Laudation: Dr. Katerina Douka, Fifteenth Recipient of the TübingenPrize for Early Prehistory and Quaternary Ecology

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During a ceremony held at Schloss Hohentübingen on January 24, 2013, Dr. Katerina Douka received the fifteenth Tübingen Prize for Early Prehistory and Quaternary Ecology, sponsored by Romina Mineralbrunnen GmbH/EiszeitQuell (Reutlingen), which carries a value of 5000 €. Through the years, the prize has gone to many brilliant young scholars, and this year is no different. As always, the pool of applicants was extremely impressive, which in general bodes well for the future of Quaternary studies and human evolution research. The jury met, discussed, and argued, but in the end, the choice was clear.

Award of the fifteenth Tübingen Prize for Early Prehistory and Quaternary Ecology on January 24, 2013, at Schloss Hohentübingen. From left to right: Priv.-Doz. Dr. Miriam Haidle, Prof. Dr. Christopher Miller, Prof. Dr. Harald Floss, Prof. Dr. Nicholas J. Conard, Dr. Britt M. Starkovich (all jury), Dr. Katerina Douka (recipient), Prof. Dr. Wolfgang Rosenstiel (Dean, Faculty of Science), Prof. Dr. Katerina Harvati, Prof. Dr. Michael Bolus (both jury), Nina Gramer (Romina Mineralbrunnen GmbH, sponsor). Photo: H. Jensen.

The winner of this year's award is Dr. Katerina Douka. Incidentally, Katerina has a special place in my heart because she is from Greece, where I have worked for many years. She was born in 1981 and received her B.Sc. in Archaeological Conservation at the Technological University of Athens in 2004. She then moved on to the University of Oxford, where she earned her M.Sc. in Archaeological Science in 2006. She is currently a postdoctoral research assistant in the School of Archaeology and Junior Research Fellow at Linacre College, both at the University of Oxford. Dr. Douka has made a name for herself working in the extremely well-known and respected Oxford Radiocarbon Accelerator Unit. Her current work involves re-dating the expansion of the Gravettian at 15 sites in western France, Moravia, and Russia. As we will see, this work is a logical expansion of her doctoral research, which focused on radiocarbon dating the Middle to Upper Paleolithic transition in the Mediterranean region.

Dr. Douka's CV is extremely impressive for her young age. She has numerous publications in prestigious journals, including the *Journal of Human Evolution, Nature, Antiquity, Journal of Archaeological Science, Journal of World Prehistory, Quaternary Research, PNAS,* and *Radiocarbon.* I should add that she is primary author on most of these works. The list of sites she has collected radiocarbon samples from could be from an encyclopedia entry on the Paleolithic: Kostenki, Riparo Mochi, Gorham's Cave, Vanguard Cave, Ksar 'Akil, Üçağızlı, Klissoura 1, Franchthi, Lakonis 1, Cavallo, Fumane…the list goes on, but we would never get to the main event. She has also somehow found time to teach graduate and undergraduate classes at Oxford.

In 2011, Katerina defended her dissertation under the supervision of Rodger Hedges to receive her Doctor of Philosophy in Archaeological Science from the University of Oxford. The title of her thesis is "Investigating the Chronology of the Middle to Upper Paleolithic Transition in Mediterranean Europe by Improved Radiocarbon Dating of Shell Ornaments." It is for this work that she is awarded the Tübingen Prize for Early Prehistory and Quaternary Ecology. The study, which I will discuss briefly in this introduction, has significant methodological implications for dating the Paleolithic, as well as addressing larger questions of human evolution. All of us appreciate the importance of refined radiocarbon dating methods, particularly in the Pleistocene.

Katerina's thesis centers around a major problem in prehistoric archaeology: accurately dating the Middle to Upper Paleolithic transition in order to understand the movement of modern humans into Europe and the eventual replacement of the Neandertals. Her work includes three major components, the development of a new radiocarbon methodology, the widespread application of this (and other) ^{14}C techniques to dating the Middle to Upper Paleolithic transition at a geographically wide range of sites, and the application of Bayesian statistics to model the appearance and spread of modern humans across southern Europe.

