

Prologue

The study of Mesolithic (early Holocene) age shell middens (*concheros*) and the role of marine mollusks and other marine food resources along the coast of the Cantabrian region of northern Spain began with the seminal and highly perceptive work of the Conde de la Vega del Sella in the first two decades of the 20th century. It was he who defined the so-called Asturian culture and correctly understood it to be a post-Pleistocene phenomenon. Some studies done after the Spanish Civil War completely misunderstood the nature and age of the Asturian, but research into the use of shellfish in late Stone Age diets was re-established by Dr. Benito Madariaga in the 1960s. With impetus from Professor Leslie Freeman, Geoffrey Clark undertook a systematic re-evaluation of the Asturian, including analyses of old faunal and artifact collections, a program of test excavations in several sites in the classic heartland of the culture in eastern Asturias including the first radiocarbon dating of key shell midden deposits in the region, and a thorough taxonomic and ecological review of the molluscan species represented in the *concheros*. The interdisciplinary study of La Riera Cave by G.A. Clark and L.G. Straus included examination of the idea that humans increasingly intensified their subsistence by broadening the spectrum of exploited wild food resources throughout the course of the late Upper Paleolithic and Mesolithic. This involved quantitative analysis of the marine mollusks from the site and from modern assemblages by J.A. Ortea that revealed size decreases in key species through time (confirming earlier observations on limpets) and, for the first time in Spain, oxygen isotope analysis by the late Professor Sir Nicholas J. Shackleton and Margaret Deith that indicated cold season collection. These results supported the hypothesis that the increased exploitation of mollusks (as well as fish, urchins, crabs, and birds) may have been a response to food stress caused by human population pressure in this physically circumscribed region. An alternate hypothesis set forth by Professor Geoff Bailey (and later his student Alan Craighead) argued that mollusk size decrease was caused by ocean temperate rise. This idea was largely refuted by Igor Gutiérrez Zugasti, in a dissertation that represented a milestone in the full-scale, multifactorial, bio-cultural study of the role of mollusks in Cantabrian Stone Age prehistory. Meanwhile Asturian Mesolithic studies had been critically advanced by Manuel González Morales' controlled excavation of the first occupation layers to be recognized in a shell midden site, namely Mazaculos rockshelter in eastern Asturias, followed by his excavation of other kinds of *concheros* around the mouth of the Asón River in eastern Cantabria.

The present work (originally a *Universidad de Cantabria* dissertation) by Asier García Escárzaga builds on this

rich history of biological, ecological, metric and isotopic study of key molluscan food resources (mainly limpets and topshells) and of debate over the causes for changes in shell size over time. Elaborating on many aspects of the methodologies for quantification and use of systematically collected control samples of modern shellfish pioneered by Dr. Gutiérrez Zugasti, García Escárzaga focuses his work on the rigorous analysis of mollusks (as well as crabs, barnacles and sea urchins) from the site of El Mazo Cave in the heartland of the Asturian Mesolithic culture on the narrow coastal plain of eastern Asturias. This site was researched under the direction of Dr. Gutiérrez Zugasti and Dr. Cuenca-Solana in collaboration with Professor González Morales as part of their on-going project on early Holocene climate and human adaptations along the Cantabrian coastal zone, and represents the second case of large-scale excavation of living surfaces and an intact shell midden. It is also important because it contained a long series of stratigraphic units (meticulously dated by C14 and amino acid racemization) that permitted García Escárzaga to study changes in climate, molluscan species, sizes, and isotopic signals through time within the first few millennia of the Holocene. The fine resolution of the excavated El Mazo deposit made possible this highly detailed dissertation research. Methodically, the author provides excellent background summaries on key research questions involving the mollusks composing the Asturian *concheros*, the region, the species and their habitats, food values, etc. His explanations of the methodologies he followed -both classic (e. g., taxonomy, measurement, C14 dating with marine reservoir correction, oxygen isotope analysis) and innovative (e. g., application of Dr. Gutiérrez Zugasti's system for determining minimum numbers of individuals from fragmentary shells, use of Inductively Coupled Plasma-Optical Emission Spectrometry and Laser Induced Breakdown Spectroscopy to enhance the ability to determine season of mollusk collection) are extensive and impeccable. His protocol for doing controlled, systematic collections of modern shells as the bases for establishing empirical knowledge of relationships among shell size, habitat, water temperature, season, etc. is exemplary, building on the ground-breaking and highly rigorous work of Dr. Gutiérrez Zugasti and, with it, setting new standards for the scientific study of mollusks as food resources for prehistoric foragers. The scientific rigor of the analyses puts the study of mollusks collected by Mesolithic humans as an integral part of their subsistence on a very strong empirical basis. The work is superbly illustrated with many high-quality photographs and graphs and supported by abundant tables and appendices.

