2) marine species are often found at inland sites; what mechanism brought them there?; 3) how were they treated to be formed into beads?; and 4) to what purpose were they put?

I do not claim to be able to answer all these questions, but I have been working on some of them and would like to share the highlights of what I have learned.

1) Age and Distribution: Not unexpectedly, shell ranks as one of the oldest and most wide-spread bead materials. Shell beads are found in the earliest assemblages of Europe, China (Choukoutein Upper Cave), and India (Patne, Maharashtra). The picture is likely true for the Americas; I would appreciate knowing more details from there. To form an idea of materials used in the Upper Paleolithic for beads, I tallied those listed in Muller-Karpe's *Handbuch Der Vorgeschichte* (1966). Excluding the very detailed Petersfels, Germany, materials from 31 European sites were as follows:

Material	# of pieces	# of sites
Shell	898	11
Tooth (inc. ivory)	351	21
Bone	68	16
Stone (chalk, jet)	7	5
Wood (!)	6	1

Shell was clearly one of the more important materials, though not as widely distributed as bone or tooth. The number of pieces was skewed by large finds at 2 sites.

2) Transportation mechanisms: Here we know very little. Several possibilities exist: trade, gift-giving, raids, expeditions, etc. I would appreciate more ethnographic data from America on this point. Certainly trade was used, but Forde mentions the Yokuts (Calif.) making long expeditions into enemy territory to gather shells.

3) Worked into beads: I conducted a series of experiments on common bead shells. A full paper has been submitted; some of the results are as follows:

a) Shells most commonly worked (at least in Old World contexts) are those with certain advantages–the pre-perforated *Dentalium*, the animal absorbing the columella so only the apex needs removal (*Oliva, Conus*), or a very large fina1 whorl (*Cypraea, Nerita*);

b) 5 methods have been described in the literature for perforating shells. Of them, *gouging* with a stone point is efficient for thin shells, but does not work on thick ones. *Hammering* with a stone is very efficient on thick shells, and with practice will work on thin ones. *Grinding* against a flat stone is efficient in tool wear and leaves a nice, smooth hole. *Sawing* with a blade takes a long time and is hard on the tool (used surface-found chalcedonic blades picked up locally). *Scratching* with a point is hard on the tool and takes a very long time (one clam took nearly 3 hours).

c) Shells at a site can probably be considered used for beads if they are found in context (i.e., burial), part of a series of similarly worked shells, or have been clearly man-perforated.

d) Man-made perforations can often be recognized: flattened surfaces from grinding, many furrows from scratching (which otherwise looks rather like drilling), deep furrows from sawing; hammering and gouging leave similar jagged holes.

4) Use of shells: Though much has been collected already, we can use more ethnographic data. Primary uses are decoration, currency, and status symbols. Magic, curios, or souvenirs are other uses. This will vary greatly between groups.

13. EARLY POST-CONTACT NATIVE-MADE GLASS BEADS IN AMERICA?, by Peter Francis, Jr. (1983, 2:5-6)

Small, light to dark translucent green beads found in Peru and Ecuador have recently come to the attention of several of our members. They vary in shape from sub-oblate and donut to cylindrical and in size from 3 to 8 mm or more in diameter. They are distinguished by poorly fused bubbly glass, conical perforations with rough surfaces on the end with the small hole, and bubbles oriented along the axis of the perforations.

The beads were first reported by Harris and Liu (*Ornament*, 1979, 4[2]:60). Experiments by Harris indicated that they might have been made by heating a small bit of glass in a crucible and piercing it with a hot pointed metal tool. The technique was within the ability of early metalsmiths in the region, and it was hypothesized that the beads were locally made by the natives soon after Spanish contact.

Smith and Good (*Early 16th Century Glass Beads in the Spanish Colonial Trade*, 1982, p. 20) have questioned this idea. They classify the beads as wound, and state the clarity of the glass is unlike native-made beads from Africa and N. America. Smith has expressed to me (letters 23 June 1982 & 9 May 1983) that glass bottles are rare on European sites of

the early 1500s and that the natives may not have had access to glass for making such beads. The many bubbles in these beads also suggest to him that European glass bottles did not furnish the raw material for making the beads.

