ered who have passed beyond tribal society to national society based on property, *i.e.*, that form of society which is characteristic of civilization. Some peoples may not have reached kinship society; none have passed it.

Nations with civilized institutions, art with palaces, monotheism as the worship of the Great Spirit, all vanish from the priscan condition of North America in the light of anthropologic research.

Tribes, with the social institutions of kinship, art with its highest architectural development exhibited in the structure of communal dwellings, and polytheism in the worship of mythic animals and nature-gods, remain.

THE GENESIS OF CERTAIN IRON ORES.*

By Dr. T. Sterry Hunt, LL. D., F.R.S.

Dr. Hunt began by considering the presence of iron, generally in a ferrous condition, in mineral silicates, in the crystalline rocks, and its liberation therefrom by the sub-ærial decay of these as hydrous ferric oxide. This, as is well known, is, by the agency of organic matter, again reduced to ferrous oxide, which is dissolved in natural waters by carbonic acid or some organic acid, from which solutions it may be deposited either as hydrous peroxide (limonite, etc.,) as carbonate (siderite), as silicate, or as sulphide (pyrite, etc.), in all of which forms iron is found in sedimentary deposits. As regards the formation of siderite, he described experiments which show that solutions holding five grammes of ferrous carbonate dissolved as di-carbonate in a litre of water, are spontaneously decomposed in close vessels at the ordinary temperature, and deposit two-thirds of their iron as a white crystalline (hydrated) mono-carbonate, with liberation of carbonic-dioxide. This serves to render more intelligible the reduction and segregation of iron as siderite in earthy sediments, as long since pointed out by W. B. Rogers, for the ores of the coal-measures.

The intervention of soluble sulphates, and their reduction through organic agency to sulphides, determines the formation of sulphide of iron in sediments. The generation of a bi-sulphide (pyrite or marcasite) was then discussed, and it was shown that the ferrous mono-sulphide, which naturally is first generated, may fix a further portion of sulphur and thus form a more stable compound. One example of this is seen when recently precipitated hydrous ferrous sulphide is brought in contact with a solution of a ferric salt, which takes up a portion of the iron, leaving sulphur free to unite with the undecomposed sulphide, and form therewith a very stable higher sulphide of iron. Experiments now in progress lead the writer to believe that sulphur liberated from soluble sulphides may, in a similar manner, unite with ferrous sulphide, and thus help us to explain the generation of pyrites in nature, in the presence of water, at ordinary temperatures.

The changes of siderite and pyrite under atmospheric influences were next considered. The latter by oxidation yields, as is well known, ferrous sulphate. Its frequent conversion by sub-ærial decay into limonite was conceived to be due to the intervention of water, holding carbonates, which, conjointly with oxygen, changes it into hydrous peroxide (limonite), which often retains the form of the pyrites. The transformation of carbonate of iron into hydrous peroxide is a familiar fact.

Limonite ores may thus be produced in three ways. They are sometimes formed by the peroxidation and precipitation of dissolved ferrous salts, as in the so-called bog-ores; but more frequently from the alteration *in situ* of deposits of pyrite or of siderite. Such are the limonites which mark the outcrops of beds or veins of pyrites in the decayed crystalline rocks of the Blue Ridge. The similar ores found in the decayed Taconic schists of the great Appalachian valley can be shown to be due in some cases to the alteration of included pyritous masses, and in others to the alteration of similar masses of siderite, both of which are found in the unaltered Taconic rocks, as, indeed, at various other horizons in the geological series.

If we take the specific gravity of pyrites at 5.0, we shall find that its complete conversion into a limonite of sp. gr. 4.0 would be attended with a contraction of only 2.7 hundredths, while if the limonite have a sp. gr. of 3.6, there would be an augmentation of 10.7 p. c. With siderite of sp. gr. 3.6, on the contrary, its conversion into limonite of the same density would result in a contraction of 19.5 p. c., and into lemonite of sp. gr. 4.0 to a contraction of 27.5 p. c. The evidences of this contraction may be seen in the structure of the limonite derived from siderite. The process operates from the surface of the masses, often resulting in the production of geodes. Their structure will generally serve to distinguish the sideritic from the pyritic limonites.

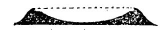
These differences were illustrated in the history of various iron ores in the Appalachian valley, and it was further pointed out that the pyritic limonites, other circumstances being equal, should be freer from phosphorus than those derived from siderite, since the native carbonates almost always contain phosphates, from which pyritous deposits are comparatively free. The source of limonites thus becomes a question of importance to the metallurgist. In conclusion it wus pointed out that deposits of manganese ores are, in some cases at least, generated by the alteration *in situ* of manganous carbonates, by a process analogous to that by which limonite is produced from siderite.—

MICROSCOPY.

NEW CELL FOR OPAQUE OBJECTS.

I desire to call the attention of the microscopists and preparers of objects generally to the new rubber cell for opaque slides, recently devised by me. A considerable experience in mounting opaque slides during the past few years has convinced me that much of the labor incident to it could be avoided, if a cell of suitable material and shape could be produced at a nominal cost. This, I think, has now been attained, and I take pleasure in submitting one for which I claim convenience, cheapness, and general utility. With it the amateur can produce a slide fully as perfect, and with as great a degree of neatness as can the professional. The cell is of hard rubber, highly polished, and of attractive shape; the base is solid, thus giving a black back-ground of rubber; around the top is a ledge fitted to receive a one-half inch cover glass; this, being secured by a little shellac or any similar cement, completes the mounting. The cell may be attached to a glass slip by any cement, before or after preparation. For exchanges it offers superior advantages, inasmuch as the cell, with objects enclosed, may be sent through the mails independent of the glass slips, the recipient attaching them. In this way a saving is made in postage, and no risk of loss by slips being broken in transit.

They will solve the problem which often perplexes the student or collector who is crowded for cabinet room. Many objects for future reference may be mounted in this simple cell, numbered and put away without a slide, a cabinet drawer holding two hundred of them, while but forty slides could be accomodated in the same space.



The above sectional view conveys a good idea of its shape, the dotted line indicating the position of the thin glass cover.

I have made arrangements to have them supplied by the following firms at thirty cents per dozen, five cents extra on single dozens to cover cost of postage and box, and they may be obtained from the parties mentioned below or from the subscriber. In remitting small sums three cent postage samps may be used.

Geo. S. Woolman, No. 116 Fulton St., New York; Jas. W. Queen & Co., Chestnut St., Philadelphia; Bausch & Dransfield, Arcade, Rochester, N. Y.; W. H. Bullock, No. 126 So. Clark St., Chicago, Ills.

In conclusion I would add that I have had these rubber cells prepared without regard to any pecuniary gain to myself, hoping they may prove an aid to those engaged in microscopical research.

H. F. Atwood,
No. 50 Hamilton Place, Rochester, N. Y.

[We have seen a sample of Mr. Atwood's rubber cell, and consider it a very perfect arrangement for opaque objects.—Ed.]

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* Read before the A. A. A. S., Boston, 1880.