The main conclusions of this meticulous and all-encompassing study are significant and of great utility for

both marine biologists and prehistoric archeologists. Size decreases throughout the El Mazo stratigraphic sequence in the key food species (*Phorcus lineatus*, formerly *Monodonta lineata*) and various limpet species of the genus *Patella* was fundamentally driven by intensified human exploitation (not by water temperature rise, which in fact was interrupted during the early Holocene by the 9.3 and 8.2 cal kya climatic downturn events). There are subtle changes among the limpet species, however, that were probably due to temperature changes. Isotopic results suggest that much shellfish gathering took place during winter, supporting the seasonal food stress hypothesis. García Escárzaga argues (on the basis of his calculations of mollusk meat weights from his samples of the El Mazo *conchero*) that shellfish were far more important than simply food supplements to the overall Asturian diet as many archeozoologists have postulated based on their focus on the better-preserved remains of ungulates dominated by red and roe deer and boar. The debate is a long one in the literature on coastal shell middens and is still active, although studies such as this one, with such careful accounting for shell fragments, clearly indicate that the contribution of shellfish to human subsistence especially during times of particular food stress with dense local forager populations and especially in winter.

All in all, García Escárzaga's is a monumental, wide-ranging, rigorous, and highly detailed inter-disciplinary work. His bibliography reflects a profound and broad knowledge and control of both past work and the most up-to-date studies in a wide range of biological, ecological, bio-chemical, instrumental, anthropological and archeological fields relevant to the study of mollusks, Quaternary climate change, and Mesolithic subsistence. The scientific literature he uses includes studies in English and French, as well as Spanish.

Were I to have been able to influence the work in any way, I might have urged the author to pursue a bit further the idea that shellfish may have been used preferentially during the cold season when other key food resources (e. g., deer, boar, plants) were either in poor condition, dispersed or unavailable in the region. The stated emphasis on socio-economic implications of the research could have been emphasized and supported a bit more strongly. It is obvious that the work is mainly focused on the chronological and biological aspects of the question of *conchero* mollusk contents, rather than the anthropological ones. Nevertheless the superb and very thorough bases of this research at El Mazo (with sample comparison to other sites such as La Riera and Mazaculos) provide a firm foundation for future work I expect García Escárzaga will do on the economic and anthropological implications of his findings, in light of some of the ideas put forth by research at La Riera over 40 years ago. However, the significance of this work goes far beyond the confines of the Asturian culture; it extends to the many other regions of the Atlantic facade of Western Europe with rich Mesolithic shell midden records, namely southern Scandinavia, Scotland, Brittany and Portugal. Intensive, systematic exploitation of marine

resources, along with terrestrial wild animal and plant foods, by these early Holocene foragers that continued long after agriculture and Neolithic lifeways had spread into Southeastern Europe represented a distinctive and genuine Broad-Spectrum Revolution that had developed out of increasingly diversified local Upper Paleolithic adaptations going back to at least the crisis of the Last Glacial Maximum some 25,000 years ago.

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Introducción

Las investigaciones de los últimos años han mostrado la relevancia que tuvo la explotación de recursos marinos en la prehistoria ya desde el Paleolítico superior, cuyos contextos arqueológicos se encuentran asociados a los humanos anatómicamente modernos, es decir al *Homo sapiens*. Sin embargo, el aprovechamiento del medio marino no es un acto exclusivo de nuestra especie, sino que ha sido ampliamente documentado, aunque en proporciones inferiores, también en sitios datados en el Paleolítico medio (p. ej., Bajondillo, Los Aviones, El Cuco o Figueira Brava, entre otros) e incluso también en el Paleolítico inferior (p. ej., Terra Amata). El aprovechamiento del entorno marino y en especial del litoral adquiere una importancia notable durante el Holoceno en diferentes áreas costeras del globo terráqueo. Uno de los periodos en los que se produce una significativa explotación del litoral es durante el Mesolítico. Este periodo cronológico en el contexto arqueológico del continente europeo debe ser entendido como el último momento en que las sociedades poseen una economía sustentada en las prácticas cinegéticas, la pesca y la recolección de diferentes recursos bromatológicos. Se trata, por tanto, de sociedades todavía ajenas a la adopción de las técnicas de producción artificial de alimentos, es decir, la agricultura y la ganadería. Durante este periodo, y como consecuencia del incremento en la explotación del litoral se produce una significativa acumulación de las partes no comestibles de los moluscos en los yacimientos arqueológicos, formando los denominados concheros mesolíticos. Un fenómeno que ha sido constatado en diferentes áreas litorales, incluyendo la fachada atlántica europea. Una de las áreas de esta franja costera con una mayor densidad de este tipo de registros es la región cantábrica, área litoral que se localiza en el norte de la península ibérica. A pesar del dinamismo de las investigaciones sobre este periodo durante las últimas décadas, todavía se ciernen un buen número de interrogantes en relación con los modos de vida de estos grupos humanos en la región cantábrica.

