalost, nije jasno

Mladeč, Predmosti, etc.), then different explanations than those commonly offered in the literature become plausible. Exchange of genes and cultural information between indigenous Neandertals and modern newcomers can even be assumed (v. Smith *et al*. 2005).

One should not lose sight of the fact that with reference to most features that are highly frequent in Neandertal groups there is no sharp break, but rather just a reduction of their frequency over time, from the later Neandertals, through the early groups of anatomically modern humans of the Upper Paleolithic, to groups of the Mesolithic, Neolithic and other, later populations. Given the results of the latest analyses, there was a real possibility of some genetic contact between Neandertals and anatomically more modern humans (see Smith 1982; 1984; Frayer 1986; 1992; 1997; Frayer *et al.* 1993; Kidder *et al.* 1992; Smith *et al.* 1989; 2005; Wolpoff 1999; Trinkaus *et al.* 2003; 2003a; Churchill & Smith 2000 and the discussion and works cited in Janković *et al.* 2006).

2.4 Veternica

Veternica Cave is situated on the southwestern slopes of Medvednica Mountain, on the western periphery of the city of Zagreb. The cave's entrance is roughly 8 m wide, 4 m high, and the entrance chamber is approximately 15 m long and 7 m wide (Miracle & Brajković 1992). Excavations at Veternica were launched by M. Malez in 1951, and continued, with some interruptions, until 1971. During this research, a multitude of archeological and paleontological material was found and subsequently published in a number of papers (Malez 1963; 1981; Miracle & Brajković 1992). Based on the results of a revision of ungulates and Upper Pleistocene stratigraphy, P. T. Miracle and D. Brajković (1992) attributed the oldest layer (*j*) with paleontological and archeological materials to the period between the sub-stages of oxygen isotopes 5c through 5a. The lithics from this layer were classified by Malez (1979: 269) as "primitive" Mousterian, while in the younger (upper) layers, he recognized the "typical" and "developed" Mousterian. The "primitive" aspect is probably due to the types of raw materials used (e.g. volcanic tuff, basalt, quartzite), which was probably gathered on the Sava terraces and at other sites near the cave (Miracle & Brajković 1992). The Mousterian industry of Veternica should undergo a thorough technological and typological analysis to facilitate comparisons with other sites.

The cave bear cult in Veternica is particularly interesting (Malez 1983). Unfortunately, it is unclear

jatno je uzrokovan vrstama korištena sirovinskog materijala (primjerice vulkanski tuf, bazalt, kvarcit), koji je najvjerojatnije prikupljan na savskim terasama i drugim nalazištima u okolici špilje (Miracle & Brajković 1992). Musterijensku industriju Veternice trebalo bi detaljno analizirati s tehnološkoga i tipološkog aspekta kako bi bila moguća usporedba s drugim nalazištima.

Posebno je zanimljivo pitanje kulta špiljskoga medvjeda u Veternici (Malez 1983). Nažalost nije jasno potječe li većina akumuliranih medvjeđih kostiju i lubanja iz srednjopaleolitičkih ili gornjopaleolitičkih slojeva. Nakupine kostiju u pojedinim dijelovima špilje, uključujući i dvije niše (Malez 1983: sl. 1), moguće je umjesto aktivnošću čovjeka objasniti prirodnim procesima, kao što je to slučaj na drugim europskim nalazištima (v. Chase 1987; Chase & Dibble 1987).

3. Nalazišta mediteranske Hrvatske

3.1 Prostor između Ljubačkog zaljeva i Posedarja

Na prostoru između Ljubačkog zaljeva i Posedarja Š. Batović (1965) prikupio je mnogobrojne nalaze musterijenske kulture. Oni se čuvaju u Arheološkome muzeju u Zadru i označeni su nazivom užega prostora odakle su prikupljeni (primjerice Radovin, Slivnica, Jovići). Dio nalaza južno od Ražanca vjerojatno je prikupio i M. Malez (1979) i oni se čuvaju u Zavodu za paleontologiju i geologiju kvartara HAZU (v. Hinić 2000). Na navedenome području poznat je čitav niz znanstveno vrijednih nalazišta koja su nažalost ponajviše pobuđivala interes privatnih sakupljača. Rekognosciranjima dijela Ravnih kotara koje je vodio J. Chapman (Chapman *et al.* 1996) utvrđena su 44 mjesta nalaza u dvama klasterima – Mataci-Stoići i Ljubački zaljev. Pet posto rukotvorina bilo je obrađeno i mogu biti pripisane srednjem paleolitiku. Premda na 80% rekognoscirana područja nalazi nisu pronađeni, Chapman *et al.* (1996: 61) zaključuju: "Large areas of the Dalmatian lowlands would have been at least potential settlement zones for migratory hunter-gatherers." D. Papagianni, N. Čondić i I. Karavanić proveli su sa zadarskim studentima kraće rekognosciranje 2002. godine, a odnedavna nalaze s tog područja analizira D. Vujević. Prisutni su uglavnom nalazi srednjega paleolitika, odnosno musterijenske kulture, a posebno su važna njuškolika grebala koja je D. Mustač (usmeno priopćenje) pronašao nedaleko od crkvice Sv. Petra, jer upućuju na postojanje nalazišta iz ranoga gornjeg paleolitika (orinjasijen), a ta su vrlo rijetka na istočnome jadranskom području.

as to whether most of the accumulated bear bones and skulls are from the Middle Paleolithic or Upper Paleolithic layers. The bone assemblages in individual parts of the cave, including two niches (Malez 1983: Fig. 1), can, instead of human activity, also be explained by natural processes, as is the case at other European sites (see Chase 1987; Chase & Dibble 1987).

3. Sites in Mediterranean Croatia

3.1 The area between Ljubački Bay and Posedarje

In the area between Ljubački Bay and Posedarje, Š. Batović (1965) collected numerous artifacts of Mousterian culture. These are kept in the Archeological Museum in Zagreb and are designated according to the actual site at which they were collected (e.g. Radovin, Slivnica, Jovići). A part of the materials found south of Ražanac were probably also collected by M. Malez (1979) and these are kept at the Institute of Quaternary Paleontology and Geology of the Croatian Academy of Arts and Science (CAAS) (see Hinić 2000). An entire series of scientifically valuable sites are known to exist in this area, although they unfortunately mostly aroused the interest of private collectors. During reconnaissance of a section of Ravni Kotari led by J. Chapman (Chapman *et al.* 1996), 44 sites were recognized in two clusters: Mataci-Stoići and Ljubački Bay. Five percent of the artifacts were analyzed and could be attributed to the Middle Paleolithic. Although materials were not found in 80% of the reconnaissance area, Chapman *et al.* (1996: 61) concluded: "Large areas of the Dalmatian lowlands would have been at least potential settlement zones for migratory hunter-gatherers." D. Papagianni, N. Čondić and I. Karavanić conducted a brief reconnaissance with students from Zadar in 2002, and recently D. Vujević began analyzing materials from this area. Generally Middle Paleolithic, i.e. Mousterian culture, materials are present, and nosed endscrapers which D. Mustač (oral communication) found not far from the small Church of St. Peter are particularly important, for they indicate the existence of sites from the early Upper Paleolithic (Aurignacian), and these are very rare in the Eastern Adriatic territory.

