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The purpose of this paper is to describe and explain what materials are used in the toolmaking industry, to resolve what type of stone is adaptable for flaking and to point out some of the working problems related to material that confront a flintknapper. The following text will endeavor to further explain the relationship of certain materials to man's ability to control the size, thickness, width and length of flakes thus detached. When one is able to control the four dimensions - thickness, width, length and curve when removing a flake, he can then produce almost any tool he may need.

The study of lithic materials is basic to the interpretation of manufacturing techniques, and also to typology. The type of material used has a direct bearing on methods of manufacture and could even have restricted the toolmaker in the final control of thinness and uniformity of the flakes. Further, a working knowledge of the stone to be flaked is essential for the knapper, as any variation in its quality may require a different method of detachment.

What are lithic materials? Ideal lithic materials are kinds of stone with the necessary properties of texture, elasticity and flexibility. They must be relatively free of flaws, cracks and inclusions so they will withstand the proper amount of shock and force necessary to detach a flake of a predetermined dimension. When subjected to the proper amount of force, applied on a properly prepared platform, portions of the stone can be removed producing flakes with a very sharp cutting edge. This definition is based on my own experience in making stone tools.

(1) Page 2 I would like to point out some of the differences in the many types of lithic materials. Each source of stone has certain attributes of which the worker is aware. For example, when Dr. Francois Bordes and the writer were doing some experimental flint working at the University of California in Berkeley, materials for our project were from many and diverse locations, i.e., Southern France, Northern France, Indiana, California (2 locations), Oregon and Idaho, representing seven widely separated sources. After a week of working, the materials were almost entirely utilized and the resulting array of flakes was mingled in one big heap. Yet, if any single flake had been given us,

and this happened, we could identify its origin without error. The point I am trying to emphasize is that after the toolmaker has worked with a given material, he will be able to ~~identify~~ recognize ~~its peculiar~~ identifiable properties.

Often I have heard reference being made to a large thick biface, irregularly surface-flaked, ~~as~~ on unsuitable material "crude heavy biface" or "crude percussion work", ~~where as~~ in reality, the worker was a skilled craftsman to have produced any type of tool considering the ~~material he had to work with. I have also heard this same reference being made to pressure work on poor material whereas the presence of any control at all denoted a skilled craftsman.~~ poor quality of the stone, A stone knapper will always relate the quality of workmanship to the material. and this same rule should apply to typology.

Page 3 Certain materials will allow the platform to collapse, leaving a dull edge, while others haven't sufficient strength or flexibility to permit ~~making~~ detaching a long thin flake, ~~thereby causing~~ and will break off short causing multiple hinge and step-fractures. Personally, I cannot do ~~fine~~ well controlled pressure flaking on coarse-grained materials, but this I can do with finer, more closely-grained stone. ~~From~~ I have noted this same relationship of ~~fine~~ well controlled flaking to fine material. Therefore, I reiterate that we must consider material in our analysis of tools, our explanation of type, and the study of technology.

Poor material showing skilled and controlled surface techniques ~~does~~ indicates good workmanship. Good quality material skillfully worked also denotes good workmanship. But, When we ~~do~~ find poor work on quality stone then I think it is safe to assume we are viewing ~~poor workmanship~~ unskilled work, unless we find, on inspection, that the worker was merely preforming good material which was later to receive refined techniques.

(1) Most sources of lithic materials produce a stone that is identifiable through special qualities recognized by the stoneworker. ~~He must,~~ (2) when choosing material, the stoneworker must determine the homogeneity of the mass and appraise the texture and lustre of the stone, and ~~fit the size of the rough material to what~~ choose the rough material of appropriate size to produce the size & type of finished tool he wants in a finished tool. ~~The~~ Stone having myriad bright colors ~~are~~ is desirable, but color in most instances, does not indicate

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workability of stone. In making an appraisal of the workability of flint-like materials ~~to determine their workability~~, one may first tap the stone lightly to prevent bruising and listen to the sound of the tapping. Other means of identifying good material are: ~~features to be examined are~~: texture, lustre, surface character (rind or cortex) color, transparency, sound, flexibility, sharpness of the removed flakes and perhaps most important is the amount of resistance to the necessary force required for detaching a flake. The degree of lustre is used as a guide by the toolmaker to determine if the stone will permit him to regulate the amount of force necessary to remove a flake of a given dimention. The variations of lustre include glassy, waxy, greasy, satiny to dull, matt, flat, sugary, fine crystalline, medium crystalline, coarse crystalline and sandy. Generally, the coarser the stone texture, the tougher and the more difficult it is to work. The tougher the stone, the more difficult it becomes to remove regular and uniform flakes. But, conversely, ~~However~~, the platform prepared on coarse material will collapse more readily than that fabricated on finer textured material.