Un debate que no es ajeno a los diferentes periodos de la prehistoria, pero que tiene una mayor trascendencia para el Mesolítico debido a la significativa relevancia de los recursos costeros en las estrategias de subsistencia, es el grado de aportación de estos alimentos a la dieta de estas poblaciones. Frente a una visión tradicional del ser humano con una economía sustentada en las actividades cinegéticas y con una escasa relevancia de la pesca y la recolección, se podría aludir a un planteamiento bien diferente, en el que se concede una mayor importancia al resto de actividades que formaron parte de las estrategias de subsistencia de estos grupos humanos. Esta segunda propuesta parece tener un mayor sustento con la información actualmente disponible para el registro mesolítico, especialmente si se tienen en consideración los

resultados obtenidos a partir de los isótopos estables del carbono y nitrógeno, investigaciones que han permitido reconstruir el origen de las proteínas ingeridas por los seres vivos durante los últimos años de vida. Aunque el estado actual de conocimiento parece ser lo suficientemente sólido como para sustentar esta hipótesis, también existen investigaciones que todavía abogan por conceder una posición destacada a las actividades cinegéticas frente a la explotación de moluscos u otros recursos litorales. Un planteamiento que pone de manifiesto la necesidad de incrementar la información disponible con respecto a este tema.

Desde otra perspectiva, y a pesar del notable aumento del número de investigaciones en relación con la explotación del litoral durante el Mesolítico en la región cantábrica (ca. 10,7 – 6,7 ka cal BP), dando lugar a la defensa de tres tesis doctorales sobre este asunto (Álvarez Fernández, 2006; Cuenca Solana, 2013; Gutiérrez Zugasti, 2009a) y de manera más reciente, también a varios trabajos fin de máster (Bello Alonso, 2014; García Escárcaga, 2013a; Martínez Cuesta, 2016; Ozkorta Escribano, 2014), todavía existen un buen número de interrogantes que se ciernen sobre el registro Mesolítico. Entre las cuestiones más importantes, podría citarse precisamente, descifrar la importancia que tuvieron los recursos costeros en las dietas de las sociedades mesolíticas, la evolución de los patrones de explotación del medio marino a corto plazo y el impacto que tuvieron los cambios climáticos abruptos (p. ej., 8,2 ka cal BP) en las estrategias de subsistencia de estos grupos humanos. Por ello, esta investigación pretende aumentar la información disponible para estos aspectos a partir de una investigación multidisciplinar en un yacimiento tipo del periodo Mesolítico en esta área septentrional de la península ibérica.

Si bien este estudio se ha centrado en el análisis de los restos de moluscos, crustáceos y equinoideos desde diferentes perspectivas, debido a la imposibilidad de estudiar la totalidad de los recursos litorales utilizados por los grupos mesolíticos, en parte debido a su inexistencia en el registro arqueológico (p. ej., cefalópodos), esta investigación tiene como principal objetivo, aumentar la información disponible en relación con las interacciones de los últimos cazadores-recolectores-pescadores con el medio marino. Para alcanzar tal objetivo, se han desarrollado dos estudios principales (un análisis arqueomalacológico y otro de isótopos estables del oxígeno), pero también varios estudios complementarios para una mejor comprensión de los resultados arqueológicos obtenidos (un programa de recolección experimental y un análisis esclerocronológico en muestras modernas), así como para el avance metodológico de las investigaciones de este género (desarrollo de la técnica LIBS para medir elementos traza).