3.2 Veli Rat

A large number of flint artifacts and chips was collected near the lighthouse on the Veli Rat promontory on the northern part of the island of Dugi. Malez

3.2 Veli Rat

U blizini svjetionika na Velom ratu na sjevernome dijelu Dugog otoka prikupljen je velik broj kremenih rukotvorina i krhotina. Za taj lokalitet M. Malez koristi naziv Panjorovica, a Š. Batović (usmeno priopćenje) od lokalnoga stanovništva preuzima naziv Panđerovica. Litičke nalaze M. Malez (1979) pripisuje musterijenu i orinjasijenu, no analiza koju je na materijalu iz Zavoda za paleontologiju i geologiju kvartara HAZU provela M. Hinić (2000) nije pokazala zastupljenost orinjasijenskih tipova alatki, dok je zastupljenost krhotina i pseudoalatki vrlo velika, što ne čudi s obzirom na to da su nalazi prikupljeni s površine, gdje su izravno izloženi djelovanju atmosferilija i dolaze zajedno s prirodno raspucanim krhotinama rožnjaka. Nalazište stoga nedvojbeno treba pripisati srednjem paleolitiku, dok je atribucija u rani gornji paleolitik dvojbena.

3.3 Velika pećina u Kličevici

Velika pećina nalazi se u kanjonu potoka Kličevice kod Benkovca. Ulaz u pećinu smješten je na jugoistoku. Glavni kanal nakon 30-ak m skreće ulijevo te se nakon 10-ak m račva. Mali ulaz i dug ulazni hodnik čine pećinu prilično tamnom. Sama špilja već je duže vrijeme poznata. S. Božićević (1987) objavio je njezin tlocrt i uzdužni presjek. M. Savić (1984) navodi da je rekognosciranjima ustanovljeno pet paleolitičkih lokaliteta i donosi sliku Male pećine (nalazi se nedaleko od Velike), koju pogrešno potpisuje kao "Velika pećina – stanište paleolitskog čovjeka". Potonji autor, bivši kustos Zavičajnoga muzeja u Benkovcu, prikupio je više kamenih nalaza i komada rožnjaka iz Velike i Male pećine i okolnih mjesta koji se čuvaju u muzeju. Nekoliko artefakata koje je vjerojatno prikupio M. Malez, a nalaze se u Zavodu za paleontologiju i geologiju kvartara u Zagrebu, pokazuje da je riječ o vrlo zanimljivu i znanstveno vrijednu nalazištu.

I. Karavanić i N. Čondić (2006) s manjom ekipom prvi su put nalazište posjetili 2003. godine. Pritom je sa špiljskoga tla prikupljeno nekoliko artefakata koji su, poput spomenutih nalaza iz Zavoda za paleontologiju i geologiju kvartara HAZU, upućivali na musterijensku materijalnu kulturu. Probno iskopavanje provedeno je 2006. godine. Sonda je postavljena u glavnoj dvorani špilje 20-ak m od ulaza. Veličina sonde prvotno je bila 1 × 2 m, a proširena je sa sjeveroistočne strane da bi se došlo do zida špilje. Primijenjena je suvremena metoda iskopavanja paleolitičkih špiljskih nalazišta u kojoj se određuje trodimenzionalan položaj svakog nalaza veličine 2 cm

refers to this site as Panjorovica, while Batović (oral communication) assumed the name Panđerovica from the local population. Malez (1979) attributed the lithics to Mousterian and Aurignacian, but an analysis of the materials held in the CAAS Institute of Quaternary Paleontology and Geology conducted by M. Hinić (2000) did not show the presence of any Aurignacian tool types, while the presence of debitage and pseudo-tools is great, which is not surprising given that these materials were gathered on the surface, where they are directly exposed to weathering and are found together with naturally fragmented pieces of chert. The site must therefore be unambiguously ascribed to the Middle Paleolithic, while the attribution to the early Upper Paleolithic is dubious.

3.3 Velika Pećina in Kličevica

Velika Pećina is located in the canyon surrounding Kličevica Creek near the town of Benkovac. The cave's entrance is in the southeast. The main channel makes a leftward turn after about 30 meters and then forks after another dozen meters. The small entrance and the long entry corridor make the cave quite dark. The cave itself has been known for some time. S. Božićević (1987) published its layout and longitudinal cross-section. M. Savić (1984) noted that during reconnaissance, five Paleolithic sites were found and also published photographs of Mala Pećina (not far from Velika), which he mistakenly captioned as "Velika Pećina – of the Paleolithic man". Savić, the former curator of the Territorial Museum in Benkovac, collected a number of stone artifact and chert fragments from Velika and Mala Pećina and surrounding sites which are held in the museum. Several artifacts probably gathered by M. Malez and held in the Institute of Quaternary Paleontology and Geology in Zagreb, indicates that this is a very interesting and scientifically valuable site.

I. Karavanić and N. Čondić (2006) visited the site with a small team for the first time in 2003. At this occasion, several artifacts were collected from the cave floor which, like the aforementioned material held in the CAAS Institute of Quaternary Paleontology and Geology, indicated the Mousterian culture. A test excavation was conducted in 2006. The test pit was set up in the cave's main chamber approximately 20 meters from the entrance. The size of the test pit was initially 1 x 2 m, and it was expanded on the northeast side to reach the cave wall. A modern excavation method for Paleolithic cave sites was applied which determines the three-dimensional position of each item with a size of 2 cm or more, with

ili više, uz obavezno prosijavanje i ispiranje sveg sedimenta kroz dvostruko sito. Prikupljeno je i ucrtano 105 nalaza, među kojima prevladavaju kameni artefakti musterijenske kulture, dok su životinjske kosti i zubi rjeđe zastupljeni. Osim toga više je nalaza prilikom ispiranja sedimenta pronađeno u situ. Nalazište je vrlo perspektivno za daljnja istraživanja kojima će se nastojati dobiti detaljnija slika života i prilagodbe neandertalaca u Dalmaciji.

3.4 Mujina pećina

Mujina pećina nalazi se sjeverno od Kaštela, na približno 260 m nadmorske visine, nedaleko od ceste koja vodi prema Labinštini. Svijetla je, 20-ak m duga i 8 m široka, ima zaklonjenu desnu nišu i manji predšpiljski prostor, što ju čini ugodnom za život. S predšpiljskoga prostora pruža se pogled na Kaštelanski zaljev i okolni teritorij koji se može uspješno kontrolirati. M. Malez (1979) navodi da je još prilikom pregleda nalazišta 1977. godine skupljeno mnoštvo kamenih rukotvorina s obilježjima srednjega paleolitika, a kraći izvještaj o prvome probnom sondiranju 1978. objavio je N. Petrić (1979). Skupljeni materijal bio je dovoljan za odredbu kulture kao musterijenske, a osim jezgara, odbojaka i nepravilno izlomljenih komada (krhotina) pronađeno je i više komada oruđa. Ta istraživanja međutim nisu nastavljena. Godine 1995. započeta su sustavna istraživanja Mujine pećine, i to u suradnji Arheološkoga zavoda Filozofskoga fakulteta Sveučilišta u Zagrebu i Muzeja grada Kaštela (tada Zavičajnoga muzeja Kaštela), koja su trajala do 2003. godine (Karavanić & Bilich-Kamenjarin 1997; Karavanić 2000). Svih se godina istraživalo istom, vrlo preciznom metodom, koja zadovoljava zahtjevne standarde suvremene arheološke znanosti, a primjenjuje se pri istraživanju paleolitičkih nalazišta (sl. 8). Uzimane su tri dimenzije položaja svih nalaza veličine 2 cm ili više. Nalazi su i ucrtavani, a sav iskopani sediment prosijavan je kako bi se skupili i najsitniji nalazi. Vodeći se suvremenim zahtjevima struke, trećina sedimenta ostavljena je za buduća istraživanja.