Marine shell beads, used as ornaments, are at the heart of Katerina's dissertation. Shell preserves well, is often noticed and curated by archaeologists even in the absence of modern excavation techniques, and shell bead production and personal decoration is associated with modern human behavior. Importantly, of course, shell also contains carbon, so it can be radiocarbon dated. A major problem with shell is that it can undergo diagenesis, which potentially causes dates on shell to appear too young or too old.

With this problem in mind, Katerina found a way to pretreat shell samples to remove diagenetically altered carbon. Without going into too much detail on the chemistry, shell contains two major carbon-bearing minerals: carbonate and aragonite. Much of the diagenesis that occurs in shells has to do with the formation of secondary carbonates, so aragonite was the mineral targeted for dating. First, Katerina developed a method for distinguishing between aragonite and carbonate using X-ray diffraction, to analyze shell samples for potential impurities. She then used non-toxic heavy liquids to separate the calcite and aragonite, since the two minerals have a different specific gravity. This procedure results in unaltered aragonite, which is then datable using "standard" radiocarbon techniques. Should one want more details on this protocol, Katerina published her methodology in 2010 in the journal *Radiocarbon*.

After developing this pretreatment procedure, Katerina used it to date fourteen sites in the northern and eastern Mediterranean. The dissertation presents 121 new radiocarbon dates, most of which are on shell ornaments, from sites in Lebanon, Turkey, Greece, Italy, and France. The selected sites all include a late Middle Paleolithic, transitional, or Upper Paleolithic component, with accompanying diagnostic archaeological materials. In general, the dating of the ornaments from these sites worked out extremely well.

The dissertation then places the new dates within a larger regional framework, including previously measured dates from the fourteen sites in this study, as well as many others. In calibrating the radiocarbon dates, Katerina uses Bayesian statistics, which take into account previously observed expectations such as stratigraphic position in a sequence or known-age regional markers, like volcanic eruptions. A comprehensive and significant model emerged.

In this synthesis, Katerina addresses the timing of the transition of the Middle to Upper Paleolithic in the Levant, Greece, and Italy. She also explores the nature of the Uluzzian in Greece and Italy, and the appearance of the Aurignacian in France. In general, transitional industries across the Mediterranean basin are roughly contemporaneous, dating to between about 40-35,000 years ago. Interestingly, the earliest shell beads are found in Western Europe (France) as opposed to the Levant, as might be expected. The dating evidence also indicates contemporaneity between Mediterranean transitional industries, such as the Uluzzian, and the earliest Aurignacian in Western Europe.

So what does this tell us about the nature of the Middle to Upper Paleolithic transition? Clearly, an east-to-west migration route for modern humans into Europe is an oversimplification of the situation. These data, along with other recent dating studies from central Europe, provide further evidence for the movement of modern humans up waterways such as the Danube corridor, a scenario advocated by those here at Tübingen, such as Prof. Nicholas Conard and Prof. Michael Bolus. Overlapping dates between some of the transitional industries thought to be made by Neandertals and the earliest Aurignacian modern human assemblages, suggests significant temporal overlap between the two groups in Western Europe. As Katerina's research highlights, this page in human evolutionary history was extremely complex and warrants many more large-scale, comprehensive studies like the one we are lauding today.

I am certain that in this brief introduction, I have not done justice to the depth and scope of Katerina Douka's extremely significant research. It is my pleasure to now

introduce you to someone who can, Dr. Katerina Douka herself. The title of her lecture today is “Shells, beads and dates: deciphering the spread of the earliest modern humans across Mediterranean Europe.” On behalf of the jury and our sponsor, I would again like to express our heartfelt congratulations. Συγχαρητήρια, Katerina!