ogy, gives in a very compact form the facts obtained in regard to the practice of trephining among prehistoric races.

The first communication on the subject was made by Broca in 1877. His attention was directed to certain crania, belonging to the age of polished stone, presenting curious losses of substance not to be explained by the action of weathering. What, then, was the cause of this, and what its object? Pathological anatomy and experiment might answer the first of these questions quite conclusively, while the second lies within the realm of speculation only.

The skulls in question usually had holes in them, the edges of which were partly sharp, rough, and irregular, and partly smooth, eburnated, and slightly bevelled. In a few the latter condition alone was present. The smoothed edges were evidently the result of cicatrization, the diploetic portion having been replaced by a compact, bony structure, thus giving the ivory-like character. Such a process could only have taken place during the life of the individual. Congenital deformity, disease, or injury were the causes which could have given rise to a loss of substance of this sort. The first two are easily excluded for reasons which would at once be accepted as valid by those who have studied the changes produced in bones under such circumstances. An injury, then, remains to account for this; and such can be accidental or intentional. Of the former sort those received in battle are the most common; and had the people of the neolithic time been armed with sharp, cutting weapons, the occurrence of these wounds might have been referable to them. A calvaria in the Musée Broca exhibits a somewhat similar condition, a slice having been removed by the blow of a Tartar sabre. But the weapons of this people were chiefly axes or hammers, which would produce depressed fractures, usually accompanied by a greater destruction of the inner than the outer table of the skull, — the opposite of what had taken place here, as shown by the bevelling.

The theory which explains the condition best is, that a portion of the skull had been removed by scraping or drilling through it. This would naturally give an oblong hole with a bevelled margin. The bone in the immediate neighborhood being healthy, and all signs of re-active inflammation having passed away, it is probable that the operation must have been done long before the death of the individual, and presumably in childhood. Broca demonstrated that a child's skull could be easily scraped through in a few minutes, with the aid of a piece of flint, and that an adult's could be perforated in an hour. A puppy was also experimented upon in the same way by him; and it was found that the operation was well borne, and the animal made a good recovery. In man this rude method of trephining is not necessarily fatal, as there are savage tribes in the South Seas and in Algeria which practise the operation in precisely the same way, with a good percentage of recovery.

This being accepted as the cause, what can have been the object of the operation? Among civilized people the operation is performed to remove diseased or depressed pieces of bone giving rise to symptoms of compression. M. Parrot has exhibited one skull which he thinks shows such was the case. There is no doubt of the evidence of disease; but it does not seem to be clearly shown that this may not have arisen subsequently to the trephining, and entirely independent of it. Among the savage tribes already referred to, the relief of epilepsy is assigned as the reason for the operation; and this is a plausible explanation of its use among prehistoric races.

It will be remembered, that, in the greater number of trephined skulls, the edges of the opening were partly rough and jagged. Such were evidently made after death, as there is no evidence of any attempt at repair; and it is conjectured that pieces of bone were then broken away so as to include a portion of the original cicatrized margin, and that these were subsequently worn as 'amulets.' This is called post-mortem trephining.

The western hemisphere has thus far furnished but one case of trephining among prehistoric people. It was discovered by Squier in an ancient Peruvian. A square piece of bone had been removed, apparently by cutting, and the patient, an adult, had survived but a short time, — fifteen days, according to Nelaton.

The thanks of American investigators are due to Dr. Fletcher for placing within their reach such a well-illustrated *résumé;* and its careful perusal will certainly repay those interested in the subject.