Sjeverni stratigrafski profil Mujine pećine dubok je samo 1,5 m, dok je istočni profil na izlazu iz pećine oko metar deblji. Slojevi se sastoje od kamenoga kršja te pijeska, silta i rijetko gline. U najdonjim (najstarijim) slojevima zemlje je najviše. Razlike u sedimentu upućuju na klimatske promjene, a kronometrijsko datiranje (radiokarbonsko i *electron spin resonance*) pokazalo je da su gornji (B i C) i srednji slojevi (D1 i D2) nastali pred približno 40-ak tisuća godina, dok su donji slojevi (E1, E2 i u nekim dijelovima špilje E3) barem par tisuća godina stariji (Rink *et al.* 2002). U slojevima su pronađeni tragovi svih faza proizvodnje kamenog oruđa, tj. odbojci,

the mandatory straining and washing of the entire sediment through a double sieve. A total of 105 finds were collected and drawn, among which stone artifacts of the Mousterian culture dominate, while animal bones and teeth are less abundant. Besides these, during rinsing of the sediment a number of items were found in the sieve. The site is very promising for further research, wherein an attempt will be made to obtain a more detailed picture of life and adaptations of Neandertals in Dalmatia.

3.4 Mujina Pećina

Mujina Pećina is located north of Kaštela, at an elevation of approximately 260 m, not far from the road that leads to the Labin area. It is well-lit, about 20 m long and 8 m wide, with a sheltered right niche and a small plateau in front of the cave, which makes it pleasant to inhabit. A view of Kaštel Bay and the surrounding territory, which can be successfully controlled, extends from the plateau. M. Malez (1979) stated that during the visit to the site in 1977, many stone artifacts bearing Middle Paleolithic features were found, while a brief report on the first test excavation was published in 1978 by N. Petrić (1979). The collected material was sufficient to determine the culture as Mousterian, and besides cores, flakes and irregularly broken pieces (debitage), several tools were also found. This research was not, however, resumed. In 1995, systematic research of the Mujina Pećina commenced in cooperation with the Department of Archaeology of the Faculty of Humanities and Social Sciences in Zagreb and the Kaštela Town Museum (at the time the Kaštela City Museum), which lasted until 2003 (Karavanić & Bilich-Kamenjarin 1997; Karavanić 2000). Throughout these years, research was conducted in compliance with an uniform, very precise method, which meets the demanding standards of contemporary archeology, and it is also applied in research of Paleolithic sites (Fig. 8). Three dimensions of the positions of all items 2 cm or larger were taken. These were also sketched, and all excavated sediment was sieved so that even the tiniest material could be collected. In compliance with the contemporary professional requirements, approximately one third of the sediment was left behind for future research.

The northern stratigraphic profile of Mujina Pećina is only 1.5 m deep, while the eastern profile at the cave's exit is a meter thicker. The layers consist of stone debris and sand, silt and, rarely, clay. Clay is most abundant in the lowest (oldest) layers. The differences in the sediment indicate climatic changes, and chronometric dating (radiocarbon and electron

jezgre i gotovo oruđe. Za izradu se rabio lokalni sirovinski materijal (rožnjaci), koji se uglavnom mogao prikupiti u neposrednoj okolici špilje, premda više nalaza upućuje i na udaljenija mjesta s kojih su pojedini komadi mogli biti doneseni. Nalazi specifičnih odbojaka i jezgara pokazuju primjenu levaloaške metode (za preciznije rezultate tehnološke analize v. Karavanić 2004). Tipologija oruđa (odbojci s obradom, nazupci, udupci, strugala) potvrđuje prvotnu odredbu materijalne kulture kao musterijenske (sl. 9). Ta se kultura u Europi veže isključivo za neandertalca pa ju tim ljudima treba pripisati i u Mujinoj pećini, premda ostaci samih fosilnih ljudi tu nisu pronađeni (Janković & Karavanić 2007). Alatke su uglavnom malih dimenzija, poput onih u tzv. mikromustrijenu. Ta pojava može biti objašnjena uporabom malih oblutaka lokalnoga sirovinskog materijala, ali i uporabom lokalnih rožnjaka, koji imaju pukotine i stoga nisu pogodni za lomljenje većih odbojaka (Karavanić 2003a).

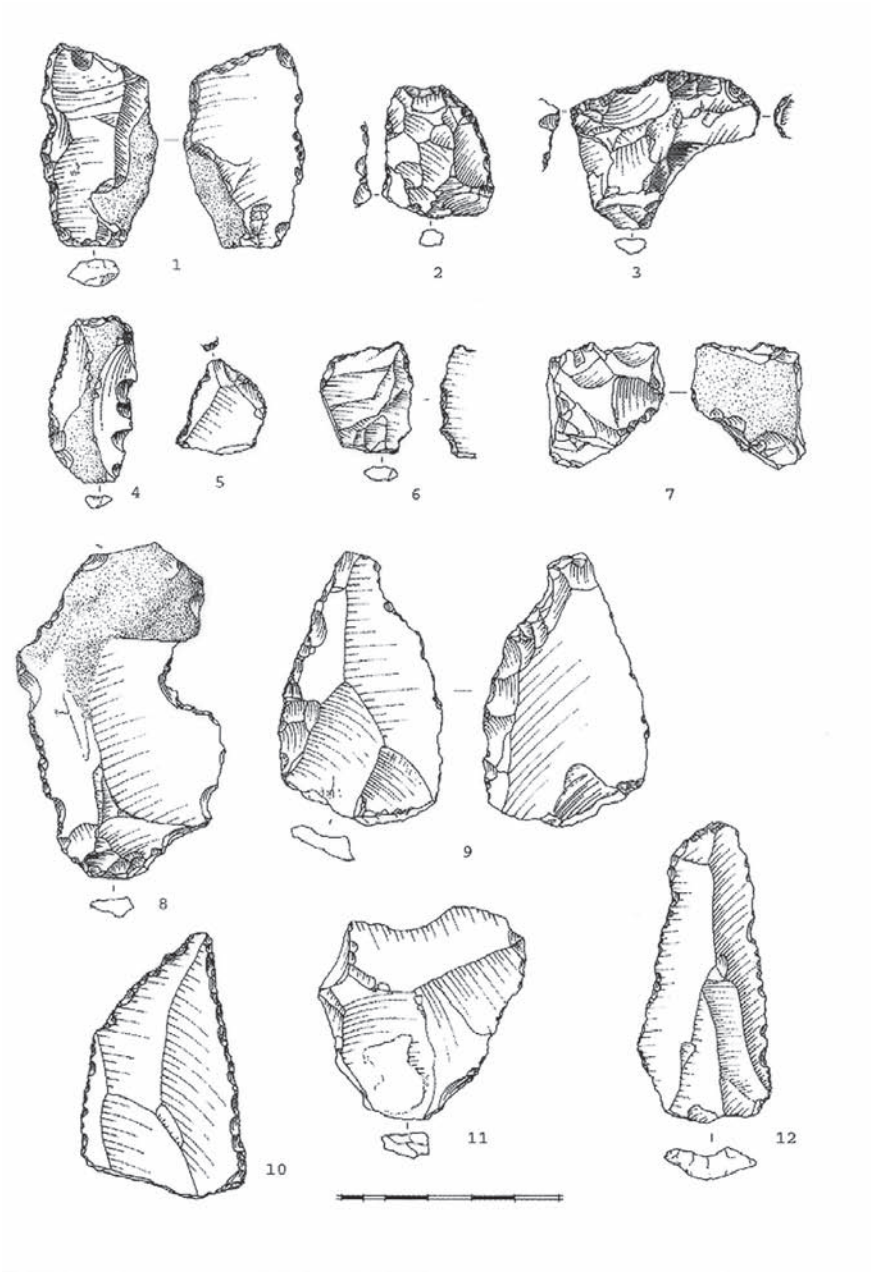
Slika 8. Iskopavanje Mujine pećine 2000. godine (snimio: S. Burić). Fig. 8. Excavation of Mujina Pećina in 2000 (photograph by: S. Burić)