In the absence of archaeological proof, we can try to resolve these differences by asking: 1) is the experimental technique likely to have been used for making beads?, 2) are the beads' characteristics those which would match this technique?, and 3) did the natives have access to glass for possibly making such beads?

In addition to Harris' experiments, Harris and Liu noted beads made in a similar method in India, citing van der Sleen (*Handbook*, 1975, pp. 27, 74; the perforation in his Fig. 40, p. 68, illustrating one such bead is at variance with the presumed method of manufacture). Sleen was relying on Dikshit, who mentioned beads made by heating and "piercing" in several papers. Dikshit has interpreted a passage of Kautilya's *Arthasastra* (ca. 4th c. A.D.) as a reference to this beadmaking technique (*East & West*, 1965, 15[1-2]:67) and said that he had witnessed the process himself being used at Ghodegere, Karnataka.

Dikshit further said that such beads had been found at Indian sites from early A.D., especially Ahichchhatra and Kondapur. Though I have examined some of the beads from these sites, none appear to have been made by heating and piercing a bit of glass. However, 2 beads from Kolhapur do seem to have been made this way; they are dark opaque blue with conical perforations and flat disc profiles.

Smith and I have discussed the green beads from S. America and examined such beads together in the collection of the University of Florida. I pointed out to him that the clarity of the glass is not a problem in this case, as the beads were not apparently made by the powder-glass method used in Africa and N. America. Glass beads made at Bida, Nigeria, by melting bottles and winding the glass as it melts are also very bubbly. He now agrees that the beads we have examined together do not appear to have been wound.

There remains the question of where the natives may have gotten the glass. Early explorers to the New World report that the natives wanted and were given not only glass beads but also pieces of glass or glass sherds. In October 1492, Columbus gave away pieces of glass on 3 occasions (S.E. Morison, 1967, *Journals and Other Documents*, pp. 67, 75, 79).

The Chimu Incas of Peru are known to have used European glass for a green glaze on some very early post-contact pottery (Bushnell, 1957, p. 137). The natives would not likely have had complete glass vessels, but pieces of glass given to them by Europeans with no further use for them or picked up around European settlements would not have been impossible for them to obtain.

In sum, the technique of heating a bit of glass in a crucible or mold or alternately dropping a bit of molten glass on a clay plate and piercing it with a pointed nail or similar metal object is a viable one for making small glass beads. The beads under discussion do appear to have the characteristics of beads made in this way; the conical perforations and roughened surface on one end are similar to Indian beads made in this manner, and the orientation of the bubbles toward and down through the perforations also suggest the technique. A limited number of glass sherds were available to S. American natives immediately after contact, and in at least one case (glazed pottery) are documented as having been recycled by them. Their metalsmiths, unacquainted with glassworking, could have mastered and even invented this piercing technique.

Further work is necessary to determine exactly which peoples might have made these beads. It is interesting to note that they were the only beads used in burials of the Manteno culture before 1550.

14. BEADMAKERS' STRIKE IN INDIA, by Peter Francis, Jr. (1984, 5:7-8)

February and early March just weren't the same in Papanaidupet. The village of 12,000 in southern Andhra Pradesh state provides all India with small drawn glass beads and marbles. But the tube-drawers working at 24 furnaces in the village had stopped drawing.

Tube-drawers come in pairs: one to manage the *lada* or *ladi*, a tapered tube which holds the glass as it is being drawn, and another to draw the tube out hand- over-hand for three hours running. The *pair* are paid 22 rupees a day (11 each), while the minimum daily wage for a man and the average daily per capita income is 5 rupees (a rupee is currently worth 9 cents U.S.). But they have also been forced to pay rent to the owners of the furnaces where they draw the tubes. So they drew the line at drawing glass tubes.

The issue highlights the "feudal" structure of the Papanaidupet glass bead industry. Two dozen families own furnaces and the land on which they are built. Some 300 men find work at the tube-drawing furnaces or the 30 small heating-and-tumbling units. Many people cut tubes and size and string beads–perhaps 5,000 altogether, counting women who do occasional stringing in neighboring villages. At the top of the ladder are four families who market the beads, some of whom make their own raw glass.