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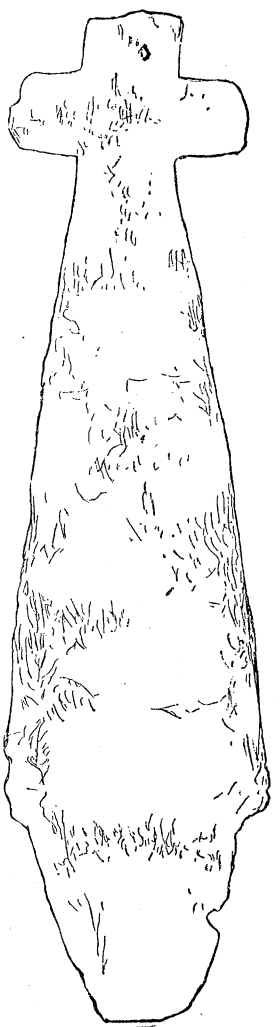
## *REPORT OF THE PEABODY MUSEUM.*

*Fifteenth annual report of the trustees of the Peabody museum of American archaeology and ethnology.* Vol. iii, no. 2. Cambridge, 1882. [106] p. 44 fig. 8°.

THIS report is chiefly devoted to notes by the curator upon the copper objects from North

and South America contained in the collections of the museum.

The extent to which copper implements were disseminated among the aboriginal tribes of America will be surprising to many. The ornaments and implements lucidly described by Mr. Putnam are from places as widely separated as the burial-fields of Maine, Vermont, Massachusetts, and the mounds of the central and south-western states; besides a fair representation from Mexico, Central America, and Peru. In fact, objects made of copper are as widely distributed in America as are the stone implements of neolithic forms. This, however, does not imply that the same stage of advancement had been reached by copper-using tribes all over this territory. In Mexico, Central America, Peru, and Chili, copper ornaments and implements were cast, and then finished by hammering. Mr. Squier reports remains of furnaces in the ruins of Chimu, where, in early times, copper ores were smelted. In Mr. Putnam's opinion, there is no evidence that copper was ever cast in moulds by the aboriginal tribes of the United States; but native copper was hammered by them, as these cuts show, into innumerable shapes. Figs. 3 (here reproduced), 10, and 11 represent cruciform copper ornaments; but this seems to be a design of natural conception, rather than a symbol of Christianity, as some have supposed. The Sioux draw a figure of the cross to signify the four winds.



CRUCIFORM PENDANT FROM A STONE GRAVE IN TENNESSEE.

Besides the above notes, the report contains, among other things, a brief account of the important exploration now in progress under the auspices of the museum, of an extensive ancient cemetery at Madisonville, near Cincinnati.

The institution needs a great increase of its funds to equip it for its pressing work. Civilization is fast destroying all vestiges of prehistoric races. The science of the whole world and of all time will be enriched by any enlargement of the Peabody museum.

## *THE PANTHER CREEK COAL-BASIN.*

*Second geological survey of Pennsylvania.* J. P. LESLEY, state geologist. *Anthracite district*, CHARLES A. ASHBURNER, geologist in charge. *Panther Creek basin*, [*in*] *Carbon and Schuylkill Counties*, 10 sheets [vertical sections, 3 sheets; horizontal sections, 3 sheets; map of the mines, 3 sheets; diagram of surface-area, 1 sheet]. — *Topographical map of the Panther Creek coal-basin*, 1 sheet. — *Preliminary map anthracite coal-fields*, 1 sheet. — *Production anthracite coal-fields*, 1 sheet. In all, 13 sheets, 605×725 mm. 1882.

THE constantly increasing use of cartographic and diagrammatic methods in illustration is an evidence of a most healthy advance in thoroughness and accuracy in geological work in this country. It is only within a comparatively few years that any trustworthy topographical maps at all have been available for our geological workers; and even now, outside of those made by government surveys in the west, they cover but a very small proportion of the area of the United States.

The theoretical as well as practical value of a geological map is directly dependent upon the accuracy and detail of its topographical basis; and, no doubt, many bitterly disputed questions which came up in earlier geological work in this country, some of which are still unsettled, would not have arisen, had it been possible to carry on the work originally on a systematic basis, instead of by individual observers who had not the advantage of comparing notes in the field, and who had either no map at all, or such as, from want of accuracy and detail, would be comparatively worthless. For practical purposes, such as the development of mineral deposits, the theoretically perfect map should contain in itself all the necessary data; so that no text would be required as an aid to its use in exploration, this being employed simply for explanation of methods of work and for theoretical deductions.

The thirteen charts now before us, recently prepared by Mr. Charles A. Ashburner, geolo-