Uz kamene rukotvorine u Mujinoj su pećini pronađeni i mnogobrojni faunistički ostaci. Preston T. Miracle (2005) utvrdio je nedvojbene tragove ljudske djelatnosti (oštećenja od razbijanja, urezi od rezanja, nagorenost) na kostima divokoze, kozoroga, jelena i velikih bovida – pragoveda i stepskog bizona. Činjenica da ostaci jelena, divokoze i kozoroga u Mujinoj pećini uglavnom potječu od odraslih jedinki te da pokazuju tragove komadanja trupla upućuje na važnu ulogu lova u životu neandertalaca iz Mujine pećine (Miracle 2005). S druge pak strane ostatke ekvida i zeca na lokalitet su vjerojatno donijele zvijeri, a ne ljudi. Iz oštećenja na kostima vidljivo je da su zvijeri dolazile u špilju nakon što bi je ljudi napuštali, kako bi se okoristile ostacima hrane i otpacima koji su poslije čovjeka ostali.

Špilja je bila i medvjeđi brlog, a pronađeni su i vučji ostaci, no te opasne životinje ondje nisu bile lovljene. Na temelju mliječnih zuba te fetalnih i/ili neonatalnih životinjskih kostiju Miracle (2005) je također

spin resonance) has shown that the upper (B and C) and middle layers (D1 and D2) were formed approximately 40,000 years ago, while the lower layers (E1, E2 and in some parts of the cave, E3) are a few thousands years older at a minimum (Rink *et al*. 2002). Traces of all phases of stone tool production were found, i.e. flakes, cores and finished tools. Local raw material (chert) was used for production; it could generally be collected in the cave's immediate vicinity, although a number of finds also indicate more distant sites whence individual pieces may have been brought. Specific flakes and cores indicate the application of the Levallois technique (for more precise results of the technological analysis, see Karavanić 2004). The typology of the tools (retouched flakes, denticulates, notches, sidescrapers) confirms the first determination of the culture as Mousterian (Fig. 9). In Europe, this culture is exclusively associated with the Neandertals, so the materials from Mujina Pećina must also be ascribed to this population, although the human fossil remains were not found here (Janković & Karavanić 2007). The tools are generally small in size, similar to those of the so-called Micro-Mousterian. This phenomenon can be explained by the use of small pebbles of local origin, as well as the use of local chert, which have fractures and therefore are not suitable for the knapping of larger flakes (Karavanić 2003a).

Besides stone tools, many faunal remains were also found at Mujina Pećina. Preston T. Miracle (2005) ascertained indisputable traces of human activity (fracture damage, cut-marks, charring) on the bones of chamois, ibex, deer and large bovids such as aurochs and steppe bison. The fact that the deer, chamois and ibex remains in Mujina Pećina generally come from adult animals and that they bear the traces of cutting of carcasses indicate the importance of hunting in the lives of the Neandertals from Mujina Pećina (Miracle 2005). On the other hand, the remains of equids and hares were probably brought to the site by carnivores and not people. The damage on the bones indicates that the carnivores probably came to the cave after people left it, to take advantage of the remains of food and refuse left behind. The cave was also a bear's den, and the remains of wolves were also found, but these dangerous animals were not hunted here. Based on milk teeth and fetal and/or neonatal animal bones, Miracle (2005) concluded that during the formation of layer B, people came to Mujina Pećina during autumn, and probably also during spring. They probably came here in spring-time in the period of layer D1. People probably did not stay in the cave during the summer, or in the winter, when it was inhabited by bears. Perhaps their summer or winter habitat



Slika 9. Odabrane alatke iz Mujine pećine – sloj B: 1. nazubak, 2. jednostavno izbočeno strugalo, 3. poprečno izbočeno strugalo, 4. udubak, 5. izmjenično dubasti šiljak, 6. svrdlo, 7. jezgra za odbojke; sloj D1: 8. nazubak, 9. izmjenično strugalo, 10. musterijenski šiljak, 11. levaloaški odbojak, 12. levaloaško sječivo. Mjerilo je u centimetrima (crtež: M. Perkić, modificirano prema Rink et al.: 2002, sl. 4).

Fig.9. Selected tools from Mujina Pećina – layer B: 1. denticulate, 2. simple convex sidescraper, 3. transverse convex sidescraper, 4. notch, 5. alternating bec, 6. drill, 7. flake core; layer D1: 8. denticulate, 9. alternate sidescraper, 10. Mousterian point, 11. Levallois point, 12. Levallois blade. Scale in centimeters (drawing by Marta Perkić, modified according to Rink et al.: 2002, Fig. 4).

utvrdio da su u razdoblju nastajanja sloja B ljudi u Mujinu pećinu dolazili tijekom jeseni, a možda bi ju posjetili i u proljeće. Tijekom proljeća možda su tu došli u razdoblju sloja D1. Ljudi u špilji nisu boravili tijekom ljeta, ni zimi, kad su u njoj bili medvjedi.

was close to the sea-coast of the time, and was thus covered by rising sea levels or destroyed by tidal action.

A particularly interesting discovery entails two charred areas in layer D2, which were probably fire sites (Karavanić 2000; 2003). They were not specifically bordered; rather the fire was tended at the habitat level. A large piece of a deer antler and several discarded stone artifacts and bones were found around the fire site in the right niche. Thanks to an analysis of charcoal conducted by M. Culiberg, it was ascertained that the prehistoric people of Mujina Pećina used juniper (*Juniperus* sp.) as fuel wood for their fires. It was probably gathered in the nearby area and dried prior to burning. A large concentration of lithics were found in the same layer (D2) in the right niche, which is not surprising, since this is a sheltered section, making it the most pleasant place to be when temperatures were low and strong winds were blowing. If the frequency of materials is considered by layer, most were found in the lowest, i.e. oldest (E3, E2 and E1), leading to the conclusion that the cave was inhabited on a more long-term basis at that time, rather than in, say, the period of formation of layers D1 and D2, which probably only testifies to brief hunting episodes. However, this need not be true, for it was established that large concentrations of materials in layers can also be due to consecutive brief stays in the cave, or even during short periods if activities were particularly intense (Conard 1996).

3.5 Šandalja II

The Upper Paleolithic site of Šandalja II is located in a quarry next to the city of Pula. It has been excavated 22 times from 1962 to 1989 under the leadership of M. Malez (Miracle 1995). The basic stratigraphy

Možda im je ljetno ili zimsko stanište bilo blizu tadašnje obale, pa je prekriveno izdizanjem morske razine ili uništeno valovima.

Posebno zanimljiva otkrića jesu dva područja gorenja u sloju D2, koja najvjerojatnije predstavljaju vatrišta (Karavanić 2000; 2003). Ona nisu posebno omeđena, nego je vatra zapaljena na stanišnoj razini. Oko vatrišta koje je bilo u desnoj niši pronađen je veći komad jelenjega roga te nekoliko porazbacanih kamenih rukotvorina i kosti. Zahvaljujući analizi ugljena koju je provela M. Culiberg doznali smo da su praljudi iz Mujine pećine kao loživo za vatru upotrebljavali borovicu (*Juniperus* sp.) koju su vjerojatno skupili u okolici te prije paljenja sušili. U istome je sloju (D2) u desnoj niši primijećena povećana koncentracija litičkih nalaza, što nije čudno s obzirom na to da je riječ o zaklonjenu dijelu, koji je pri niskim temperaturama i oštrim vjetrovima možda bio i najugodnije mjesto za boravak. Ako promatramo učestalost nalaza po slojevima, najviše ih je u najdonjim, tj. najstarijim (E3, E2 i E1), pa se nameće misao da je špilja dugotrajnije bila nastavana tada nego, recimo, u razdoblju nastajanja slojeva D1 i D2, koji vjerojatno svjedoče samo o kraćim lovnim epizodama. No to ne mora biti točno jer je ustanovljeno da velike koncentracije nalaza u slojevima mogu nastati i kao posljedica uzastopnih kratkih boravaka u špilji ili pak tijekom kratka perioda ako je djelatnost bila izrazito intenzivna (Conard 1996).

3.5 ŠANDALJA II

Gornjopaleolitičko nalazište Šandalja II nalazi se u kamenolomu kraj Pule. Iskopavano je 22 puta od 1962. do 1989. godine pod vodstvom M. Maleza (Miracle 1995). Osnovna stratigrafija sadrži 8 naslaga (A–H) ukupne debljine više od 8 m (Malez 1963; 1964; 1979; Malez & Vogel 1969) iz kojih je prikupljeno više od 15 tisuća litičkih nalaza iz gornjega paleolitika, koštane izrađevine, mnogobrojni ostaci faune te ostaci čovjeka iz kasnog epigravetijena (Malez 1972; 1987). Uz faunističke nalaze i litički materijal u holocenskome sloju A pronađeni su i ulomci brončanodobne keramike. Naslage je od A do H moguće na profilu makroskopski razlikovati i njihove su stratigrafske sekvence gotovo konstantne kroz cijelo nalazište. Fizička obilježja sedimenta na cijelu su nalazištu vrlo slična, a u raznim dijelovima špilje dolazi do jasne razlike u relativnim debljinama naslaga. Znatne promjene debljine pojedinoga sloja uočljive su i pri vodoravnim udaljenostima od samo nekoliko metara (Miracle 1995).

Treba napomenuti da se u literaturi spominje sloj *i*, koji je stariji od sloja H, a ne nalazi se ni na jednome crtežu stratigrafskoga profila, vjerojatno zato što se

contains 8 layers (A–H) with a total thickness of over 8 m (Malez 1963; 1964; 1979; Malez & Vogel 1969), from which over fifteen thousand lithics from the Upper Paleolithic, bone artifacts, numerous faunal and human remains from the late Epigravettian (Malez 1972; 1987) were extracted. Beside faunal remains and lithics, fragments of Bronze Age pottery were also found in Holocene layer A. The sediments from layers A to H can be macroscopically distinguished along the profile and their stratigraphic sequences are almost constant throughout the entire site. The physical features of the sediments in the entire site are very similar, and at various parts of the cave there are clear differences in the relative thicknesses of the layers. Considerable changes in the thickness of individual layers are also visible at horizontal distances of only several meters (Miracle 1995).

It should be noted that layer *i*, that is older than the layer H, is also mentioned in the literature, but it is not found on any drawings of the stratigraphic profile, probably because it was reached at the very end of excavations, when a number of works on Šandalja's stratigraphy had already been completed (Malez 1990). Therefore no reference to layer *i* and the younger layers D, C, B and A, which do not contain any Aurignacian industry will be made in this article.

Based on the results of radiocarbon dating, layers G, F and E were formed between 28,000 and 23,000 years before present, while the results obtained for layer H do not chronologically fit into the dated stratigraphic sequence (see Srdoč *et al.* 1979; Djindjian *et al.* 1999).

The exceptionally meager lithics of layer *i* consist of eight flakes (one original flake and two secondary) and four tools. The tools are few in number and atypical, therefore a cultural determination is not possible. Since there are no elements that could indicate the presence of the Middle Paleolithic, they are probably the result of a brief stay during the early Upper Paleolithic. The culture of the remaining, oldest layers of Šandalja (H, G/H), based on only rare finds of lithic industry, cannot be reliably determined either, but they can generally be placed in the early Upper Paleolithic, during the era of Aurignacian industry. There are no examples of what, according to Malez (1987: 17), could indicate "the presence of the final phase of the Mousterian".

Among the lithics of layer G, three keeled endscrapers are particularly important, and based on them and the chronostratigraphic position, the industry of this layer can probably be attributed to the Aurignacian. However, there are no indicators for a more precise determination as the initial phase of the Aurignacian or the close of the Mousterian, as done by

do njega došlo na samu kraju iskopavanja, kada je već više radova sa stratigrafijom Šandalje bilo objavljeno (Malez 1990). Stoga se na sloj *i* te na mlađe naslage – D, C, B i A, koje ne sadrže orinjasijensku industriju – u ovome članku nećemo osvrtati.

Prema rezultatima radiokarbonskoga datiranja slojevi G, F i E nataloženi su približno između 28 000 i 23 000 godina prije sadašnjosti, dok se rezultat dobiven za sloj H kronološki ne uklapa u datiranu stratigrafsku sekvencu (v. Srdoč *et al.* 1979; Djindjian *et al.* 1999).

Izrazito malobrojan litički materijal sloja *i* sastoji se od 8 odbojaka (jedan prvotni odbojak, dva drugotna) i 4 alatke. Alatke su malobrojne i nisu tipične, pa kulturna determinacija nije moguća. Budući da nema elemenata koji bi mogli upućivati na prisutnost srednjega paleolitika, vjerojatno se radi o jednome kratkotrajnu boravku tijekom ranoga gornjeg paleolitika. Ostale najstarije naslage Šandalje (H, G/H) samo na osnovi oskudnih primjeraka litičke industrije također nije moguće pouzdano kulturno odrediti, ali okvirno se mogu smjestiti u rani gornji paleolitik, odnosno u vrijeme orinjasijenske industrije. Primjeraka koji bi po M. Malezu (1987: 17) upućivali "na prisustvo završne faze musterijena" nema.

U litičkome materijalu sloja G tipološki su važna 3 kobiličasta grebala te po njima i kronostratigrafskoj poziciji možemo reći da industrija sloja vjerojatno pripada orinjasijenu. Međutim nema pokazatelja za precizniju odredbu u početnu fazu orinjasijena ili u završetak musterijena, kao što su to učinili M. Malez (1987: 17) i Đ. Basler (1983: 49). U kasnijim slojevima F i E te prijelazu E/F također dolaze tipična orinjasijenska oruđa, kao što su njuškolika i kobiličasta grebala. Za Maleza (1987: 17) tipološke značajke alatki iz sloja F upućuju na stariji orinjasijen, dok industriju sloja E određuje kao mlađi orinjasijen. S obzirom na relativno malen broj alatki u sloju E, i nešto veći u sloju F, ne može se utemeljeno govoriti o nekim vidnim razlikama između industrija tih dvaju slojeva, već ih jednostavno valja pripisati orinjasijenu (Karavanić 2003a). Prisutna je izrada odbojaka, sječiva i pločica. Odbojci prevladavaju, premda odnos pločica i sječiva varira od sloja do sloja. Uočljiva je prisutnost širokih odbojaka, tj. odbojaka kod kojih je širina veća od dužine. Njih primjerice u sloju F među odbojcima ima više od 20%. Sječiva su izrađivana tehnikom izravna odbijanja mekanim čekićem (tu su opservaciju na uzorku materijala iz sloja F potvrdili J. Pelegrin i F. Blaser). Pločice su izrađivane istom tehnikom. Vrlo je malen postotak lomljevine prerađene u alatke, što može upućivati na odnošenje samih alatki s nalazišta ili pak na njihovu proizvodnju na drugome mjestu. Njuškolika i kobilična grebala česta su, ali nema orinjasijenskih sječiva (sl. 10). Nema pločica Duffor, ali nije jasno treba li njihov M. Malez (1987: 17) and Đ. Basler (1983: 49). Typical Aurignacian implement, such as nosed and keeled endscrapers, also appeared in the later layers F and E and the E/F transition. For Malez (1987: 17), the typological features of tools from layer F indicated the older Aurignacian, while he attributed the industry of layer E to the younger Aurignacian. Given the relatively small number of tools in layer E, and the somewhat larger number in layer F, there are no grounds for drawing visible differences between the industries of these two layers, rather they should simply be attributed to the Aurignacian (Karavanić 2003a). The presence of flakes, blades and bladelets has also been ascertained. Flakes predominate, although the relationship between bladelets and choppers varies from layer to layer. The presence of wide flakes has been noted, i.e. flakes that are wider than they are long. For example, in layer F they account for 20% of the flakes. Blades were made by direct knapping by soft hammer technique (this observation was confirmed by J. Pelegrin and F. Blaser based on a sample of the materials). Bladelets were made using the same technique. A very small percentage of the debitage were retouched into tools, which may indicate the removal of the tools themselves from the site or their production at another location. Nosed and keeled endscrapers are frequent, but there are no Aurignacian blades (Fig. 10). There are no Dufour bladelets, but it is unclear as to whether their absence should be interpreted as a lack of production or to methodological flaws in excavation, i.e. failure to sieve the sediment. The Epigravettian layers were excavated by the same method, and numerous tiny materials were collected therein (e.g. ridged bladelets), so it is therefore likely that the Dufour bladelets in the Aurignacian layers would have been noticed and collected had they been present in a higher percentage.

Among the bone tools, the most frequent are awls, and one split-base point from layer H which, due to its shape and dimensions, contrasts from the customary Aurignacian split-base points, and similar to those which appear in the Franco-Cantabrian Magdalenian (oral communication from L. Strauss). It is therefore possible that the original came from later layers, although in Šandalja II there is no Magdalenian, rather only the Epigravettian is present. Four pierced animal teeth from the Aurignacian layers are decorative elements (probably jewelry) and they indicate symbolism.

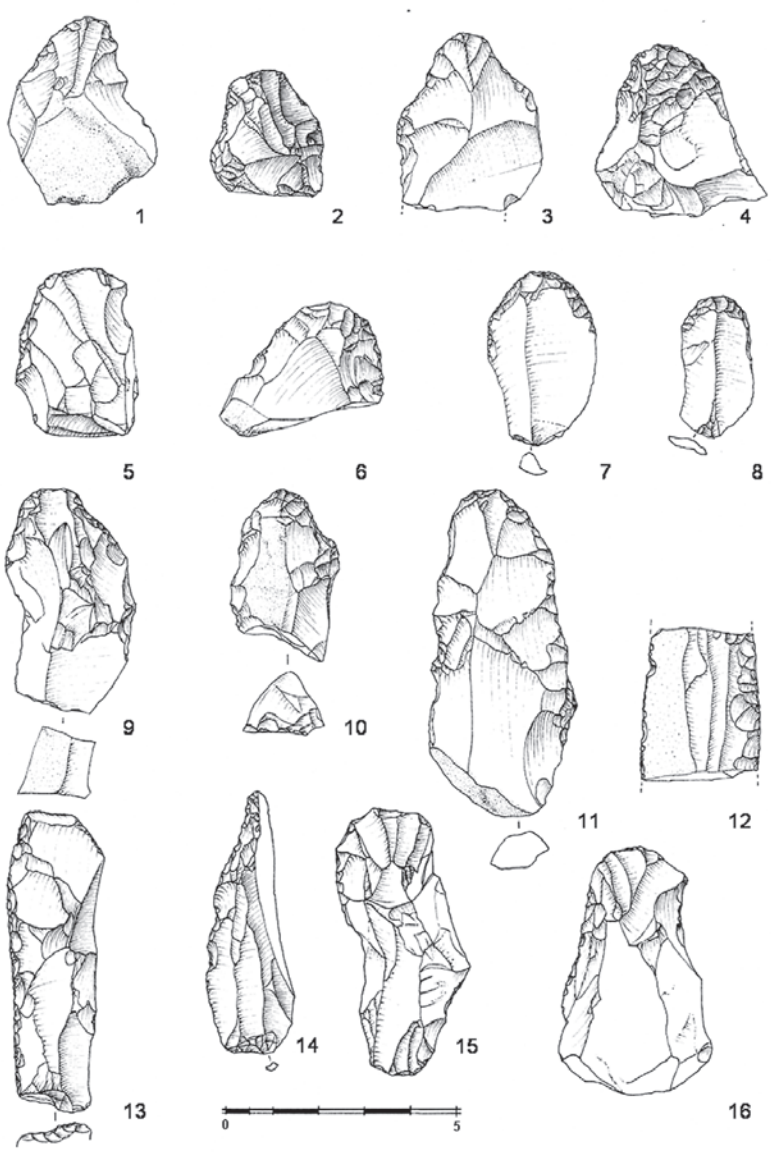
3.6 Bukovac Pećina

The Bukovac Pećina is located in Croatia's Gorski Kotar region, southeast of the town of Lokve on the

izostanak tumačiti nepostojanjem njihove izradbe ili metodološkim manjkavostima iskopavanja, tj. neprosijavanjem sedimenta. Epigravetijenski slojevi iskopavani su istom metodom te su u njima prikupljeni mnogobrojni sitni nalazi (primjerice pločice s hrptom), pa je vjerojatno da bi i duforske pločice u orinjasijenskim slojevima bile zamijećene i prikupljene da su bile prisutne u većem postotku.

Od koštanih alatki najčešći su probojci, a jedan šiljak s rascijepljenom bazom iz sloja H po svom obliku i dimenzijama odudara od uobičajenih orinjasijenskih šiljaka s rascijepljenom bazom, a sličan je onima kakvi se pojavljuju u franko-kantabrijskome magdalenijenu (usmeno priopćenje L. Straussa). Stoga je možda moguće da izvorno potječe iz kasnijih slojeva, premda u Šandalji II nema magdalenijena, nego je prisutan epigravetijen. Četiri probušena životinjska zuba iz orinjasijenskih slojeva pripadaju dekorativnim elementima (vjerojatno nakit) i upućuju na simboliku.

northwestern slopes of Sleme Hill (Malez 1979). Although the local environment is not Mediterranean, Bukovac Pećina is placed in the section with Mediterranean sites because it is in the border zone between the Mediterranean and continental zones of Croatia, closer to Adriatic than continental sites. The cave was first test excavated by T. Kormos (1912) and L. Szilágy (Malez 1979). The frontal section of the test pit generated no results, while the test pit deeper inside the cave resulted in faunal remains and a lovely example of a bone point. This point was the basis for differing attributions of the material culture (v. Malez 1979), and today the overriding view is that it was Aurignacian or Olschewian (Malez 1979; Montet-White 1996; Horusitzky 2004). Although Malez (1979) studied the site, renewed research is sorely needed. Based on the bone point, one can assume that this is truly one of those rare sites with traces of the early Upper Paleolithic in Croatia, and it is possible that a bone "flute" (i.e. a Paleolithic musical instrument) comes from the same site (Horusitzky 2004).



Slika 10. Odabrane alatke iz orinjasijenskih slojeva Šandalje II – sloj F: 1–4, 9, 10. njuškolika grebala, 5. kobiličasto grebalo, 6. grebalo na odbojku, 7–8. jednostavna grebala; sloj E: 11, 15, 16. kobilična grebala, 12. komadić (sječivo) s obradbom na dvama rubovima, 13. komadić (sječivo) s obradbom na jednome rubu i zarupkom, 14. svrdlenica. Mjerilo je u centimetrima (crtež: M. Bezić, prema Karavanić 2003a: sl. 6).

Fig. 10. Selected tools from the Aurignacian layers of Šandalja II – layer F: 1–4, 9, 10. nosed endscraper, 5. atypical keeled endscraper, 6. endscraper on flake, 7–8. simple endscrapers; layer E: 11, 15, 16. keeled endscraper, 12. piece (blade) with retouch at both ends, 13. piece (blade) with retouch at one end and truncated butt, 14. atypical perforator. Scale in centimeters (drawing by M. Bezić, after Karavanić 2003a: Fig. 6).

3.6 Bukovac pećina

Bukovac pećina nalazi u Gorskom kotaru, jugoistočno od Lokava na sjeverozapadnoj padini brda Sleme (Malez 1979). Iako okoliš ondje nije mediteranski, Bukovac pećinu navodimo u poglavlju s mediteranskim nalazištima jer se nalazi u graničnoj zoni između mediteranskog i kontinentalnog dijela Hrvatske, bliže jadranskim nego kontinentalnim nalazištima. Prvi su špilju sondirali T. Kormos (1912) i L. Szilágy (Malez 1979). Sonda u prednjem dijelu nije dala rezultate, dok je sonda u dubini pećine uz faunističke nalaze dala i lijep primjerak koštanoga šiljka. Na osnovi tog šiljka materijalna je kultura različito determinirana (v. Malez 1979), a danas prevladava mišljenje da je riječ o orinjasijenu ili olševijenu (Malez 1979; Montet-White 1996; Horusitzky 2004). Premda je M. Malez (1979) istraživao lokalitet, ponovljena istraživanja bila bi prijeko potrebna. Na temelju koštanoga šiljka možemo pretpostaviti da se uistinu radi o jednom od rijetkih lokaliteta s tragovima ranoga gornjeg paleolitika u Hrvatskoj, a moguće je da s istog nalazišta potječe i koštana "frula", odnosno paleolitička svirala (Horusitzky 2004).

4. Kratka usporedba nalazišta kontinentalne (sjeverozapadne) i mediteranske Hrvatske

Neandertalci iz Mujine pećine živjeli su 90-ak tisuća godina nakon krapinskih, a možda usporedno s jednom skupinom istih ljudi iz Vindije (sloj G3). Premda su prebivali u drukčijem okolišu, na obama su područjima (Hrvatsko zagorje i Dalmacija) ti ljudi proizvodnju svojih alatki uspješno prilagodili različitim vrstama najlakše dostupnih sirovinskih materijala. Neandertalci iz Krapine bili su uspješni lovci na nosoroge i druge životinje (Patou-Mathis 1997; Miracle 1999), neandertalci iz Mujine pećine hranili su se stepskim bizonima, pragovedima, jelenima, divokozama i kozorozima (Miracle 2005), a analiza stabilnih izotopa vindijskih neandertalaca (sloj G_1) pokazala je da je gotovo isključiv izvor njihove prehrane bilo meso (Richards *et al.* 2000). Sve to govori o razvijenoj lovnoj aktivnosti, visoku stupnju inteligencije, društvenih odnosa i prilagodbene spretnosti neandertalaca, kojih ponašanje nije strogo ovisilo o uvjetima koje je pred njih postavljao okoliš (v. Patou-Mathis 2000).

Dok arheološki nalazi s područja sjeverozapadne Hrvatske (špilja Vindija) upućuju na prijelaz srednjega u gornji paleolitik, povezanost neandertalaca s inicijalnim gornjim paleolitikom i možda moguće susrete neandertalaca i ranih modernih ljudi, situacija na istočnoj jadranskoj obali i njezinu zaleđu posve je

4. A brief comparison of sites in continental (Northwestern) and Mediterranean Croatia

The Neandertals from Mujina Pećina lived approximately 90,000 years after the Krapina Neandertals, and were perhaps contemporaneous to a group of Neandertals from Vindija (layer G3). Although they lived in a different environment, in both regions (Hrvatsko Zagorje and Dalmatia), these people managed to adapt the production of their tools to the various types of most easily acquired raw materials. The Neandertals from Krapina successfully hunted rhinoceros and other game (Patou-Mathis 1997; Miracle 1999), the Neandertals from Mujina Pećina fed on steppe bison, aurochs, deer, chamois and ibex (Miracle 2005), and the analysis of the stable isotopes of the Vindija Neandertals (layer G_1) indicated that their diet consisted almost exclusively of meat (Richards *et al.* 2000). All of this points to the prolific hunting activities, high degree of intelligence, social relations and adaptive ability of the Neandertals, whose behavior was not dependent on the conditions placed before them by the environment (see Patou-Mathis 2000).

While the archeological finds from the Northwestern Croatia (Vindija Cave) indicate the transition from the Middle to the Upper Paleolithic and to a tie between Neandertals and the initial Upper Paleolithic and perhaps even encounters between Neandertals and early modern people, the situation on the Eastern Adriatic coast and its hinterland is entirely different. There is a chronological gap greater than 10,000 years between the late Mousterian of Mujina Pećina and the Aurignacian of Šandalja II, with a visible difference in production methods and tool typology. For example, in Šandalja II, blades were produced using the soft hammer technique, while at the Mujina Pećina site such artifacts are very rare and produced using the Levallois technique, which implies use of hard hammer. Moreover, throughout the entire Eastern Adriatic coast and its hinterland, there are no sites with confirmed Middle and early Upper Paleolithic layers, and the sites from the early Upper Paleolithic are very few (Karavanić 2003a).

It is unclear as to why Šandalja II is one of the rare sites with Aurignacian industry in the entire Eastern Adriatic region. The reasons may lie in the relatively meager research conducted in this region. More recent, truly intense research in Istria (Miracle 1997; Komšo *et al.* 2005) and other parts of the Eastern Adriatic region resulted in only a single site with early Upper Paleolithic layers (oral communication from D. Komšo), so it would appear that insufficient research cannot be the sole reason for the absence of

drukčija. Između kasnoga musterijena Mujine pećine i orinjasijena Šandalje II postoji vremenska praznina veća od 10 000 godina, uz vidnu razliku u načinu proizvodnje i tipologiji alatki. Primjerice u Šandalji II sječiva su proizvođena tehnikom odbijanja mekim čekićem, dok su na lokalitetu Mujina pećina te rukotvorine vrlo rijetke i proizvedene levaloaškom metodom, koja podrazumijeva uporabu tvrdog čekića. Štoviše na području cijele istočne jadranske obale i zaleđa ne postoji nijedno nalazište s pouzdano utvrđenim slojevima srednjega i ranoga gornjeg paleolitika, a nalazišta iz ranoga gornjeg paleolitika veoma su malobrojna (Karavanić 2003a).

Nije jasno zašto je Šandalja II jedno od rijetkih nalazišta s orinjasijenskom industrijom na cijelom istočnojadranskom prostoru. Razlozi mogu ležati u relativno slaboj istraženosti tog područja. Novijim, dosta intenzivnim istraživanjima u Istri (Miracle 1997; Komšo *et al*. 2005) i drugim dijelovima istočnojadranskoga područja otkriven je samo jedan lokalitet sa slojevima ranoga gornjeg paleolitika (usmeno priopćenje D. Komše), pa se čini da nedovoljna istraženost ne može biti isključivi razlog nepostojanja više nalazišta sa slojevima te starosti, premda bi mogla biti jedan od razloga. Moguće je da se dio tadašnjih lokaliteta nalazio blizu morske obale, pa su uništeni ili zatrpani djelovanjem valova i prekriveni podizanjem razine mora krajem pleistocena. Međutim ni ta mogućnost ne čini se dovoljnom. Ipak, s obzirom na sadašnje stanje istraženosti, može biti da je to područje u vremenu orinjasijena bilo slabije nastavano. Cjelovit odgovor možda leži u kombinaciji svih navedenih mogućnosti ili nekih od njih.

5. Zaključak

Premda se na tlu Hrvatske nalaze paleolitička nalazišta važna za proučavanje materijalnih kultura i razvoja hominina, tijekom prošloga stoljeća svega ih je nekoliko sustavno istraženo. Iskopavanje Krapine provedeno je vrlo precizno, iznad tada uobičajena načina. Kasnija iskopavanja obično su provođena radi prikupljanja materijala koji bi pružio nove informacije o nekoj kulturi ili razdoblju, dok je princip testiranja hipoteza uz primjenu standardne metodologije istraživanja špiljskih nalazišta obično izostao. Štoviše faunistički materijal prikupljen u špiljama sjeverozapadne Hrvatske (Vindija, Velika pećina, Veternica) bio je ponajprije promatran s paleontološkoga gledišta, bez detaljnijih arheozooloških analiza. Litički nalazi, za koje nije bilo uspostavljeno sustavno nazivlje (v. Karavanić 1992; 1995b) služili su samo za određivanje materijalnih kultura, bez provedbe detaljnijih tipološko-statističkih i tehnoloških analiza, ili za pokušaj lociranja izvora

more sites with layers of this age, although it could be one of any number of reasons. It is possible that some of the sites of the time may have been located close to the sea, so that they were destroyed or buried due to tidal action and concealed by rising sea levels at the end of the Pleistocene. However, even this reason seems inadequate. Nevertheless, given the current state of research, it is possible that this area was simply not very densely populated during the Aurignacian. A comprehensive answer may lie in a combination of some or all of these possibilities.

5. Conclusion

Although there are Paleolithic sites in Croatia's territory which are vital to the study of material culture and human evolution, during the past century only a few were systematically examined. The excavations at Krapina were conducted very meticulously, far above the customary levels of the time. Subsequent excavations were generally conducted to collect material that could provide new information on a given culture or period, while the principle of testing a hypothesis while applying standard research methodologies to research cave sites was usually absent. Moreover, faunal materials collected in the caves of Northwestern Croatia (Vindija, Velika Pećina, Veternica) were primarily examined from the paleontological standpoint, without a thorough-going zooarcheological analysis. Lithics, for which no systematic terminology was adopted (see Karavanić 1992; 1995b), only served to determine material cultures, without implementation of detailed typological/statistical and technological analysis, or any attempt to locate sources of raw materials. The collected archeological material was generally only superficially processed and published in advance, while the Neandertal remains were thoroughly analyzed in cooperation with foreign scholars and published in more respected journals. Over the past ten or so years, several detailed analyses of lithic and faunal remains were conducted, and new projects were also launched which generally had different objectives. It can be said that research into the Paleolithic in Croatia over the past decade has been conducted at two levels.

The first level encompasses research into new sites using state-of-the-art methods to study the adaptations by hunters and gatherers to the changing environment of the Middle and Upper Paleolithic and Mesolithic. This research was often conducted jointly by Croatian and foreign researchers and institutions, and they satisfy modern scientific criteria for multidisciplinary research.

sirovinskoga materijala. Prikupljeni arheološki materijal bio je uglavnom samo letimično i prethodno obrađen i objavljen, dok su ostaci neandertalaca u suradnji sa stranim znanstvenicima bili detaljno obrađeni i objavljeni u više renomiranih časopisa. U posljednjih 10-ak godina provedeno je nekoliko detaljnih analiza litičkog i faunističkog materijala, a započeti su i novi projekti koji su uglavnom postavili drukčije ciljeve. Možemo reći da se istraživanja paleolitika u posljednjih 10-ak godina u Hrvatskoj provode na dvjema razinama.

Prva razina obuhvaća iskopavanja novih nalazišta primjenom suvremene metodologije radi proučavanja prilagodbe lovaca i skupljača na promjene okoliša tijekom srednjeg i gornjeg paleolitika te mezolitika. Ta istraživanja često zajedno provode hrvatski i inozemni znanstvenici i institucije te ona zadovoljavaju suvremene znanstvene principe multidisciplinarnih istraživanja.

Druga razina obuhvaća analizu neobjavljena, prije iskopana materijala, ponovne analize objavljena materijala te datiranje i primjenu novijih metoda na materijalu s nalazišta koja su ranije istražena. To primjerice obuhvaća provedbu standardne tehnološke i tipološke analize litičkoga materijala, petrografsku analizu, faunističku analizu (uključujući tafonomiju), datiranje i određivanje prehrane na osnovi stabilnih izotopa.

Trenutno raspoložive rezultate i interpretacije svakako valja sagledati u kontekstu dosadašnjih istraživanja paleolitika u Hrvatskoj. Revizije dostupna materijala i istraživanja paleolitičkih nalazišta koja su u tijeku trebali bi dati nove podatke važne za rekonstrukciju okoliša i sagledavanje djelatnosti paleolitičkih lovaca i skupljača na tlu Hrvatske.

Zahvale

Autori su zahvalni pokojnoj dr. sc. Maji Paunović, koja je omogućila rad na materijalu Vindije i Šandalje II (Zavod za paleontologiju i geologiju kvartara HAZU). Također smo zahvalni prof. dr. sc. Fredu H. Smithu (Loyola University Chicago) i prof. dr. sc. Jamesu C. M. Ahernu (University of Wyoming) na mnogobrojnim stručnim razgovorima, dr. sc. Marku Leneyu na pruženim stručnim informacijama, doc. dr. sc. Heleni Tomas i mr. sc. Domagoju Tončiniću na pozivu da za prigodan broj časopisa *Opuscula archaeologica* napišemo ovaj članak te anonimnim recenzentima. Prikazani rezultati dijelom su proizašli iz znanstvenih projekata Ministarstva znanosti, obrazovanja i športa Republike Hrvatske (projekti broj: 130-0000000-0871 i 196-196-2766-2740).

The second level encompasses analysis of unpublished although previously excavated materials, renewed analyses of published materials and dating and application of newer methods to materials from earlier-examined sites. This, for example, includes implementation of standard technological and typological analysis of lithics, petrographic analysis, faunal analysis (including taphonomy), dating and determination of diet based on stable isotopes.

The currently available results and interpretations certainly should be viewed in the context of all previous research into the Paleolithic in Croatia. Revision of available material and research into Paleolithic sites currently under way should provide new data vital to the reconstruction of the environment and understanding of the activities of Paleolithic hunters and gatherers in Croatia's territory.

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